NORTH AMERICAN

GEOLOGY AND PALÆONTOLOGY

FOR THE USE OF

AMATEURS, STUDENTS, AND SCIENTISTS

BY S. A. MILLER

> CINCINNATI, OHIO 1889

> > 0

....

A GENI to the peop any other d state of lear common con no special i difficult to evidence of make them names are al of Natural H the names a than the arb work an effor to define the Generic

the fossils are are printed in rules of nom other reason, species to a found in ital which it belo reference will An atter

An atter Palæozoic roc is given, the o book and page of the type sp order, will be authors of the

PRESS OF th WESTERN METHODIST BOOK CONCERN, CINCINNATI, OHIO.

Vavaue

Entered, according to Act of Congress, in the year 1889, by S. A. MILLER,

In the Office of the Librarian of Congress, at Washington.

PREFACE.

A GENERAL knowledge of Geology is probably of greater importance to the people of the United States than a like amount of information in any other department of natural science; but every one will admit the state of learning in this branch is not of a very high grade. There is a common complaint among well-informed people who have given Geology no special study that the language used is technical, the names long, difficult to understand, and not unfrequently bear upon their face the evidence of affectation, as if those coining the words had attempted to make them as obscure as possible. It is a fact, however, that technical names are absolutely essential to a correct understanding of every branch of Natural History; and when the system of nomenclature is once learned the names are readily understood, and much more easily remembered, than the arbitrary names of individual things possibly can be. In this work an effort has been made to popularize the rules of nomenclature, and to define the technical words in the text or in the Glossary.

Generic and specific names, which have been used by authors where the fossils are not known to occur in the Palæozoic rocks of North America, are printed in italics. Synonyms, names not described as required by the rules of nomenclature, preoccupied names, and those condemned for any other reason, are also printed in italics. When an author has referred his species to a genus to which it does not belong, the specific name will be found in italics under such generic name, and referred to the genus to which it belongs, and at the latter place the original erroneous generic reference will be found in parenthesis.

An attempt has been made to define all genera known from the Palæozoic rocks of North America; the name of the author of each genus is given, the date of coining the word, and an abbreviated reference to the book and page where published, and the etymology of the word and name of the type species. The names of all the species, arranged in alphabetical order, will be found under the genera to which they belong; and also the authors of them, the dates and places of publication, and very frequently

4355

PREFACE.

references to two places of publication, especially where, in the first instance, the species was defined without illustration, as has been too frequently done in society publications, the place above and beyond all others where no species should be described unless accompanied by proper illustrations.

An attempt has also been made to correct the misspelling of words so as to perfect the nomenclature, and we call special attention to the Index of Genera, where a few corrections are made that were overlooked in the text, and where the gender of each genus is indicated.

After the author had commenced the preparation of this work, which was several years ago, knowing the great expense attending the making of illustrations, he applied to several State Geologists and others for the privilege of taking electrotypes from the wood-cuts belonging to the State Governments and to the individuals; and he has now to express his acknowledgments to Alfred R. C. Selwyn, F. R. S. F. G. S., Director of the Geological Survey of Canada, who placed at his disposal all belonging to the Canadian Survey, and he availed himself of about one hundred and sixty of the original figures used by the late Prof. Billings; and also to express his obligations to the late Prof. A. H. Worthen, from whom he obtained nearly all those used in the Geological Survey of Illinois. After a very large number of figures had been made by the expensive process of wood-engraving, he learned of the much cheaper electrotype process, and engaged the services of the Kline Photo-engraving Company, of Cincinnati, and for the accuracy and faithfulness with which many figures have been reproduced he is indebted to the skill of the artists in that company.

CINCINNATI, November, 1889.

NOR

DE

§ 1. GE investigates i upon the ast and later in upon the sur at the botton the fact that sea, the prev darkness. G overlying stra velopment of of the earth y and might b branches of N synclinal trou position, at th rarely afford s except by the the dip of the or flexures.] study of the se

§ 2. The vestigation of occurred withi ages, from the the process of cavities and p characters of tl nor animals tu to preserve its penetrate the c decays, we hav operation. Th and the upliftin but are distribu

t instance, ently done where no tions. f words so index of n the text,

ork, which ie making rs for the the State xpress his Director of belonging ndred and nd also to whom he ois. After process of cocess, and Cincinnati, have been any.

NORTH AMERICAN GEOLOGY.

CHAPTER I.

DEFINITIONS AND LAWS OF GEOLOGY.

 \S 1. GEOLOGY is the science which comprehends the structure of the earth and investigates its history. It does not extend to the beginning, nor throw any light upon the astronomical theory that the world was, at one time, in a gaseous state, and later in a condition of fluidity. It commences at the most ancient rocks found upon the surface of the earth. These had their origin, in sedimentary deposition, at the bottom of an ocean. The world was then as large as it is now, and beyond the fact that these rocks were once merely sedimentary layers at the bed of a sea, the previous history of the earth is unknown, and all prior time is impenetrable darkness. Geology commences at the lowest discovered rocks, and investigates the overlying strata, the changes that have taken place, the lapse of time, and the development of organic life, to the present moment. If the strata of rocks on the surface of the earth were horizontal, the science would extend over a short period of time. and might be learned as rapidly as we progress in zoölogy, anatomy, or other branches of Natural History; but the rocks are inclined at various angles, and form synclinal troughs and anticlinal ridges, and expose, in the order of sedimentary deposition, at the maximum more than forty miles in thickness. Mountain regions rarely afford so good opportunities for the study of Geology as a country unbroken, except by the exposures in stone-quarries and the banks of streams. In some States the dip of the strata is quite uniform for a hundred miles or more, without any folds or flexures. It is in these areas the student will find the most inviting fields for the study of the science.

§ 2. The laws of the science have been ascertained, from observation and investigation of the changes now taking place, from a knowledge of those which have occurred within the historical period, from the evidence of change in more remote ages, from the study of the skeletons and harder parts of animals and plants, and the process of infiltration of mineral matter into these organisms, which fills up the cavities and produces petrifactions, and from the study and determination of the characters of the petrifactions found in the rocks of nearly all ages. Neither plants nor animals turn to stone; flesh can not petrify. When a body is sufficiently firm to preserve its form until water, holding lime or silica in chemical solution, can penetrate the cavities, saturate it, and deposit the stony matter as the organism decays, we have a fossil or petrifaction. The laws of nature are uniform in their operation. The diversified character of the rocks has resulted from general causes, and the uplifting and inclination of sediments did not occur in one period of time, but are distributed through and belong to all geological ages. We do not assume

the intensity of any forces exceeded, in times past, those which are now in activity.



geological investigations were produced by the same laws, acting with the same degree of power, as those we may daily witness. This is true of aqueous and igneous action and of all organic and inorganic movements. \S 3. An *anticlinal* axis is that line from which strata dip to

The changes which the earth has undergone within the scope of

FIG. 1. Anticlinal axis at a. Strata disturbed, folded, and denuded, and afterward uncon-formable strata depos-tied upon them, fol-lowed by conformable layers.

either side. The ridge of a house-top, the slope of the roof representing the dip of the strata, will convey an idea of an anticlinal axis; but an upheaval may be in the form of a dome, or the arc of a circle, and, in such case, the strata incline in all

directions from a given point, which is the anticlinal axis. A synclinal axis is the reverse of an anticlinal axis. Rocks are called

stratified whether the planes of the beds are parallel to each other, or rest unconformably. Conformable strata have the planes of the beds parallel to each other, and unconformable strata have the planes of the strata of one bed resting upon the edges of the strata of another. This must necessarily mark an interval of time between the two which is not represented by a deposit. A fault is a dislocation of strata so that the continuity of the mass is destroyed by one side of the



FIG. 3. Escarpment on the right, *débris* representing the slope from the escarpment. Outliers, lone rocks, or standing columns in the center and to the left of the illustration. The central figure is a form sometimes called a cheese rock.



FIG. 2. Section of the Jura Mountains, illustrating the folding of strata, anticlinal axis at A and B. Synclinal axis between A and B and C. Strata unbroken at A and B, but broken at C, a, b, c, and d. Strata conformable, though at C, a, b. c, and d. Strata confo disturbed and thrown into waves.

fracture being elevated higher than the other. A dyke is a wall of rock between the two sides of a fault or fracture, interrupting the continuity of the beds on either side. Sometimes a dyke shows an overflow at the top. When strata terminate abruptly, they terminate in an escarpment. An outlier is a lone rock in place, or a hill detached by erosion from the surrounding mass of similar beds, of which it evidently once formed a part.

Decomposed and disintegrated § 4. The erosion of the earth never ceases.

substances are being constantly removed by rain and superficial waters to a lower level than they previously occupied. The erosion or denudation must be followed by the deposition of the materials. The deposit at one place can only progress at the rate with which it is transported from another. All strata consist of transported matter, and, as Lyell said, the evidence of the work of denudation is defective, because it is the tendency of every destroying



FIG.51. Strata inclined but conformable. Fault from f to 2 and dyke in the fault.

cause to obliterate in great part the signs of its own agency. Stratified rocks, therefore, indicate only part of the erosion which the earth's surface has undergone,

because the sa again, and re forms through were formed 1 see any part (§ 5. The

are generally union with ca siderable. Th of disintegration and soils, whil of sand, driver and sometimes Sand blowing from the disint the character o to the unaltere atmospheric ag winds, blowing pile it in moun upon the desert exposed to its track at East S several tons. parts of the wo

§ 6. Wate creases with he enter the minut and so it will er burst from ledg by expansion, c and freezing aro will, when brok winds, transport are transported (in the temperate bowlders are fou

§ 7. The ca increases with th currents of the a in colder latitude rain. The rain f the disintegrated agencies, down t the sea 6,368.00 basin of the river of a foot thick.

in activity. he scope of aws, acting ily witness. organic and

rata dip to ne roof repof an antia dome, or cline in all axis is the



itains, illustratlaxis at A and B and between d B, but broken rmable, though

side of the higher than a wall of sides of a rupting the on either ce shows an Vhen strata y terminate *tlier* is a lone ill detached surrounding of which it= a part. lisintegrated



ta inclined but Fault from f to the fault.

s undergone,

because the same materials in a multitude of cases have been broken up again and again, and restratified, presenting for our observation only the last of the many forms through which they have passed. The oldest rocks, as well as the most recent, were formed from the waste of older rocks than themselves, therefore we can never see any part of the primitive earth or original solidified matter.

\$ 5. The atmospheric forces, in activity and disturbing the surface of the earth. are generally combined with the aqueous, as in frost; or the chemical, as in the union with carbonic acid; but the effects of air and wind are, by no means, inconsiderable. The surface of all exposed rocks and earthy materials bear the evidences of disintegration and denudation. The sun dries up the mud and cracks the earth and soils, while the winds sweep the dust from roads and barren places. Grains of sand, driven by the wind, will groove and polish the hardest rocks and minerals. and sometimes fairly dissolve and carry away limestone and more friable substances. Sand blowing is used in the arts for etching hard materials. All soils have resulted from the disintegration of rocks, and when not transported, the quality depends upon the character of the parent rock immediately below; and the penetration of the soil to the unaltered parent rock will reveal the different stages of the change effected by atmospheric agencies, aided more or less by the effects of frost and water. The winds, blowing inland from large bodies of water, carry sand from the beaches, and pile it in mounds and ridges, called sand-dunes; and the same effects are produced upon the deserts, and to a greater or less extent wherever light or loose materials are exposed to its action. A wind-storm blew a standing locomotive off the railroad track at East St. Louis, and other storms have been known to move bodies weighing several tons. The geological effects of the wind therefore are conspicuous in some parts of the world, while in others they are so slight as to be quite overlooked.

§ 6. Water is an active solvent of rocky substances, and the solvent power increases with heat and pressure. It is also a powerful mechancial agent. It will enter the minute openings in the hardest rocks, freeze, and chip up minute scales; and so it will enter larger cracks and orifices, freeze and break open large rocks, or burst from ledges immense masses. Ice, freezing at the margin of lakes and ponds, by expansion, crowds the loose rocks on the shores in the form of ridges of bowlders, and freezing around the free rocks at the bottom in shallow water or near the shore, will, when broken up by partial thawing, and assisted by the force of waves and winds, transport such rocks to distant places. Mud, sand, gravel, and pieces of rock are transported down stream by all rivers, and the transportation is aided by the ice in the temperate and colder latitudes. On the shores of the St. Lawrence transported bowlders are found weighing many tons.

§ 7. The capacity of the atmosphere to take up aqueous vapor in suspension, increases with the temperature, and when saturated the least interference with the currents of the air will precipitate rain. Hence there is more rain in warmer than in colder latitudes. Clouds drifting against mountains and high lands will discharge rain. The rain falls upon the ground, disintegrates earthy substances, and transports the disintegrated materials resulting from its own action, and from atmospheric agencies, down the valleys to the ocean. It is said the Ganges annually carries to the sea 6,368,000,000 cubic feet of sediment, which, being spread over the whole basin of the river, comprehending 400,000 square miles, would make a layer 1-1751 of a foot thick. The Ganges, therefore, erodes its basin one foot in 1,751 years.

The area of the Mississippi basin is 1,244,000 square miles, and the annual discharge of sediment by the river is estimated at 7,471,411,200 cubic feet, an amount sufficient to cover the whole basin 1-4640 of a foot. Therefore the Mississippi River removes from its basin a thickness of one foot in 4,640 years.

§ 8. The greater number of valleys in North America have been carved out by the streams flowing in them at substantially the same rate of excavation that is now in progress. All the valleys in Ohio, Indiana, and Illinois, have been excavated by the slow process of the action of rain and the rivers. The Mississippi and all its tributaries have excavated their own valleys, with the exception of a few in the mountain regions. Not only have the valleys been thus excavated, but much of the intervening land has been denuded of many feet of surface rocks. While the beds of the older streams sink extremely slow, if at all, the valleys are gradually widening by the wear and tear of rain and storm. This erosion has taken place since the close of Palæozoic time. The hills are usually terraced because the strata are of different degrees of hardness and durability, the softer and more easily disintegrated are gradually removed by atmospheric influences and the transporting power of rains and springs, leaving the harder and more solid standing out in more or less abrupt slopes and cliffs.

§ 9. The lower limit of perpetual snow under the equator is 16,000 feet above the sea, in the Swiss Alps, in latitude 46 N., it is 8,500 feet, and in the arctic and antarctic regions it reaches the level of the sea. The isothermal lines, around the earth, being affected by the distribution of the land and water surface and the ocean currents, do not follow the degrees of latitude; therefore, in ages past, when the land and water occupied different areas, and the ocean currents moved in other routes, the isothermal lines were correspondingly changed. Above the line of perpetual snow there is an augmentation from year to year, and below it, during the colder seasons, the snow falls many feet in thickness. An equilibrium is preserved by the melting of the snow in sunshine, by occasional rains to which it is subjected, and by the natural tendency to creep down the mountain side by the force of its own. gravity. This movement gives rise to glaciers, which follow the depressions or rayines on the sides of the mountains to a considerable distance below the perpetual line of snow. They move very slowly, but transport sand, gravel, and masses of rock, and smooth, polish, and groove their rocky channels, because fragments of rock get interposed between the glacier and the rocks of the valley. The stones carried along on the ice are called the "moraines" of the glacier. There is always one line of block on each side, these are called the "lateral moraines." Where there are confluent glaciers the lateral moraines of the tributary glacier are carried into the larger stream of ice, and are called "medial moraines."

§ 10. The effects of glaciers upon the face of the earth are not important, notwithstanding so much has been said about them, and it is evident they have not been much more imposing in past geological ages than they are now. There are probably no evidences of glacial action upon the continent of North America where they do not now exist, except in a few places in the Rocky Mountain region, where they have departed on account of the drainage of adjacent lakes, and some indications in the New England Mountains where they are unknown now, either because that region is somewhat depressed, or because the Arctic Current does not hug the shore as far south as it did in the Pliocene or Post-pliocene period.

§ 11. Ir where fragm the earth and in with ocean and let the marine surfac rock. Coastwinds. The surface, and of the current intervene, in bergs drift fro mouth of the Hope, and als bearing a rock known land. than glaciers.

is inconspicuou § 12. A 1 in chemical so this manner 1 storms and tid

terials at other where the wate never ceases, a realize the mag § 13. The and depression

historical perio past geological neither penetra the surface of 1 experienced the phenomena mor of sand and gi water, and obse that steam is a the layers of th of temperature the first 2,000 (tinuing increase rock, or at differ of heat, nor the earth, but, on 1 caverns near the causes which are § 14. All a

9

al discharge mount suffipi River re-

a carved out ation that is n excavated of and all its few in the much of the nile the beds lly widening nce the close of different tegrated are wer of rains r less abrupt

0 feet above ne arctic and , around the nd the ocean hen the land other routes, of perpetual g the colder erved by the cted, and by of its own. epressions or ine perpetual nd masses of nents of rock tones carried vavs one line re there are ried into the

portant, notney have not
There are merica where region, where some indicaither because
not hug the

§ 11. In high northern and southern latitudes glaciers descend into the sea. where fragments are broken off, which are called "icebergs." Icebergs bear all the earth and rocks they did when constituting part of a glacier, and they soon fall in with ocean currents, and are drifted great distances before they are dissolved, and let the "moraines" fall to the bottom of the sea. In this manner the submarine surface is strewn with foreign mud, sand, gravel, bowlders, and fragments of rock. Coast-ice acts in the same manner when blown out into the sea by off-shore winds. The ice sinks into the ocean eight times as deep as it projects above the surface, and when in shallow water it impinges upon the submarine bottom, the force of the current or the winds may cause it to polish or groove the rocks, if fragments intervene, in the same manner that glaciers will polish or groove their valleys. Icebergs drift from Baffin's Bay to the latitude of the Azores, from Greenland to the mouth of the Gulf of St. Lawrence, from the antarctic regions to the Cape of Good Hope, and also to Chili, in South America. Darwin saw one in the southern seas bearing a rock visible twelve feet above the surface, 1,400 miles distant from any known land. Icebergs have a transporting power more than a thousand-fold greater than glaciers, and an eroding power but little inferior, and yet the action of icebergs is inconspicuous now, and has been, so far as we know, in all the ages gone by.

§ 12. A large part of the rain sinks into the ground, takes up mineral matter in chemical solution, flows out in springs, and transports its load to the ocean. In this manner many caves and caverns are excavated. The waves produced by storms and tides beat down the shores of large bodies of water, and deposit the materials at other places. The ocean currents have a drifting and denuding action where the water is shallow. The wear and tear of the earth by the action of water never ceases, and the more we contemplate the subject, the better able we are to realize the magnitude of the never-ending destruction.

§ 13. The violence of earthquakes, and the fires of the volcanoes, the elevations and depressions of land with respect to the sea, seem to have operated within the historical period on as grand a scale as we are warranted in believing they did in past geological ages. Earthquakes and volcanic fires are intimately connected, and neither penetrate the earth to any great depth. Earthquakes have been felt upon the surface of the earth when miners, at a depth of 1,000 feet or more, have not experienced the sensation. The transmission of the vibration is more distinct, and phenomena more apparent where the strata are hard rocks than where they consist of sand and gravel, or softer material. All volcanoes are near large bodies of water, and observation has shown that water gains access to the volcanic foci, and that steam is a powerful agent in all eruptions. The pressure or force of gravity of the layers of the surface of the earth develops the latent heat, so there is an increase of temperature at the rate of about one degree for every sixty feet penetrated for the first 2,000 or 3,000 feet. The deeper borings have not shown the regular continuing increase of the heat, nor is the increase uniform through different kinds of rock, or at different places. The better opinion seems to be that neither this increase of heat, nor the volcanic fires afford any evidence of the internal fluidity of the earth, but, on the contrary, the earth is probably solid, with exception of local caverns near the surface, and local masses of melted matter resulting from chemical causes which are in operation at no great depth.

§ 14. All are more or less familiar with the story of the buried cities of Hercu-

langum and Pompeii, and the great eruptions of Vesuvius. In 1669 a current of lava flowed from Etna, having a width of 600 yards, and a depth of 40 feet when it reached the sea at the distance of fifteen miles. In 1783 Skapter Jokul, in Iceland, sent forth two currents of lava in opposite directions, one of which extended fifty miles, and the other forty-five. The extreme breadth of the one in Skapter valley was fifteen miles, and the other had a breadth of seven miles. The ordinary height of the current was 100 feet, but in narrow defiles it sometimes amounted to 600 feet. There is no evidence of a volcanic eruption on the continent of North America in past geological ages that surpassed this in volume.

About midnight, August 11, 1772, a luminous cloud appeared to envelop Papandayang, a volcano on the island of Java, and in a short time it actually fell in with a great noise. Immense quantities of volcanic substances were thrown out and distributed for many miles around. It is estimated the mountain for fifteen miles in length and six in breadth was swallowed up in the earth by this commotion. Forty villages were ingulfed or destroyed, and 2,957 inhabitants perished. It seems in this instance the eruptions had formed a corresponding cavity beneath the surface, and when the weight above overcame the resistance, the volcano suddenly fell into the abyss beneath.

A volcano forced its way from beneath the sea into the atmosphere off St. Michael's, Azores, in 1811. It was first seen above the sea on June 13th. The appearances were exceedingly beautiful, the volcano shooting up columns of the blackest cinders to the height of between 700 and 800 feet above the surface of the water. When not ejecting ashes, an immense body of vapor or smoke revolved almost horizontally on the sea. The bursts were accompanied by explosions resembling a mixed discharge of cannon and musketry, and a great abundance of lightning. By the 4th of July an island was formed a mile in circumference and 300 feet high. In the center there was a crater full of hot water, which discharged itself through an opening facing St. Michael's. The island subsequently disappeared "beneath the water.

Twelve islands constitute the Hawaiian Group, four of these are mere barren. rocks; the remaining eight have an area of about 6,000 square miles. All of these islands are volcanic, and no other rocks than volcanic are found upon them save a few remnants of sea-beaches. They are all mountainous, and the deep sea surroundings have shown the islands are only the summits of gigantic mountain masses. Mauna Kea, on Hawaii, is 13,900 feet above the sea, and Mauna Loa 13,700 feet. If the ocean were driven away, it is said these mountain peaks would stand 30,000 feet above the foot of the mountain range. On Hawaii the volcanic forces are still in operation. On Maui they rested at a recent epoch, or within a few hundred years. On the other islands they have long been extinct, and the piles built up have been greatly eroded. On Hawaii there are two grand foci of volcanic eruption where the fires are now raging, Mauna Loa and Kilauea. Mauna Loa is the largest volcano in the world, and none approach it in the magnitude of its eruptions. Α moderate eruption represents more material than Vesuvius has emitted since the days of Pompeii, and the flow of 1855 would have nearly built Vesuvins. On the whole, it appears there are as many active volcanoes, and some as vast and frightful in eruptive power as seem to have existed at any other single period in geological time.

§ 15. A ing 4,600 sc of Chili for more. The 1819 an ear about fifty n the delta of quakes in th every centur are warrante

§ 16. In tervention of the Baltic, d coast of Scan area in Gree of Fundy, th feet of water the New Eng tion of severa elevations and

§ 17. Ee accompany th rise or fall wi volcanic and show the imp present one fi they act by sp to internal flu intermittent en up until strens earth, when th forever. Volc heat contained sidered as lend earth was at o Geyser (f

intermittent he intermittent he The analogy b erupting hot w supposed to sin and by its mole plosive gas, wh out the column is furnished. ' dition of the : counted for.

The melted

a current of feet when it l, in Iceland, xtended fifty kapter valley linary height Lto 600 feet. America in

d to envelop etually fell in rown out and fteen miles in ption. Forty It seems in a the surface, enly fell into

phere off St. 3th. The apof the blackest of the water. d almost horibling a mixed By the 4th igh. In the f through an "beneath the

e mere barren. All of these i them save a sea surroundintain masses. 700 feet. If the ,000 feet above still in operaed years. On up have been sruption where he largest voleruptions. A itted since the

vius. On the

ast and fright-

riod in geolog-

§ 15. An earthquake in New Zealand in 1856 raised a tract of land comprising 4,600 square miles, from one to nine feet. In 1822, and again in 1835, the coast of Chili for several hundred miles was elevated from one to three or four feet or more. The estimated area raised in 1822 amounted to 100,000 square miles. In 1819 an earthquake at Cutch, in the delta of the Indus, raised an extent of country about fifty miles long and sixteen miles wide, ten feet, while a considerable tract in the delta of the Indus sank down. Such are a few of the effects produced by earthquakes in the present century; they are similar to those which have occurred in every century during the historical period, and are quite as extensive as any we are warranted in believing occurred in any of the earlier geological ages.

§ 16. It is said large tracts of land are elevated and depressed without the intervention of earthquakes. It is said there has been an elevation of land bordering the Baltic, during the historic period, of about three feet in a century.' The whole coast of Scandinavia is said to be gradually rising at a very slow pace. A large area in Greenland is reported as slowly subsiding. At Fort Lawrence, in the Bay of Fundy, there is a pine and beach forest covered at high tide by about thirty feet of water. And it is claimed there is some evidence of subsidence on part of the New England Coast, where we have the most indubitable evidence of an elevation of several hundred feet since the beginning of the Post-pliocene period, but these elevations and depressions may have been accompanied with earthquakes.

§ 17. Earthquakes and volcanoes have a common origin, the former always accompany the eruption of the latter, and it is not likely any great areas of land rise or fall without the intervention of the same energies. The proximate cause of volcanic and earthquake phenomena is not fully known, and it is much easier to show the improbability of the many theories offered for their explanation than to present one free from objections. Volcanoes are intermittent in their eruptions; they act by spasms of activity, separated by intervals of repose. If they were vents to internal fluidity of the earth, the streams of flowing fire would be constant, not intermittent explosions. If they were vents to any great mass of melted matter pent up until strength enough were obtained to force a passage way to the surface of the earth, when the vents would open the reservoirs would exhaust themselves and close forever. Volcanoes are not to be attributed to the remains or residue of enormous heat contained in the globe, at some remote period of its physical evolution, or considered as lending any support to the nebular hypothesis, or the theory that the earth was at one time in a gaseous or fluid condition.

Geyser (from the Icelandic word geysa, to gush,) is a periodically eruptive or intermittent hot spring, from which the water is projected in a fountain-like column. The analogy between it and a volcano is so striking that it might be called a volcano erupting hot water instead of melted lava. In the case of a geyser, cold water is supposed to sink from the surface to heated rocks; it starts as a passive liquid, and by its molecular absorption of heat is converted in the depths into an elastic, explosive gas, which ejects it through another orifice to the surface. The gas forces out the column of water and escapes; then quiet ensues until a new supply of water is furnished. This accounts for the intermitting flows. Grant the local heated condition of the rocks below, and all the phenomena of the geysers may be accounted for.

The melted lavas of volcanoes bring up with them great quantities of the vapor

ŝ

of water, having an enormous expansive power which is given off as steam at the moment of eruption. Lava is generally a sponge-like mass of myriads of visible vesicles formed by the sudden exclusion of the water-vapor in the act of solidification. There is abundant evidence of the participation of water and its constituent gases in volcanic phenomena. From the proximity of volcanoes to or occurrence in the sea, it has been supposed their active state is produced by the percolation of seawater to metallic bases of the earths, or alkalies, at various depths, which bases become inflamed and chemical action ensues, producing the eruption. The oxygen of the water is supposed to unite with the metallic base, the hydrogen to unite with sulphur, forming sulphureted hydrogen gas, and with the chlorine forming muriatic acid gas, etc. The gases evolved from volcanoes are muriatic acid gas, sulphur combined with oxygen or hydrogen, carbonic acid gas, nitrogen, and aqueous vapor. Electricity is a factor in all earthquakes and volcanic eruptions. Its action is manifest in the atmospheric disturbances, in the undulatory movement on the surface of the earth, and in the speed with which the earthquake wave travels. An earthquake moves in the direction of the wave at a rate frequently exceeding fifty miles in a minute, and when the movement is communicated to the waters of the ocean, the waves follow at a pace hundreds of times slower. Suppose a powerful current of electricity near the surface of the earth, to be broken, and suddenly restored, the shock may be supposed to resemble that of an earthquake. Fusion might result in consequence of such restoration. The crystallization of stratified rocks might break such electrical currents, if any exist in the earth, or it might disturb the equanimity of the electricity if it exists in a passive state, to the same extent as if it were a broken and restored current. In other words, subterranean electric currents, if once excited, may melt the rocks and produce the heat necessary, when assisted by the presence of a sufficient quantity of water, to produce volcanic eruptions. Such are some of the theories to account for the instigating or proximate causes of earthquakes and volcanoes.

The mouth of a volcano is called a *crater*, though the pit on Kilauea has been called a *caldera*. If steam alone escapes through a vent, it is called a *fumarole*; but if sulphurous vapors also escape, it is called a *solfatara*. When hot springs deposit lime, it is called *tufa*; but if the deposit is silicious, it is called *sinter* or *geyserite*. Lava consists of silica, alumina, lime, magnesia, soda, potash, and iron oxide. If the silica is in excess, it is *trachyte*, and belongs to what lithologists call the acidic group, from the large quantity of silicic acid it contains; but if there is a large proportion of soda or potash and lime or magnesia, and not more than 50 per cent of silica, it is a *basalt*, and belongs to the basic group, from the larger quantity of alkaline and earthy bases it contains. Trachyte is a grayish igneous rock, of rough fracture owing to the grains of glassy feldspar which mainly constitute it. Basalt may be light-colored crystalline or granitoid, or dark colored, compact, massive, like dolerite; but in addition to labradorite and pyroxene, it contains chrysolite in disseminated grains. When lava becomes glassy, it is called *obsidian*.

§ 18. The most important change taking place upon the earth is in constant operation at the bed of the ocean. Near the shore it is a littoral deposit; farther away it is a chalky deposit, consisting of foraminifera and shells, and in deeper water it is a red, silicious clay. The character of the deposit is dependent upon the depth of the ocean, except where washings from land affect it. The depth of the pure globigerina c depths the d consists alm moderate de increases the the chemical of water, no The simple f of the depos which exceet they do in t induration, b arenaceous or

§ 19. An modifying th changes, because spot, for cent corals, is eve operation, affe past to deposi and to elevate denude it and § 20. Ev

much of what

a large part, time, been ab form of ridges existing in the different degre with the secre great diversity separately inve rocks. Cretace hence, many d the strata upor the animal and tions of type a approximately equal depths of water and near farther from la tinuous over la or limestone; h mony to prove been ascertaine characterized d order of superp

globigerina ooze, or chalky deposit, is limited to about 2,250 fathoms, and at greater depths the deposit gradually passes into fine pure clay, and below 2,500 fathoms it consists almost wholly of a silicate of the red oxide of iron and alumina. At moderate depths shells fall upon the bottom, in perfect condition; as the depth increases they become more and more brittle, and finally break up and disappear by the chemical action which affects them, until, having passed through 2,500 fathoms of water, nothing is left save an insoluble residue, which constitutes the red clay. The simple fact of the increasing depth of the ocean gives variety to the character of the deposits. But at the greatest depth to which the dredge has descended, which exceeds five miles, the silicious shells of Radiolarians exist as abundantly as they do in the shallower depths of the ocean. Such deposits, in the process of induration, become stratified and laminated, and form calcareous, argillaceous, and arenaceous or silicious rocks.

§ 19. Animals, secreting carbonate of lime, have played an important part in modifying the surface of the earth. The coral-making polyp has wrought great changes, because the reef-forming genera continue the accumulation, on the same spot, for centuries, and the influence of the Bryozoa, which produce only delicate corals, is everywhere conspicuously engraved. There are other agents, inferior in operation, affecting the surface of the earth, and all combined have served in times past to deposit in water all the rocks constituting the continent of North America, and to elevate the land above the seas and lakes, after such deposition, and again to denude it and present it to us with its mountains and valleys as they now exist.

§ 20. Every part of the surface of the earth has been covered with water, and much of what is now dry land has been several times inundated; and it is supposed a large part, if not the whole area covered by the oceans, has, at some period of time, been above the water line. The elevations and depressions have been in the form of ridges, with intervening basins, in different ages of the world; and basins, existing in the same age, have been filled with deposits of different kinds and in different degrees of rapidity,-some being filled with drifted materials, and others with the secretions of animal and vegetable organisms. Consequently there is a great diversity in the structure of the land of different continents, and they must be separately investigated. The most recent deposits may be made on the most ancient rocks. Cretaceous deposits may occur upon the Silurian, or Jurassic on the Devonian; hence, many difficulties are encountered in ascertaining the chronological order of the strata upon each continent; and this would be utterly impossible were it not for the animal and vegetable remains, which have followed the progress of time in evolutions of type and structure in different oceanic basins, so as to furnish the means of approximately parallelizing the strata. Different kinds of rocks are forming at unequal depths of the ocean, at the same time; conglomerates and sandstones in shallow water and near the shores; chalky, and slaty or shaly in deeper water, and silicious farther from land and at still greater depths. Strata of the same kind are not continuous over large areas; but change within short distances from sandstone to shale or limestone; hence, it is never safe to trust to the character of the rock for the testimony to prove its age. We must go to the fossils for the evidence, because it has been ascertained that species did not generally live beyond a geological period, and characterized different Groups of rocks, and thus become infallible guides to the order of superposition. No two periods are represented by like assemblages of fossil

team at the visible vesolidification. ituent gases ence in the tion of seach bases bee oxygen of unite with ng muriatic gas, sulphur ueous vapor. ion is manie surface of 1 earthquake y miles in a e ocean, the il current of ily restored, 'usion might atified rocks night disturb me extent as electric curtry, when asnic eruptions. ate causes of

> uea has been narole; but if deposit lime, serite. Lava tide. If the acidic group, ge proportion it of silica, it alkaline and ough fracture asalt may be , like dolerite; disseminated

is in constant posit; farther 1 deeper water pon the depth 1 of the pure

forms, and this dissimilarity furnishes the facts upon which the Groups of rocks are distinguished from each other. Comparison of the fossils shows a progression in development along an ascending scale toward the higher and more enduring plants and animals, and the extinction of lower or less highly organized forms.

§ 21. Sandstone is a rock made of sand derived from a silicious rock. When pure it is used for making glass. Iron usually colors it red or yellowish, and often cements it into good building stone. When a little clay is intermixed it is called freestone, and if it contains gravel it is conglomerate, or if loosely cemented in the air and not under water a pudding-stone. When sandstone is subjected to heat and pressure it is metamorphosed and becomes quartzite.

Shale is a soft, fine-grained, aluminous rock, in layers. If it is pure it is clay shale; if it contains sand it is sandy shale; if bituminous matter, bituminous shale. When the shale is hardened it becomes slate. Slate rocks among the metamorphic series are called schists. The clay slate used in North Carolina for making slatepencils is called pyrophyllite.

Limestone is ordinarily composed of lime and carbonic acid, with impurities of clay, sand, and iron. Hydraulic limestone contains clay and magnesia. Magnesian limestone is called dolomite, after Dolomieu, a mineralogist. Lithographic stone is a very even-grained, compact limestone, usually of buff or drab color. Chalk is a soft limestone, and marble is a hard crystalline limestone. Gypsum, alabaster, calcite, dogtooth spar and satin spar are names given to crystalline limestone.

§ 22. The general order of superposition of the rocks of North America has been ascertained, and they have been divided into Systems and Groups. Another division has been made, founded on the organisms that occur in the rocks, viz: Eozoic, Palæozoic, Mesozoic and Cænozoic. Some use the word Archæan instead of Eozoic. The Eozoic includes the Laurentian and Taconic Systems. The Palæozoic includes the Lower Silurian, Upper Silurian, Devonian, Subcarboniferous and Carboniferous Systems. The Mesozoic includes the Triassic, Jurassic and Cretaceous Systems. The Cænozoic is synonymous with the Tertiary System. These Systems may be very closely parallelized with the strata of Europe and other parts of the world. The words "System" and "formation" are in use with this nomenclature, as Devonian "System" or Devonian "formation," but more generally they are both omitted as unnecessary appendages to the names of the divisions.

The Taconic is introduced in many places with conglomerate layers resting unconformably upon the Laurentian; the Lower Silurian commences with the Potsdam sandstone, the Upper Silurian with the Medina sandstone, the Devonian with the Oriskany sandstone, the Subcarboniferous with the Waverly sandstone, and the Coal Measures with the Carboniferous Conglomerate. Each of these great divisions commences with drifted materials, and important changes of the fauna. They are each capable of subdivision into Groups, and they are not only convenient in the discussion of the science, but they are, to a certain extent, founded in nature.

§ 23. For the purpose of more definite classification these larger divisions are subdivided. Each subdivision is called a "Group," and it generally bears the name of the place where first studied and described; as, the Potsdam Group, so named because the strata were first studied and described at Potsdam, New York. This method is preferred to any other, because the geographical name, when combined with the word "Group," is sufficiently technical. It can not be used for any other purpose; it strata, and erates, lime geological s acters of th simple mine not in chron To speak of of its geolo character.

§ 24. I palæozoic ro cant of their different par Scalent, Pre tine, Umbra break, Morr noon, Declin Unfortunatel ture then qu use of conflic extensive Gr consequently suggested by

§ 25. Tł epoch, and er cause express palæontologica When proper name for it, n it at a parti Groups had b Utica in the v or Hudson R black slate, wl though calcare becki, Leptobol plainly disting Utica had thir Cincinnati, the or both of the the Utica is es § 26. And

been named a another localit priority in non defined so as to

of rocks are rogression in luring plants

ock. When sh, and often l it is called lented in the to heat and

nre it is clay ninous shale. metamorphic naking slate-

impurities of

Magnesian hic stone is a halk is a soft uster, calcite,

America has ps. Another e rocks, viz: an instead of 'he Palæozoic ous and Card Cretaceous hese Systems parts of the omenclature, they are both

rs resting unthe Potsdam ian with the and the Coal eat divisions . They are enient in the nature. divisions are ears the name so named be-York. This hen combined for any other purpose; it can never mislead as to the mineral structure or relative position of the strata, and it indicates the typical locality of the exposure. Sandstones, conglomerates, limestones, and shales, occur in nearly every Group, and for this reason geological subdivisions can not be established upon the mineral or chemical characters of the rocks. The rocks which form these Groups are composed of a few simple minerals, which are repeated over and over again in the different layers, but not in chronological succession, nor in any other way indicative of age or position. To speak of a rock as a limestone, sandstone, shale, slate, or clay, conveys no idea of its geological age or place. It is merely the expression of a mineralogical character.

§ 24. Prof. Rogers conceived the idea of improving the nomenclature of the palaeozoic rocks by dividing them into fifteen parts, and giving them names significant of their relative ages. This he did by using words suggesting metaphorically different parts of a day, as follows: Primal, Auroral, Matinal, Levant, Surgent, Scalent, Premeridian, Meridian, Post Meridian, Cadent, Vergent, Pouent, Vespertine, Umbral, and Seral, meaning respectively the formations of the Dawn, Daybreak, Morning, Sunrise, Mounting Day, Climbing Day, Forenoon, Noon, Afternoon, Declining Day, Descending Day, Sunset, Evening, Dusk, and Nightfall. Unfortunately for his attempt to substitute another for the geographical nomenclature then quite well established and susceptible of indefinite expansion, without the use of conflicting terms or words that could mislead the student, there were several extensive Groups of rocks full of the remains of animal life, then unexplored, and consequently quite unknown to his system. For obvious reasons the nomenclature suggested by Mr. Rogers has not been adopted.

§ 25. The words series, strata, layer, deposit, zone, bed, horizon, period, age, epoch, and era are not technical names, but are used in geological descriptions, because expressive and convenient. Each Group must, in all cases, depend upon the paleeontological characters, and can never rest upon the structure of the rocks. When properly defined, it is established, and no one has a right to substitute another name for it, nor to propose a name, simply because of inability to properly distinguish it at a particular locality. For example, the Trenton, Utica, and Hudson River Groups had been long established, when some one, being unable to distinguish the Utica in the vicinity of Cincinnati, and not knowing whether the rocks are Trenton or Hudson River, proposed to call the exposure the "Cincinnati Group." The black slate, which characterizes the Utica in New York, does not exist at Cincinnati, though calcareous slates and shales of the same age do, and they contain Triarthrus becki, Leptobolus lepis, and other characteristic fossils, while the Hudson River is plainly distinguishable above, and the Trenton as readily determined below. If the Utica had thinned out in its extension westward from New York before reaching Cincinnati, there would have been no excuse for calling the Trenton or Hudson River, or both of them together, by a new name, nor is there any excuse for so doing when the Utica is easily distinguished.

§ 26. Another kind of synonymy to be deplored exists where a Group has been named and thoroughly defined, and for some trivial reason, the geologists of another locality use another name for rocks of the same age without regard to priority in nomenclature. For example, the Calciferous Group was established and defined so as to include rocks other than Calciferous sandrock, and ten years after-

3.79

ward rocks of the same age on the Mississippi were called the "Lower Magnesian IAmestone," and geologists of that locality persist in the use of the latter name, because they say the word Calciferous is not admissible from the lithological character of the rock. It is to be regretted that the name Calciferous has come down to this generation as the name of a Group of rocks, but it is as well established as the name of any other Group, and like the word Tertiary, which has no application to the rocks to which it is applied, is fastened upon the science, and so interlocked with it that it can not be eradicated even were it desirable so to do. With how much less reason should we encourage the use of another mineralogical name, having more limited application, in its stead!

§ 27. The rule is, the law of priority should be rigorously enforced where a Group has been named, and the fossils have been so described and illustrated that it may be identified by a paleeontologist elsewhere than at the typical locality. Synonymy is always the result of ignorance, and much of it has come from those whose work has been absolutely worthless.

§ 28. Experience has shown the impracticability of making lesser subdivisions for the purpose of geological nomenclature, than Groups, especially in the present state of the science, though it is eminently fit and proper to speak of the marl-beds or sandstone layers in any Group, or of the *Glyptocrinus* or Orthis beds at any locality. Minute and careful definition and description of the characters of each and every part of a Group is one thing, and the suggestion of a geological subdivision, founded upon a marked peculiarity at one locality, which can not be distinguished at another, is quite a different thing. It must not be supposed none of the Groups will be subdivided, but proposing a name is not establishing a Group. The Coal Measures ought to be divided into Groups because of the great thickness of the fossiliferous rocks, and a temporary division in some localities is indicated by the use of the words Upper, Middle, and Lower Coal Measures, but great palaeontological information must be acquired before any practicable subdivision can be made.

The stratigraphical division of the rocks of North America into Groups § 29. bearing geographical names, with an approximate thickness in ascending order, is as follows:

Laur	entian System, not divided into Groups,	40,000	feet.
Taco- nic.	Lower Taconic, not divided into Groups,	25,000 10,000 10,000	"
L d	Potsdam Group,	4,000 2,000	"
Silurian	Chazy Group,	$1,000 \\ 150 \\ 1,100 \\ 600 \\ 1,200$	66 66 66 66
per rian.	Medina Group,	2,500 500 800	66 66 66
Silur	Guelph Group, Onondaga Group, } Lower Helderberg Group,	1,200 2, 00 0	**
	Carried forward,	02,050	feet.

§ 30. TH and not from rocks of Cana of the Geolog of these rocks the Potsdam; rests uncomfor and hence the consist of sedin thicknesses of and quartzite. phic, or prima Granite is

Devonian.

Subcarbon-

iferous. Ke

Car Cos Pen (Ca

Triassic r

Jurassic 1

Cretaceous

Tertiary. Mic

Dal

For

Nic For

Foz

For Eoc

Plic

Pos

Ul Ha

Po Ch Ca

Wa Bu

St. Ka

In

applied. It is usually gives t being separate excess, it is m

Magnesian er name, beal character lown to this as the name tion to the cked with it w much less having more

rated that it lity. Synothose whose

subdivisions the present he marl-beds any locality. h and every ion, founded d at another, will be subpal Measures fossiliferous of the words information

into Groups ing order, is

),000 f	eet.	
6000	"	
000	"	
),000	"	
£,000	¢	
2,000	"	
,000	"	
150	"	
1.100	66	
600	"	
1,200	"	
2,500	"	
500	""	
800	"	
1,200	"	
2,000		
2,050	feet.	

0	Brought forward	d, .																			. 1	02.050	feet.	
	(Oriskany Group, .																					300	"	
an	Upper Helderberg	Gro	up	,																		900	"	
ni	Hamilton Group,			٠.																		1,400	66	11.2
20	Portage Group,					•							A.			•		•				1,400	66 T	17.0
õ	Chemung Group, .	• •					•		·		•		•		x.	•	•	•				3,000	"	
-	Catskill Group,	• •	•	•	•	•	•	•	÷			•	•	•	•	•	•			•		7,500	"	
ċ	Waverly Group, .					•								•		•		•				500]	
S. 00	Burlington Group,			٠.	•	•	•		•	•	•			•		•	•	•	•	•		500	""	
arl	Keokuk Group, .	• •	•	•	·	•	•	•	•	·	•			•	•	·	•	•	•			200	"	
bc	Warsaw Group, .	• •	•	•	•	•	•	•	•	·	۰,	·	·	·	·	•	•	•	•	•	•	100	"	
i	St. Louis Group, .	• •	•	•	•	•	•	•	•	٠	•	•	•	•	•	•	•	•	•	٠	•	400		18-4
01	(Kaskaskia Group,		•	•	•	•	۰.	•	۰.	•	۰.	ċ	٠	٠	•	•	•	•	•	•	•	720	••	
	In Pennsylvania,	whe	re	t	he	5	ul	oca	arl	bo	ni	fe	ro	us	C	ar	1	n	ot	b	e		,	
	separated into G	roup	08,	th	er	e	18	8. 1	thi	IC	۲n	es	8 (of	5,0)()() f	ee	t, :	an	d			
	in Nova Scotia 6	,000	Ie	et	•		_																	
if-	(Carboniferous Con	glon	ner	at	e,	or	N	Iil	lls	to	ne	G	ri	t,	•	•	,	•	•	•	•	6,000	"	
ron	{ Coal Measures,	• •	•	•	•	٠	٠	٠	٠	٠	•	٠	•	٠	•	•	•	•	•	•	•	10,000		100
ہ م	(Permian Group,	• •	•	•	•		•	•	•	٠	٠	•	•	٠	·	•	•	٠	•	•		1,000		100
Tria	ssic not divided into	Gre	oup	ps,	3	•	•			•	•	•	•	•			•	٠	•	•		25,000	"	251
Jura	ssic not divided into	Gre	ouj	р в ,	•	÷	٠	٠	٠	٠	•	•	٠	·	•		٠	٠	٠	•		10,000	"	
ŝ	Dakota Group,		•		•				•	•			•									1,000	""	
no	Fort Benton Group	p, .		•	•	•		•	•	•	•	•			•			•		•		900	""	
e	Niobrara Group, .	• •	•	•	•		•	٠	٠	•	•	•	·	•	•	•	•	•	•	•		500	"	1246
ta	Fort Pierre Group	,	•	٠	•	٠	٠	•	•	٠	٠	·	•	•	·	·		•	•	•	٠ł	1,200	"	
Le	Fox Hills Group, .	• :	•	•	•	٠	٠	٠	•	٠			·	•	•	•	•	•	•	•	-	4,000	"	
0	[Fort Union or Lar	ami	e (jr	bu]	p,	٠	٠	•	٠	•	٠			•	•	٠	٠	٠	٠	+	7,000		
	\int Eocene, \ldots		•				•		•	•	•	•					•				÷	15,000	" "	
	$Miocene, \ldots \ldots$		•	•	•	•	•		•		•		·			•						3,000	" "	
ti J	Pliocene,	• •	•	•		٠	•		•	•						•	•	•				3,000	"	
	[Post-pliocene,	• •	•			•	•	•	•	•			•	•	•		•	•	•	•		1,000	""	
	(D. 4.1																							
	Total,	• •	•	•	٠	٠	٠	•	·		٠	•			•	٠	٠	•		•	•	211,150	feet.	

CHAPTER II.

LAURENTIAN SYSTEM.

§ 30. THE Laurentian System was so named from the Laurentian Mountains, and not from the St. Lawrence River. The name was applied to the metamorphic rocks of Canada as a scientific term, by Sir William Logan, in the Report of Progress of the Geological Survey of Canada for the years 1852–53. His special study of these rocks began as early as 1846. He applied the name to all rocks lower than the Potsdam; but Emmons had preceded him in defining the Taconic System, which rests uncomformably upon the rocks that comprise nearly all which Logan studied; and hence the Laurentian is confined to the rocks below the Taconic. The rocks consist of sedimentary strata altered to a highly crystalline condition — great vertical thicknesses of gneiss and granitoid rocks, separated by masses of crystalline limestone and quartzite. Previous to this geographical name they were called azoic, metamorphic, or primary rocks.

Granite is a word derived from the granular texture of the rock to which it is applied. It is crystalline and composed of quartz, felspar, and mica. The felspar usually gives the predominating color. When the granite is stratified, the laminæ being separated by thin scales of mica, it is gneiss or granite schist; if mica is in excess, it is mica schist; when hornblende displaces the mica, it is synite (named

from Syene, in Egypt); and if it only partially displaces it, it is syenitic granite. Many of the granites and syenites are intrusive, while others, not distinguishable from these, take the place of sedimentation and pass into gneiss or mica schist. Felspar signifies rock-spar from the German word fels, a rock, though it is usually spelled feldspar from the German word feld, a field, and therefore made to signify field-spar. There are several species of felspar, dependent upon the potash, soda, or lime they contain. That which usually enters granite is orthoclase, or potash felspar, and is compact laminated, or compact crypto-crystalline, consisting of about the following substances: silica 64.6, alumina 18.5, and potash 16.9. When soda enters into the composition of the felspar, it becomes albite, and the granite is then disposed to undergo spontaneous disintegration, which sometimes takes place below direct atmospheric influences at great depths in the earth. The kaolin of the Chinese is derived from felspar from the disintegration of granitic rocks, and porcelain clay is often from the same source. Garnets are common in gneiss and mica schist. The most common mica, and that which generally enters into granite, gneiss, and related rocks, is called muscovite. Other species in the mica group are called phlogopite, biotite, lepidomelane, astrophyllite, lepidolite, and cryophyllite.

§ 31. Logan said of the Laurentian System: "Stretching on the north side of the St. Lawrence from Labrador to Lake Huron, this series occupies by far the larger portion of Canada, and its strata probably possess a great thickness. To determine the superposition of the various members of such an ancient series of rocks is a task which has never vet been accomplished in geology, and the difficulties attending it arise from the absence of fossils to characterize its different members. Bands of the crystalline limestone are easily distinguished from bands of the gneiss; but it is scarcely possible to know from local inspection whether any mass of limestone in one part is equivalent to a certain mass in another. They all resemble one another lithologically, and although masses dipping in the same direction are met with, running for considerable distances rudely parellel with one another, it is scarcely ever safe to take for granted that they are stratigraphically distinct. The dips avail but little in tracing out the structure; for in the numerous folds of the series the dips are frequently overturned, and the only reliable mode of pursuing the investigation and working out the physical structure, is patiently and continuously to follow the outcrop of each important mass in all its windings as far as it can be traced, until it becomes covered up by superior, unconformable strata; is cut off by a great dislocation, or disappears by thinning out."

§ 32. The surface area accupied by the Laurentian series in Canada and British America, exclusive of any exposure that may exist in the Cordillera or Rocky Mountains, is not less than 250,000 square miles. The northern limit is the Arctic Ocean; from here it may be traced south upon the western side of Hudson's Bay, and appearing upon its eastern side it spreads over the greater part of Labrador, and extends to the Gulf of St. Lawrence. The southern limit is the St. Lawrence from Labrador to Cape Tourmente, a distance of 600 miles, except a narrow border of Taconic on the Strait of Belle Isle; another at the mouth of the Mingan River; a third near the Seven Islands, and two on Murray Bay River, and the Gouffre. Extending westwardly it occurs 30 miles north of Montreal, and follows up the Ottawa River for a distance. It then strikes off to the Thousand Islands, and crosses over into New York, where it exposes an area of 10,000 square miles. From there it extends forth Lake Superio of Rainy Rive Wisconsin. ' Woods in a si that divide th directions, to covered with ' § 33. The

of Michigan, I one of which granite, gneiss useful mineral posures in the North Carolina belt from twee eastern section ward into Virg of gneiss, whic southern borde the Virginia lin and crosses th another small a in Georgia, Vi at other places Iron Mountain, many exposures rection of the Nevada, Utah, § 34. A se as follows:

Orthoclase
 Crystallin
 Orthoclase
 Crystalline
 stratifi
 Orthoclase
 Grenvi
 Crystalline
 Orthoclase
 Proctor's 1
 Orthoclase
 Proctor's 1
 Orthoclase
 T

This is about thickness in Wise by no means repribe that the Lau

extends north-westerly a short distance north of Lake Huron, and bordering upon Lake Superior, a great part of its length, it appears at Lake of the Woods, north of Rainy River, though an arm extends south of Lake Superior into Michigan and Wisconsin. The western boundary of this great area extends from Lake of the Woods in a sinuous northerly direction among the lakes, and following the highlands that divide the waters which flow into Hudson's Bay from those flowing in other directions, to the Arctic Ocean. There are some patches within this general outline covered with Taconic rocks, or those of Post-pliocene age.

§ 33. The arm of this great exposure, which appears in the Upper Peninsula of Michigan, has an area of about 1,839 square miles, consisting of several tracts, one of which touches Lake Superior west of Marquette. The rocks are chiefly granite, gneiss, syenite, and crystalline limestone, which thus far have afforded no useful minerals. The surface area in Wisconsin is somewhat greater. Other exposures in the United States are confined to irregular areas in the mountain regions. North Carolina exposes about 20,000 square miles, or nearly half the State. One belt from twenty to twenty-five miles wide, crosses the northern part of the subeastern section of the State upon which the capital is situated. It extends northward into Virginia, and southward beyond Cape Fear River. It consists generally of gneiss, which passes into granite or mica schist. Another belt extends from the southern border of the State at Catawba River in a north-east direction, almost to the Virginia line near Roxboro, and reappears eight or ten miles to the eastward and crosses the northern border about midway of Granville County. There is another small area in the southern part of Orange County. Limited areas are found in Georgia, Virginia, Pennsylvania, New Jersey, Vermont, New Hampshire, and at other places in the Appalachian chain. A small area occurs in Missouri near Iron Mountain, and another in Arkansas. In the Rocky Mountain region there are many exposures, some of which are quite large. They generally trend in the direction of the mountain chain, and are found in Mexico, New Mexico, Arizona, Nevada, Utah, Colorado, Idaho, Nebraska, Wyoming, and Montana.

 \S 34. A section taken by Logan in the region where he studied the rocks, is as follows:

1. Orthoclase gneiss, composing Trembling Mountain,		5.000	feet.
2. Crystalline limestone of Trembling Lake.		1 500	66
3 Orthoclase gneiss		4,000	* 6
	•	4,000	
4. Crystalline limestone of Great Beaver and Green Lakes, with in	ter-	•	
stratified garnetiferous rock and hornblendic orthoclase gne	iss,	2,500	"
5. Orthoclase gneiss, garnetiferous gneiss and quartzite below t	he	,	
Grenville limestone,		3,500	* 6
6. Crystalline limestone of Grenville, with interstratified gneiss,		750	""
7. Orthoclase gneiss,		1,580	66
8. Proctor's Lake limestone,		20	""
9. Orthoclase gneiss, passing gradually into Anorthosite betwee	en		
Proctor's Lake and Morin band,		3,400	""
10. Anorthosite above the Morin band,		10,000	"
Total		32 250	feat

This is about the thickness in New Hampshire, and not equal to the estimated thickness in Wisconsin. Enough is known, however, to show this section of Logan's by no means represents the total thickness in Canada. The better opinion seems to be that the Laurentian series has a thickness in Canada of more than 40,000 feet,

vitic granite. shable from st. Felspar ally spelled y field-spar. r lime they spar, and is he following ers into the disposed to irect atmosse is derived s often from ost common ks, is called e, lepidome-

north side of by far the ckness. To ries of rocks e difficulties it members. the gneiss; of limestone one another e met with, t is scarcely he dips avail he series the ursuing the itinuously to as it can be is cut off by

> a and British ra or Rocky is the Arctic udson's Bay, abrador, and wrence from pw border of gan River; a couffre. Exp the Ottawa l crosses over 'rom there it

and probably more than eight miles, or quite as great as it is in Bohemia or any other European country.

§ 35. While these are the oldest rocks known, they were, in their unmetamorphosed condition, ordinary sediment in water derived from materials that preceded them. They were formed by the disintegration, denudation, and redeposition of older rocks, which in their turn preceded others, in how many cycles of change we have no means of knowing. Their upheaval above the surface of the sea was the beginning of the North American continent. The trend of the range in this upheaval is as nearly east and west as the later elevations of the Appalachian and Rocky Mountain chains are north and south. These rocks were until recently supposed to have preceded the existence of both vegetable and animal organisms, and were, therefore, called azoic, but in addition to the fossil Eozoon canadense there are other evidences of organic life, as follows:

1. The iron ore evidences organic life, because all the accumulations of iron now in progress are formed by the agency of organic matter. The peroxide of iron existing in the rocks is not soluble in water alone, but the addition of decomposing organic matter deoxidizes it, and carbonate of iron is formed, which is soluble and may be precipitated. Peroxide of iron being insoluble, the infiltrating waters which take up soda, lime, and magnesia from sediments, can not remove this metal unless they contain organic matter. The evidence of the reducing and dissolving action of organic matter is, in the great thickness of sediments, almost destitute of iron and in the extensive beds of iron ore.

2. The masses of limestone tend to prove the existence of organic matter, because limestone in process of formation is almost wholly composed of shells, corals, tests of foraminifera, and other animal secretions, and nearly all the unmetamorphosed limestones of past ages are largely composed of organic relics.

3. Graphite occurs in beds, imbedded masses, and in scales; in granite, gneiss, mica schist, and crystalline limestones; it results from the alteration by heat of coal in the Coal Measures, and is a common product of furnaces. Its presence is, therefore, an evidence of organic matter, because we know of no other source for its derivation, and are able to trace its origin to vegetable matter in rocks of a less remote date. It is inferred the carbon was collected by marine vegetation at that early period.

4. In the lowest non-metamorphosed rocks, and in the shales and limestones of the Taconic System, several classes of the animal subkingdom are represented, which indicates, if we judge by analogy with subsequent changes and progress of life, that the seas in much earlier times must have teemed with life. This is the only view consistent with the modern theory of evolution and the present state of knowledge concerning the development of animals and vegetables.

5. The Eozoon canadense, a fossil rhizopod, is found in the Grenville band of limestone near the middle of the series. The limestone is thus described: "The general character of the rock connected with the fossil produces the impression that it is a great foraminiferal reef, in which the pyroxene masses represent a more ancient portion, which, having died and become much broken up and worn into cavities and deep recesses, afforded a seat for a new growth of foraminifera, represented by the calcareo-serpentinous part. This in its turn became broken up, leaving, however, in some places, uninjured portions of the organic structure. The main difference between this with the latter more ancient reef."

6. The r abundant man in potash, and in the sedimen

7. And, lifeless; beside from those in magnesium, ca rocks in the w

§ 36. The silica, alumina transformation and new comb acting under t sea would dev volcanic and ea as active agenc sedimentary de accumulations; the crust of the is too chimerics § 37. Sedi

continued elsev mospheric and land and in the furnished many and will foreven rentian rocks v The Taconic is glomerate conta unrevealed cha and never can formably upon graphiss, and oth precious metals of later times.

iemia or any

heir unmetaals that preand redeposiany cycles of urface of the of the range Appalachian until recently al organisms, nadense there

tions of iron e peroxide of ion of decomied, which is he infiltrating bt remove this icing and dists, almost des-

ic matter, beshells, corals, netamorphosed

granite, gneiss, by heat of coal is presence is, r source for its tocks of a less etation at that

d limestones of re represented, and progress of This is the only resent state of

enville band of scribed: "The pression that it a more ancient nto cavities and resented by the wing, however, main difference between this foraminiferal reef and more recent coral reefs seems to be, that while with the latter are usually associated many shells and other organic remains, in the more ancient one the only remains yet found are those of the animal which built the reef."

6. The relatively large amount of potash in the Laurentian series indicates an abundant marine vegetable life, because later fossil fucoidal layers frequently abound in potash, and living algæ secrete potash from the ocean in such form as to retain it in the sediments now accumulating, and in which they are buried.

7. And, negatively, we have no good reason to think the Laurentian Age was lifeless; beside, the actual elements composing the Laurentian rocks are not different from those in succeeding formations; indeed, oxygen, hydrogen, silicon, aluminum, magnesium, calcium, potassium, sodium, iron, and carbon constitute .99 of all the rocks in the world.

§ 36. The change which sedimentary strata of sands and clays, composed of silica, alumina, and potash, underwent to form granite, gneiss, and mica schist; the transformation of sand into quartzite, and all other changes caused by crystallization and new combinations, are supposed to be owing to chemical and molecular forces, acting under the conditions of pressure, heat, and moisture. The pressure of a deep sea would develop a high degree of heat. The mountain ranges have undergone volcanic and earthquake upheavals which may have accompanied the metamorphism as active agencies. It would seem to be a law that mountain upheavals follow great sedimentary deposits, and the chemical action is most powerful under the grandest accumulations; but the idea that such accumulations bend the crust of the earth, or the crust of the earth contracts and wrinkles up mountain chains in the act of cooling, is too chimerical for consideration.

§ 37. Sedimentation ceased when the beds were forced above the ocean, but continued elsewhere. When the beds were elevated, the wear and wash from atmospheric and aqueous forces began, and deposits ensued upon the margin of the land and in the depths of the ocean. The denudation of the anticlinal heights has furnished many geological sections, but the older rocks remain hidden from view, There is absolute nonconformability of the Lauand will forever remain unknown. rentian rocks with overlying Groups at every locality which has been examined. The Taconic is introduced by total nonconformability, and frequently with a conglomerate containing pebbles derived from the adjacent Laurentian. Here is an unrevealed chapter of geological history, one that has not been reached and read. and never can be unless some region is unearthed where the Taconic rests conformably upon the Laurentian. The Laurentian is the home of granite, marble, gravity and other valuable building rocks, and the best mica quarries; but the precious metals have been found only in the intrusive, altered, or sedimentary rocks of later times. 3

CHAPTER III.

TACONIC SYSTEM.

§ 38. IN 1842, Ebenezer Emmons, in his Report on the Second Geological District of New York, described the rocks lying on the sides of the Taconic Mountains, parallel with the boundary line between New York and Vermont, under the name of the Taconic System. He found the belt on the western border of the mountains more than fifteen miles wide, and on the eastern side nearly twenty-five miles, making a total width of nearly forty miles. The rocks occur in Westchester, Columbia, Rensselaer, and Washington Counties, and stretching the whole length of Vermont, enter Canada, and extend beyond Quebec. He mentioned a typical locality in Berkshire, Massachusetts. The general character of the rocks was given as follows:

1. A coarse, granular limestone of various colors called Stockbridge limestone from the quarries at that place.

2. Granular quartz rock, generally fine-grained, in firm, tough crystalline masses of a brown color, but sometimes white, granular, and friable.

3. Magnesian slate.

4. Sparry limestone.

5. Taconic slate, which is extremely fine-grained and only slightly coherent.

He traced the rocks in a north and south course for 150 or 200 miles, and observed the fact that they underlie the Potsdam sandstone wherever it does not rest upon the gneissoid strata.

§ 39. In 1844 he published the "Taconic System," reviewed his former work, furnished numerous evidences in support of the existence of these rocks below the Potsdam and above the gneissoid rocks, or what are now known as Laurentian, and ascertained they had a thickness, as shown by a single section, of more than two miles. He said, taking one broad view of the whole system, it might be described as consisting of fine and coarse slates, with subordinate beds of chert, fine and coarse limestones, and gray, brown, and white sandstone; these admitting, however, of further divisions. The leading divisions recognized were:

1. Granular quartz, or brown sandstone, resting unconformably upon the older gneiss. It is the least regular in its continuation of any of the rocks of the Taconic System, and generally appears in insulated mountain masses, as at Oak Hill between Adams and Williamstown, Mass., at Monument Mountain, in the south part of Berkshire, in the east part of Bennington, Vt., and in Dutchess, Putnam, and Westchester Counties, New York.

2. Stockbridge limestone, generally known as Stockbridge marble, and occurring in New York, Vermont, Massachusetts, and Connecticut. Commencing at Sing Sing, it runs a northerly course through Westchester, Dutchess, and Columbia Counties, and extends into Connecticut. It passes up the valley of the Housatonic into the upper valleys of the Hoosic, and onward into Vermont, and is well represented at Williamstown, Massachusetts.

3. Magnesian slate, which composes the highest mountains in the Taconic ranges. The range of mountains composed of this slate, extending along the western border of M hundred fe It crosses th through Ne 4. Span

Eaton. It Rensselaer, Arlington, 5. Taco

ated layers, Counties, an Vermont and above Newb roofing-slate ton County Nereites dewey murchisoni, an 6. Blacl

System, and § 40. H

bridge limest stone Valley in the slates a Nereites at I dinate to the with Douglas Upper Penin pressions and his work on t an appendix granite rocks.

§ 41. In and establishe others, much his fossils to n erent names, knowledge res sustained his o position taken him, but has Marcou, and I ability of the gan and Wisc name, Huronia have been mos Huronian whe § 42. In

border of Massachusetts and through Vermont, often rising to the height of fifteen hundred feet, known as the Taconic range, furnished the name to this System. It crosses the Hudson about thirty miles above New York City, and passing south through New Jersey, enters Pennsylvania.

4. Sparry limestone, a name given to it many years before by Prof. Amos Eaton. It occupies a belt of country in the eastern part of Dutchess, Columbia, Rensselaer, and Washington Counties, and passing north strikes the west line of Arlington, Vermont.

5. Taconic slate, with its subordinate beds of roofing-slate and coarse brecciated layers, occupies almost the whole of Columbia, Rensselaer, and Washington Counties, and extends to the base of the Taconic range, which separates New York from Vermont and Massachusetts, and has an immense thickness. It crosses the Hudson above Newburg, and passes through Orange County into New Jersey. From the roofing-slate he defined Diplograptus simplex, and from the Taconic slate in Washington County Bythotrephis flexuosa, B. rigida, Palæochorda marina, Nemapodia tenuissima, Nereites deweyi, N. gracilis, N. jacksoni, N. lanceolatus, N. loomisi, N. pugnus, Myrianites murchisoni, and M. sillimani.

6. Black slate, forming, so far as he knew, the highest member of the Taconic System, and from which he defined *Elliptocephala asaphoides* and *Atops trilineatus*.

§ 40. He identified the Smithfield limestone in Rhode Island with the Stockbridge limestone, and an accompanying slate with the Magnesian Slate, and in Blackstone Valley found the brown sandstone and fine granular quartz. He recognized in the slates at Waterville, Maine, the Taconic Slate of New York, and found the Nereites at Kennebec. The fine roofing-slates on the Piscataqua he found subordinate to the Taconic Slate, in like manner as they exist in New York. And, jointly with Douglas Houghton, the Taconic System was found largely developed in the Upper Peninsula of Michigan; the slates of the formation with their fucoidal impressions and the granular quartz were both recognized. In 1846, he reproduced his work on the Taconic System in a book on the Agriculture of New York, with an appendix describing a conglomerate at the base, resting unconformably upon granite rocks.

§ 41. In this manner this geological subdivision was first determined, defined, and established, and it should have been recognized from that time forward. But others, much less informed, disputed the existence of the rocks, erroneously referred his fossils to more recent genera; and some, finding the same rocks, gave them differerent names, which added to the confusion, and seriously retarded the progress of knowledge respecting them. It may be later researches have not, in every respect, sustained his determinations, but Ford's work near Albany, New York, where the position taken by Emmons was most violently assaulted, has not only corroborated him, but has forever set the questions at rest in that locality. Wing, Dale, Marcou, and Dwight have sustained his assertions respecting the want of conformability of the Hudson River Slates with the Taconic. All the surveys of Michigan and Wisconsin have sustained him, though the geologists apply the later name, Huronian, to the Strata. His determinations of the rocks in North Carolina have been most fully confirmed by later geologists, though some use the word Huronian when referring to them.

teological Disic Mountains, ider the name he mountains nty-five miles, estchester, Coiole length of l a typical locks was given

dge limestone

gh crystalline

y coherent. miles, and obdoes not rest

former work, cks below the aurentian, and nore than two t be described ine and coarse g, however, of

upon the older of the Taconic k Hill between south part of am, and West-

le, and occurcommencing at and Columbia of the Housaont, and is well

n the Taconic ng the western

§ 42. In 1849, Alexander Murray, an assistant on the Geological Survey of

Canada, in the Report of Progress for the year 1847, described the rocks on the north side of Lake Huron, and constituting many of the adjacent islands, under the name of "quartz rocks and sandstones, conglomerates, slates, and limestones," and correctly identified them as resting unconformably upon the older granite and syenitic gneiss, and succeeded unconformably by the Potsdam, but he did not call them by any geological name. If he had read Emmons's "Taconic System," it is difficult to conceive why he should have hesitated in referring the rocks to that System. In the Report of Progress of 1856, he redescribed the rocks, under the name of the "Huronian Series," which was adopted by the officers of the Canadian Survey. without once mentioning the Taconic System. From that time forward authors have generally used the name Huronian, and have almost annihilated the name Taconic. The word Taconic, however, has priority over Huronian. It is equally appropriate, and the definition of the fossils in the Upper Slates at once furnished the means of tracing it and determining it at different and distant places. The word "Huronian" is, therefore, a synonym for Taconic, and comprehended, as used originally by the Canadian Geologists, substantially the same series of rocks, though not ascending quite so high.

§ 43. A section of the so-called Huronian, but more properly called the Lower Taconic, between Missisquoi and St. Mary's Rivers, in ascending order, is as follows:

1.	Gray quartzite	e, •	• •																		÷			500	feet.
2.	Greenish, red	-wea	the	rin	go	hl	or	iti	ic	an	d	ep	id	lot	\mathbf{ic}	şla	ate	es,					•	2,000	""
3.	White quartzi	ite, e	tc.,		•					• 1	ø	P,												1,000	"
4.	Slate conglom	erate	э, і			•	*			. '	۰.	•	•				:							1,280	"
5.	Limestone, .		• •	•	•	•	:	•	•											•		•		300	"
6.	Slate conglom	erate	e, e	tc.,								-,	•	£	3	ĥ.			•				•	3,000	"
7.	Red quartzite	, etc	., .	÷.										79	V.,									2,300	**
8.	Red jasper co	nglo	mei	rate	8,	et	c.,	,						`.		÷.								2,150	44
9.	White quartzi	te, e	tc.,					•								•								2,970	4.6
10.	Yellowish che	rt, e	tc.,			r																		400	" "
11.	White quartzi	ite, e	tc.,																					1,500	**
12.	Yellowish che	rt, e	tc.,			•					•	•												200	£ 6
13.	White quartzi	te,						•	•		•													400	""
											9	7													
	Total,								•		."	-	•	•										18,000	**

Another section adds to this one 4,000 feet, and even then the maximum thickness of the series in that locality has not been reached.

§ 44. Throughout the Huronian region, the whole series bears evidence of great disturbance, and is frequently cut with intrusive masses of greenstone, granite, or other igneous rocks. The more recent disturbances frequently bear metalliferous veins, which give to the country its value as a mineral region. Copper and iron are the chief minerals, and abound in nearly every section. Gold and silver sometimes occur. The Taconic of Michigan contains vast beds of iron ore. The ores are magnetic, red specular hematite and soft hematite resembling the brown hematite of other States. The magnetic and specular ores are the most prized, and usually contain from 60 to 70 per cent of iron, and hardly a trace of phosphorus or sulphur. (Phosphorus makes iron brittle when it is cold, and is therefore called cold-short, though it is malleable when hot, while sulphur makes it brittle when it is hot, and it is therefore called red-short.) The Lake Superior region is the chief locality of the world for native copper. It is so pure the aborigines manufactured it into implements. The copper-beaping rocks extend eastward along the s a narrow be extremity of associated wi Sometimes be sheets, string County, Wise though not y extends across diagonally the dish, metamon is a layer of largely used the south-wes quartizte occu

§ 45. Th may be traced south westwar lake and the distance in all area in the U thickness, ext Houghton; t complete a rep Minnesota. 1 including the thickness is m exceeds four h called the "¢ Keweenawan'f System the pr rocks appear b Nares and Feil § 46. In

The Canadian and called it only geographic Groups, which in descending (Group—if in f Emmons.placed from the exam clearly marked The Paradoxide and wherever fo culty exists in t the Potsdam, t

rocks on the ds, under the estones," and granite and e did not call System," it is) that System. e name of the dian Survey, ward authors ted the name It is equally nce furnished places. The nded, as used rocks, though

ed the Lower is as follows:

500	feet.
2,000	""
1,000	"
1,280	""
300	44
3,000	"
2,300	""
2,150	66
2,970	66
400	" "
1,500	" "
200	66
400	""
8,000	44
-,///	

ximum thick-

lence of great e, granite, or metalliferous pper and iron d silver some-

The ores are own hematite 1, and usually phosphorus or erefore called brittle when region is the he aborigines end eastward along the south shore of the lake for more than forty miles, then forming a narrow belt stretch in a north-east direction for about a hundred miles to the extremity of Keweenaw Point. The copper occurs in a rock called melaphyre, associated with beds of conglomerate, and appears to be interstratified with them. Sometimes bands of slate separate beds of melaphyre. The native copper exists in sheets, strings, and masses, and is sometimes associated with silver. In Ashland County, Wisconsin, the copper-bearing series has a thickness of more than four miles, though not very rich in the ore. The Taconic area in Minnesota is large. It extends across the northern border, and forming an elbow in the north-east extends diagonally through the State to the south-west corner. Here there is a hard, reddish, metamorphic sandstone, called the Sioux quartzite, interstratified with which is a layer of red indurated clay or pipestone, one foot thick, called Catlinite, largely used for the manufacture of pipes. The quarry is thirty miles north of the south-west corner of the State, and four miles east of the west line. The Sioux quartzite occurs in the north-west corner of Iowa.

§ 45. The geographical extent of these rocks in Canada is very great. They may be traced from near Lake Temiscaming 80 miles north-west of Lake Nipissing, south westward to Lake Huron, and from thence westward on the north shore of the lake and the north shore of Lake Superior, and on beyond Lake of the Woods, a distance in all of about 800 miles. They pass beneath the lakes and expose a large area in the Upper Peninsula of Michigan at Marquette and Menominee, and a great thickness, extending from the lowest to the highest Taconic, as first ascertained by Houghton; thence they pass into Wisconsin, exposing a large area and quite as complete a representation of the series, while another arm extends from Duluth into Minnesota. The thickness in Michigan is about four miles; but in Wisconsin, including the copper-bearing series, which is three-fourths of igneous material, the thickness is much greater; and even excluding the igneous material the thickness exceeds four miles. The upper part of the Taconic System in Wisconsin, formerly called the "Copper-bearing series," has received the unattractive name of the Keweenawan' formation, from the Keweenaw Point; but as it is part of the Taconic System the preferable name is the older one of the "Copper-bearing series." The rocks appear between Scoresby Bay and Cape Cresswell, in Lat. 82° 40' N., where Nares and Feilden called them Cape Rawson beds.

§ 46. In 1856 Emmons divided the System into Upper and Lower Taconic. The Canadian Geologists in 1863 placed his Upper Taconic in the Silurian System and called it "Lower Potsdam," which name therefore became a synonym. The only geographical names which have been used to subdivide the Upper Taconic into Groups, which seem in the present state of learning to be worthy of retention, are, in descending order, the Swanton Group, the Georgia Group, and the St. John Group—if in fact the latter is below the Georgia, and therefore not a synonym. Emmons placed the Stockbridge limestone in the Lower Taconic; but it would seem from the examinations made by others, that his division would have been more clearly marked if the Stockbridge limestone had been retained in the Upper Taconic. The Paradoxides beds at Braintree, Mass., in Newfoundland and New Brunswick, and wherever found on the continent, belong to the Upper Taconic. The same difficulty exists in the West, in separating the Upper Taconic from the overlying rocks of the Potsdam, that has led to so much discussion in the East; and the confusion is 26

increased by the addition of numerous synonyms—the ready weapon to which ignorance resorts.

§ 47. In 1863 G. F. Matthew named the rocks exposed at St. John, New Branswick, the "St. John Group." He described them as arenaceous, argillaceous, and carbonaceous shales, and clay slates; often sandy, with sandstone and quartzite, having a thickness of 4,500 feet, and having an exposure about 30 miles long and 4 miles wide. He collected *Paradoxides, Conocoryphe, Obolella, Orthis, Orthisina, Stenotheca, Hyolithes*, and *Lingula*. In 1865 he and Bailey and Hartt correlated these rocks with the slates of Vermont having *Elliptocephala asaphoides*, and the schistose beds at Braintree, Mass., holding *Paradoxides harlani*, and thus proved their "St. John Group" to be a synonym for Emmons's "Black Slate," in the Upper Taconic System. Furthermore, they identified the slates with some found in Newfoundland containing *Paradoxides* and *Conocoryphe*. Later they divided the Lower Taconic of New Brunswick, which they called Huronian, into the "Coldbrook Group," the "Coastal Group," and the "Kingston Group," and estimated the thickness as exceeding 10,000 feet.

§ 48. The Vermont Geologists in 1861 called the Black Slate, Taconic Slate, and Roofing-slate of Emmons the "Georgia Group." The name has priority over the "St. John Group," and if the Taconic System is to be divided into Groups with geographical names, and these three divisions of Emmons are to be thrown together in one Group, then they must under the laws of nomenclature bear the name of the Georgia Group. The Black Slate has, however, been called the Swanton Group, and if this name should become desirable then the Upper Taconic would be divided into the Swanton Group and the Georgia Group, and their maximum thickness in Vermont exceeds two miles. This division is that adopted by Perry, who has shown the Potsdam sandstone rests directly upon the Swanton Group, or Black Slate; as originally asserted by Emmons, and that both the Swanton Group and the Georgia Group are fossiliferous.

§ 49. The Taconic rocks extend from Canada East and Maine to Georgia and Alabama, flanking almost continuously the ranges of mountains upon both the eastern and western slopes. Their thickness in New Hampshire is over four miles, and in Vermont the maximum must exceed five miles. The slate belts of York and Lancaster Counties, Pa., and the rocks containing the valuable ores of nickel and copper belong to this System. There are five extensive outcrops in North Carolina, and three or four subordinate ones. They rest unconformably upon the belts of the exposed Laurentian, and very much resemble in their character the subdivisions in Vermont and New York. The largest outcrop is from twenty to forty miles wide, and extends quite across the State. The maximum thickness exceeds five miles. There are large outcrops in Virginia, South Carolina, Georgia, and Tennessee, and limited outcrops in Alabama. Gold, silver, copper, lead, iron, and other valuable minerals, occur in these rocks not only in veins, fissures, and dykes, but in seams following the stratification and as part of the sedimentary materials. In Northern Georgia gold exists in seams, with milky quartz, following the stratification of hornblende schists, and constituting as truly sedimentary rocks as the schists themselves do. The seams are stratified within the slaty sediments, and are of the same age as the Taconic System. These seams are so constant they characterize the slates or schists in the Appalachian System. They are metalliferous, and frequent also occur wi tuting part of cally inexhau iron ore distr is of this age very thick ve ore, containin and bearing numerous pla often exposing usually metal

§ 50. Th pass up into S coryphe, Anopol lithellus, Archae rocks, but the closed their ex from this rem to live to the velopment in single species separates it fre determination formability) in and the comm of the disintegr sents the washi in this system. bers (if the Po Group belong t author believes first order of an become extinct. very likely it v § 51. The

Keweenian, Ke whole basin of face area upon 18,000 square r with an estimate feet for the low the last having feet. The Cupr sive dykes. The sunk beneath th representing the

o which igno-

John, New argillaceous, ind quartzite, iles long and *is*, Orthisina, rtt correlated *ides*, and the proved their n the Upper ound in Newd the Lower "Coldbrook wed the thick-

aconic Slate, priority over Groups with own together name of the n Group, and divided into cness in Veras shown the ck Slate; as the Georgia

Georgia and on both the r four miles, elts of York res of nickel North Carooon the belts ter the subenty to forty ness exceeds Heorgia, and id, iron, and , and dykes, ry materials. ng the stratirocks as the ents, and are t they charnetalliferous,

and frequently auriferous, or cupriferous. The magnetic and specular iron ores also occur with the material of the slates as a deposit of the same age, and constituting part of the same system. This mineral wealth is so distributed it is practically inexhaustible. The Taconic appears in Missouri, Arkansas, and Texas. The iron ore district about Iron Mountain and Pilot Knob containing porphyry rocks is of this age, but the granite to the east is Laurentian. The ore is found in very thick veins in Iron and Shepard Mountain, and Pilot Knob. It is specular ore, containing between sixty and seventy-five per cent of iron, free from sulphur and bearing no more than a mere trace of phosphorus. The rocks appear in numerous places in the Rocky Mountain ranges from Mexico to British Columbia, often exposing great geographical areas and an immense thickness, and they are usually metalliferous.

§ 50. The genera, regarded as typical of the Taconic fauna, and which do not pass up into Silurian rocks, are Paradoxides, Microdiscus, Atops, Elliptocephala, Conocoryphe, Anopolenus, Bathynotus, Solenopleura, Acrothele, Salterella, Scenella, Iphidea, Hyolithellus, Archaeocyathus, and Ethmophyllum. There are some others peculiar to these rocks, but they are either obscure or limited in their distribution. Some genera closed their existence in Silurian time, others reached the Devonian age, and some from this remote period, as Orthis, Orthisina, Orthoceras, and Leperditia, continued to live to the Carboniferous, though Orthoceras reached its most remarkable development in the Black River Group, and Orthis in the Hudson River. Not a single species belonging to the Upper Taconic system crossed over the line that separates it from the Potsdam Group of the Lower Silurian, so far as any reliable determination has thus far been made. This, supported as it is by a want of conformability) indicates a vast lapse of time between the deposit of the Upper Taconic and the commencement of the Potsdam period. The Taconic is composed in part of the disintegrated materials of prior Laurentian rocks, while the Potsdam represents the washings of the Laurentian and Taconic. The order Graptolida appeared in this system, and reached its maximum development of genera, species, and numbers (if the Point Levis beds referred by the Canadian Geologists to the Quebec Group belong to the Upper Taconic, as claimed by Marcou and others, and as the author believes), and became extinct in the Upper Silurian System. This is the first order of animal life to reach the highest stage of its existence, and the first to become extinct. It is referred to the class Hydrozoa, but if more was known of it, very likely it would form a distinct class.

§ 51. The Cupriferous series of the lake region, called also the Keweenaw, Keweenian, Keweenawan, and Nipigon series, is supposed to underlie nearly the whole basin of Lake Superior, or an area of about 28,000 square miles, and a surface area upon the borders of the lakes and their immediate vicinity of about 18,000 square miles. This series has been divided into an upper and lower division, with an estimated maximum thickness of 15,000 feet for the upper division, and 35,000 feet for the lower, which rests upon the slates and quartzites of the Taconic System, the last having a variable thickness that reaches a maximum of at least 22,000 feet. The Cupriferous series consists of eruptive flows and detrital rocks, with massive dykes. The region was, in Taconic days, represented by a volcano, which has sunk beneath the waters of the lake. The flows were followed by detrital rocks, representing the intervals of time between them; but these detrital rocks are com-

SILURIAN SYSTEM.

posed largely of conglomerate layers and large-sized pebbles, indicating strong currents of water. The flows visible upon the borders of the lakes were forced through fissures by volcanic energies. The copper which occurs in the conglomerates, amygdaloids, epidote veins, and otherwise, is supposed to have been precipitated from water holding it in solution, or leached from detrital rocks where it was originally deposited in a sulphureted form. R. D. Irving, who has studied closely the copper-bearing rocks of this region, says the explorer for transverse veins should bear in mind that epidote, prehnite, and chlorite are favorite associates of copper, while laumonitic veins, and those bearing a predominating quantity of calcite, are not so rich; that a wide vein in amygdaloidal or other soft rock will pinch to a mere seam within the massive and compact layers; and in sandstone and conglomerate deposits the valuable belts have been found where the conglomerate is overlaid with trap, or in sandstone very rich in basic detritus. Any of the conglomerate seams from Keweenaw Point to Minnesota may be cupriferous. All of the upper division of the series is noncupriferous, except the Nonesuch sandstone belt in the Porcupine Mountains; and all the belts and areas of acid rocks, such as the central area of the Porcupine Mountains, and the great spread of red rock in the Brulé Lake country in Minnesota, and all belts and areas of coarse-grained basic rocks, such as the great area of coarse gabbro in the Bad River region in Wisconsin, and the similar area which occupies the belt of country from Duluth to Brulé Lake, are also noncupriferous. The slates and quartities of the Taconic System which lie below the Cupriferous series on the north shore of Lake Superior, have been called the Animikie Group. About three-fourths of the great thickness of the rocks is referred to volcanic overflows, and does not, therefore, belong to the geological column, the whole of which is the result of sedimentary deposition.

CHAPTER IV.

SILURIAN SYSTEM.

§ 52. IN 1833, Sir R. I. Murchison, in a memoir read before the Geological Society of London, divided the fossiliferous rocks below the Devonian into six Groups. He founded this subdivision upon the fossils, and mentioned such species as were then defined. This was followed in the succeeding year by other memoirs, and in 1835 he concluded all these Groups might be placed in one System, and in honor of the ancient tribe of Silures, who inhabited Wales, he named it the Silurian. He placed three Groups in the Upper Silurian, and three in the Lower Silurian. Before this time no knowledge of the order of the strata had been ascertained, and hence he is entitled to the gredit of the name. Subsequently palæontologists found his discoveries were world-wide in their application, and it was not long until the distinction between the Upper and the Lower Silurian had been observed in North America, and the base of the Lower Silurian in the Medina sandstone.

§ 53. Some years later, the word Cambrian was applied in England to the rocks which belong to the Lower Silurian, and to inferior strata which are the equivalent in part of but in the hig was never we breaks in geole No careful geo strata, though times we see su

§ 54. The the following Trenton, Utica ing order, into Helderberg.

§ 55. Prof of New York for and proposed for described quite gists in 1863 ca is a granitic con ure, are sometin veloped in the d composition is compact layers, slaty sandstone, Calciferous, at gradual into the 200 feet. The to Lake Champ § 56. It/ex

ranging from 3(with magnesian more diversity in sometimes occur and fills up inecrests unconforms to have been de and wind marks Lake Huron an variations in thiagain thins out t Canada, the strawhich the tracks ripple-marked.

marks, and the s as to show the di dant in the upp

POTSDAM GROUP.

ng strong curpreed through ierates, amygipitated from was originally sely the cops should bear copper, while te, are not so ch to a mere conglomerate te is overlaid conglomerate of the upper ne belt in the as the central in the Brulé 1 basic rocks, Visconsin, and Brulé Lake, System which or, have been ckness of the to the geolog-1.

> he Geological onian into six d such species ther memoirs, system, and in ed it the Siluin the Lower ad been ascerntly palæontolnd it was not rian had been sen recognized n the Medina

id to the rocks re the equivalent in part of the Taconic System. It was not used in the sense of a "Group," but in the higher sense of a "System," as these words were then understood. It was never well defined, and it crossed one of the grandest and most important breaks in geological time—that which separates the Taconic and Silurian Systems. No careful geologist or palæontologist uses the word in the nomenclature of American strata, though it occasionally occurs in incoherent geological papers, and sometimes we see such monsters in nomenclature as Cambro-Silurian and Siluro-Cambrian.

§ 54. The Lower Silurian in North America is divided, in ascending order, into the following Groups: viz., Potsdam, Calciferous, Quebec, Chazy, Black River, Trenton, Utica Slate, and Hudson River. The Upper Silurian is divided, in ascending order, into the Medina, Clinton, Niagara, Onondaga, Guelph, and Lower Helderberg.

POTSDAM GROUP.

§ 55. Prof. Ebenezer Emmons, in the Annual Report of the Geological Survey of New York for 1838, described the sandstone at Potsdam in St. Lawrence County, and proposed for it the designation "Potsdam Sandstone." It was subsequently described quite fully in the New York Reports, and finally the Canadian Geologists in 1863 called the rocks the Potsdam Group. The lowest portion at Potsdam is a granitic conglomerate, in which large masses of quartz, the size of a peck measure, are sometimes inclosed. These were water-worn and rounded before being enveloped in the deposit. The sandstone is quite variable in texture and color, but its composition is uniformly silicious. At some places it is an even-grained mass in compact layers, and at others it is traversed by joints. In some localities a dark, slaty sandstone, about ten feet in thickness, intervenes between the Potsdam and Calciferous, at others a coarse brecciated rock, and at others the passage is very gradual into the Calciferous sand-rock. The thickness in New York is from 100 to 200 feet. The exposure is narrow, but extends from near the Thousand Islands to Lake Champlain, and enters Vermont with a thickness of about fifty feet.

§ 56. It/extends from New York into Canada, where it attains a thickness ranging from 300 to 700 feet, and at the summit the sandstone is interstratified with magnesian limestone that constitutes a passage to the Calciferous. There is more diversity in the rocks in Canada than in New York, and limestones and slate sometimes occur with the sandstone. It rests unconformably upon the Laurentian, and fills up inequalities where the Taconic System does not intervene, and it also rests unconformably upon the Taconic when it is present. The sandstone appears to have been deposited in shallow water along the margin of a sea. The tracks and wind marks support that view. In its extension westerly, by the way of Lake Huron and Lake Superior, across Wisconsin and into Minnesota, the same variations in thickness occur. Sometimes it attains a thickness of 3,000 feet, and again thins out to 40 or 50 feet. For several miles in distance near Beauharnois, Canada, the strata are marked by the tracks of *Protichnites*. The surfaces on which the tracks are impressed are sometimes smooth, and sometimes beautifully ripple-marked. On the latter the tracks have often beaten down the ripplemarks, and the sand of the ridge has been dragged into the furrow, in such a way as to show the direction in which the animal was progressing. Fucoids are abundant in the upper part of the Group, and Scolithus so common as to be quite

characteristic, and near St. Genevieve the rock is completely honey-combed with it to the depth of three feet.

§ 57. It is largely distributed in Northern Michigan, and striking into Wisconsin north of Green Bay gradually widens southerly as a surface rock, until it reaches the central part of the State, where it has a width of 100 miles. It then curves northwardly and enters Minnesota, forming the high hills on the Mississippi River. It is unconformable with the rocks below, and rests upon an exceedingly irregular surface, sometimes filling depressions in the quartzite or metamorphic rocks of several hundred feet. Its upper surface is uniform, and graduates into the Calciferous Group or the Lower Magnesian limestone, as the rocks in these States are called. The exposed area in Wisconsin is about 12,000 square miles, the thickness very irregular by reason of the great depressions and elevations at the base, and the maximum thickness is fully 1,000 feet. The rock is chiefly composed of cemented grains of silicious sand, but presents several varieties, as the calcareous, argillaceous, ferruginous, and green sand, and the waters issuing from it in places contain a small percentage of lime salts. In the argillaceous class the clayey material becomes so abundant as to render the rock shaly, and so impervious to water that valuable springs occur at its upper exposed surface. In the calcareous class the lime becomes so great in some layers that they are more properly limestones than sandstones, and so associated with magnesia that they become arenaceous dolomites. In the ferruginous class, at one extreme, the amount of iron oxide is barely sufficient to color or cement the mass, and at the other so great as to make an iron ore. In the green sand there are two classes, one in which the grains are colored by iron, and the other consisting of deep green grains of glauconite. The green sand is not restricted to the Potsdam in Wisconsin, for it also occurs in the Calciferous and St. Peter's Sandstone. It is almost identical with the Cretaceous green sand of New Jersey, and similar deposits in existing seas. The surface area in Michigan, Wisconsin, Iowa, and Minnesota is estimated at 25,000 square miles, which is about half the surface area on the continent; but it is generally believed to exist under many of the more recent deposits, and, therefore, to cover several hundred thousand square miles. Springs and streams of soft water are abundant where it forms the surface rock, and a good supply of soft water has been found wherever it has been penetrated with the drill; its existence, therefore, becomes a question of much economical interest where a supply of good water is desired from artesian boring. The drill has never reached it in Ohio, though a supply of good water is imperatively demanded in some parts of the State; and it is to be hoped an effort will be made to determine whether it exists below the Calciferous, which has been reached with the drill many times.

§ 58. It is exposed at numerous places in the Appalachian System from New York to Tennessee. In New Jersey it reaches a thickness of 3,000 feet, and if both the Chilhowee sandstone and Knox Group in Tennessee belong to it, it has a thickness of 9,000 feet, but probably 5,000 feet of this belongs to the Taconic. In the southern and south-eastern counties of Missouri it has a thickness of 700 feet. It appears in several counties in Northern Texas, along the margins of the Big Horn, Laramie, and Wind River ranges, at the Black Hills, and in other regions of the Rocky Mountain System from Mexico to British America. The erosion by water and weathering has left picturesque scenery in the sandstone at many places. The " Pictured Roc " Chasm of the

§ 59. Ever from the adjace and schists, resu tains ripple-mar evidence shallow not have one ty climate was diffe ence of land and prevailed over g Dicellocephalus m somewhat charac slowly deposited ity, indicating a is no doubt that time the sand w dam age has bee

§ 60. This lime and fine gra contains calcite a taining beds of r defined by Vanu He united the sil fucoidal layers in cious, magnesian, They pass from co ties lined with ci sessed of a single Middleville and 1 contain a fluid or structure of the r structure, as in a Counties.

At Chazy the

1. Silico-calca feet; fossils rare ε

2. Limestone

3. Dull, gray

4. Cystidean 15 feet. ombed with it

g into Wisconrock, until it niles. It then the Mississippi in exceedingly morphic rocks uates into the n these States 3, the thickness base, and the d of cemented s, argillaceous, ices contain- a material beto water that eous class the mestones than ous dolomites. is barely suffice an iron ore. olored by iron, en sand is not ferous and St. 1 sand of New Michigan, Wish is about half st under many iousand square ms the surface een penetrated omical interest drill has never demanded in

to determine with the drill

rom New York nd if both the has a thickness In the southit. It appears [orn, Laramie, of the Rocky by water and places. The

CALCIFEROUS GROUP.

"Pictured Rocks" of Lake Superior, the "Dalles" of the Wisconsin, and the "Chasm of the Au Sable" in New York are examples.

§ 59. Everywhere it is essentially an accumulation of sandstone and pebbles from the adjacent Laurentian gneisses, granites and svenites, and Taconic quartzites and schists, resulting from the disintegrating influences of air and water. It contains ripple-marks, wave-lines, mud cracks, animal tracks, and worm burrows, which evidence shallow seas and shore lines. The continent at the time of its deposit did not have one twentieth its present area. There is nothing known to indicate the climate was different then from what it is now, except so far as the relative differs ence of land and water surface would necessarily change it. Some species of fossils prevailed over great areas, as Hyolithes primordialis, Lingulepis pinniformis, L. prima, Dicellocephalus minnesotensis, D. osceola, and Ptychaspis minuta, and therefore become somewhat characteristic of the Group. Though composed almost wholly of sand it was slowly deposited. The sandstone is frequently charged with fossils to its full capacity, indicating a formation almost as slow as marine limestone is now made. There is no doubt that Calcareous mud was forming in the depths of the ocean at the same time the sand was deposited nearer the shore, but no limestone group of the Potsdam age has been found, unless it exists in the Eureka district of Nevada.

CHAPTER V.

CALCIFEROUS GROUP.

§ 60. This name was first applied by Prof. Eaton to a gray rock consisting of lime and fine grains of sand, so intimately blended as to appear homogeneous. It contains calcite and a sparkling surface, but passes into a carbonate of lime, containing beds of magnesian limestone and a small amount of iron. The Group was defined by Vanuxem in 1842, in the Geology of the Third District of New York. He united the silicious layers above the Potsdam, the calciferous sand-rock, and the fucoidal layers in one Group. The rocks consist in general of three varieties—silicious, magnesian, and carbonate of lime, with intermediate grades of composition. They pass from compact to granular, and granular to porous, the latter having cavities lined with crystals of quartz, calcareous spar; or, instead of being lined, possessed of a single beautiful perfect crystal of limpid quartz, nearly filling the space. Middleville and Little Falls are noted localities for these crystals, some of which contain a fluid or anthracite, which enhances their value as cabinet specimens. The structure of the rock is often oolitic, passing into thick layers having a concretionary structure, as in agate. The typical localities are in Montgomery and Herkimer Counties.

At Chazy the following ascending section occurs:

1. Silico-calcareous beds, more or less interspersed with sparry masses, 30 to 35 feet; fossils rare and cherty.

2. Limestone, in which the plates of Cystideans abound, 20 feet.

 Dull, gray, earthy mass, without fossils, and passing into colitic beds, 10 feet.
 Cystidean limestone, similar to the first though of a brighter red color, 15 feet.

CALCIFEROUS GROUP.

5. Massive earthy and silicious limestone containing trilobites, 20 feet, followed by beds of similar character of greater thickness containing brachiopods.

6. Red Cystidean limestone, susceptible of a fine polish, 15 feet.

7. Drab-colored, thin-bedded, earthy magnesian beds, suitable for hydraulic lime, of considerable thickness; fossils rare, except fucoids. Aroward the top of the rock it is blue and frequently cherty, oolitic, and concretionary, the upper masses from 20 to 30 feet thick.

§ 61. The Group is persistent, and surrounds the irregular dome of Laurentian rocks, which form the northern highlands of New York, in a belt, overlying the Potsdam. It is chiefly a hard calcareous sandstone or arenaceous limestone, resting upon the margin of the Potsdam sandstone, from Lake Ontario eastwardly to Vermont, and from New Jersey north, near the line of New York and Vermont, into Canada. It forms a narrow belt of surface exposure, with a variable thickness from 50 to 350 feet. Lake Champlain has cut a channel through it for twenty miles. In Canada, adjacent to New York and Vermont, it is, in the lower part, a dark, bluish-gray, crystalline, strongly coherent dolomite or magnesian limestone, and in the upper part a bluish-gray, calcareous argillite, but its characters are different in different localities. It is usually found as a narrow belt following the sinuosities of the Potsdam Sandstone, from west of Lake of the Woods to the Atlantic sea-board; but where the rocks have been disturbed by volcanic energies it may be absent or difficult of detection. The surface area of its distribution in Canada is several thousand square miles, and in its undisturbed condition the maximum thickness rarely exceeds 450 feet, though in Newfoundland, where it is a definitely stratified dimestone, it has a thickness of more than 2,000 feet. In the region of the Mingan Islands, in the Gulf of St. Lawrence, the fossil casts and shells are in a good state of preservation.

§ 62. In Northern Michigan and on the Menominee and Escanaba it preserves its New York characters in a remarkable degree, although its thickness may not exceed 50 feet. The upper portions are highly calcareous, and on fresh fracture show the peculiar granular structure so characteristic in New York. It is thinbedded, and contains small cavities lined with crystals of calc-spar, quartz, or hornblende. The surfaces of the layers are often covered with fucoidal impressions. From St. Mary's River westerly to the Wisconsin and the Mississippi there is a gradual augmentation in the thickness of the rocks and a material change in their composition. The Group enters Wisconsin from Michigan a few miles from Green Bay, and striking south-west upon the border of the Potsdam it forms a serrated margin from five to fifteen miles in width, until it reaches the streams that flow into the Mississippi in the south-western part of the State, where it is exposed upon some of the streams for a distance of 75 or 100 miles. It crosses the Mississippi and the north-eastern corner of Iowa, appearing in the bluffs and hills more conspicuous than the Potsdam, though not so thick, because it is a much firmer rock. It is a buff-colored dolomite, without uniformity of texture or stratification, and weathers into rough, bold, and often picturesque fronts along the valleys, and has a thickness of about 250 feet.

§ 63. From Iowa the area of exposure is a little west of north through Minnesota, reaching as far west as the second tier of counties from the Mississippi and following the bluffs with limited outcrops in Wisconsin to Lake Pepin, north of

which and east Wisconsin. It it is covered w cropping out fr mouth of the V consin, Iowa, an conformable wi surface is undu distances into e sea. These ui elapsed before t frequently calle called it the Sha ing that Indian to a serviceable sand. The dol talline forms, a abundant, excer and the amount cent. The diffe face rocks to pre by weathering, a

§ 64. The (Missouri, where with an intermed order, of the " "Third Magnesi earthy magnesian with occasionally cellular, silico-ma Osage and its tr It is often a lead. feet, though on brownish sandsto ness, though som ness rarely excee of intercalated cl bedded, coarsely chert-beds. It is and is frequently feet high. The (caves, or dissemin times in masses (ayers of limesto other places ban heavy spar (sulph t seldom exceeds

 $\mathbf{32}$

CALCIFEROUS GROUP.

0 feet, followed ods.

e for hydraulic the top of the upper masses

of Laurentian , overlying the nestone, resting wardly to Ver-Vermont, into

iable thickness it for twenty e lower part, a sian limestone, racters are dif-: following the ods to the Atnic energies it distribution in lition the maxi-

where it is a feet. In the ossil casts and

aba it preserves kness may not fresh fracture rk. It is thinjuartz, or hornal impressions. ppi there is a change in their les from Green

1 through Min-Mississippi and Pepin, north of

which and east of the St. Croix it forms the surface of nearly two large counties of Wisconsin. It follows the Mississippi north of Minneapolis for several miles before it is covered with later formations. The conspicuous perpendicular walls of rock. cropping out from the hills and bluffs along the Mississippi from the St. Croix to the mouth of the Wisconsin, belong to this Group. Throughout the exposures in Wisconsin, Iowa, and Minnesota, it is conformable with the underlying Potsdam, and unconformable with the overlying rocks. The lower surface is plane, while the upper surface is undulating, and in some instances the undulations are said to swell in short distances into elliptical domes, rising 100 feet above their bases, like billows on the These undulations are the work of denudation during the interval that sea. elapsed before the deposition of superimposed strata. The Group in Wisconsin is frequently called the Lower Magnesian limestone, and some one in Minnesota has called it the Shakopee Group, because the stone has been quarried at a village bearing that Indian name. The Magnesian limestone is usually sufficiently pure to burn

to a serviceable quicklime. The chief impurities are quartz, clay, iron, and green sand. The dolomite occurs in the earthy, granular, crystalline, and crypto-crystalline forms, and chert is irregularly distributed. Argillaceous material is not abundant, except in shaly bands, where it may constitute 20 per cent of the whole: and the amount of silica disseminated through the rock varies from 1 to 10 per cent. The difference in the composition and hardness of the layers causes the surface rocks to present great irregularities, which are much enhanced and exaggerated by weathering, and hence outliers have a rough and often grotesque exterior.

\$ 64. The Group is displayed in grand proportions in the southern counties of Missouri, where it consists of an upper and lower division of magnesian limestone with an intermediate division of sandstone. These received the names, in descending order, of the "Second Magnesian limestone," the "Second Sandstone," and the "Third Magnesian limestone." The upper division is generally composed of beds of earthy magnesian limestone, interstratified with shale-beds and layers of white chert, with occasionally thin beds of white sandstone, and near the lower part thick, cellular, silico-magnesian limestone-beds. It constitutes many of the bluffs of the Osage and its tributaries, and also of the Missouri from Osage to Jefferson City. It is often a lead-bearing rock, as in Cole County. The thickness rarely exceeds 200 feet, though on the Meramec it is 300 feet. The middle division is usually a brownish sandstone, stratified in firm, regular beds from 2 inches to 3 feet in thickness, though sometimes friable. The surfaces are often ripple-marked. The thickrms a serrated ness rarely exceeds 150 feet. The upper part often occurs in thin strata with beds hat flow into the of intercalated chert abounding in fossils. The third division is generally a thickd upon some of bedded, coarsely crystalline, bluish-gray magnesian limestone, with occasional thick issippi and the chert-beds. It is the chief lead-bearing rock of South-east and Southern Missouri, pre conspicuous and is frequently exposed along the streams in **bold** escarpments from 200 to 300 rock. It is a feet high. The ores of lead, zinc, copper, nickel, and cobalt, occur in fissures and , and weathers caves, or disseminated in small masses in the limestone itself. The lead occurs somehas a thickness times in masses of galena accompanied with copper pyrites disseminated through avers of limestone, while the ores of nickel and cobalt occur in clay slate. At other places bands of red clay inclose calamine (silicate of zinc), galena, and heavy spar (sulphate of baryta). The maximum thickness is about 600 feet, though t seldom exceeds 300 feet. The maximum thickness of the three divisions is more

than 1,000 feet, but the Group at no single locality displays so great a thickness. From Missouri the Group extends southerly across Arkansas into San Saba, Llano, McCulloch, Menard, Mason, and Lampasas Counties, in Texas, where the maximum thickness is more than 400 feet. It is exposed in narrow belts in the Appalachian chain from New York and New Jersey to Tennessee and Georgia, but has not been very clearly distinguished in the mountain regions of the West.

§ 65. It is said this Group in some localities graduates into the Quebec; but on the other hand it is claimed the Quebec belongs to the Taconic System, and is below the Potsdam. It is certain many of the rocks referred to the Quebec Group belong to the Taconic, and some of them may belong to the Calciferous or the Chazy, or may form passage beds from one to the other. The oldest known Lamellibranchiata are found in this Group. Among the fossils having the greatest distribution, and which are most characteristic, we may mention Ophileta complanata, O. uniangularis, Holopea turgida, H. dilicula, and Orthoceras primigenium. Pleurotomaria canadensis and Leptena barabuensis occur in this Group and in the Potsdam-Pleurotomaria calcifera, P. postumia, Holopea dilicula, Helicotoma perstriata, Maclurea matutina, M. sordida, Eccyliomphalus canadensis, Camarella calcifera, Lingulella mantelli, L. irene, Amphion salteri, Bathyurus cordai, B. conicus, and Asaphus canalis have been described from this Group and from the Quebec. These identifications may well be doubted, unless the rocks containing all these species really belong to the Calciferous.

CHAPTER VI.

QUEBEC GROUP.

§ 66. THE Quebec Group was first characterized and its position between the Calciferous and Chazy asserted, upon paleontological evidence, in 1862, by Prof. Billings. His position was supported by the Canadian Geology in 1863, and in Decade 2 of a later date. The limits of the Group are still a subject of discussion, and part of the rocks originally referred to it belong to the Upper Taconic; but another part of them may form passage beds from the Calciferous to the Chazy, and occupy a position which warrants the name of an independent Group. The name was derived from the city of Quebec, where it was subdivided into the Levis, Lauzon, and Sillery divisions. The Levis was named from Point Levis, where it is fossiliferous, and has a thickness of 6,145 feet; the Lauzon from Lauzon, where its thickness is 4,000 feet, and it is non-fossiliferous; and the Sillery from Sillery Cove, where it is 2,000 feet thick and almost barren of fossils. The Lauzon division is below the Levis, and, from fragments of fossils found in pebbles, it has been since ascertained that it belongs to the Upper Taconic. A great fault at the Island of New Orleans and another near the Falls of Montmorency, with lesser faults, are said to account for the erroneous reference of this division to the Quebec. It was supposed at one time that the Sillery and Lauzon were upper members of the Quebec Group; but both of them belong to the Upper Taconic.

§ 67. The Group has been traced from Vermont to Newfoundland, a distance of 1,000 miles, and the Levis division noted at several localities, where it consists of a variety of shales, with some sandstones and conglomerates, distinguished by

the general black graptolitic shales 1,000 feet of ser black slates and division. Serper be undiscovered and therefore the be an erroneous may be found in the trilobites des primordial or T examine the rock of the learning should be retain undoubtedly does East from which that which belon Lower Silurian n in the Calciferou the rocks referre belong to the Up

§ 68. The G at Pogonip Mou where the Calcife onip mountain-be beds of the Potso termined beds of *Acrotreta gemma*, *C. unisulcatus*.

§ 69. In this animal kingdom clining, and final of the Upper Ta Group, and bec of these forms s distinguished in . Group is said to and Asaphus cana mon to all the G

§ 70. This C lines of separation sage-beds occur w conformability so geographical surfi System, and to su vast period of tin animals, and by

QUEBEC GROUP.

35

t a thickness. Saba, Llano, the maximum Appalachian t has not been

hebec; but on , and is below uebec Group iferous or the oldest known g the greatest eta complanata, ium. Pleurotothe Potsdamiata, Maclurea va, Lingulella saphus canalis identifications ally belong to

between the 362, by Prof. 1863, and in of discussion, **Faconic**; but to the Chazy, Group. The to the Levis, evis, where it auzon, where from Sillery The Lauzon ebbles, it has t fault at the 1 lesser faults, Quebec. It embers of the

id, a distance ere it consists inguished by the general black or dark color. In Newfoundland the Levis division consists of graptolitic shales, having a thickness of 4,000 feet, which are followed by about 1,000 feet of serpentines and diorites referred to the Lauzon division; and these by black slates and limestones, having a thickness of 4,000 feet, referred to the Sillery division. Serpentines, diorites, and slates sound like Upper Taconic, and it may be undiscovered faults have given rise to an erroneous determination of the order, and therefore the so-called Lauzon and Sillery may be below the Levis; or it may be an erroneous identification of the Lauzon and Sillery; and yet the true solution may be found in the fact that all three divisions belong to the Upper Taconic, for the trilobites described by Billings, from these rocks in Newfoundland, have a primordial or Taconic aspect. The author has never had an opportunity to examine the rocks of the Quebec Group, but an examination of the present state of the learning respecting it, makes it very doubtful whether or not the name should be retained. If the Group belongs to the Taconic System, as most of it undoubtedly does, possibly the name should be retained. If that part of it in the East from which Calciferous fossils have been obtained, constitutes all of it except that which belongs to the Taconic, then probably the name should be stricken from Lower Silurian nomenclature, and the part containing such fossils should be included in the Calciferous Group, in which event the Chazy Group would include some of the rocks referred to the Quebec in the Western mountains, and the rest would belong to the Upper Taconic.

§ 68. The Quebec Group has been recognized in the Wahsatch Range, in Utah, at Pogonip Mountain, Nevada, and other places in the Western mountain chains, where the Calciferous and Chazy have not been distinguished from it. In the Pogonip mountain-beds the following species are said to pass from clearly distinguished beds of the Potsdam Group up three or four thousand feet into as certainly determined beds of the Quebec Group, viz.: Lingulepis maera, L. minuta, L. manticula, Acrotreta gemma, Agnostus communis, A. bidens, A. neon, Crepicephalus haguei, and C. unisulcatus.

§ 69. In this Group we find the first illustration of an important branch of the animal kingdom reaching its highest stage of development, and subsequently declining, and finally becoming extinct. The first known *Graptolites* appear in slates of the Upper Taconic System, and reach the climax of evolution in the Quebec Group, and become extinct in the Upper Silurian era. The development of these forms seems to have been wonderful. About thirty genera have been distinguished in America, and to these have been referred about 170 species. The Group is said to be connected specifically with higher Groups by *Maclurea atlantica* and *Asaphus canalis*, that occurrin the Chazy, and by *Leptana sericea*, which is common to all the Groups in some of its varietal forms as high as the Clinton.

§ 70. This Group/is said to graduate up into the Chazy without lithological lines of separation, and without an abrupt break in the chain of fossils. Clear passage-beds occur where the Groups are well developed, and even where there is nonconformability some fossil species are said to be common to the two Groups. The geographical surface distribution is confined to limited areas east of the Appalachian System, and to small exposures among the Western chains; but it must represent a vast period of time, as evidenced by the great development and evolution of its animals, and by the erosion of the Cakcifarous where; it does not exist.

CHAZY GROUP.

§ 71. Bitumen, or mineral pitch, is a product resulting from the distillation of vegetable and animal matter within the earth. It has a pitch-like odor, and burns with a bright flame without any ash, and varies from liquid naphtha to solid asphaltum. Naphtha is a nearly colorless fluid, having a pungent smell, that issues from the rocks in Persia. Its specific gravity is about 7-10, and by exposure it loses its transparency and odor, and acquires a yellowish or brown color, becomes thicker and heavier, and approaches petroleum. Petroleum is so called from exuding as an oil from the rocks. Its specific gravity is 87-100, and by exposure to the air and the application of heat it may be converted into asphaltum. Asphaltum was so named from a lake in Judea, where it rises in a liquid form to the surface of the water and then hardens. Its specific gravity varies from 1.07 to 1.65. It is quite brittle and electric, though coal is not. Bituminous matter occurs in the limestones and dolomites of the Quebec Group, and the odor may be detected in many places by striking or heating the rocks. A black, combustible, coal-like matter is found with crystals of bitter spar and quartz, sometimes coating the crystals or the walls of cavities, and at other times in the form of buttons or drops, evidently having been introduced in a liquid state and subsequently hardened. It fills veins and fissures in limestones, shales, and sandstones, and even in the trap-rocks which traverse these. It is very pulverulent, brittle, of a shining black color, and yields from ten to twenty per cent of volatile matter. It approaches anthracite in its characters. The volatile matter is a hydrocarbon gas. It has resulted from the slow alteration of liquid bitumen in the fissures of the strata. The bitumen was derived from marine vegetation or marine animals, which underwent a special mineralization, producing the bituminous matter instead of coal. It is due to chemical reactions, by which it retained a greater proportion of hydrogen in its combination than would have been retained if it had been converted into coal.

CHAPTER VII.

CHAZY GROUP.

§ 72. THE Chazy Group was first defined in the Report of the Second District of New York in 1842, by Prof. Emmons, under the name of the Chazy limestone. The name was derived from the town of Chazy, where it has a thickness of 130 feet, reposes unconformably upon the Calciferous, and is succeeded by the Birdseye limestone. It is a dark, irregular, thick-bedded limestone, containing many rough, flinty, or cherty masses, and extends as a belt into Vermont, where it exposes more surface area than any other Group of the Lower Silurian, and has a maximum thickness of 300 feet. It was called the "Chazy Formation" in the Geology of Canada for 1863, because shales and sandstones are there associated with the limestone. It occupies a narrow area about the Ottawa and Montreal, and extends to the Mingan Islands and Newfoundland, its thickness not exceeding 300 feet. The western extension of the belt appears in cliffs on the coast of Lake Winnipeg, in the region of Lakes Huron and Superior, in Michigan, Wisconsin, Iowa, and Minnesota. In the lake region it consists of arenaceous and arenaceocalcareous beds, lowed by beds o § 73. In 14

the river of tha ally made up of occupies part of forms the base at the Falls of erous, fills up tl the lower part t the Calciferous yellow, friable of ferruginous cem posed to be due surface there is yellow or red by larly. The outl or painted rocks. the Calciferous; ally ripple-mark layers, but the o absence of fossils

§ 74. Prof. are derived in th particles of quar talline minerals. tion, and occupie ready taken shap about the crystal in its own crystal reduced to earth grains. By the a of the waves in c and finally depos worn into somew The angularity, h crystals, but is d inal crystalline r quartz, which in sandstone itself se they have been questionable, and and fragments of their characteristi

§ 75. It occubanks, stretching north-eastern bord
CHAZY GROUP.

calcareous beds, sometimes difficult to distinguish from the Calciferous layers, followed by beds of argillo-calcareous composition.

§ 73. In 1852 David Dale Owen called it the "St. Peter's Sandstone," after the river of that name, now sometimes called the Minnesota River, where it is usually made up of grains of limpid and colorless quartz, remarkable for whiteness. It occupies part of the slope between the first and second terrace at Prairie du Chien, forms the base of the bluffs at the St. Peter's, and the lower nineteen feet at the Falls of St. Anthony. It rests upon the billowy surface of the Calciferous, fills up the depressions, and is followed conformably by the Trenton. In the lower part there is some shaly material and conglomerate matter washed from the Calciferous and older rocks, but above this it is a remarkably uniform, white or yellow, friable quartzose sandstone, substantially free from silt and calcareous or ferruginous cement. There are oblique and discordant lines of stratification, supposed to be due to the shifting of the waves during deposition, and near the upper surface there is more or less argillaceous material. In some localities it is tinged vellow or red by the oxides of iron, and cemented in streaks, and weathers irregularly. The outliers and standing rocks are brightly colored, and are called pictured or painted rocks. The thickness will exceed 200 feet where filling a depression in the Calciferous; but the average thickness does not exceed 100 feet. Occasionally ripple-marks, fuccidal impressions, and tubes of Scolithus occur in the harder layers, but the only fossil yet described from this region is Lingulepis morsei. The absence of fossils is due to want of preservation.

§ 74. Prof. T. C. Chamberlin says the constituent grains of sand in this Group are derived in the main from granitoid and schistose rocks, which are composed of particles of quartz intermixed with a variety of softer and more decomposable crys-In the metamorphism the quartz was usually last in crystallizatalline minerals. tion, and occupied the angular interstitial spaces between the crystals that had already taken shape, and hence while crystalline in internal structure it molded itself about the crystals of the previously formed minerals. It was thus angular, but not in its own crystalline form. Upon decomposition the associated minerals were mainly reduced to earths and clays, while the undecomposable quartz remained in angular grains. By the action of streams in carrying these down to the sea, and by the agency of the waves in distributing them, the grains were sifted, assorted, rolled, rounded, and finally deposited in the forms in which we now find them. The majority are worn into somewhat spherical grains; others less acted upon remain quite angular. The angularity, however, is not what is characteristic of freely forming quartz crystals, but is due to the circumstances under which it was formed. In the original crystalline rock occasional cracks and cavities occurred filled with secondary quartz, which in such a situation assumed its own crystalline form; and in the sandstone itself secondary crystals might have been formed after deposition, just as they have been in adjacent limestone-beds where their secondary origin is unquestionable, and the degradation of the rock inclosing these would furnish points and fragments of true crystals of quartz, which might not be so far worn as to lose their characteristic form.

§ 75. It occupies a narrow area fringing the Calciferous, or exposed in river banks, stretching in an irregular course from the Lower Menominee River on the north-eastern border of Wisconsin to the mouth of the Wisconsin River. It occurs

e distillation of dor, and burns ha to solid asell, that issues y exposure it color, becomes ed from exudy exposure to tum. Asphald form to the from 1.07 to matter occurs or may be de-, combustible. letimes coating of buttons or equently hard-, and even in , of a shining It approaches is. It has ree strata. The ch underwent oal. It is due ydrogen in its into coal.

> econd District azy limestone. ckness of 130 by the Birdstaining many , where it exin, and has a ation" in the ere associated and Montreal, not exceeding coast of Lake n, Wisconsin, and arenaceo-

CHAZY GROUP.

in North-eastern Iowa and the eastern part of Minnesota, where its dip is westerly. It occurs in Illinois, at Oregon, on Rock River, and at La Salle, on the Illinois, caused by a local uplift. The unevenness of the Calciferous bed, as proven by artesian boring, is greater near the margin or shore-line of the oceanic deposit than elsewhere. It is known, by artesian boring, in Minnesota more than 100 miles from the Mississippi, and in Illinois more than 100 miles from its exposure in Wisconsin. In some places the sand mingles with the calcareous materials and forms **passage** beds to the Trenton, and at other places the transition, while conformable, is abrupt. In Missouri the upper part of the Group received the name of the "First Magnesian Limestone," and the lower part the "First Sandstone" and the "Saccharoidal Sandstone." The latter presents very few characters not found in the exposures in Illinois and Wisconsin; while the former is limited in its distribution, and indicates local changes in the deposition of the upper part of the Group. It is usually a gray or buff crystalline, cherty, magnesian limestone, filled with silicious patches, breaking readily with the hammer, and extremely variable in thickness. In New Jersey it consists of a fine, even-grained limestone, sometimes a pure dolomite, except near the base, where there are sandy and calcareous layers. It occurs in long, narrow belts, in a north-east and south-west direction, corresponding to synclinal and anticlinal axes. From this State and from Pennsylvania it is exposed in numerous places within the Appalachian System as far south as Alabama, and may generally be detected by the presence of Maclurea magna. In Tennessee the lower part is an argillaceous limestone, varying in thickness from 50 to 600 feet; and if the marble of Knox County is referred to it, its upper part will have a thickness of more than 400 feet. It occurs in the Wahsatch Range in Utah, in the White Pine district of Nevada, in the Wind River Mountains of Wyoming, and in numerous other localities in the great system of mountain ranges of the West, where it also bears the name of the Quebec Group. It has been identified in the Arctic regions, on King William's Island, North Devon, and Depot Bay, in Bellotis Strait, where it is a dolomitic limestone. It graduates into the Black River wherever the latter is separable from the Trenton, and especially where the Birdseye limestone is present. Numerous fossil species connect it intimately with the overlying rocks, many of which occur as high as the Hudson River, viz. : Strophomena alternata, S. incrassata, Orthis perveta, Leperditia canadensis, L. louckana, L. amygdalina, Orthoceras multicameratum, O. bilineatum, and Modiolopsis nasuta. The most characteristic fossil is Maclurea magna.

§ 76. THI logical Report

posures on Bla cliff extending composed of tl well-characteriz stone applied t Group of rock been so used it eye limestone ers, and the pr organisms, which and when brok sistent in geogr about 30 feet. Cephalopoda, a feet in length a The thickness o

§ 77. Fron thickness becom received the na exceeds 20 feet greater thicknes a belt upon the on the St. Lawr been identified Lake Winnipeg St. Mary's, Esca It has been iden westwardly and as a local and pe merely beds of r logical reasons f many species unl are conformable But the strongest ness of limestone menced its exist succeeding ages a quently, it dimini a home in every The Cyrtoceratidae

BLACK RIVER GROUP.

CHAPTER VIII.

BLACK RIVER GROUP.

§ 76. THE Black River Group was defined by Lardner Vanuxem, in the Geological Report for the Third District of New York in 1842, and named from its exposures on Black River. The name "Black River limestone" was applied to the cliff extending from Boonville through Lewis into Jefferson County, the cliff being composed of the Birdseye limestone of the Mohawk and the rocks upon which the well-characterized Trenton limestone is placed. We find the name Birdseye limestone applied to rocks in the report of 1838, but not in the sense of the name of a Group of rocks, as the term Black River was used in 1842, and if the name had been so used it would necessarily give way to the geographical name. The Birdseve limestone was distinguished on the Mohawk by its light dove-color, thick lavers, and the presence of crystalline particles representing Phytopsis tubulosa or other organisms, which caused the rock to break readily or possess a kind of brittleness. and when broken to clearly show the crystalline spots. This character is not persistent in geographical distribution, and the greatest thickness of the rocks is only about 30 feet. The Black River limestone is distinguished by the abundance of Cephalopoda, and especially by remarkably large Orthoceras, some of which are 10 feet in length and a foot in diameter; beside, it has quite an extensive distribution. The thickness on Black River is about 50 feet.

§ 77. From New York it extends into Vermont, where about 12 or 14 feet in thickness becomes a black, finely granular mass, susceptible of a high polish, and has received the name of the Black Marble of Isle La Motte. In Vermont it rarely exceeds 20 feet in thickness; but it outcrops in Pennis Valley, Pennsylvania, with greater thickness than it possesses in New York. It crosses into Canada, and forms a belt upon the margin of the Chazy, but rarely attains any great thickness, though on the St. Lawrence, 90 miles below Quebec, it has a thickness of 130 feet. It has been identified by the presence of gigantic Orthoceras on the north-west side of Lake Winnipeg; and its existence has been noted in the Lake Superior region, on St. Mary's, Escanaba, and Menominee Rivers, and on St. Joseph and Sugar Islands. It has been identified at various places in the Appalachian System, but it thins out westwardly and has a limited area of surface distribution. By some it is regarded as a local and peculiar phase of the lower part of the Trenton, or as constituting merely beds of passage from the Chazy to the Trenton, but there are paleeontological reasons for retaining the name as a geological subdivision. It contains many species unknown in the Trenton, though others pass up, as the two Groups are conformable, and both represent the deeper oceanic deposits of limestone. But the strongest reason for holding to the geological separation of so small a thickness of limestone from other Groups is that the family Orthoceratida, which commenced its existence in the Upper Taconic, increased in genera and species in succeeding ages until it reached its maximum development in this Group. Subsequently, it diminished in number of species and size of specimens, though it found a home in every Group, until it became extinct in the latest Carboniferous epoch. The Ortoceratida and Endoceratida were highly developed, and the Gomphoceratida.

ip is westerly. n the Illinois. as proven by ic deposit than nan 100 miles posure in Wisals and forms e conformable, e name of the tone" and the not found in in its distribuof the Group. ne, filled with ly variable in ie, sometimes a careous layers. on, correspondnsylvania it is south as Alaagna. In Teness from 50 to its upper part satch Range in Mountains of

iountain ranges It has been ron, and Depot luates into the and especially connect it intiis the Hudson litia canadensis, and Modiolopsis

Phragmoceratidæ, and Gyroceratidæ here first developed their essential characters. In the Birdseye limestone at Montmorency, Canada, petroleum exudes in drops from fossil corals, supposed to have its origin either in the marine animals or fucoidal vegetation.

CHAPTER IX.

§ 78. THE Trenton Group was named from Trenton, Oneida County, New York. The limestone at the Falls, where it is more than 100 feet thick, was called the Trenton limestone long prior to the use of the words in a geological sense. In 1838 Vanuxem referred to the Trenton limestone, but it was not until 1842 that he and Prof. Emmons so described the Group as to establish it. At Trenton Falls there are two kinds of stone—one a dark, fine-grained limestone, in thin layers, separated by black shale, and abounding in fossils; the other a gray, coarse-grained limestone, in thick layers, forming the top of the mass, and much less fossiliferous. The Group has quite an extensive surface distribution in belts upon the margin of the older rocks in New York, and varies somewhat in its characters, but seems at all times to be a limestone, with the exception of shaly partings. It is 400 feet thick at Chazy, the greatest exposed thickness, and from here it thins toward the east.

§ 79. It enters Vermont from New York in three narrow outcrops, consisting of black layers and seams of limestone and occasional argillaceous matter, with a maximum thickness of about 400 feet. It enters New Jersey, and crosses the counties of Warren and Sussex, with a maximum thickness of about 200 feet. It is frequently exposed in the broken-up hills and mountains of Pennsylvania, showing a thickness from 300 to 700 feet. The exposures continue to occur southerly in the Appalachian Mountains in crossing Virginia, North Carolina, and Tennessee, where, in the eastern part of the latter State, there is a thickness of 1,100 feet, and in the middle part of about 500 feet. It is exposed by an ancient uplift in the central part of Kentucky over several counties, forming a large part of what is called the Blue-grass Region, and reaches as far north as the Ohio River. The thickness is about 700 feet.

§ 80. It has an extensive geographical distribution in Canada. The Montreal and Ottawa sections have each a thickness of 600 feet. The sections in Western Canada, on the Trent River and at Collingwood, have a thickness of 750 feet, but it thins westerly, and in following the outcrops around Lakes Huron and Michigan the exposures rarely exceed 50 feet in thickness. In passing south of Lake Superior it crosses Sulphur, St. Joseph's, and Great Encampment Islands, and thence stretches west and south-west near Little Bay de Noquet and Green Bay, and enters Wisconsin near the mouth of the Menominee River. From here the exposure extends south-west across the State, displaying a large area in the south-western part, and, entering the State of Illinois, occupies more or less of the surface in four or five of the north-western counties. From here the exposures bear north-west and north, occupying several counties in North-eastern Iowa, with a continuing belt across

Minnesota to 8 Iowa, the Grou called the Tre which is the l divisions is van upper or Galer feet. It thins disappears. T ginous oolitic la the east and no from western s posit from the Northern Dako British America curs in fissures supposed to ha Galena limestor Illinois. The l consin and the

§ 81. It fo crops occur 400 mountain range Somerset, Booth ville, Ky., at Co most any place upon the surface is a regular sea of fathoms. The with little detrived of nearly all the in the ocean, an Trilobites, which on the decline, Lamellibranchs

§ 82. Recep vision of this G1 chisonia major, F characteristic of ing its age where Kentucky, Misso and Kentucky; Minnesota; Hyb Blastoidocrinus ca Leperditia fabulit tucky; and Orthi The genus Amyge sil in every locali

al characters. ides in drops inimals or fu-

County, New ick, was called cal sense. In itil 1842 that Trenton Falls a thin layers, coarse-grained is fossiliferous. the margin of but seems at It is 400 feet thins toward

ops, consisting matter, with a nd crosses the 200 feet. It ylvania, showceur southerly and Tennessee, 1,100 feet, and it uplift in the rt of what is br. The thick-

The Montreal ns in Western 750 feet, but and Michigan of Lake Suds, and thence Bay, and enthe exposure south-western surface in four north-west and uing belt across Minnesota to St. Paul and the Falls of St. Anthony. In Wisconsin, Illinois, and Iowa, the Group is separable into two divisions, the lower one being a blue limestone called the Trenton limestone, and the upper a dolomite called the Galena limestone, which is the lead and zinc bearing rock of that region. The thickness of these divisions is variable, but where most persistent, as in South-western Wisconsin, the upper or Galena has a thickness of 250 feet, and the lower or blue limestone 120 feet. It thins northward through Minnesota, and the Galena division gradually disappears. The layers of limestone become thin and shaly, with sometimes ferruginous oolitic layers. The Galena appears as a lenticular mass or as thinning toward the east and north, and was apparently derived, so far as detrital matter occurs, from western sources, though a great part, like that of other limestones, was a deposit from the harder parts of animal organisms. Erratics and bowlders found in Northern Dakota indicate the existence of Galena limestone in the mountains of British America. The Galena contains about 86.6 lead and 13.4 sulphur, and occurs in fissures and crevices in the limestone, and not in true veins. The ore is supposed to have been precipitated from an aqueous solution. It was called the Galena limestone from the lead or galena, and from its typical exposure at Galena, Illinois. The lead area is about 4,000 square miles, two-thirds of which is in Wisconsin and the rest about equally divided between Illinois and Iowa.

§ 81. It forms some large surface exposures in Southern Missouri, where outcrops occur 400 feet in thickness. Numerous outcrops occur among the Western mountain ranges and in the Arctic regions, on King William's Island, at North Somerset, Boothia, and other places. It was found by the artesian boring at Louisville, Ky., at Columbus, Ohio, and it is expected it will be found by boring at almost any place upon the continent, save where the rocks of older date are exposed upon the surface. It was not formed upon the margin of an island or continent, but is a regular sea deposit of general distribution where the depth did not exceed 2,000 fathoms. The materials are marine, the mass being remains of organic secretions, with little detrital matter. The fauna was abundant, and embraced representatives of nearly all the great subdivisions of invertebrate life that now have an existence in the ocean, and several orders and classes, as the Graptolites, Cystideans, and Trilobites, which have become extinct. The Graptolites and Trilobites were then on the decline, while Crinoids, Cystideans, Brachiopods, Corals, Gasteropods, and Lamellibranchs were on the increase.

§ 82. Receptaculites oweni is peculiar to and characteristic of the Galena division of this Group, and it is usually accompanied with Lingula quadrata, Murchisonia major, Fusispira elongata, and other characteristic species. The species most characteristic of the Trenton Group, and which may be relied upon as determining its age wherever they occur, are Orthis tricenaria, found in New York, Canada, Kentucky, Missouri, and Nevada; Orthis pectinella, found in New York, Canada, and Kentucky; Oyrtolites compressus, found in New York, Canada, Wisconsin, and Minnesota; Hybocrinus tumidus, H. conicus, Amygdalocystites florealis, A. radiatus, Blastoidocrinus carcharidens, found at Ottawa, Canada, and High Bridge, Kentucky; Leperditia fabulites and Conularia quadrata, found in New York, Canada, and Kentucky; and Orthis borealis, found in Canada, Wisconsin, Minnesota, and Kentucky. The genus Amygdalocystites has a wide geographical distribution, though a rare fossil in every locality, and, so far as known, is confined to this Group. Other char-

acteristic species are Bythotrephis succulens, Monticulipora lycoperdon, Schizocrinus nodosus, Stictopora elegantula, Orthis bellarugosa, O. aquivalvis, Trochonema umbilicatum, Subulites elongatus, and Helicotoma planulata.

§ 83. There are numerous species which continued to live until the Hudson River age, and are therefore common to three Groups, as Strophomena alternata, S. rhomboidalis, Leptena sericea, Zygospira modesta, Rhynchonella capax, Calumene callicephala, Asaphus gigas, and Cerqurus pleurexanthemus. Such species are usually quite variable in form and size, and seem to have changed to suit the conditions of their habitat, and also, in accordance with the theory of evolution, to have reached the climax of development, and subsequently gradually declined. Strophomena rhomboidalis occurs in Trenton, Utica Slate, Hudson River, Clinton, Niagara, Lower Helderberg, Upper Helderberg, Hamilton, Chemung, Waverly, Burlington, and Keokuk Groups. Its vertical range exceeds that of any other species in any of the rocks of the known world, and its geographical distribution is common to every continent where strata of these ages have been studied and described. The varietal forms have been called S. tenuistriata from the Lower Silurian, S. depressa from the Upper Silurian, and S. rhomboidalis from the Devonian and Subcarboniferous. The Lower Silurian specimens are usually smaller, and have fewer concentric wrinkles over the visceral region, than those from the Upper Silurian and Devonian, while the length of the front and lateral margins from the geniculation is usually greater in the Upper Silurian than it is in the Lower Silurian, Devonian, or Subcarboniferous specimens; but these differences are not so constant as to form inflexible characters, and hence it is that many of the learned and better palæontologists have classed them all together under the first and oldest specific name. The various forms which Strophomena alternata assume in the same Group of rocks are wonderful; the radiating striæ differ in size and number; the hinge line is sometimes longer and at other times shorter than the greatest width of the shell. The shells are sometimes much longer than wide, and at other times as much shorter. The lateral sides are sometimes straight, and at other times rounded. Some shells are nearly flat, others are deeply concave on the dorsal side and highly convex on the ventral. Age in some specimens appears to have materially thickened the shells, and preserved strong imbricating lines of growth, while in other cases we have much larger shells that are very thin and destitute of imbrications. Like differences may be distinguished in other species having great vertical distribution, as in Rhynchonella capax and Zygospira modesta.

§ 84. The rocks of this Group are composed almost entirely of remains of the hard parts of animals that swarmed in the seas of that age. Some shells are preserved in good condition, but generally the comminuted fragments are held together by lime cement, forming the limestone strata, leaving well-preserved specimens to be found only in the shaly partings. It is common to find that one animal has grown upon another, as a *Lichenocrinus* upon a brachiopod, and a bryozoan upon the former, under such circumstances as to show the shell was at the bottom of the ocean during the growth of the *Lichenocrinus*, and that the latter must have ceased to grow before the bryozoan attached. From this we infer the clearness of the water, for otherwise mud would have intervened; and we also infer a slow deposition of materials, for the lives of two animals transpired before the deposit was

sufficient to contemperature of § 85. When

with it; and wl formable with t in New York as rocks, and a n up into calcare the line of sep changing fauna.

§ 86. Ligh tion of organic 1 rocks from the from the Trent per minute. It discharges large surprising when a considerable th offers successions trating waters w hydrogen gas es Niagara Falls, an well-known "fire collieries, and wl with an unprote rocks charged wi the Christian era occurs in the cav at Pakenham an petroleum occur i has been found absence of porou and vegetable ma It has been asser Group, but the a

 $\mathbf{42}$

, Schizocrinus onema umbili-

the Hudson ena alternata, ax, Calymene es are usually conditions of have reached Strophomena

iagara, Lower rlington, and in any of the to every convarietal forms m the Upper

The Lower wrinkles over an, while the lly greater in or Subcarbonorm inflexible alæontologists The varie. s are wonderletimes longer 'he shells are shorter. The me shells are ly convex on thickened the ther cases we ations. Like 1 distribution,

emains of the shells are preare held toved specimens is animal has ryozoan upon bottom of the st have ceased earness of the a slow depoe deposit was

sufficient to cover a thin shell. There is no evidence of any difference between the temperature of the water then and now, nor between the climate then and now.

§ 85. Wherever the Black River limestone exists, the Trenton is conformable with it; and where the Black River is not distinguished, the Trenton is usually conformable with the Chazy. The Trenton is conformable with the Utica Slate above, in New York and Canada; but there is an abrupt change in the character of the rocks, and a marked difference in the fauna, while in Kentucky it graduates up into calcareous shales of the age of the Utica Slate by imperceptible grades, so the line of separation can not be determined, except as based upon a slowly changing fauna.

§ 86. Light carbureted hydrogen gas is often the product of the transformation of organic matter at ordinary temperatures, and is abundant in the palæozoic rocks from the Chazy to the Permian. A spring at Caledonia, Canada, issuing from the Trenton Group, evolves 300 cubic inches of carbureted hydrogen gas per minute. It is saline water. Another discharges somewhat less, and another discharges large quantities of sulphureted hydrogen gas. This is not considered surprising when it is remembered the Chazy Group in the Ottawa Valley includes a considerable thickness of shales and argillaceous limestones, and the Quebec Group offers successions of limestones and shales, whose slow decomposition from infiltrating waters will furnish such gases. In higher strata, however, the carbureted hydrogen gas escapes in much greater quantities, as at the burning spring near Niagara Falls, and in the region of the oil-wells. Carbureted hydrogen gas is the well-known "fire-damp" of the coal-mines. It collects in ill-ventilated galleries of collieries, and when sufficiently mixed with the atmosphere, if it comes in contact with an unprotected flame, it explodes with great violence. It exudes from all rocks charged with petroleum or naphtha, and was known and used for fuel before the Christian era on the Caspian Sea, where it is evidently inexhaustible. Petroleum occurs in the cavities of fossils, Orthoceras sometimes holding serveral ounces of it. at Pakenham and Lancaster, Canada. While both carbureted hydrogen and petroleum occur in the rocks of the Quebec and all succeeding Groups, yet none has been found of commercial value as low as the Trenton. The reasons are, absence of porous strata and cavities for its collection, and because the animal and vegetable matter was not collected in sufficient quantity at any single locality. It has been asserted the gas in Western Ohio and Northern Indiana is from this Group, but the author thinks all the evidence is against such conclusion.

UTICA SLATE GROUP.

CHAPTER X.

UTICA SLATE GROUP.

§ 87. THIS Group was named the Utica Slate from Utica, New York, and quite fully defined as a geological subdivision in 1842 by both Vanuxem and Emmons in their respective reports. It is in typical localities a dark-colored slate or shaly mass, highly charged with carbon, and agreeing in its composition with the dark layers that separate the limestone strata in the Trenton Group. The surface exposure forms a belt resting upon the Trenton, extending from New Jersey across New York into Vermont, passing under Lake Champlain and entering Canada. The greatest thickness in New York is about 600 feet, and in Vermont about 100 feet. It exposes considerable surface in Canada, never exceeding 500 feet in thickness, and extends from Lake Huron, where it thins out, to the eastern shores of the continent, appearing on the Saguenay, in Newfoundland, and the Island of Anticosti. It is very fossiliferous, and everywhere characterized by the presence of *Triarthrus becki*; and in the vicinity of Ottawa *Triarthus spinosus* is abundant, and the Scotch fossil, *Siphonotreta scotica*, occurs. It is often interstratified with thin bands of limestone.

§ 88. It is exposed in numerous places in the Appalachian System, and at tains a thickness in Huntingdon County, Pennsylvania, of more than 1,000 feet. It thins out westerly, and loses its character as a black slate before reaching the Ohio River, where it is composed of blue calcareous shales and marls with interstratified thin limestones, apparently forming beds of passage from the Trenton to the Hudson River without any want of conformability. The change in its lithological characters would have prevented forever its identification in the banks of the Ohio, had it not been for the tell-tale fossils. The abundance of Triarthrus beck and Leptobolus lepis and associate fossils settled the question of its identity. It is unknown farther west, but exists in the Arctic regions as a more or less calcareous slate. The fossils of the greatest geographical distribution, and by which it may generally be recognized, are Triarthrus becki, Leptobolus lepis, Asaphus canadensis, Lingula progne, and Graptolithus quadrimucronatus. The rocks are composed in part of mechanical sediment, derived from sources east of the Appalachian System, and not almost wholly of shells and the harder parts of animals, as the Trenton is below and the Hudson River above. It thins westerly, and as the mechanical sediment disappears the marine deposits form continuous passage beds from the Trenton to the Hudson River. The strongest reason for its retention as a geological subdivision is found in the fauna with which it abounds; for at many localities, e. q.Cincinnati, Ohio, and Jefferson County, New York, it can only be separated from the Hudson River Group by an arbitrary line; and at other localities, e. q., Deerfield, New York, and in Kentucky, the Trenton Group is so blended with it that the line of demarcation is wholly obscured. The Galena limestone of Northern Illinois, Eastern Iowa, and South-western Wisconsin occupies substantially the same geological position, though its affinities are more closely allied with the Tren ton, while the relations of this Group are nearer the Hudson River; beside, none of the characteristic fossils of this Group are found in the Galena, and none of the

characteristic for from this Grou evolve large v gas has been co shales of this C distilled they gis shales of Colling

§ 89. THE River in New 7 1842. At the a thick-bedded gri regular order of mentions, as occur Cone," which is thickness in New

§ 90. The Appalachian Sy of 1,200 feet.] surface rock of n Ohio, to near I western part of limestone, and ha Blue limestone. consin, and north 240 feet. In the it appears in Tex ada, extending fr the Great Lakes, ain ranges border 1,100 feet, but it Great Lakes rare about 2,000 feet.

§ 91. This G upon the older ro to find it almost a It is the equivaler England and Wal Trenton and all e able depth, not a the sandstone occu and derived from 1

HUDSON RIVER GROUP.

characteristic fossils of the Galena occur in this Group. A petroleum spring rises from this Group on the Grand Manitoulin Island, and saline springs at Varennes evolve large volumes of carbureted hydrogen gas. At one of these springs the gas has been collected in a holder, and employed in lighting a house. The black shales of this Group contain variable amounts of combustible matter, and when distilled they give, beside inflammable gases, portions of oily matter, which in the shales of Collingwood are equal to four or five per cent.

CHAPTER XI.

HUDSON RIVER GROUP.

§ 89. THE Hudson River Group was named from an exposure near Hudson River in New York, and first defined in the geological report by Vanuxem in 1842. At the typical locality it consists of shales, shaly sandstones, slates, and thick-bedded grits, stratified and conformable, alternating many times without any regular order of alternation. It was called the Lorraine Shales by Emmons, who mentions, as occurring at one place in New York, that structure called "Cone within Cone," which is so common in the Devonian and later formations. Its maximum

thickness in New York is about 800 feet.

§ 90. The Group is largely exposed in Pennsylvania and other States in the Appalachian System, as far south as Tennessee, and has a thickness in some places of 1,200 feet. In the latter State it has been called the Nashville Group. It is the surface rock of many counties in Kentucky, extending from above Maysville on the Ohio, to near Louisville. In the south-eastern part of Indiana and the southwestern part of Ohio, it consists of alternating layers of blue calcareous clay and limestone, and has a thickness of about 800 feet. It has been called in this section the Blue limestone. It occurs in the northern part of Illinois, southern part of Wisconsin, and north-eastern part of Iowa. Its thickness in these States does not exceed 240 feet. In the south-eastern part of Missouri its thickness is about 250 feet, and it appears in Texas and New Mexico. It has a wide geographical range in Canada, extending from the Island of Anticosti and the eastern border west, by way of the Great Lakes, to the Red River of the north, and again appearing in the mountain ranges bordering the Pacific. In the vicinity of Toronto its thickness is about 1,100 feet, but it is much thinner in its western extension, and in the region of the Great Lakes rarely exceeds 100 feet. Its greatest thickness in Eastern Canada is about 2,000 feet.

§ 91. This Group is persistent and of almost universal distribution, except upon the older rocks that were dry land before its deposition. We would expect to find it almost anywhere on the continent by boring through more recent deposits. It is the equivalent, to some extent, of the Caradoc sandstone, or Bala Group, of England and Wales, and is represented in different European exposures. Like the Trenton and all earlier Groups, it is a marine deposit made in water of considerable depth, not a littoral or shore-line deposit as the Potsdam Group was, though the sandstone occurring in many of the northern exposures was evidently mechanical and derived from land at no great distance to the north.

ew York, and Vanuxem and rk-colored slate mposition with). The surface v Jersey across tering Canada. nont about 100 g 500 feet in eastern shores l the Island of y the presence abundant, and ified with thin

ystem, and athan 1,000 feet. e reaching the arls with interthe Trenton to ge in its lithohe banks of the Friarthrus becki identity. It is less calcareous which it may hus canadensis, mposed in part in System, and renton is below inical sediment the Trenton to geological sub localities, e. g., separated from ies, e. g., Deered with it that ie of Northern bstantially the with the Trenr; beside, none and none of the

HUDSON RIVER GROUP.

§ 92. The seas swarmed with animal life and fucoidal organisms, and the rocks are composed almost wholly of their remains. It is literally a graveyard of invertebrate life. The Brachiopoda and Bryozoa reached in this age the stage of their greatest varietal development, and possibly the highest state of their existence.

§ 93. As the exposure in Ohio, Indiana, and Kentucky is very large and quite characteristic of it in other places, it may be fit and proper to further define it. To go from the Ohio River, at Cincinnati, west 51 miles to Osgood, Indiana, or north to Dayton, or north-east to Xenia, Ohio, one will pass across the upturned edges of this Group, and reach the Niagara. The rocks dip westerly and northerly at the rate of about ten feet in a mile. The hills at Cincinnati expose about 400 feet in thickness, constituting the lower half of the Group; and the upper half, or about 400 feet, occurs between the top of these hills and the bordering Niagara Group, about 50 miles distant to the north and west. The area of its exposure in Ohio is all of Hamilton, Butler, Warren, Clermont, and Brown Counties, and part of eight counties that border upon these, The exposure in Indiana is about half as great, reaching as far north as Richmond, and bordering the Ohio nearly half-way from Madison to Jeffersonville. (The exposure in Kentucky is greater than in Ohio, for it surrounds the Trenton Group in that State. Throughout the whole area it is composed of alternate layers of calcareous clay and limestone of varying thickness. In some places calcareous clay is 6 or 8 feet thick, without a layer of stone. At other places one layer of stone, 4, 6, 8, or 10 inches in thickness, follows another, with intervening layers of calcareous clay of much less thickness, for 40 or 50 feet. It is rare to find a layer of limestone more than a foot in thickness. All the layers are broken into small, irregular pieces of suitable size for cellar and other light stone-work, for which they are used. The blue calcareous clay exposed to the action of the weather for a few years loses its color and becomes of a dull gray hue. The sulphuret of iron occurs in the blue rocks, but instead of this we find iron oxide and sulphate of lime in the gray. The silicious matter prevails over the carbonate of lime in the layers of represented by any calcareous clay, while the carbonate of lime is much in excess of the silicious matter in the stone, due, in part at least, to the fact that the stones are a mass of more or less comminuted shells, corals, and crinoids. There is nothing in the general character and appearance of the rocks and calcareous clays to indicate the changes which the fossils undergo; that is, the changes are not to be attributed to surrounding conditions without the aid of that law of animal evolution which the science of palaeontology teaches us has taken place in all past geological ages.

§ 94. Some fossils, as Calymene callicephala, Asaphus megistus, A. gigas, Beyrichia chambersi, Leptæna sericea, Bellerophon bilobatus, Zygospira modesta, Strophomena alternata, and Orthis testudinaria, pass from the extreme lower part to the extreme upper part of the Group; and all of them save Beyrichia chambersi are known from lower rocks, and Leptana sericea occurs in higher ones. Streptorhynchus hallianum has a limited range in the lower part, S. planoconvexum and S. sinuatum a limited range below the middle of the Group, S. nutans and S. sulcatum in the middle of the upper half of the Group, and S. subtentum and S. filitextum in the upper part. Lichenocrinus crateriformis, L. dyeri, and L. pattersoni are confined to the lower half, and L. tuberculatus and L. affinis to the upper part. Acidaspis crossotus occurs in the lower part, A. anchoralis and A. cincinnationsis in the middle part, while A. onealli occurs in the

upper part. Rh lata, Tetradium fi Such are a few completely preser Crinoids, as a rul particular range. istic of the Grou alis, O. subquadre Glyptocrinus decad

§ 95. With t the greatest break of the Potsdam to nearer the line of Silurian, than any Hudson River ha unconformable with almost complete. unconformably up Clinton Groups be upon it. On the oy rocks apparent. cal break. Of 12 at once below the by 45 species that s at any other kno probably the strata

§ 96. There is bility and palæon been described as which had become which had come int o have an existen ever been discovered and had existed ab ain, by warmth and fon. If the land v course none will eve or fresh-water anima

HUDSON RIVER GROUP.

47

and the rocks yard of inverstage of their existence.

rge and quite her define it. 1. Indiana, or the upturned and northerly expose about nd the upper the bordering ie area of its and Brown The exposure 1, and borderexposure in roup in that of calcareous clay is 6 or 8 stone, 4, 6, 8, of calcareous laver of limesmall, irreguor a few years ron occurs in al ages. xtreme upper vn from lower hallianum has limited range ; of the upper . Lichenocri-, and L. tuber he lower part, i occurs in the

upper part. Rhynchonella capax, R. dentata, Streptelasma corniculum, Favistella stellata, Tetradium fibratum, Cypricardites haynesi, etc., are confined to the upper part. Such are a few illustrations of the changing fauna at different elevations. To completely present the subject would require the enumeration of all the species. Crinoids, as a rule, are limited vertically, and hence each species is sought in its particular range. Species having a wide geographical distribution, and characteristic of the Group are Aulopora arachnoidea, Stomatopora inflata, Orthis occidentalis, O. subquadrata, O. retrorsa, Pterinea demissa, P. insueta, Cyclonema bilix, and Glyptocrinus decadactylus.

§ 95. With this Group the Lower Silurian closes, because at its top we have the greatest break stratigraphically and paleontologically that occurs from the base of the Potsdam to the top of the Lower Helderberg, and because it approaches nearer the line of division established by Murchison, between his Lower and Upper Silurian, than any other line, if, indeed, it is not identical with it. Wherever the Hudson River has been examined on the continent, the superimposed rocks are unconformable with it, no passage-beds are found, and the paleeontological break is almost complete. In the Western States the Niagara Group succeeds it, and rests unconformably upon it. In the Eastern States it is succeeded by the Medina and Clinton Groups before the Niagara is reached, but the Medina rests unconformably upon it. On the Island of Anticosti it has a thickness of 950 feet, and is followed by rocks apparently conformable with it, although there is an abrupt palæontological break. Of 121 species known to Prof. Billings from Anticosti, 80 disappear at once below the dividing line, and 41 only appear above it, where they are joined by 45 species that are not found below. This palaeontological break is less than it hich they are s at any other known place on the continent; but it is so great as to show that probably the strata are not strictly conformable.

S 96. There is an important period of time indicated by this want of conformbility and palæontological change. Vast ages must have intervened, which are not the layers of licious matter ass of more or n the general e the changes ibuted to suron which the al ages. igas, Beyrichia phomena alterintervened by any known rocks on the continent. More than 400 genera have the continued as existing previous to this time, more than three-fourths of which had become extinct. Or, in other words, less than one-fourth of the genera which had come into existence prior to the close of the Lower Silurian Age continued to have an existence afterward. No evidence of the existence of land-plants has ever been discovered in Lower Silurian rocks. We are convinced, however, that and had existed above water for ages; that it was necessarily refreshed by sun and ain, by warmth and air, and that it may have sustained some kind of land vegetaion. If the land vegetation did not possess hard parts capable of preservation, of ourse none will ever be found. Neither has any evidence of the existence of landr fresh-water animals of this era ever been discovered.

CHAPTER XII.

UPPER SILURIAN.

§ 97. ALL the rocks of the Upper Silurian System are marine; but landplants, or such as may have existed in marshes, and received support from sunlight and air, have been found within them. No remains of land or fresh-water animals, or marine vertebrates, have been discovered in North America. There is no radical difference in the general character of the Lower Silurian and Upper Silurian fossils, because vertebrates had not made their appearance, and the same orders of invertebrates were represented in each era; but the separation into two Systems is very convenient, because both are introduced with sandstone Groups, and the Trenton in the Lower Silurian, and Niagara in the Upper Silurian, are alike extensive in geographical distribution, and some analogy may be traced between the upper Groups in each System. On the whole, the calling of one System Lower Silurian, and the other Upper Silurian, was a happy hit in nomenclature as well as correct in science.

MEDINA GROUP.

§ 98. This Group took its name from Medina, New York. The rocks were described by Vanuxem in 1842, under the names Oneida Conglomerate, Grav Sandstone of Oswego, and Medina Sandstone. At the typical localities they are conglomerate, and gray and red sandstone. The conglomerate is hard and gritty, and composed of quartz pebbles and sand so firmly cemented as to be used for millstones. The sandstone is argillaceous, thinly laminated, and of red, gray, and mottled colors. Where it is not fragile, but firmly cemented, it makes a good building stone, and has been largely used for paving streets, as it readily breaks into stone of regulation size. The Group borders Lake Ontario on the south, and extends in an east and west line of exposure about three-fourths the length of the State, and entering Canada at the Niagara River, continues to Lake Huron. In Oneida and Oswego Counties the thickness is from 500 to 600 feet; at the west end d Lake Ontario 614 feet, and at Lake Huron 100 feet. It thins so rapidly that few if any, traces have been discovered west of this lake. A small surface area in Net Jersey has a thickness of 900 feet, and a larger one in Pennsylvania has a thickness of 2,500 feet. It occurs in patches among the broken ranges of the Appalachia System in Maryland and other States, as far south as Tennessee; but is unknow in the Western States.

§ 99. The conglomerate is 500 feet thick in the Shawangunk Mountains, and extension into Cana 700 feet in the Kittatinny Valley in Pennsylvania. It graduates into the gray sand as far as Anticosti stone, and then into the red sandstone, so they can scarcely be distinguished except of the divisions of by color; and the gray sandstone in like manner graduates into the conglomerate Hudson River to t by enlarging and increasing the number of its pebbles; so there is no reason, strate It occurs in the App graphical or palæontological, for subdividing the Group, as was done in early work on the New York Survey. It always rests unconformably upon the Hudson River Group, and bears the internal evidence of having been derived from land immed porders of the Appa ately north and east, and of having been deposited in shallow water, subjet from the mechanical

to waves and cur conglomerate indi ous, though a fe definition, have b been deposited ne about shells, and In all these respe from the Lower S

§ 100. In the fairly well preserv and species being *Lingulella cuneata*, the whole extent brine is frequently reted hydrogen ga at Gasport it was

§ 101. THIS (defined by Vanux Survey of that Sta the typical localit andstone, often lar at other places, it imestones, conglor narrow belt of cour westward south of width in Wayne C Huron, appearing probably enters the and rapidly thins o The two upper ba Clinton Group, ar ossils peculiar to the extension into Can as far as Anticosti of the divisions of Hudson River to t It occurs in the Ap crossing Pennsylvar thins out before rea borders of the Appa

CLINTON GROUP.

to waves and currents which transported the materials only short distances. The conglomerate indicates a shore-line and rapid deposition, and is almost non-fossiliferous, though a few fragments of fucoids and shells, generally too imperfect for definition, have been found in it. The sandstone, too, bears the evidence of having been deposited near the land in shallow water, not only in wave-lines, rill-marks about shells, and ripple-marked slabs, but in mud-cracks produced by sun-drying. In all these respects it compares with the Potsdam, which separates the Taconic from the Lower Silurian.

§ 100. In the more argillaceous part of the sandstone, fossils are sometimes fairly well preserved. The characteristic fossils are Arthrophycus harlani, both genus and species being confined to this Group, and having a wide distribution, and Lingulella cuneata, a strongly marked species. Saline springs are common throughout the whole extent of these rocks, and brine is universally found by boring. The brine is frequently impure from the presence of muriate of lime and iron. Carbureted hydrogen gas rises in many places on the Erie Canal east of Lockport, and at Gasport it was collected and used for illuminating purposes a half century ago.

CHAPTER XIII.

CLINTON GROUP.

§ 101. THIS Group was named from the town of Clinton, in New York, and ard and gritty, defined by Vanuxem in 1842; and re-defined by Hall in 1843 in the Geological to be used for Survey of that State. The rocks have no uniformity in color or composition. At red. gray, and the typical locality there is green and black-blue shale; green, gray, and red a good building sandstone, often laminated; calcareous sandstone and red fossiliferous iron ore beds; aks into stone at other places, it consists of shaly sandstones and shales of various colors, impure and extends in imestones, conglomerates, and colitic iron ore, with concretions. It occupies a the State, and parrow belt of country in New York, commencing near Canajoharie, and stretching In Oneid westward south of Lake Ontario, resting on the Medina Group, with the greatest ne west end width in Wayne County, and, entering Canada at Hamilton, extends west to Lake pidly that few Huron, appearing on Drummond, Manitoulin, Cockburn, and other islands, and ce area in Net probably enters the Peninsula of Michigan with a thickness of less than 50 feet, has a thickness and rapidly thins out. The maximum thickness in New York is about 400 feet. ne Appalachia. The two upper bands of limestone included by the New York geologists in the ut is unknow Clinton Group, are now generally classed with the Niagara, as they possess no

ossils peculiar to the Clinton, and the shales which separate them thin out in their Mountains, and extension into Canada. In its easterly extension from New York, outcrops occur the gray sand as far as Anticosti Island and Newfoundland. On Anticosti it is described as one guished except of the divisions of the Anticosti Group, which there includes the rocks from the e conglomerat Hudson River to the Niagara, and has a maximum thickness of about 500 feet. p reason, strated to occurs in the Appalachian chain as far south as Georgia and Tennessee, and in in early work crossing Pennsylvania develops a thickness of more than 2,000 feet. The Group Hudson Rive thins out before reaching the Western States, and is unknown except upon the a land immed borders of the Appalachian and Laurentian elevations. It appears to have resulted water, subject from the mechanical deposition of materials derived from land lying north and east

ine; but land t from sunlight -water animals, ere is no radical Silurian fossils. orders of inver-Systems is very nd the Trenton ce extensive in een the upper lower Silurian. well as correct

The rocks were lomerate, Grav alities they are

NIAGARA GROUP.

of it, and to represent a border-land and shallow water deposit, that extended only a short distance from the primitive source of its materials.

§ 102. In Western New York the dividing line between the Medina and Clinton is sharply defined, and the materials of which each are composed are quite distinct: but in the central part they graduate into each other, the Clinton being. largely composed of sandstone. There is strong resemblance between the marine vegetation which abounds in the two periods. Westerly the Clinton is more calcareous and more fossiliferous, and graduates up into the Niagara in its lithological and fossil characteristics. The Medina, Clinton, and Niagara are clearly defined in some localities; but in others the Medina graduates into the Clinton, and in others the Clinton blends with the Niagara. There is no want of conformability between them where best developed, and the lines of separation show only a changed condition or altered circumstances under which the deposition was continued from one Group to the other. Pentamerus oblongus, Spirifera radiata, Meristella cylindrica, and Lingulella lamellata are among the species accredited both to the Clinton and Niagara, and which show the intimate relation between the Groups. The Clinton abounds in fucoids, tracks, and trails, the former being more abundant than in any earlier Group. The fossils having the greater distribution and being most characteristic are Ichnophycus tridactylus, Graptolithus clintonensis, Helopora fragilis, Athyris naviformis, Leptocælia hemispherica, Triplesia congesta, Cyclonema cancellatum, and Cornulites distans. The iron ore beds are frequently thick enough to be valuable, and are worked successfully. They are sometimes very fossiliferous, and the quantity of iron is decisive proof of the vegetable character of the fucoids of that age, and the absence of land-plants among the fossils is almost conclusive against their existence at that period.

CHAPTER XIV.

NIAGARA GROUP.

§ 103. This Group was named from its development at Niagara Falls, where the rock over which the water is precipitated belongs to it. It was defined by Vanuxem in 1842, and by Hall in 1843. It is the most persistent in its geographical distribution of any Upper Silurian Group; indeed, wherever the Upper-Silurian is found it is present, except with the exposed belts of the lower Groups, and not unfrequently it constitutes the whole formation. It generally consists of limestone and shales, but sometimes becomes arenaceous, argillaceous, or highly ferruginous In New York it exposes an east and west belt almost the entire length of the State, a short distance south of Lake Ontario, with a maximum thickness of 300 feet. Near Niagara Falls there are 165 feet of limestone (directly at the falls 85 feet) overlying 80 feet of shale. In its western extension it crosses the Niagara River into Canada, appears at Lake Huron, on Manitoulin and Drummond Islands, or cupies the southern part of the northern peninsula of Michigan, spreads over the south-eastern part of Wisconsin and the northern part of Illinois. Keeping south of the Lower Silurian area in the north-western part of Illinois, it enters Iowa be low Dubuque, and presents a surface exposure 160 miles in length by 40 or 50 in

-3 breadth. In Wis sometimes too por Chicago and Raci Joliet. It sometim where it indicates ties near its base Iron Ridge, in De 640 feet, in Wiscor eastern Canada, in mum thickness is lachian System er shales, it has a ma Tennessee and Ala a porous magnesia tion, and now co forms a sub-circul great Lower Silur South-eastern Indi and whitish-yellow ing, with a maxim there is iron-staine stone is used for t Paul, and other pl rounds the Lower and frequently occ in the Arctic region its exposures on Be from Capes Hilga equivalent of the Russia, Germany, ring in the upper 1 occurring at the Baltic Sea. It is : to the Devonian ar nearly all the more § 104. It is a

shore-line, and mar is generally limestc ing the entire age, It is so thoroughly culty in recognizing plants occur—*Psilo* pression of uncerta have been a marshmud, which preserv plant in America. in the Clinton. Sp

50

磨

NIAGARA GROUP.

51

at extended

Medina and ed are quite linton being. the marine ton is more in its lithoare clearly Clinton, and onformability show only a position was ifera radiata. dited both to the Groups. ore abundant n and being sis. Helopora a, Cyclonema chick enough fossiliferous, acter of the ils is almost

Falls, where s defined by geographical er-Silurian is ups, and not of limestone ferruginous. length of the ckness of 300 t the falls 85 Niagara River I Islands, of ads over the Leeping south ters Iowa be v 40 or 50 in

breadth. In Wisconsin, Illinois, and Iowa it is principally a magnesian limestone. sometimes too porous or friable for building purposes, but suitable for lime, as at Chicago and Racine; at other places having a good reputation for buildings, as at Joliet. It sometimes occurs more or less saturated with petroleum, as at Chicago, where it indicates the presence of shales immediately below it, and in some localities near its base it contains beds of hematite in small lenticular concretions, as at Iron Ridge, in Dodge County, Wisconsin. The maximum thickness in Illinois is 640 feet, in Wisconsin 800 feet, and in Illinois and Iowa 600 feet. It occurs in southeastern Canada, in New Brunswick, Newfoundland, and Anticosti, where its maximum thickness is 800 feet. It occurs in nearly all the States to which the Appalachian System extends. In crossing Pennsylvania, where it consists mostly of shales, it has a maximum thickness of 1,600 feet. It occupies extensive areas in Tennessee and Alabama; and in the latter State that part of it which was originally a porous magnesian limestone, subsequently became infiltrated with iron in solution, and now constitutes the celebrated fossiliferous iron ore of Alabama. It forms a sub-circular belt of exposures from 5 to 60 miles in width surrounding the great Lower Silurian area in the middle part of Kentucky, South-western Ohio, and South-eastern Indiana, where it consists of hard, blue and gray limestone, yellowish and whitish-yellow magnesian limestone, and shales, variously alternating and combining, with a maximum thickness of about 600 feet. In some places near the base there is iron-stained chert. At Cedarville, near the top, the porous magnesian limestone is used for the manufacture of lime, and the harder limestone at Dayton, St. Paul. and other places is used for building and other economic purposes. It surrounds the Lower Silurian and Taconic uplift in the southern part of Missouri. and frequently occurs in the Rocky Mountain ranges. It outcrops far to the north. in the Arctic regions north of British America. Fossils have been described from its exposures on Beechy, Cornwallis, Griffiths, Seal, Napoleon, and Offley Islands, from Capes Hilgard, Hotham, Louis, and other points. It is substantially the equivalent of the Wenlock in England, and has its representative in Scandinavia. Russia, Germany, and other European countries. Several species of fossils occurring in the upper part of the Group at Waldron, Indiana, are identical with those occurring at the equally celebrated locality on the Island of Gottland, in the Baltic Sea. It is so constantly present where the rocks from the Lower Silurian to the Devonian are exposed, that it is regarded as a universal Group underlying nearly all the more recent rocks on this continent.

§ 104. It is a deep-sea deposit, as distinguished from all mechanical, littoral, shore-line, and marsh deposits, and, like most other undisturbed marine sediments, is generally limestone. The ocean must have swarmed with invertebrate life during the entire age, as the rocks are almost wholly constituted of their harder parts. It is so thoroughly characterized by its fossils that a palaeontologist has little difficulty in recognizing it wherever it exists. It is in this Group the earliest landplants occur—*Psilophyton* and *Glyptodendron*. The latter was founded upon an impression of uncertain value in a magnesian limestone. *Psilophyton* is supposed to have been a marsh-plant that drifted in the ocean and became imbedded in the mud, which preserved its characters. *Psilophyton princeps* is the oldest fossil landplant in America. Fucoids are scarce; in striking contrast with their abundance in the Clinton. Sponges were more numerous than in any preceding age. Coral-

NIAGARA GROUP.

reefs were formed, which may now be traced for many miles; single masses were several feet in diameter, and the beauty of their structure is not surpassed by any of the corals which now abound in the ocean. Some of the species, too, were almost world-wide in their distribution, as Halysites catenulatus, Heliolites pyriformis, and Favorites forbesi. It is famous, too, for its Echinoderms. The Cystideans commenced their existence in Taconic times, as evidenced by the plate called *Eocystites*, and reached the climax of their evolution and development in this Group, and almost suddenly disappeared from the face of the earth, a few small species only being found in the Lower Helderberg and Lower Devonian, where the entire order became extinct. Cystideans were marine animals, related to the Crinoidea. Some were sessile; others possessed a column and roots, by which they attached to other objects; and others were free, and possessed a flexible column tapering to a point, which could be used for attaching purposes. The head was globular, oval, pyriform, conical, cylindrical, or of any other shape, but always covered with an external skeleton composed of polygonal calcareous plates, which are sometimes very richly ornamented. The fracture of the plates presents the same crystalline structure as crinoidal plates do. In some species the number of plates and order of arrangement remained constant throughout the life of the animal, the size of the animal increasing by the growth of the original plates, which enlarged throughout, instead of by addition to the edges. In other species the plates are not limited in number, and have no order of arrangement; they increase in size, or new plates are introduced, so as to destroy uniformity in different specimens in the same species, \mathcal{J} In other species the dorsal side has a definite number of plates and regular order of arrangement without any increase, while the ventral side has no order of arrangement of the plates, and they increase in number to cover the increased growth of the animal. There are usually two principal apertures, and often many smaller ones through which the most important functions of the animal economy were exercised. One of these is called the mouth, and is found on the side near the base or near the apex. It is a curious fact that so important an organ as the mouth occurs almost anywhere on the body of a Cystidean, but, of course, always occupying the same position in each species. Another aperture, called the ambulacral orifice, occurs near the center of the upper part of the body, and between the bases of the arms, when the species possessed such organs. The other aperture are called calycine pores and pectinated rhombs. The calycine pores served i some manner to introduce water into the interior of the animal, but they bear little resemblance to each other in different species, and one can form no adequate ide of the system of circulation. Pectinated rhombs differ in number and position in different species, and sometimes do not occur at all. Their function, too, is an abso lute mystery, except they furnished another medium of communication from the exterior to the interior of the body. The Blastoidea commenced existence in this Group by the appearance of Stephanocrinus, and became extinct in Carboniferou times. The order Myelodactyloidea, another Echinoderm of very uncertain affinity seems to have been confined to this age. The development of the Crinoidea wa wonderful, no less than 15 genera making their first appearance, eight of which a unknown in later rocks. The Graptolitidæ here became extinct.

§ 105. Holocystites occurs in Ohio, Indiana, Illinois, New York, and othe States. Twenty-five species have been defined, and none are known from high or lower rocks, a *hyptocrinus* has a for the same reas *O. hybrida*, *Calyn* distribution, and § 106. The

In some parts of exudes from the these rocks is of spring" on the ri rose from beneath its way in countle plication of a li which seldom tou and only obtainin height of several the shale, which through 85 feet or limestone at Chica sian boring failed from surface lime mercial importanc which have passed sea. There must substances in value

§ 107. THIS G fined by Logan in 1 and having a maxilarly distinguished fossils closely allied It may have been a north-western part in Canada, but is un daga Group, and p few fossils found in the Guelph. Mega grandis are found in dentalis, Murchisonia ioides, and Dinobolus

GUELPH GROUP.

8

or lower rocks, and it may therefore be considered a characteristic genus. Eucalyptocrinus has a wider geographical distribution, and is more abundant, and for the same reason may be called characteristic. Orthis elegantula, O. flabellum, O. hybrida, Calymene blumenbachi, and Illanus barriensis have almost world-wide distribution, and are characteristic of rocks of this age.

§ 106. The dolomites of this Group in Canada are more or less bituminous. In some parts of Western New York they contain so much solid bitumen that it exudes from the rocks when heated. The escape of carbureted hydrogen from these rocks is of common occurrence. Lyell described in 1841 a "burning spring" on the river just above Niagara Falls, where the light hydro-carbon gas rose from beneath the water out of the limestone rock. The invisible gas makes its way in countless bubbles through the clear, transparent water, and on the application of a lighted candle it plays about with a lambent, flickering flame. which seldom touches the water, the gas being at first too pure to be inflammable. and only obtaining sufficient oxygen after mingling with the atmosphere at the height of several inches above the surface of the river. This gas had its origin in the shale, which forms the lower part of the Falls, and has found its way up through 85 feet or more of quite compact limestone. Petroleum occurs in Niagara limestone at Chicago, which had its origin in some shaly strata beneath, but artesian boring failed to discover it in commercial quantities. Where gas or oil escapes from surface limestone there is little prospect of finding accumulations of commercial importance by artesian boring, because so much has escaped in the ages which have passed away since the elevation of the limestone above the water of the sea. There must be an impervious covering of clay or stone to retain such volatile substances in valuable quantities.

CHAPTER XV.

GUELPH GROUP.

§ 107. THIS Group was named from the town of Guelph in Canada, and defined by Logan in 1863. It appears as a lenticular mass, resting upon the Niagara, and having a maximum thickness of 160 feet. It is a limestone dolomite, particularly distinguished for having no fossil Echinoderms, while it is rich in other fossils closely allied to those in the Niagara, some of the species being identical. It may have been a brackish water-deposit in an arm of the sea. It occurs in the north-western part of Ohio with all the fossils and characteristics pertaining to it in Canada, but is unknown elsewhere. It is doubtless of the same age as the Onondaga Group, and probably should not bear a distinct name, as among the very few fossils found in the latter, *Murchisonia boydi* and *Cyclonema sulcatum* occur in the Guelph. *Megalomus canadensis*, the most common species, and *Trimerella* grandis are found in the Niagara. The characteristic fossils are *Pentamerus occidentalis*, *Murchisonia bivittata*, *M. longispira*, *Subulites ventricosus*, *Pleurotomaria solarioides*, and *Dinobolus galtensis*.

 $\mathbf{53}$

rk, and othe

1 from highe

masses were

ONONDAGA GROUP.

CHAPTER XVI.

ONONDAGA GROUP.

\$ 108. This Group was named the Onondaga Salt Group, by the New York Geologists, from Onondaga County, New York, in 1839, and re-defined by Vanuxem in 1842, and by Hall in 1843. The Canadian Geologists very properly dropped the word "salt" from the name. It consists, on Oneida Creek and Cayuga Lake, in the lower part, of clayey deposits and red shale, showing green spots, followed by gypseous shales and impure limestones, which at the commencement alternate with the red shale, and this is followed by the gypseous deposit, which embraces the great lenticular masses quarried for plaster, and this by a magnesian rock having groups of needle-form cavities caused by the crystallization of sulphate of magnesia, and the upper member is the Waterline. It rests upon the Niagara from the western line of New York, east to the middle part of Herkimer County, where the Niagara thins out; it then rests upon the Clinton until it disappears, and then upon older rocks until it reaches the Hudson River. It is therefore unconformable with the underlying rocks in middle and Eastern New York. The red shale loses its color west of the Genesee, becomes a bluish green, and gradually thins out, showing the unconformability in Western New York. The passage from the Niagara to the Onondaga is abrupt, offering no gradation in character of products or in continuation of fossil species. The great mass of gypseous deposits consists of yellowish or drab, and brownish colored argillaceous, and calcareous shale and slate, or of hard and compact slate, which weathers as if hacked by an instrument. The dark color of the gypsum, and brownish color of other rocks, is due to carbonaceous matter. An important member is called the vermicular limerock, which is gray or blue, and perforated with holes and cells, once filled with soluble saline material, which subsequently dissolved, leaving the cavities, some of which are hopper-shaped, and were produced by common salt, as no other common soluble mineral presents similar ones. The sulphate of magnesia cavities are lined with carbon, showing the liquid that held the salt in solution, contained bituminous matter, the salt ejecting its particles in the act of assuming form, as occurs in the purification of acetic acid when obtained from the distillation of wood. This Group is celebrated for its salines, and formerly furnished nearly all the salt consumed in New York; for this reason it has been called the Salina and Saliferous Group. Sulphate of Strontian and sulphurets of lead and zinc occur in small quantities. Sulphuric acid escapes with the water from the earth in many localities, giving rise to acid springs, and sometimes destroying the water in wells for culinary purposes, as the sulphuric acid becomes strong enough to coagulate milk.

§ 109. The Group attains its greatest thickness at about 1,000 feet in Wayne County, and gradually diminishes westerly, so that on Grand River, Canada, it does not exceed 300 feet, which belongs chiefly to the upper portions, from the summit to a little below the gypsum-beds. The beds of gypsum are never continuous for long distances, but appear as detached lenticular or dome-like masses; the strata above them being arched over and often broken, while those below constitute an even, undisturbed floor. The Group is continued through Lake Huron to the Straits of M land. The thick broken up in a southern line of Island, and at S be seen on the County, and as not been accurate rable, the thickn varying from 1 Iowa, and is un composition of the it does not appea

§ 110. It is extremely rare. part of it and the quetra were early fera, Atrypa, and

§ 111. The used for making while the Canadia berg. It has its Geologists, it is he and Pennsylvanis nized by its minbrownish limestor small Orthoceras f Waterlime, while New York. The Onondaga, is that

§ 112. The w quarries usually odor when struck gas supplied by the salt manufactured City, rock-salt occ surface, which is m afterward pumping been formed at van York, Michigan, a

ONONDAGA GROUP.

the Straits of Mackinac, where it forms the island and the points of the main land. The thickness on the peninsula of Michigan does not exceed 50 feet. It is broken up in a ridge extending west from the west end of Lake Erie near the southern line of Michigan, where it is much thicker, and again at Put-in Bay Island, and at Sandusky and other places in Ottawa County, Ohio, and may be seen on the western and south-west anticlinals, which pass through Wood County, and as far south as Delaware and Pike. The thickness in Ohio has not been accurately ascertained, but including the Waterlime, which is not separable, the thickness is several hundred feet. It has been identified in Missouri, varying from 10 to 75 feet in thickness. It does not occur in Wisconsin or Iowa, and is unknown south of Pennsylvania in the Appalachian system. The composition of the rocks indicates shallow water; but as there is no conglomerate, it does not appear as a shore deposit.

§ 110. It is not very fossiliferous at any locality, and generally fossils are extremely rare. In addition to the two species mentioned as common to the lower part of it and the Guelph, Orthoceras sublave, Euomphalus sulcatus, and Avicula triquetra were early described from Wayne County; but the indistinct forms of Spirifera, Atrypa, and Cornulites remain without specific names.

§ 111. The Waterlime takes its name from the earthy, drab-colored limestone used for making hydraulic cement, and is regarded by some as a distinct Group, while the Canadian Geologists regard it as the lower member of the Lower Helderberg. It has its characteristic minerals and fossils; but, following the New York Geologists, it is here treated as the upper member of the Onondaga. In New York and Pennsylvania its thickness is from 30 to 300 feet, and is well-defined and recognized by its mineral nature, its fossils and position. In Eastern New York a brownish limestone, often mottled, containing corals, fragments of crinoids, and small Orthoceras forms the base of it. All the species of Pterygotus belong to the Waterlime, while Europterus remipes and Pterinea rugosa are characteristic of it in New York. The species which has the greatest geographical distribution in the Onondaga, is that peculiar form called Pleurodictyum problematicum.

§ 112. The whole Group contains more or less carbonaceous matter, and the quarries usually smell of petroleum, and the limestone generally gives up the odor when struck with a hammer. This Group is the source of a large part of the gas supplied by the gas-wells of Ohio and Indiana. It is the chief source of the salt manufactured in New York and in Michigan. On the St. Clair River, at Marine City, rock-salt occurs in a mass, extending from 1,633 feet to 1,748 feet below the surface, which is mined by forcing fresh water down into it to take up the salt, and afterward pumping the brine and evaporating it. Thick masses of rock-salt have been formed at various other places in this Group within the salt districts of New York, Michigan, and Ontario.

New York oy Vanuxem rly dropped iyuga Lake, ots, followed ternate with nbraces the rock having of magnesia, om the west-. where the d then upon rmable with ale loses its out, showing agara to the in continuayellowish or or of hard e dark color eous matter. ray or blue, erial, which shaped, and ral presents showing the salt ejecting on of acetic rated for its rk; for this te of Stronlphuric acid acid springs, he sulphuric

t in Wayne , Canada, it is, from the iever continmasses; the pelow constice Huron to

LOWER HELDERBERG GROUP.

CHAPTER XVII.

LOWER HELDERBERG GROUP.

§ 113. This Group was named from the Helderberg Mountains, and defined by Hall in 1859, in the third volume of the Palaeontology of New York. The lower member is a thin-bedded, often thinly laminated, dark-blue limestone, resting on the Waterlime-beds called Tentaculite limestone. The second member is a thin limestone full of Stromatopora, followed by a dark-gray concretionary limestone, in irregular layers, charged with Pentamerus galeatus and other fossils, which has a maximum thickness in Otsego County of 80 feet, and is called the Pentamerus limestone. The third is a blue, drab-weathering, calcareous shale and blue limestone, full of Spirifera macropleura and other fossils, having a maximum thickness in Albany County of 70 feet, called the Delthyris or Catskill Shaly limestone, from Catskill Creek, near Madison, Greene County. The fourth member is a light-gray limestone, full of broken Encrinites, having a thickness of 25 feet. And above this there is a bluish-gray limestone, charged with Brachiopoda, called the Upper Pentamerus limestone. These local subdivisons are not recognized at any distance from the Helderberg Mountains, nor does the Group occur in Western New York or Western Canada. Strata of this age occur in two or three small outliers in the great basin near Montreal, at the distance of 200 miles from the nearest exposure of the Group in New York. The most important of these is on the Island of St. Helen's. opposite Montreal. The Group, however, is quite largely developed in the Eastern Provinces, where it includes part of the Gaspe limestones. It is exposed on both sides of the Hudson River, and forms the outlier known as Becrafts Mountain, and appears in Maine and New Hampshire. Its maximum thickness in New York is about 400 feet, and nearly as much in Maine, while at Gaspe it is 2,000 feet. It extends southwardly to Tennessee, having a thickness in Pennsylvania of 1,400 feet, in Virginia 1,000 feet, in New Jersey 150 feet, and in Tennessee 100 feet. It has been identified at Cape Frazier in latitude 80°.

§ 114. This is an important Group on the eastern part of the continent, but does not occur west of the Appalachian system, which is in striking contrast with the Onondaga, that spreads out westerly from New York instead of southerly. It abounds in limestone strata, and the evidences of marine life, the latter apparently succeeding that of the Niagara age, by gradual change and development. Crinoids, Corals, Bryozoans, Brachiopods, Gasteropods, Lamellibranchs, and Crustaceans were abundant, but we have no evidence that a vertebrate land or fresh-water animal had yet made its appearance on this continent. The evidence of swamp or air vegetation is on the increase, and here we discover the genus Annularia, which subsequently became so abundant in the Coal Measures. The characteristic fossils are: Tentaculites gyracanthus, Spirifera macropleura, S. vanuxemi, Eatonia singularis, E. medialis, Pentamerus galeatus, P. pseudogaleatus, Streptoryhnchus radiatum, Strophonella punctulifera, Meristella lavis, Rhynchonella semiplicata, R. ventricosa, Strophodonta varistriata, Avicula naviformis, A. manticula, Beyrichia granulata, and B. notata.

§ 115. Petroleum springs occur on the St. John's River and on Silver Brook,

in the Gaspe ser which has harde peculiar odor the is from the fossil good well has, h

§ 116. With stratigraphical a System as establ the overlying rorepresented in th

§ 117. The 1 England. It has its fossils in this of ascending order a Group, Portage G

§ 118. It con principally of lime at all places, exce been regularly de in New York and rine deposits. Di within the seas, w gan to assume som we now behold. libranchs, and Cr was a long and glo organisms than c genera and species sented a strong res alence of Gymnosp the two Systems. The masses and dy rocks older than th carbonaceous shales of rocks, and, as a continent. Very v different States. I exposed sandstone

 $\mathbf{56}$

DEVONIAN SYSTEM.

in the Gaspe series, and in cavities of an amygdaloidal greenstone at Tar Point, which has hardened in some instances to the consistency of pitch, and from its peculiar odor the name Tar Point was given to the locality. The source of this oil is from the fossiliferous rocks or shales beneath, and exudes from an anticlinal. No good well has, however, been discovered by boring in these rocks.

§ 116. With this Group the Upper Silurian closes, because we have another stratigraphical and palæontological chasm, and have arrived at the top of the System as established by Murchison. The absolute want of conformability, with the overlying rocks, is everywhere apparent, and an age of time is therefore unrepresented in the geological column.

CHAPTER XVIII.

DEVONIAN SYSTEM.

§ 117. The Devonian was named in 1837, by Murchison, from Devonshire, in England. It has greater thickness, and is capable of more subdivisions based upon its fossils in this country than in any other part of the world. It is subdivided in ascending order as follows: Oriskany Group, Upper Helderberg Group, Hamilton Group, Portage Group, Chemung Group, and Catskill Group.

§ 118. It commences with a sandstone formation, after which it consists principally of limestone and shales. It is unconformable with the Upper Silurian at all places, except possibly Gaspe, Canada, where the sediment seems to have been regularly deposited from one age to the other. Its greatest development is in New York and Pennsylvania, where mechanical detritus accompanies the marine deposits. During this era land-plants became abundant, and fish swarmed within the seas, while the Archipelago, which had existed in the Silurian era, began to assume somewhat the outlines of a continent, though by no means such as we now behold. Corals, Crinoids, Brachiopods, Gasteropods, Cephalopods, Lamellibranchs, and Crustaceans were abundant, while Cystideans became extinct. It was a long and glorious era, marked by more progress in animal and vegetable organisms than characterized earlier ages. The plants increased in number of genera and species from the Lower to the Upper Devonian, until the flora presented a strong resemblance to that of the Subcarboniferous, especially in the prevalence of Gymnosperms and Cryptogams, though very few species are identical in the two Systems. It is everywhere unconformable with the Subcarboniferous, The masses and dykes of intrusive granite in Nova Scotia, which penetrate all the rocks older than the Subcarboniferous, belong to the close of the Devonian. The carbonaceous shales of this System exceed in thickness those of any other System of rocks, and, as a result, they are the chief oil and gas producing rocks on the continent. Very valuable iron ores and manganese ores occur in this System in different States. In Virginia huge masses of manganese are found imbedded in exposed sandstone ledges, where the supply seems to be practically inexhaustible.

defined by lower memthe Water-1 limestone n irregular maximum The tone. ill of Spiriny County kill Creek, estone, full there is a Pentamerus e from the k or Westa the great sure of the St. Helen's. the Eastern ed on both intain, and ew York is 00 feet. It a of 1,400 00 feet. It

> tinent, but ntrast with therly. It tter apparvelopment. nchs, and ite land or ne evidence the genus ures. The *vanuxemi*, Streptoryhnsemiplicata, *Beyrichia*

> > ver Brook,

ORISKANY GROUP.

CHAPTER XIX.

ORISKANY GROUP.

§ 119. This Group was defined as the Oriskany sandstone by Vanuxem, in 1839, and named from the white sandstone occurring at the Falls of the Oriskany, in Oneida County, N. Y., where it is about 20 feet in thickness. It forms a narrow belt of rough sandstone from the Hudson to Cayuga Lake, charged with peculiar fossils, and varying from a few inches to 30 feet in thickness. It stretches south in the Appalachian region through Pennsylvania, Maryland, and Virginia, and has a thickness in Pennsylvania of 300 feet. It appears in New Jersey with a thickness of 130 feet. In Maine there is a large exposure between Parlin Pond and Aroostook, and it exists at Gaspe and in Nova Scotia. It is known in Canada at but few places, one of the principal exposures being at North Cayuga, and covering only 230 acres. In Southern Illinois it is underlaid with silicious limestone, called the Clear Creek limestone, which constitutes incomplete passage-beds from the Upper Silurian. It is also known in Missouri.

§ 120. It appears as a belt deposited upon the shores of the islands which then existed, and to mark their outlines in a greater or less degree. Like other arenaceous deposits, it indicates the presence of land and shallow water. It abounds in the casts of Brachiopods and Gasteropods in New York, Maryland, and Virginia, and in some places Crinoids occur. The characteristic species are *Spirifera arenosa*. S. arrecta, S. pyxidata, Rensselaeria ovoides, Orthis proximus, O. musculosa, Strophodonta magniventra, S. magnifica, Cyrtina rostrata, Eatonia peculiaris, Leptocalia flabellites, and Platystoma ventricosum. In some places in Virginia the shells are silicified and quite free from adhering matter, and the exterior markings and internal structure are well preserved, even the internal coils of Brachiopoda are beautifully represented. Near Cumberland, Md., a few elegant crinoids have been found, and one Cystidean, Anomalocystites disparilis, which is the latest known representative of that order, except Strobilocystites calvini.

§ 121. The Brachiopods are Devonian in their character rather than Silurian, and there is graduation to the succeeding rocks through the Cauda galli grit, which is a dark, gritty slate, bearing few fossils. The rocks are not such as to have preserved land-plants very well; but they should have preserved fish-teeth if any then existed, but no trace of them has been discovered.

§ 122. This divided into the erous limestone. great geographic erous formation" ogical word, Upp gritty slate cover grit, which is an in the eastern c thin out and are bony plates of fis subcrystalline, con which bears dark suggested the na these two division chert, or hornsto or protophytes, si pods, and other a is about 300 feet.

§ 123. From sula of Canada to into Michigan wh western Ohio, at the Scioto, resting State. It crosses Ohio River at Lo resting on the Or serving the charac exceeding a thick galli grit has a th ing a total thickn is one of the most

§ 124. It is a corals, and coral specimens being se earlier period. It or the outer bony of layers, 3 or 4 and singularly con in length compose tubercles. Cephale drifted land-plants

UPPER HELDERBERG GROUP.

CHAPTER XX.

UPPER HELDERBERG GROUP.

§ 122. This Group was named from the Helderberg Mountains, where it was divided into the Cauda-galli grit, Schoharie grit, Onondaga limestone, and Corniferous limestone. The Corniferous limestone being the only one which has any great geographical distribution, the Canadian Geologists in 1863 used "Corniferous formation" instead of Upper Helderberg; but as Corniferous is a mineralogical word, Upper Helderberg is to be preferred. The Cauda-galli grit is a dark gritty slate covered with Taonurus cauda-galli, and graduates into the Schoharie grit, which is an arenaceous limestone weathering to a brownish color. These occur in the eastern counties of New York, Albany, Greene, and Schoharie, but soon thin out and are not found west as far as the center of the State. The scales and bony plates of fish are first found in the Schoharie grit. The Onondaga is a gray subcrystalline, coralline limestone. It is followed by the Corniferous limestone, which bears dark-colored, cherty beds, that break with a horny fracture, which suggested the name Corniferous; but the cherty beds occur in various places in these two divisions, and there is no real line of separation between them. The chert, or hornstone, is largely composed of microscopic, silicious forms of plants or protophytes, spiculæ of sponges, fragments of the dental apparatus of Gasteropods, and other organisms. The aggregate thickness of the Group in New York is about 300 feet.,

§ 123. From New York the Group extends in a belt west across the peninsula of Canada to Mackinac Island, where it is 250 feet thick, and from thence into Michigan where its thickness is 354 feet. It appears at Sandusky and Northwestern Ohio, at Columbus, and on the Ohio a few miles below the mouth of the Scioto, resting upon the Waterlime Group, which has great thickness in this State. It crosses into Northern Indiana, and striking south-westerly, crosses the Ohio River at Louisville. It appears in Illinois, Iowa, Missouri, and Tennessee, resting on the Oriskany, or the Waterlime, or the Niagara, and everywhere preserving the character of the great coral-reef period of the Devonian, but never exceeding a thickness of about 300 feet. In New Jersey, however, the Caudagalli grit has a thickness of 400 feet, and the Corniferous limestone 500 feet, making a total thickness of 900 feet. It occurs in the western mountain ranges, and is one of the most persistent and generally distributed Groups.

§ 124. It is a marine limestone, distinguished for the remarkable abundance of corals, and coral reefs, the variety in form, number, and size of species, some specimens being several feet in diameter, and larger than any belonging to any earlier period. It is distinguished also for its fish remains, which consist of teeth, or the outer bony covering, sometimes so abundant as to constitute the major part of layers, 3 or 4 inches, or even more, in thickness. Some were very large and singularly constructed. The *Macropetalichthys sullivanti* had a head 15 inches in length composed of hard, bony plates, covered with a thick skin dotted with tubercles. Cephalopods are abundant and quite characteristic, and in a few places drifted land-plants have been found, but they are not of general occurrence. The

anuxem, in ne Oriskany, ms a narrow ith peculiar etches south niá, and has rith a thick-Pond and Canada at t, and coveris limestone, ge-beds from

is which then other arenat abounds in nd Virginia, *ifera arenosa*, *Strophodonta labellites*, and *ied and quite eture are well ented. Near ie Cystidean*, *iat order, ex-*

han Silurian, li grit, which to have preh if any then

HAMILTON GROUP.

most characteristic species among the invertebrates, and those by which the rocks may be readily identified are Cyathophyllum rugosum, Favosites goldfussi, Syringopora maclurii, Phillipsastrea verneuili, Nucleocrinus verneuili, Spirifera acuminata, S. gregaria, Pentamerus knighti, P. aratus, Stricklandinia elongata, Paracyclas occidentalis, Conocardium subtrigonale, Platyceras dumosum, Tentaculites scalariformis, and Dalmanites selenurus. In the vicinity of Davenport, Iowa, it furnishes an abundance of durable and massive building material and contains cavernous openings, as if worn out by the action of water, and filled up subsequently with material derived from higher rocks, and especially those of the Hamilton Group. The quarries at Columbus, Ohio, and North Vernon, Indiana, are in this Group. The strata in the vicinity of the Straits of Mackinac have been eroded and excavated so as to produce the Island of Mackinac, and large masses of the materials have been transported and distributed over Southern Michigan and Ohio.

§ 125. The limestones of this Group in Canada are usually bituminous, and petroleum frequently fills the cells of corals and other fossils. The corals often prevail in distinct bands, some of which will be saturated with the oil, while others will not. Petroleum springs rise from this Group at Tilsonburg, and other places along an anticlinal which runs through the Western Peninsula. The oil being lighter than water, and permeating the strata, naturally rises to the highest part of the anticlinal between the impervious layers of rock, and escapes to the surface. In other localities the bitumen is solid, and takes the form of asphaltum or mineral pitch, as at Kincardine, where slaty beds contain from 10 to 15 per cent of bitumen soluble in benzole. No good well, however, has been discovered in Canada by boring in these rocks, though it has been contended the oil at Enniskillen and on the Thames has its source here. Where the oil has been found in this Group, it has had its source in the Waterlime or in the shales below.

CHAPTER XXI.

HAMILTON GROUP.

§ 126. THIS Group was named from Hamilton, Madison County, New York, and defined by Vanuxem in 1842, though he did not include within it the Marcellus Shale, Tully Limestone, and Genesee Slate. The divisions made for it in New York are Marcellus Shale, Ludlowville Shale, Encrinal Limestone, Moscow Shale, Tully Limestone, and Genesee Slate. The rocks are not susceptible of this division, except locally, and they all belong to a single Group. The Marcellus Shale was named from Marcellus, where it is an argillaceous slaty rock, bearing much carbonaceous matter, and sometimes small pieces of coal, and has a thickness of about 200 feet. It contains layers of impure limestone, and abounds in fossils. In many places it contains so much bitumen as to give out flame when thrown into the fire, which led the early settlers to explore it throughout its whole extent for coal, only, of course, to suffer disappointment. It is not separable from the Ludlowville Shale by any well-defined characters. The Ludlowville Shales were named from the town of that name, and separated from the Moscow Shale by a layer of limestone 3 or 4 feet thick, called the Encrinal limestone; but such division is scar from 300 to 90 fossils. The Tu has a thickness the gorge of the fissile mass, atta Group in New

§ 127. The of variable wid thickness in the feet in the we excavated for me afford the best fa stones in the east State. The bed wave-lines, and Fucoids and mar good size, and di as to show much in the extension and the Group 1 Wisconsin, which Milwaukee, where the manufacture Helderberg as fai Falls of the Ohio Iowa, and also in on the Mackenzi thickness in Penn lachian chain, tha ment. In the E remains, while mo § 128. It is

S 128. It is its invertebrate Lepidodendron, wt shales. The rema species are distinct usually be determ Tropidoleptus caris limitare, L. quadr recurva, Pterinea fu sulcomarginata, Sty

§ 129. The oi known to the Indi upon the surface of sinking through th considerable suppli

HAMILTON GROUP.

division is scarcely worthy of recognition. The three have a thickness varying from 300 to 900 feet, extend from Lake Erie to the Hudson, and abound in fossils. The Tully limestone was named from Tully, where it is burnt for lime, and has a thickness of 14 to 20 feet. The Genesee slate, named from the opening of the gorge of the Genesee River at Mount Morris, where it is a black, argillaceous fissile mass, attains a thickness of 150 feet and closes the era of the Hamilton Group in New York.

§ 127. The Group extends from the Hudson to Lake Erie, occupying a belt of variable width in the central part of the State, and attaining a maximum thickness in the eastern part of 1,200 to 1,400 feet, and diminishing to about 300 The valleys of Seneca and Cayuga Lakes are feet in the western part. excavated for more than half their length in these rocks, and the banks and ravines afford the best facilities for examination. It is an olive shale, with slates and sandstones in the eastern, and calcareous shale and limestone in the western part of the State. The bedded rocks are remarkable for the abundance of ripple-marks, and wave-lines, and the shales abound in carbonaceous material, due to vegetation. Fucoids and marine plants are common, and coniferous trees and ferns grew to a good size, and drifted into the ocean, where they were imbedded and preserved, so as to show much of their form and structure. The New York subdivisions are lost in the extension across the peninsula of Canada from Lake Erie to Lake Huron, and the Group becomes a limestone in Michigan. It occurs at only one place in Wisconsin, which consists of a strip about 10 miles long and 5 or 6 wide, near Milwaukee, where it is an impure limestone, quite fossiliferous, and largely mined for the manufacture of hydraulic cement. It occurs in Ohio, resting on the Upper Helderberg as far south as Columbus, and the upper part of the limestone at the Falls of the Ohio, is referred to it. It occurs at Davenport and New Buffalo, in Iowa, and also in Illinois and Missouri. It appears among the western mountains, on the Mackenzie River, in Alaska, and in the Arctic regions. It has greater thickness in Pennsylvania, New Jersey, Virginia, and other States in the Appalachian chain, than it has in the West, and contains much more mechanical sediment. In the East it is a mud rock supplied with drift materials and marine remains, while more westerly it is exclusively a marine calcareous rock.

New York, Shin it the made for it ne, Moscow ible of this Marcellus ck, bearing a thickness in fossils. hen thrown hole extent chales were shales vere usually tropidol limitare, s 12 Lepidode shales, usually tropidol limitare, s 12 Lepidode shales, species a usually tropidol sits inve tropidol limitare, s 12 tropidol shales vere upon th sinking

; but such

h the rocks

Syringopora uminata, S.

las occident.

formis, and

irnishes an

avernous

uently with

ton Group.

this Group.

eroded and

sses of the

n and Ohio.

ninous, and

corals often

while others

other places e oil being

hest part of the surface.

phaltum or

15 per cent

scovered in the oil at

been found

elow.

§ 128. It is of quite general distribution and usually readily determined by its invertebrate fossils, which exceed in number almost all earlier Groups. Lepidodendron, which became so common in the Coal Measures, is found in the shales. The remains of fish are much like those of the Upper Helderberg, though species are distinct. The characteristic fossils, and those by which the Group may usually be determined, are Heliophyllum halli, Spirifera pennata, S. granulifera, Tropidoleptus carinatus, Rhynchonella venustula, Athyris spiriferoides, Leiorhynchus limitare, L. quadricostatum, Orthonotu undulata, Cypricardella bellistriata, Cimitaria recurva, Pterinea flabellum, Modiomorpha concentrica, Bellerophon patulus, Pleurotomaria sulcomarginata, Styliola fissurella, Homalonotus dekayi, and Phacops bufo.

§ 129. The oil-springs of Enniskillen and of the Thames, in Canada, were known to the Indians and to the settlers from an early period. The oil floated upon the surface of the waters, and formed by its drying beds of tarry bitumen. On sinking through the clay from 40 to 60 feet, a bed of gravel is reached, from which considerable supplies of petroleum are obtained. Such are called surface-wells,

PORTAGE GROUP.

and are less productive than the deeper ones. Below the gravel thin limestones, shales, and clavs occur for a distance of about 230 feet before the Upper Helderberg limestones are reached. One of these wells, when sunk to a depth of 200 feet below the surface, yielded, when first opened, 2,000 barrels of oil in twenty-four hours. In some of the wells bored in this vicinity, both oil and water flowed to the surface, and in some of the deeper ones the water is saline. Wells bored into the Upper Helderberg limestone sometimes reached small quantities of oil, but no valuable wells have thus far been discovered in Canada by boring below the Hamilton Group. The flowing wells soon become intermittent, and within a year cease to flow altogether; they continue, however, to furnish oil by pumping for a limited period, and then appear to be exhausted. The petroleum differs in volatility; the less volatile contains paraffine in solution, and is suited for lubricating machinery, while the more volatile is best suited for light. The alliaceous odor of some of the unrefined oil is due to the presence of a little sulphureted hydrogen. Petroleum is modified on exposure to the air by volatilization and oxidation, and eventually assumes a solid form. Thus near Oil Creek, in Enniskillen, the thickened oil formed two layers, called gum-beds, of a viscid, tarry consistence, covering two or three acres with a thickness from a few inches to two feet. In sinking a well, a bed of this asphaltum, from 2 to 4 inches thick, was met with at a depth of 10 feet, upon a layer of gravel. It contained the remains of leaves and insects, which were imbedded in it during its slow accumulation and solidification. In boring the oilwells there is always a greater or less disengagement of inflammable carbureted hydrogen-gas, and sometimes it is liberated with explosive violence. The strata almost everywhere in that region hold in a condensed state portions of light carbureted hydrogen, which is discharged wherever a natural fissure or an artificial boring furnishes a vent. The shale on Sulphur Island, at the mouth of Thunder Bay in Lake Huron, is so highly charged with bituminous matter that it has been set on fire and burned for months. The bitumen burns out and leaves the shale with a reddened appearance.

CHAPTER XXII.

PORTAGE GROUP.

§ 130. This Group was named from Portage, New York, and defined by Hall in 1843. It consists of variable shales and sandstones, forming in New York an east and west band, resting upon the Hamilton Group, and dipping south about 25 feet in a mile. The sandstones produce falls in the streams, beautiful cascades, and grand and striking scenery. The highest perpendicular fall of water and deepest canons and gorges in the State exist in this Group. It thickens westerly and thins easterly, and does not extend to the extreme eastern part of the State. Sandstones greatly predominate in the eastern part, while shales increase westerly, until the whole Group becomes a mass of black, bituminous shale. The thickness" on the Genesee is 1,000 feet, on Lake Erie 1,400 feet. A considerable part of Lake Erie is excavated out of this Group, which shows a belt on the south side extending nearly to Sandusky; and from here it bends southerly across Ohio, leaving Columbus to the west, and, reaching the Ohio River below the mouth of the Scioto, it crosses into I ranges. It cros sula, and enterthe Huron Gro and enters India reaching the Oh toward Tennesse Ohio for 1838, a Indiana, and Ter in Indiana from been recognized to the Appalachi

§ 131. Fuco throughout its di with those above be spent in some greatest abundan which are of giga lævis occur in Ne istic. Fish of la teeth strong eno a carnivorous fish mian. It was we of any other genu seas or arms of th large geographica local in their exte limestone, some of monster Dinichthy

§ 132. The G posed to be the so New York, Penns rocks until the Po supply. Ten per shale yields oil by and in those which vania belong to th of this Group as The gas at Fredon 1820. Lyell desciwith little variatio

PORTAGE GROUP.

63

it crosses into Kentucky, and is soon broken up in the spurs of the mountain ranges. It crosses Lake Erie, and occupies a small part of the Canadian peninsula, and enters the southern peninsula of Michigan, where Winchell called it the Huron Group. From Michigan it crosses the north-western corner of Ohio, and enters Indiana, forming a belt across that State by way of Indianapolis, and, reaching the Ohio River at New Albany, crosses into Kentucky, and extends far toward Tennessee. It was called the Black Shales in the Geological Survey of Ohio for 1838, and in that of Indiana for 1839, and in later surveys of Kentucky, Indiana, and Tennessee. The thickness in Ohio is from 200 to 1,000 feet or more, in Indiana from 100 to 200, and in Tennessee from 10 to 150 feet. It has never been recognized west of these States, and is therefore classed as a Group belonging to the Appalachian mountain system.

§ 131. Fucoids, wave-lines, and ripple-marks are numerous, and occur throughout its distribution. The paucity of fossils in this Group, when compared with those above and below it, is one of its striking characters. Whole days may be spent in some parts of it without finding a shell, though fucoids are in the greatest abundance. Land-plants occur in profusion in New Brunswick, some of which are of gigantic size. Goniatites complanatus, Panenka speciosa, and Spirifera lævis occur in New York and in Ohio, and may therefore be considered characteristic. Fish of large size, covered with thick heavy plates, and having jaws and teeth strong enough to crush a body the size of a man, occur in it. Cladodus, a carnivorous fish, became abundant in this period, and flourished until the Permian. It was world-wide in its distribution, and its vertical range exceeds that of any other genus of fishes. The Group seems to have been deposited in internal seas or arms of the ocean, and is the last Group of the Devonian System, having a large geographical distribution, for the Chemung and Catskill are comparatively local in their extension. In Ohio there are large concretionary balls of impure limestone, some of them several feet in diameter, and it was in one of these the monster Dinichthys was discovered.

§ 132. The Group is distinguished as the great seat of petroleum, and is supposed to be the source from which the chief supply in this country is derived. In New York, Pennsylvania, and Ohio the wells are bored through the overlying rocks until the Portage is reached, or the saturated sands that overlie it furnish the supply. Ten per cent of the shales is bituminous and carbonaceous matter. The shale yields oil by distillation, and gas and oil springs abound in its sandstones, and in those which overlie it. The great oil-sands in the oil regions of Pennsylvania belong to the Chemung, and have doubtless been fed as well from the shales of this Group as from those of the Chemung, which furnish the same products. The gas at Fredonia, New York, in this Group, was used for lighting houses in 1820. Lyell described it in his travels in 1841, and it has been in constant use, with little variation in the supply, ever since.

limestones, Helderberg 200 feet wenty-four flowed to bored into oil, but no below the hin a year ping for a differs in lubricating ous odor of hydrogen. lation, and + thickened vering two g a well, a of 10 feet, which were ng the oilcarbureted The strata ght carbucial boring der Bay in set on fire a reddened

> ed by Hall v York an h about 25 l cascades, and deepest esterly and the State. we westerly, thickness ole part of ith side exnio, leaving the Scioto,

CHEMUNG GROUP.

CHAPTER XXIII.

CHEMUNG GROUP.

§ 133. This Group was named from the exposure at the Chemung Upper Narrows, at Chemung, New York, and defined by Vanuxem and Hall in 1842 and 1843. The shale and sandstone at Ithaca, having a thickness at Hector's Falls of 400 feet, was called the Ithaca Group, but it is only part of the Chemung. The Chemung consists of a highly fossiliferous series of shales and thin-bedded sandstones and impure limestones, and an infinite variety formed from admixture of these. Except in a few localities there is no marked line between it and the Portage below. The two are distinguished by their fossils. The shales vary in color from a deep black to olive-green, with every grade of intermixture; the sandstones are gray, olive, or green, and almost the whole series weathers to a brownish olive. The Group forms an east and west belt across the southern part of New York, having a thickness in the eastern part of 2,000 feet, dipping southerly at 25 feet or more to the mile, and thinning westwardly, so as not to be determined a short distance from where it crosses the line of Ohio. It is unknown farther west. In its extension from Eastern New York into Pennsylvania the thickness increases until it exceeds 3,000 feet. It occurs at New Brunswick and at Gaspe, Canada, but has not been satisfactorily determined at many other places, though it probably occurs in many other regions of the Appalachian system. The rocks which have been called Chemung in Ohio, Indiana, Illinois, Missouri, Iowa, and Michigan belong to the Waverly, except the thin, tapering belt in North-eastern Ohio, already mentioned.

§ 134. The alternations and interlaminations of shales and sandstones show deposition under similar circumstances to those under which the Portage was deposited. The source of the materials was to the east or south-east of New York, as evidenced by the thinning of the deposits and diminution of sandy strata toward the west. The land-plants occur in Eastern New York, and disappear westerly, proving the land existed in that direction. The marine and land plants are abundant in the sandstones, while marine shells increase with the decline of the sandstones and augmentation of the shales westerly, though fucoids continue in abundance wherever the Group exists. The plants foreshadow the approaching Carboniferous System by the presence of Archaeopteris, Cyclopteris, Sigillaria, Lepidodendron, and Trigonocarpon. The fauna has more of a Carboniferous aspect than any which preceded it, and there is a diminution of the types which characterized the earlier Devonian. The species having the greater distribution and most characteristic are Lepidodendron chemungense, Archeopteris laza, Asterophyllites parvulus, Orthis impressa, Orthis tioga, Streptorhynchus chemungense, S. pectinaceum, Strophodonta cayuta, S. mucronata, Chonetes muricatus, Productella hirsuta, Spirifera disjuncta, S. mesacostalis, Atrypa dumosa, A. hystrix, Aviculopecten duplicatus, A. rugistriatus, Leptodesma longispinum, L. spinigerum, Leiopteria chemungensis, Pterinopecten dispandus, P. crenicostatus, P. suborbicularis, Pterinea consimilis, Crenipecten crenulatus, Mytilarca chemungensis, and Phacops nupera.

§ 135. Springs, evolving carbureted hydrogen-gas, or gas accompanied with petroleum, are common throughout nearly all that part of New York and Pennsyl-

vania covered minous odor or and gas produ the oil had the rived from veg taining carbona possible the gas making the latt both formed at organisms, and evidence also se for the shales be the greater sup are porous and troleum, which i are bored until the Chemung san as well as from with anticlinal a supported with much less has t Wells are as val rock is struck ab

,91

§ 136. This (quite fully defined conglomerates, an portion is brick-re shales are gray, o eastern New York feet, and dips rap feet, and soon dis New York, and is It is conformable lithology, and by been described from erally very poorly the rocks belong to though these are ra Old Red Sandstone is cemented and for and strata unequall

CATSKILL GROUP.

vania covered with the Chemung. The rocks in nearly all localities emit a bituminous odor on percussion, and petroleum often exudes from the crevices. The oil and gas products are the same in the Chemung as in the Portage. The gas and the oil had the same origin. They are both hydrocarbons. They were both derived from vegetable and animal organisms. Wherever shales are found containing carbonaceous matter, evidence of these products may be obtained. It is possible the gas was first produced, and from it the petroleum has been derived. making the latter a secondary product; but the evidence seems to prove they were both formed at the same period of time, and during the decomposition of the organisms, and before the mud had indurated or hardened into rock. And the evidence also seems to prove they were derived almost wholly from marine plants, for the shales bearing the greater number of fucoids are those to which we ascribe the greater supplies of hydrocarbons. The sandstones which overlie these shales are porous and capable of holding from one-eighth to one-tenth their bulk of petroleum, which is sufficient to account for the flowing wells of Pennsylvania which are bored until they penetrate the sandstone. Many of the wells penetrate only the Chemung sandstone, though the oil is derived from the shales of the Portage as well as from the Chemung. The supposed connection of petroleum and gas with anticlinal axes, or synclinal ones, has not been verified by observation, nor supported with reason, neither are they dependent upon faults or crevices, and much less has the depth of the well any connection with the level of the sea. Wells are as valuable when bored below the sea level as they are when the proper rock is struck above that horizon.

CHAPTER XXIV.

CATSKILL GROUP.

§ 136. This Group was named by Emmons from the Catskill Mountains, and quite fully defined by Vanuxem in 1842. It consists of sandstones, shales, slates, conglomerates, and impure limestones. The prevailing color of the arenaceous portion is brick-red, though all of it is more or less colored with iron, and the shales are gray, olive-red, or green. It exists only in a few counties in Southeastern New York, in the Catskill Mountains, where it has a thickness of 3,000 feet, and dips rapidly toward Pennsylvania, where it reaches a thickness of 7,500 feet, and soon disappears. It does not extend west of the 'Genesee Valley in New York, and is wholly unknown on any part of the continent west of that State. It is conformable with the Chemung, and is distinguished only by the change in lithology, and by the fossils. No Corals, Crinoids, Brachiopods, or Trilobites have been described from it, and only a few Lamellibranchs. The land-plants are generally very poorly preserved. The fish remains are relied upon to really prove the rocks belong to the Devonian rather than to the Subcarboniferous age, and though these are rare and poorly preserved, they show it is the equivalent of the Old Red Sandstone of England, and therefore Devonian. In some places the sand is cemented and forms a grindstone grit, and there are hard concretionary masses, and strata unequally hardened, that weather into picturesque rocks. The Group is

ung Upper n 1842 and r's Falls of ung. The sandstones re of these. tage below om a deep gray, olive, The Group ing a thickmore to the tance from s extension it exceeds it has not v occurs in been called ong to the mentioned. tones show ge was de-New York, rata toward r westerly, s are abunf the sandabundance rboniferous endron, and which prethe earlier aracteristic Orthis immta cayuta, S. mesacos-Leptodesma pandus, P. , Mytilarca anied with

d Pennsyl-

SUBCARBONIFEROUS SYSTEM.

almost wholly a mechanical deposit of very limited distribution and enormous thickness. There are ripple-marks and other evidences of shallow water in different strata. The fossils characteristic of it are Aneimites obtusus, Amnigenia castskillensis, Holoptychius americanus, H. taylori, and Dipterus sherwoodi.

§ 137. The total maximum thickness of the several Groups belonging to the Devonian as given above is 14,500 feet, though no single section would furnish such a depth. The greatest thickness is in Pennsylvania, and next in New York. The thickness at Gaspe, Canada, is 7,036 feet, and the divisions into Groups are not well defined. In the Western States several Groups are missing, and the thickness of the rest is only a few hundred feet. All the strata are marine; no land or fresh-water shells have been found within them, and the land-plants are fairly supposed to have drifted to the places where they occur. The Devonian is everywhere unconformable with the superimposed Subcarboniferous, which always begins with a conglomerate or sandstone. The great reef-forming Corals so conspicuous in the Upper Helderberg and Hamilton, did not survive the era. Cystideans became extinct. The family Spiriferidae, which commenced in the Upper Silurian, became most prosperous in this age, and lived until the Jurassic. The three most notable steps in the progress of development are found in the growth and abundance of land-plants, the appearance of insects, and in the introduction and diversity of fish. The Devonian fish belong to the Selachians or cartilaginous fishes, the Ganoids, or fishes covered with plates or bony scales, and the Placoderms. There is nothing known in connection with plants or animals indicating the temperature of the sea, or climate on land, was different then from what it is now.

CHAPTER XXV.

SUBCARBONIFEROUS SYSTEM.

§ 138. This System was named and defined by David Dale Owen in 1838, in the Geological Survey of Indiana. He found it to consist of massive sandstones, limestones, and shales, lying between the Devonian and the Coal Measures, to be characterized by *Pentremites* and other peculiar fossils, and to be capable of subdivision into Groups. The name Subcarboniferous indicates its position is below the Coal Measures. In the great valley of the Mississippi it is divided, in ascending order, into Waverly, Burlington, Keokuk, Warsaw, St. Louis, and Kaskaskia Groups. These Groups have been fully defined in Illinois, Iowa, Missouri, Arkansas, Indiana, Ohio, Kentucky, and Tennessee, and can be determined with more or less satisfaction beneath the Coal Measures in the four larger coal-basins, though not throughout their whole extent. For example, while the Groups are not Nistinctly marked in Pennsylvania, they can be readily determined on the opposite side of the basin in Kentucky and Tennessee. This is because the rocks consist largely of sandstones and shales in the east, which did not preserve well the fossils, while in the west they are principally limestones, containing fossils in great profusion and perfection. In Pennsylvania the sandstones and shales have a thickness of 5,000 feet, which thin westerly and southerly, and gradually give way to limestones and deep marine deposits.

§ 139. In upper part Lov is called Lower of sandstones, a limestones bear in the Illinois occur in the sti ness is 4,600 fee 7,000 feet or m The System has Red Wall Grou son found no p boniferous as a & of subdivision i with a sandstone with it, there is better defined els carding it.

§ 140. The and belonging a Spirifera striata, Productus semiret each of the Coal-It is in this Syter bertite is so abund clay, with much b ervation. The sl of asphaltic mine The argillaceous n minuted vegetable some later age esca parts and partial of heat for such tran flow from these roo and in gas manufi or black mangane from the spontane from them. Salir the commencemen occur occasionally Stewiacke, Musquo auriferous quartz-v exactly as in mode glomerate^{*} and in t The rocks of the a ain Limestone.

66

+

SUBCARBONIFEROUS SYSTEM.

ous thickdifferent stskillensis,

ing to the d furnish ew York. troups are the thick-; no land are fairly is everyays begins picuous in)ecame exn, became st notable ndance of versity of ishes, the acoderms. the temnow.

> 1 in 1838. andstones, ires, to be ple of subn is below ascending Kaskaskia ssouri, Arwith more ns, though e not disthe opporocks cone well the ls in great ve a thickve way to

§ 139. In Nova Scotia the lower part is called Lower Coal Measures, and the upper part Lower Carboniferous Marine Formation, or more generally the whole is called Lower Carboniferous, even where its thickness is 6,000 feet. It consists of sandstones, shales, conglomerates, and limestones, with beds of gypsum. The limestones bear Brachiopods specifically identical with those of corresponding age in the Illinois basin. In Pennsylvania and in Nova Scotia thin seams of coal occur in the strata, which is not the case farther west. On Cape Breton the thickness is 4,600 feet. In the Rocky Mountain region there is a thickness of 4,000 to 7,000 feet or more, and the several Groups may be determined at different places. The System has been divided in the west into the Lodore Group, Tonto Group, Red Wall Group, Lower Aubrey Group, and Upper Aubrey Group. Prof. Dawson found no paleontological or stratigraphical reason for regarding the Subcarboniferous as a System distinct from the Carboniferous, but as it is generally capable of subdivision into Groups, is always unconformable with the Devonian, begins with a sandstone, and is followed by a conglomerate or sandstone unconformable with it, there is good reason for retaining the name, though if the lines were not better defined elsewhere than in Nova Scotia, we might join Prof. Dawson in discarding it.

§ 140. There are some fossils in this System almost world-wide in distribution. and belonging alike to all the Groups into which it has been subdivided; viz. Spirifera striata, Athyris lamellosa, A. planosulcata, Orthis michelini, O. resupinata, and Productus semireticulatus. There are some that occur in the rocks of this age in each of the Coal-basins on this continent; as, Athyris subtilita and Productus cora. It is in this Sytem at Hillsborough, New Brunswick, the bituminous mineral Albertite is so abundant. The rocks are thin-bedded shales, composed of fine, indurated clay, with much bituminous matter, and are full of fossil fishes in a good state of preservation. The shales have been disturbed and contorted, and contain the vein of asphaltic mineral called Albertite. The theory of its creation is as follows: The argillaceous mud which formed the indurated shales, was charged with finely comminuted vegetable matter, which in its decomposition furnished the petroleum that at some later age escaped into a vein or fissure in the rocks, and by losing its more volatile parts and partial oxidation, it hardened into the coaly or asphaltic substance. No extra heat for such transformation was necessarily required. Springs yielding petroleum flow from these rocks in various places. Peroxide of manganese, used in bleaching and in gas manufacture, occurs in limestone near the base of the System, and wad or black manganese ore is abundant at different places. Alum frequently occurs from the spontaneous weathering of pyritous shales, and is sometimes manufactured from them. Saline springs are not uncommon; indeed, they are numerous from the commencement of the Upper Silurian rocks to the close of this System, and occur occasionally both above and below such range. The conglomerate on the Stewiacke, Musquodoboit, and St. Mary's Rivers, is auriferous. It was formed from auriferous quartz-veins, derived from the Taconic System, and gold occurs in it exactly as in modern auriferous gravels, being found in the lower part of the conglomerate, and in the hollows and crevices of the underlying unconformable rocks. The rocks of the age of this System in Europe are commonly known as the Mountain Limestone.

WAVERLY GROUP.

CHAPTER XXVI.

WAVERLY GROUP

§ 141. THIS Group was named in 1838, by Mr. C. Briggs, an assistant geologist on the Ohio Survey, from Waverly, Ohio, where it consists of a fine-grained sandstone, about 300 feet in thickness, superimposed upon a black argillaceous slate 200 or 300 feet thick, and is followed by from 40 to 80 feet of conglomerate. He identified the rocks at Portsmouth, Piketown, and Chillicothe. Mr. J. W. Foster, another assistant, followed them through Licking and Fairfield Counties. In 1839 David Dale Owen, after having examined the rocks in Ohio, found them in Indiana, Illinois, and Kentucky, and described the freestone knobs displayed back of New Albany as the Waverly Sandstone series, and referred them to the base of his Subcarboniferous System. Owen established this Group as a geological subdivision by a fair definition.' Owen, Norwood, Pratten, and other Western geologists recognized the Group from that time forward. In 1841 Hubbard recognized the Group in the geological survey of Michigan. Hall and some Eastern geologists erroneously asserted the rocks were of Devonian age. In 1861, Meek and Worthen, having ascertained, upon palaeontological evidence, the limestones at Rockford, Indiana, at Choteau, Missouri, and at Kinderhook, in Pike County, Illinois, belong to the base of the Subcarboniferous rocks, proposed to call them the Kinderhook Group. They understood they were making a synonym, but supposed they were including less in their Group than is included in the Waverly. In the same year Alexander Winchell described the Marshall Group of Michigan, and afterward thoroughly defined it, and proved its identity with the Waverly Group, the Kinderhook, the Yellow sandstone series of Iowa, and Choteau limestone, Vermicular sandstone and shale, and Lithographic limestone of Missouri.

§ 142. The Group in Ohio forms a belt from 10 to 20 miles in width, commencing near the mouth of the Scioto, and bearing north and north-east toward Cleveland, but widening as it approaches Lake Erie, until its width exceeds 40 miles. It rests upon the Portage Group, and has been called in its northern extension the Cuvahoga shale, Berea Grit, Bedford and Cleveland Shales. It crosses the Ohio from the Scioto, and entering Kentucky is soon broken up among the mountain ranges. In Indiana it forms a belt extending from New Albany north, by way of Rockford, and south across the Ohio River, by way of Danville and Knob Lick, Kentucky. The fossiliferous, greenish, mottled limestone at Rockford, so famous for its Goniatites is at the base of the Group. The maximum thickness in Indiana is 500 feet, in Kentucky 200 feet. In Michigan, at Marshall, Hillsdale, and other places, it consists of reddish, yellowish, and greenish sandstones, having a thickness of 160 feet, and the Napoleon sandstone, 123 feet in thickness. It furnishes large quantities of salt and gypsum. The brine is obtained by boring and pumping, and very large salt-works are established on the Lower Saginaw River. Salt has been largely manufactured from brine obtained from the rocks in Ohio. The celebrated Ohio freestone, so much used for building purposes, is from this Group.

§ 143. In Missouri, the Lithographic limestone has a thickness of 55 feet; is a fine-grained, compact limestone, breaking with a free, conchoidal fracture, and is especially charac thickness of 75 f burrows. The C Choteau Springs, At Burlington, I and sandstones, c it disappears. It sists of grit-stones colitic limestone. other places in th

§ 144. The able in the species fish remains. Fo ductella concentrice liaris; Syringothyri Centronella allii, dianense, Goniatite

§ 145. This (Burlington limesto geologist seems to 1 science, though the The limestone at B of crinoidal remain increases in siliciou beds, which, withou Group. Hall refer and others refer the dips below the bed fine exposure at E Mississippi, from St. and at Sedalia. Th fossils received from Valley Mining Dist the great West.

§ 146. The sepa tained were it not for and this resulted prowestern localities durties. The detrital m the Appalachian sysand other States may

BURLINGTON GROUP.

especially characterized by *Pentremites roemeri*. The Vermicular sandstone has a thickness of 75 feet, and is ramified with irregular perforations resembling wormburrows. The Choteau limestone has a thickness of 100 feet, and was named from Choteau Springs, in Cooper County. It has an extensive geographical distribution. At Burlington, Iowa, the Group has a thickness of 77 feet, and consists of shales and sandstones, capped by a four-feet bed of oolitic rock. It thins northerly until it disappears. It has a thickness in Illinois of 200 feet, and at Kinderhook it consists of grit-stones, sandy and argillaceous shales, with thin beds of fine-grained and oolitic limestone. It has been identified in the Wahsatch Range, in Utah, and at other places in the great West.

§ 144. The fauna, on the whole, has assumed a Carboniferous aspect, noticeable in the species which pass to higher Groups, and more strongly in the genera of fish remains. Fossils having a wide distribution and characteristic species are Productella concentrica, Productus cooperensis, Spirifera carteri, S. extenuata, S. peculiaris; Syringothyris halli, Athyris hannibalensis, Rynchonella hubbardi, R. missouriensis, Centronella allii, Bellerophon cyrtolites, Grammysia hannibalensis, Orthoceras indianense, Goniatites oweni, G. marshallensis, and Phillipsia doris.

CHAPTER XXVII.

BURLINGTON GROUP.

§ 145. This Group was named from Burlington, Iowa, where it was called the Burlington limestone before it was described as a geological subdivision. No single geologist seems to have established the Group, or to have introduced the name to science, though the first full definition is in the geological survey of Iowa for 1858. The limestone at Burlington is subcrystalline, often friable, and largely composed of crinoidal remains, has a thickness of 100 feet, and thins out northwardly. It increases in silicious matter toward the top, until the limestone merges into silicious beds, which, without evidence of unconformability, separate it from the Keokuk Group. Hall referred these cherty layers to the Keokuk, but White, Wachsmuth, and others refer them to the Burlington. In its southern extension, the Group dips below the bed of the Mississippi, and rises again at Quincy, and furnishes a fine exposure at Hannibal, Missouri. It exists in nearly every county on the Mississippi, from St. Louis to Iowa, and west from St. Charles to Howard County, and at Sedalia. The thickness varies from 100 to 500 feet. From a collection of fossils received from Prof. Cope, the author identified the Group in the Lake Valley Mining District of New Mexico; and it doubtless exists at other places in the great West.

§ 146. The separation of the Burlington from the Keokuk could not be maintained were it not for the great change in the specific characters, of the Crinoids, and this resulted probably from the deeper, or elearer, or less disturbed water in the western localities during the Burlington period, than existed in the eastern localities. The detrital material may have prevented the recognition of the Group in the Appalachian system, and rocks of the same age in Ohio, Kentucky, Indiana, and other States may be referred to the Waverly or the Keokuk. In no other

69

ant geoloie-grained eous slate He iden-'oster, an-In 1839 ı in Indiback of e base of gical subern geoloecognized geologists Worthen, Rockford, linois, be-Kinderosed they the same afterward the Kinermicular

> dth, comst toward sceeds 40 rthern ex-It crosses mong the ny north, ville and Rockford, thickness all, Hillsindstones, thickness. by boring aw River. hio. The is Group. 5 feet; is re, and is

KEOKUK GROUP.

period did the harder parts of Crinoids so completely form the limestone, and hence it is pre-eminently the age of Crinoids. As the Graptolida reached the height of development in the Quebec or Upper Taconic, the Orthoceratida in the Black River, and the Cystidea in the Niagara; so did the Crinoidea in the Burlington. The bed of the ocean was covered with a dense growth of Crinoids, one generation after another, while the superincumbent water swarmed with fish and invertebrate life. About 400 species of Crinoids, or one-fourth of all known, are from this Group. Among those having the greater distribution and being most characteristic are Dorycrinus missouriensis, D. parvus, D. unicornis, Batocrinus christyi, B. pyriformis, B. rotundus, Actinocrinus proboscidialis, Platycrinus planus, Amphoracrinus divergens, Belemnocrinus typus, Strotocrinus regalis, Steganocrinus concinnus, and Physetocrinus ventricosus.

CHAPTER XXVIII.

KEOKUK GROUP.

§ 147. THIS Group was named from Keokuk, Iowa, where it was extensively quarried, and known as the Keokuk limestone, before it was known as a geological subdivision. It was first defined by Owen in 1852, and afterward by Hall in 1858. As defined by Hall, it consisted of fifty feet of fossiliferous limestone capped by 40 feet of shale, abounding in geodes of quartz, called the geode bed. Others refer the chert layers, which separate it from the Burlington, to this Group. It rapidly thins out to the north, but maintains its thickness southerly to the mouth of the Illinois River, and appears in the south-western part of Missouri, with a thickness of 200 feet, where it is a lead-bearing rock. It crops out in Indiana, 40 or 50 miles north-west of Crawfordsville, and extends southerly, crossing into Kentucky a short distance below New Albany. The thickness does not much exceed 100 feet. It is celebrated at Crawfordsville for the abundance and perfection of the Crinoids; entire specimens-roots, column, head, arms, and pinnules-have been collected. It is well displayed in Southern Kentucky, at King's Mountain tunnel, and in Tennessee, where the thickness is 200 feet. It occurs in Richland County, Ohio, and at other places on the western border of the Appalachian coal basin, but has not been described on the eastern border. It has been identified at numerous places in the western mountain ranges.

§ 148. Ores of lead and zinc occur in South-western Missouri in pockets and fissures associated with limestone and chert, and some of the mines are very rich and have been largely worked. In New Mexico and south of there, in Mexico, silver and lead occur in veins and fissures, some of the mines being very valuable. Some of the fossils having an extensive distribution, and being characteristic, are Dorycrinus mississippiensis, Cyathocrinus multibrachiatus, Barycrinus hoveyi, Forbesiocrinus wortheni, Platycrinus hemisphericus, Agaricocrinus americanus, A. wortheni, Actinocrinus lowei, A. pernodosus, Batocrinus biturbinatus, B. indianensis, Gonias teroidocrinus tuberosus, Cyathocrinus subtumidus, Palæacis compressus, Amplexus fraglis, Productus vittatus, Orthis keokuk, Spirifera keokuk, S. suborbicularis, Platyceras fissurellum, P. equilaterale, and Lithophaga illinoisensis.

§ 149. THIS more fully define magnesian, arena able with the K a member of the been described fr tances from the Alton, Illinois; a County, Missouri probably be regar having great distr crinus simplex, All nus, Productus bise nori, R. mutata, I sublævis, Naticopsi tomaria subglobusa,

ical Survey of Mi splendid quarries, a thin layers of argil forms bluffs below sippi, but soon rises are 175 feet high. Missouri and Iowa, band of red clay, crosses Kentucky a palachian coal-field Cincinnati Southern limestones, more or geodes, and having in Kentucky or Ten cavernous, and abou face, funnel-shaped Wyandotte Cave of 240 feet high, are in

§ 150. This 6

WARSAW GROUP-ST. LOUIS GROUP.

71

CHAPTER XXIX.

WARSAW GROUP.

§ 149. THIS Group was named from Warsaw, Illinois, by Hall, in 1856, and more fully defined in 1858. At the typical locality, near Warsaw, it consists of magnesian, arenaceous, and shaly limestones, abounding in Bryozoa. It is conformable with the Keokuk, only a few feet in thickness, and generally considered as a member of the Keokuk. I have retained it, because so many small fossils have been described from it, which have been the means of identifying it, at great distances from the typical locality. It occurs below the limestone of the cliffs at Alton, Illinois; at Bloomington and Spergen Hill, Indiana; and in St. Genevieve County, Missouri, where it attains its maximum thickness of 100 feet. It should probably be regarded as a mere member of the Keokuk Group. Some of the fossils having great distribution, and therefore characteristic, are Endothura bailevi, Dichocrinus simplex, Alloprosallocrinus conicus, Batocrinus icosidactylus, Pentremites koninckanus, Productus biseriatus, Spiriferina norwoodana, Athyris hirsuta, Rhynchonella grosvenori, R. mutata, Terebratula turgida, T. formosa, Cypricardinia indianensis, Bellerophon sublævis, Naticopsis carleyana, Holopea proutana, Cyclonema leavenworthanum, Pleurtomaria subglobusa, and Spirorbis annulatus.

CHAPTER XXX.

ST. LOUIS GROUP,

§ 150. This Group was named and described by Dr. Shumard in the Geological Survey of Missouri, in 1855. In St. Douis County it is celebrated for its splendid quarries, and consists of hard crystalline limestone, sometimes cherty, with thin layers of argillaceous shales, and has a maximum thickness of 250 feet. It forms bluffs below St. Louis as far as Carondelet, where it dips beneath the Mississippi, but soon rises again, and forms bluffs as far as the Meramec, some of which are 175 feet high. It is exposed in the western part of Illinois and eastern part of Missouri and Iowa, thinning out a short distance north of Keokuk. It forms a band of red clay, chert, and limestone bordering the Indiana coal-fields, and crosses Kentucky and Tennessee, south, by way of Clarksville. It borders the Appalachian coal-field in Southern Kentucky, and may be seen at Burnside, on the Cincinnati Southern Railroad and in Eastern Kentucky. In Indiana it consists of limestones, more or less argillaceous, with beds of red clay, sometimes containing geodes, and having a thickness of 200 to 300 feet. It does not lose its thickness in Kentucky or Tennessee, but becomes more cherty and silicious. It is everywhere cavernous, and abounds in sunken rivers, lost or subterranean streams, and in surface, funnel-shaped sink-holes. The Mammoth Cave of Kentucky, and the Wyandotte Cave of Indiana, which has been explored 23 miles, and has a room 240 feet high, are in this Group.

stone, and eached the dæ in the ie Burlings, one genish and insnown, are being most Batocrinus nus planus, perinus com-

> extensively a geological all in 1858. pped by 40 **)thers** refer It rapidly outh of the a thickness , 40 or 50 Kentucky exceed 100 ction of the ve been colain tunnel, nd County, 1 basin, but t numerous

> > ockets and very rich in Mexico, y valuable. teristic, are hoveyi, For-A. worthem, usis, Gonias plexus fragii, Platyceras

ST. LOUIS GROUP.

§ 151. These underground avenues have resulted from percolating water, without the intervention of earthquakes or other extraordinary agency. Surface water from ordinary rain-storms, finding its way through the ground as it does, to supply common springs, will take up carbonate of lime in chemical solution in limestone countries, and by so doing the fissures through which it passes will be enlarged. In massive limestones with thin, shaly partings, the constant action for ages of percolating water, aided by disengaged carbonic-acid gas, will enlarge the fissures into rivulets, which will culminate in a subterranean river, finding an outlet in some open stream at a lower level. Such is the process by which the sink-holes, caverns, and subterranean streams in this Group of rocks have been formed. Slight projections on the walls record the different stages of the streams as they were slowly cutting their way to greater depths in the limestone. At the bottom of caverns where little or no water is now flowing, rounded pebbles that have played their part in grinding out the channels occur, as well as sand and clay.

§ 152. When water, holding bicarbonate of lime in solution, slowly drops from the ceiling of a cavern, exposed to the air long enough to allow one equivalent of carbonic-acid gas to escape, the lime is crystallized. If the deposit takes place from above downward, in the form of an icicle, it constitutes stalactite; but if it forms on the floor, from below upward, it is stalagmite. These two sometimes meet and form columns. If the solution which forms the stalactites is free from oxide of iron and other impurities, they will be translucent or milk-white. The presence of iron gives them a dirty yellow, red, or brown color. The chambers in which gypsum occurs are dry, and when rosettes of alabaster or translucent lime are formed the caverns must be dry, as they will not form in a damp atmosphere.

§ 153. The fossils having the greatest distribution, and which are most characteristic of this Group are Lithostrotion canadense, L. proliferum, Productus ovatus, P. marginicinctus, Melonites multiporus, Mydtina st ludovici, Tennocheilus coxanum, and Solenocheilus collectum. Ores of lead and zinc occur in pockets and fissures in Livingston, Crittenden, and Caldwell Counties, Kentucky, and at Rosiclare, Illinois. The ores are associated with fluor spar and calc spar. The principal gangue with which the lead is associated in Hardin County, Illinois, is fluor spar, and it is thoroughly disseminated through it. The fluor spar is used for the manufacture of hydro-fluoric acid, and as a flux for smelting ores, where sulphuret of zinc is associated with galena. Lead occurs associated with different minerals and in many Groups of rocks, but never appears to have had an igneous origin.

§ 154. DR. Kentucky, India In 1856 Hall na In 1866 Prof. V the name in 185. 1855; but the Chester used Ka has priority of p ceous, and coarse bedded sandstone by a mass of gre Chester is 198 f Tennessee 720 fe forms a belt surro and south-western der of the Missou limestones and sa

§ 155. The f Acrocrinus shuma: godoni, P. sulcatu Talarocrinus corni Spirifera increbesce spectabile.

§ 156. THIS Measures, and Pe formably upon th basins. It is a m the occasional pres thickness is about Ohio 200 feet, in] feet, and in Nova pebbles are well r time on the beach cemented into rocl Coal Measures in] everywhere of a sł does not underlie are free from it, a
CHAPTER XXXI.

KASKASKIA GROUP.

§ 154. DR. GEO. G. AND B. F. SHUMARD were acquainted with this Group, in Kentucky, Indiana, Illinois, Missouri, and Arkansas, in 1852, but did not name it. In 1856 Hall named it, from Kaskaskia, Illinois, and more fully defined it in 1858. In 1866 Prof. Worthen called it the Chester Group, because he had proposed the name in 1853, and had so informed Prof. Hall while acting as his assistant in 1855; but the latter published the information, and instead of using the name Chester used Kaskaskia. Chester is the shortest and best name, but Kaskaskia has priority of publication. At the typical locality it consists of a compact, arenaceous, and coarse-textured limestone, with shaly partings, in the lower part, heavybedded sandstone and limestone; with shaly partings, in the central part, followed by a mass of green shale, succeeded by heavy-bedded limestone. The thickness at Chester is 198 feet, at Huntsville, Alabama, 635 feet, on the southern line of Tennessee 720 feet, at the northern line 400 feet, and in Indiana 300 feet. It forms a belt surrounding the Illinois and Indiana Coal-basin, exists upon the western and south-western border of the Appalachian Coal-basin, and upon the eastern border of the Missouri and Arkansas Coal-basin. It consists everywhere of fossiliferous limestones and sandstones, and is followed by rocks unconformable with it.

§ 155. The fossils having the greatest distribution and most characteristic are Acrocrinus shumardi, Agassizocrinus conicus, Hydreionocrinus depressus, Pentremites godoni, P. sulcatus, P. cervinus, P. obesus, P. pyriformis, Pterotocrinus capitalis, Talarocrinus cornigerus, Zeacrinus maniformis, Athyris sublamellosa, A. subquadrata, Spirifera increbescens, Spiriferina spinosa, Euomphalus planidorsatus, and Temnocheilus spectabile.

CHAPTER XXXII.

CARBONIFEROUS SYSTEM.

§ 156. THIS system is divided into the Carboniferous Conglomerate, Coal Measures, and Permian Group. The Carboniferous Conglomerate rests unconformably upon the Subcarboniferous rocks, and forms a belt around all the coalbasins. It is a massive sandstone or conglomerate, almost nonfossiliferous, except the occasional presence of Stigmaria, Calamites, and Lepidodendron. In Indiana the thickness is about 200 feet, in Illinois about 300 feet, in Kentucky 500 feet, in Ohio 200 feet, in Michigan 100 feet, in Pennsylvania 1,500 feet, in Virginia 1,000 feet, and in Nova Scotia, where it is called the Millstone grit, 6,000 feet. The pebbles are well rounded, showing the fragments of rock were rolled for a long time on the beaches by the action of the winds and waves, before they were cemented into rock. A similar conglomerate separates the Subcarboniferous and Coal Measures in Europe, where it is called the Millstone Grit. It bears the marks everywhere of a shore-line deposit that surrounded the basins of internal seas. It does not underlie the whole of the Coal Measures—the central parts of the basins are free from it, as is shown by artesian boring.

73

ng water, Surface it does, to solution in ses will be on for ages the fissures let in some sink-holes, in formed. ns as they the bottom that have d clay.

drops from uivalent of takes place ; if it forms s meet and m oxide of ne presence s in which nt lime are sphere.

most charictus ovatus, xanum, and fissures in ire, Illinois, gangue with r, and it is nanufacture t of zinc is rals and in in.

CHAPTER XXXIII.

COAL MEASURES.

§ 157. THE name "Coal Measures" originated among the miners of Englandbefore Geology became a science. It is familiarly used in the earliest text-books on Geology, as a scientific term, which was understood without a definition. It is applied to part of the Carboniferous System, and not to Cretaceous or Tertiary Coal regions. The Coal Measures consist of beds of sandstone, shale, slate, limestone, clay, and coal, which are variable in their geographical distribution. The area covered in North America is estimated at about 210,000 square miles, nearly all of which is included in five fields, four of which are in the United States and one in Nova Scotia. Canada and British America are destitute of this important deposit, as well as many States in the Union, among which are Maine, New Hampshire, Vermont, Connecticut, New York, New Jersey, Delaware, South Carolina, Florida, Mississippi, Louisiana, Minnesota, and Wisconsin.

§ 158. The Coal Measures of Novia Scotia rest upon Subcarboniferous rocks, and are divided into the Millstone Grit, Middle Coal Formation, and Upper Coal Formation. A section of the Millstone Grit is as follows: 1. Reddish shales and red and gray sandstones, having a thickness of 2,082 feet, containing no coal, and poor in fossils, except a few drifted trunks of trees. 2. Sandstones, red shales, and a few dark-colored shales, with nine small or rudimentary coal-beds, with a total thickness of 3,240 feet. The underclays abound in Sigillaria, and some strata are quite fossiliferous, containing plants, crustaceans, and fish. 3. Red and gray sandstones, red and chocolate shales, arenaceous conglomerates, and thin beds of concretionary limestones, having a thickness of 700 feet, making a total thickness of 6,000 feet. The Middle Coal Formation includes the productive coal-beds, and contains no marine limestones or conglomerates. It consists of shales and sandstones, and has a thickness of 4,000 feet. The Upper Coal Formation consists of shales, sandstones, conglomerates, limestone, and coal, and has a thickness of 3,000 feet: On Cape Breton, the last two divisions have a thickness of 10,000 feet, making the maximum thickness of the Measures, 16,000 feet. From Nova Scotia the Measures dip south-west, and reappear in the form of a subtriangular basin in New Brunswick. The area in Nova Scotia and New Brunswick is 18,000 square miles. The coal is all bituminous. There are 72 seams and numerous dark bands containing more or less carbonaceous material. A coal-bed at Pictou is $37\frac{1}{2}$ feet thick, and another 221 feet. A large part of the coal-basin is beneath the waters of the Atlantic and the Gulf of St. Lawrence.

§ 159. The first coal-field in the United States is the Appalachian, which extends over important parts of Pennsylvania, Virginia, West Virginia, Maryland, Ohio, Kentucky, Tennessee, and Alabama. Its length is 875 miles, and width from 30 to 200 miles. The anthracite region is in the north-eastern part of Pennsylvania, and does not cover 500 square miles. The coal-beds form synclinals, anticlinals, or stand highly tilted on their edges, but are never horizontal. All the other parts of this great area, estimated at 60,000 square miles, produce only bituminous coal, and the beds may be horizontal or possessed of a slight dip, to which all the strata are subjected. is 120 feet, in feet. The thick The best seam i River Coal-bed.

§ 160. The the western part of 47,000 square the coal-beds is are ten seams of are from 2 and c

§ 161. The of Iowa, Missour 80,000 square mi and eastern part lowest Group of There are 22 seat Ten of them are excellent.

§ 162. The f miles, with a thic one bed from 3 t thinnest near the seams in close pr fern-leaves and ot and Massachusetts but possessing no of the rocks and p anthracite, and ar

§ 163. The C much in thickness, the Group in Mic feet; Ohio, 2,500 Indiana, 1,000 feet an upper and lower than one conglome localities, and land stones, and coal. and open seas, and have accompanied bearing Stigmaria a of the vegetation of laceous sediment, a the coal vegetation potash. This clay peat, the alkalies waters were fresh, 1

COAL MEASURES.

are subjected. The aggregate thickness of the coal-beds in the Pottsville district is 120 feet, in the Wilkesbarre district 62 feet, and in the Pittsburg district $25\frac{1}{2}$ feet. The thickest vein at Wilkesbarre is $29\frac{1}{2}$ feet, and at Pittsburg 8 feet. The best seam in Ohio is from 6 to 12 feet in thickness, and is called the Hocking River Coal-bed.

§ 160. The second coal-field in importance covers nearly two-thirds of Illinois, the western part of Indiana, and the western part of Kentucky, and has an area of 47,000 square miles. The coal is bituminous, and the aggregate thickness of the coal-beds is about 40 feet. Indiana is celebrated for her block coal. There are ten seams of coal in a vertical thickness of 600 feet in Illinois, and six of them are from 2 and one-half to 6 feet each in thickness.

§ 161. The third coal-field in importance is the larger one, and occupies parts of Iowa, Missouri, Kansas, Nebraska, Arkansas, and Texas, and has an area of 80,000 square miles. The coal is all bituminous. The western part of Missouri and eastern part of Kansas bear coal in abundance. The Coal Measures are the lowest Group of rocks exposed in Kansas, and have a thickness of 2,000 feet. There are 22 seams of coal, varying in thickness from a few inches to seven feet. Ten of them are more than a foot each in thickness. The coal in Arkansas is excellent.

§ 162. The fourth coal-field is in Michigan, and occupies about 6,700 square miles, with a thickness of about 125 feet. The coal is bituminous, and consists of one bed from 3 to 5 feet in thickness throughout the whole shallow basin, being thinnest near the border. Toward the central axis of the basin there are 2 or 3 thin seams in close proximity to the main seam. The shales are well stocked with fern-leaves and other terrestrial vegetation. There is a small area in Rhode Island and Massachusetts of about 1,000 square miles, having a thickness of 6,500 feet, but possessing no valuable coal-seam. The basin has suffered by the metamorphism of the rocks and plication of the strata. The coal-seams have been changed to anthracite, and are often somewhat wedge-shaped or of irregular thickness.

§ 163. The Coal Measures were deposited in basins, and must necessarily vary much in thickness, the Group in Nova Scotia being thicker than elsewhere, and the Group in Michigan thinner. The maximum thickness in Pennsylvania is 8,000 feet; Ohio, 2,500 feet; Tennessee, 2,500 feet; Western Kentucky, 3,500 feet; Indiana, 1,000 feet, and Missouri, 2,000 feet. The Group is frequently separated into an upper and lower series by the intervention of a conglomerate, and sometimes more thán one conglomerate exists in the Group. Marine vegetation abounds at some localities, and land or marsh plants are distributed throughout the shales, sandstones, and coal. Coal was formed from plants which grew in swamps, marshes, and open seas, and, where valuable, it is quite free from sediment, such as would have accompanied much disturbance of the water. The beds usually rest on clay, bearing Stigmaria and stumps of trees, and are followed by rocks bearing the leaves of the vegetation of that era. The clay beneath the coal-beds is usually an argillaceous sediment, almost devoid of alkalies, and represents the ancient soil in which the coal vegetation flourished, and apparently deprived it of the greater part of its potash. This clay is usually excellent fire-clay. From the coal, as from modern peat, the alkalies were almost entirely removed by the action of water. The waters were fresh, brackish, and salt at different times and at different places. The

f England text-books ion. It is or Tertiary date, limetion. The les, nearly zes and one int deposit, Iampshire, a, Florida,

rous rocks, Jpper Coal shales and , coal, and shales, and rith a total strata are gray sandds of connickness of -beds, and and sandconsists of s of 3,000 0,000 feet, ova Scotia ar basin in)00 square lark bands ou is 371 eneath the

> ich extends and, Ohio, h from 30 insylvania, anticlinals, other parts inous coal, the strata

COAL MEASURES.

marshes were subject to overflows, as shown by the remains of fish and beds of sand and shale, while land-shells, air-breathing reptiles, and trees show the presence of land. The bark of the trees was the most durable part, and it is not unusual in sandstone to find only a cast of the tree, covered with a thin film of coal, retaining the original markings of the bark. Some blocks of coal are composed of thin layers formed from the bark of trees and nothing else. Beds vary in purity, from coal with less than one per cent of earthy matter to dark-colored shales, with only a trace of coal.

§ 164. When bituminous coal has lost part of its hydrocarbon gas, it is semibituminous, as at Blossburg and Broad Top Mountain coal-fields in Pennsylvania; but if the bitumen is all driven off, it is converted into anthracite. At gasworks bituminous coal is put in a retort, and by the application of heat the gas is driven off, leaving a residue of coke; but if the gas is driven off under great pressure, the residuum is anthracite. When coal melts and runs together in the fire, forming a crust which must be broken to give vent to the draft, it is cokingl coal. Splint-coal or block-coal does not melt and run together, and is therefore dry-burning coal. Cannel-coal burns with a bright flame like that of a candle, from which circumstance it derived its name. Cannel was the pronunciation of candle in Scotland and England, where this coal received its name. Coal containing sulphur is unfit for smelting iron ores in a blast-furnace, and is not suitable for the manufacture of illuminating gas.

§ 165. Bituminous shales frequently contain iron ore disseminated through them, either as a carbonate or sesquioxide, and sometimes forming black-bands. The same layer of shale which constitutes black-band ore at one place will have the ore gathered in balls, arranged in rows, at another place. By chemical affinity the disseminated particles were brought together, and formed into balls or discs; and hence the iron exists in all stages, from fine distribution through the shales to layers of kidney ores, with whitened shales intervening. The iron ores of the Coal Measures are generally hardened mud, charged with iron, or clay-iron stone, and rarely yield more than 40 per cent of iron, and they are not of much value except as they exist around the margin of the Appalachian coal-field in the Lower Coal Measures. No good iron-mines are found in the other coal-basins. The greater part of iron manufactured from these ores has been obtained in Pennsylvania.

§ 166. The first trace of reptiles observed in the Carboniferous System consisted of foot-prints, found in 1841, in the Lower Coal Measures of Horton Bluff, in Nova Scotia. This was followed in 1844 by the discovery of reptilian bones at Saarbruck, and in 1851 to 1853, bones in Nova Scotia, and the land-snail, *Pupe* vetusta. Since that time the discoveries have been numerous. There is no reason to suppose the atmosphere was charged then with any more carbonic acid than it is now; on the contrary, the air-breathing animals prove it was not. The life of plants and animals is controlled by oxygen, and the adaptation of organs is in accordance with its properties. If there was less oxygen in the atmosphere, the membranous reptile lung could not supply the demands of its system, and analogy proves these animals could not have existed in the coal period with a less proportion of oxygen than is required now.

§ 167. The coal-beds and the vegetation of the coal period are usually suffi-

cient to determ fossils of wide g liferum, Spirifer tes mesolobus, A isma subcuneatus Crenipecten retifi ulata, P. sphærn nata, Nautilus m

§ 168. This Ural Mountains this country by 1 Norwood announ lupe Mountains thickness of 1,00 shales, conglomer New Mexico. F marks, and someti It is conformable ures, having a the mains in Illinois a unconformable wi species are Pseudo Pleurophorus subcu

§ 169. This (voted. All the C visions of the Sub Group has no ex 38,000 feet. Som other States than in Nova Scotia tha western ranges of 1

PERMIAN GROUP.

cient to determine the age of the rocks, but some of the invertebrate characteristic fossils of wide geographical distribution are: Fusulina cylindrica, Lophophyllum proliferum, Spirifera camerata, Productus rogersi, P. nebraskensis, P. longispinus, Chonetes mesolobus, Athyris subtilita, Spiriferina kentuckiensis, Macrodon carbonarius, Allorisma subcuneatum, Aviculopecten rectilaterarius, Pernopecten aviculatus, Pinna peracuta, Crenipecten retiferus, Myalina subquadrata, Bellerophon carbonarius, Pleurotomaria tabulata, P. sphærulata, Macrochilina gracilis, M. primigenia, M. kansasensis, M. carinata, Nautilus missouriensis, Phillipsia missouriensis, and P. sangamonensis.

CHAPTER XXXIV.

PERMIAN GROUP

§ 168. This Group was described by Murchison in 1845, in Russia and the Ural Mountains, and named from Perm, in Russia. It was first ascertained in this country by Swallow in 1858, in Kansas, where it has a thickness of 320 feet. Norwood announced its existence in Illinois, and Shumard described it in the Guada-lupe Mountains of New Mexico, where it consists of white limestone, having a thickness of 1,000 feet. In Kansas it consists of magnesian limestone, marls, shales, conglomerates, and gypsum; the magnesian character increases southerly to New Mexico. Fossils are abundant on the Cottonwood, with sun-cracks and ripple marks, and sometimes small piles of fossils and fragments appear, as if washed together. It is conformable with the Coal Measures. In Pennsylvania the Upper Barren Measures, having a thickness of 1,000 feet, are referred to it. It is claimed the reptilian remains in Illinois and Texas have shown its existence in those States. It is always unconformable with the rocks above, in this country and elsewhere. Characteristic species are *Pseudomonotis hauni, Myalina permiana, Bakevellia parva, Monotis halli*, and *Pleurophorus subcuneatus*.

§ 169. This Group closes the Palæozoic series, to which this work is chiefly devoted. All the Groups exist in New York and Pennsylvania, except the subdivisions of the Subcarboniferous can not be distinguished, and the doubtful Quebec Group has no existence there. The maximum thickness in these States is about 38,000 feet. Some of the Groups in the Lower Silurian have greater thickness in other States than they have in these two, and the Coal Measures are much thicker in Nova Scotia than they are in Pennsylvania. The whole Palæozoic series in the western ranges of mountains has an estimated thickness of about 40,000 feet.

sually suffi-

e, the memlogy proves oportion of 77

he presence is not unlm of coal, omposed of in purity, hales, with it is semi-

id beds of

nsylvania; At gaseat the gas nder great her in the , it is cokd is therethat of a pronunciaame. Coal and is not

ed through lack-bands. place will By chemormed into listribution ntervening. arged with , and they ppalachian ind in the is has been

ystem conon Bluff, in in bones at snail, Pupa no reason cid than it The life of ns is in ac-

CHAPTER XXXV.

TRIASSIC SYSTEM.

§ 170. THE Mesozoic era is divided into three grand ages-Triassic, Jurassic, and Cretaceous. The name Triassic was applied to the rocks in Germany, in allusion to a threefold 'division which they present (in that country; but no such division exists in America. Indeed, notwithstanding the vast thickness of the rocks, they have thus far baffled all attempts to divide them into Groups, and, on account of the similarity of the rocks with the Jurassic and the barrenness of fossils in the eastern exposures, these Systems have not been satisfactorily defined and separated. On the eastern part of the continent they fill synclinal troughs, and have been very much disturbed by intrusive rocks and volcanic action. They generally rest on Laurentian or Taconic strata, and, of course, the bed is always unconformable. But on the western part of the continent they are frequently undisturbed, and spread over great areas of country, resting on unconformable rocks. The Triassic in the Connecticut Valley extends from Northfield, in the northern part of Massachusetts, across the latter State and Connecticut to New Haven, on Long Island Sound, a distance of 105 miles. It fills a synclinal trough, and has its greatest width at the mouth of the Farmington River, which is about 20 miles. The rocks consist of red sandstones, conglomerates, shales, and occasionally impure limestone. The maximum thickness is about 20,000 feet, but the upper 8,500 feet is referred to the Jurassic, leaving 11,500 feet for the Triassic. A great many reptilian tracks, some fish and a few land-plants and fucoids, have been described from these rocks. Much excellent building-stone has been quarried from the sandstone. About 15 miles west of the exposure, on Long Island Sound, there is another exhibit, about 6 or 7 miles long and 2 miles wide.

§ 171. A long trough and great exposure begins at Stony Point, on the Hudson, and extends across New Jersey, Pennsylvania, and Maryland to Culpeper County, Virginia. It has a length of about 350 miles, and, though frequently narrowing to a breadth of 4 or 5 miles, expands in New Jersey to a width of about 36 miles. The general character of the rocks is like those in the Connecticut Valley, and the total thickness on the Delaware River is 27,000 feet, part of which is probably Jurassic. Another range crosses the Potomac near Washington City, and extends 25 or 30 miles beyond Richmond, and another exists 25 miles west of this one. There is a valuable coal-field in this System in Virginia, which is about 26 miles long and 4 to 12 wide. The James River flows through the middle of it, about 15 miles from the northern extremity, while the Appomattox traverses it near its southern border, and on its eastern side it is distant from Richmond about 13 miles. A great many fossil plants have been described from this locality. There are two basins in North Carolina. One begins at Lakeville, and extends about 30 miles south-west to Germantown, being from 4 to 6 miles wide; and the other commences in Granville County, six miles south of Oxford, and extends south-west about 120 miles, reaching 6 miles into South Carolina. Its width is generally about 6 miles, but at the widest part 18 miles. The thickness in some places exceeds 25,000 feet; the area is about 1,000 square miles, nearly one-third

of which conta laceous iron ore these rocks, and discovered in A sides of Cobequ south side of th miles along the rocks of this ag

§ 172. The and all varieties system from M. square miles. I from nearly even extensive areas (and bear interna without any mec rocks earlier or 1 few genera are c

§ 173. In C the Shinarump C of the Shinarum coloring is strong terraced buttes. red, approximatin great cliff-forming homogeneous sand vening; the shales off vertically. T and sloping taluse been called the K mum thickness in columns in the "()

TRIASSIC SYSTEM.

79

of which contains coal-beds. Very valuable beds of coal and beds of good argillaceous iron ore are distributed through it. Many fossils have been described from these rocks, and among them *Dromatherium sylvestre*, the earliest fossil mammal yet discovered in America. The rocks occur in Nova Scotia, on the north and south sides of Cobequid Bay, from Moose River to the mouth of North River, and on the south side of the Bay of Fundy. Prince Edward's Island, which stretches for 125 miles along the northern coast of Nova Scotia and New Brunswick, consists of rocks of this age.

§ 172. The red beds of the Triassic, consisting of every texture of sandstone and all varieties of red, are distributed almost throughout the Rocky Mountain system from Mexico to the Arctic regions, covering hundreds of thousands of square miles. Fossils have been collected and described from every territory and from nearly every mountain range throughout this vast extent of country. Over extensive areas of country the Triassic rocks are more than a mile in thickness, and bear internal evidence of having been deposited in the depths of the ocean without any mechanical sediment. Not a single species of any organism found in rocks earlief or later than the Triassic have ever been found within it, and very few genera are common to it and rocks of earlier or more recent date.

§ 173. In Colorado and Utah the lower part of the Triassic has been called the Shinarump Group, and the upper part the Vermilion Cliff Group. The rocks of the Shinarump are persistent in their characters for hundreds of miles, and the coloring is strong and deep. They weather into striking architectural forms and terraced buttes. The rocks of the Vermilion Cliff Group are colored a brilliant red, approximating vermilion, or sometimes inclining to orange, and constitute the great cliff-forming series of the West. The Group consists of massive layers of homogeneous sandstone, from 100 to 300 feet in thickness, with shaly layers intervening; the shales disintegrate, and thereby the sandrock is undermined and breaks off vertically. This process, in time, has presented a series of perpendicular walls and sloping taluses. In the West Humboldt Range of Mountains the lower part has been called the Koipato Group, and the upper part the Star Peak Group. The maximum thickness in this region has been estimated at 16,000 feet. The fantastic columns in the "Garden of the Gods" and in Pleasant Park, Colorado, have been weathered out of the sandstones of this System.

, Jurassic. y, in allu t no such ess of the is, and, on less of fosefined and ughs, and They genalways unfrequently onformable eld, in the t to New nal trough, h is about and occaet, but the e Triassic. oids, have n quarried und Sound,

> the Hud-> Culpeper frequently th of about ecticut Valof which is 1 City, and les west of ch is about iddle of it, raverses it nond about is locality. id extends e; and the nd extends Its width ess in some y one-third

JURASSIC SYSTEM.

CHAPTER XXXVI.

JURASSIC SYSTEM.

§ 174. The Jurassic System was named from the Jura Mountains, of Switzer land. No Trigonia, Belemnites, Ammonites, or specially characteristic fossils of the Jurassic, have been found on the Atlantic side of the continent, notwithstanding the upper part of the rocks described in the last chapter may be Jurassic. The Jurassic fossils, however, occur in the Rocky Mountain Ranges from Mexico to the Arctic regions. The rocks exist in every State and Territory throughout that vast extent of country, varying in thickness from a few hundred feet to 10,000 They follow the Triassic, and generally rest upon it. Fossils have been described from California, Arizona, New Mexico, Idaho, Colorado, Nevada, Montana feet. Dakota, British Columbia, Cook's Inlet, Alaska, Point Wilkie on Prince Patrick's Land, and the islands north of Grinnell Land. In some parts of its grand geographical distribution it is composed of sandstones and clays, resembling, in appearance, the Triassic; but in others it consists of limestones, sandstones, shales, and clays, indicating shallow water, and bearing no resemblance to the Triassic. The limestones are frequently fossiliferous, and show the progress animal life had made in the ocean, and vegetation had made on the land. Of 50 genera of vertebrates described from the Jurassic, none of them are Palæozoic, and only two have been doubtfully identified in the Cretaceous. Ammonites, Ceratites, and Belemnites made their first appearance in the Jurassic, and became extinct in the Cretaceous. The genus Spirifera, so abundant in the Devonian and Carboniferous, became extinct in the Jurassic. Several genera of mammalian remains have been defined from the Jurassic, but they are all peculiar to it. No single species of plant or animal is common to the Jurassic and any other formation. Ten genera of Carboniferous plants have been identified in the Jurassic, and four genera occurring in the Jurassic have been identified in the Cretaceous. There is a general progress among the invertebrates toward succeeding ages, but the evolution of the vertebrates is very much more marked. There is almost universal unconformability with the overlying Cretaceous, and hence there is an ega of time not represented by the rocks. It has been called the Reptilian age, because of the gigantic saurians which then infested Some of the rocks belonging to this System in California, and, especially the seas. about Mariposa, are said to be gold-bearing, but minerals are generally very scarce.

§ 175. THE to the rocks in the Cretaceous c uxem. The Ci the Tertiary, fo York to Florida with the except Mississippi, exte West of the 97tl country is covered regions, exposing swepteaway, and cludes, of course, It is found east o of British Ameri rock, or is overla American contin fairly presume, a its present dimen but in the west t.

§ 176. Meek and the great We ton Group, Niob Dakota Group w with alternations silicified wood, an trees, with casts o thickness in that 1 the San Juan re Group of Alabam contains beds of li § 177. The F

Missouri, where it with seams of lime and other fossils, a

§ 178. The N consists of marls ar fish, and has a thition, but rarely exc § 179. The Fo

it consists of clays of sulphuret of iron,

CRETACEOUS SYSTEM.

CHAPTER XXXVII.

CRETACEOUS SYSTEM.

§ 175. THE name Cretaceous is from the Latin Creta, chalk, and was applied to the rocks in Europe long before its use as a geological term. The existence of the Cretaceous on this continent was first ascertained, in 1827, by Morton and Vanuxem. The Cretaceous is found either exposed upon the surface, or covered by the Tertiary, forming a border of variable width on the Atlantic Coast, from New York to Florida. In like manner it occurs everywhere south of the 33d parallel. with the exception of limited areas in the mountain regions. It covers nearly all Mississippi, extends into Tennessee and Arkansas, and reaches Southern Illinois. West of the 97th Meridian, from the 33d parallel to the Arctic Ocean, the whole country is covered with this formation, with the exception of the areas in the mountain regions, exposing older rocks and inconsiderable extensions of land, where it has been swept^caway, and an area of some magnitude north and west of Hudson's Bay. This includes, of course, the whole extent covered by the Tertiary and more recent deposits. It is found east of the 97th Meridian, extending into Iowa, Minnesota, and some parts of British America. Or, approximately stated, the Cretaceous forms the surfacerock, or is overlaid with the Tertiary and recent strata over nearly half the North American continent, and from the extensive denudation it has suffered, we may fairly presume, at the commencement of the deposit, the land surface was not half its present dimension. In the east and south the formation is exclusively marine, but in the west the marine is succeeded by a brackish-water deposit.

§ 176. Meek and Hayden divided the marine Cretaceous of Kansas, Nebraska, and the great West, in 1861, in ascending order, into the Dakota Group, Fort Benton Group, Niobrara Group, Fort Pierre Group, and Fox Hills Group. The Dakota Group was named from Dakota County, where it consists of sandstones, with alternations of various colored clays, and beds, and seams of impure lignite, silicified wood, and great numbers of leaves of the higher types of dicotyledonous trees, with casts of *Pharella dakotensis*, *Axinwa siouxensis*, and *Cyrena arenaria*. The thickness in that locality is 400 feet, in North-western Colorado 600 feet, and in the San Juan region 1,000 feet. It is the supposed equivalent of the Eutaw Group of Alabama and Mississippi, which has a thickness of about 400 feet and contains beds of lignite.

§ 177. The Fort Benton Group was named from Fort Benton on the Upper Missouri, where it consists of dark-gray, laminated clays, sometimes alternating with seams of limestone. It abounds in *Inoceramus, Ammonites, Scaphites, Nautilus*, and other fossils, and has a thickness of 800 feet.

§ 178. The Niobrara Group was named from Niobrara, in Nebraska, where it consists of marls and limestones, and abounds in *Inoceramus*, Ostrea, and remains of fish, and has a thickness of 200 feet. It has an extensive geographical distribution, but rarely exceeds 500 feet in thickness.

§ 179. The Fort Pierre Group was named from Fort Pierre, in Dakota, where it consists of clays containing carbonaceous matter, seams of gypsum, and masses of sulphuret of iron, and abounds in the shells of Cephalopods, Lamellibranchs.

81

of Switzer ssils of the thstanding ussic. The Mexico to ghout that to 10,000 e been de-. Montana' e Patrick's grand geoin appearshales, and assic. The had made vertebrates have been mites made eous. The extinct in 1 from the animal is rboniferous the Jurasamong the tes is very e overlying ks. It has en infested , especially very scarce.

CRETACEOUS SYSTEM.

remains of fish and saurians, and has a thickness of 700 feet. In Northern Colorado it is 800 feet thick, and in Alabama and Mississippi it is known as the Rotten limestone, and reaches a thickness of 1,200 feet.

§ 180. The Fox Hills Group was named from Fox Hills, in Dakota, where it consists of gray, ferruginous, and yellowish sandstones, and arenaceous clays, abounding with shells of Cephalopods, Lamellibranchs, Gasteropods, remains of fish and saurians, and has a thickness of 500 feet. East of the Colorado Range its thickness is 1,500 feet, in the valley of Bitter Creek 3,000 feet, and in that of the North Platte 4,000 feet. It is the same as the Ripley Group of North Carolina, Alabama, and Mississippi, which has a thickness of about 400 feet.

§ 181. The thickness of the marine Cretaceous in New Jersey is about 700 feet. It is valued in that State for its fertile marl, and beds of kaolin in its lower part. In Louisiana its thickness is more than 1,000 feet, in the Uintah Mountain region 7,000 feet, and in New Mexico and British America more than a mile at many places. The cañon of San Carlos, on the Rio Grande, exposes a clear perpendicular height above the river level of 1,500 feet of Cretaceous strata. The Cretaceous is the Coal-bearing formation at Vancouver's Island and other points on the Pacific Coast.

§ 182. There is in the West, superimposed upon the marine Cretaceous strata, rocks which were deposited in brackish water, and form transition-beds from the strictly marine condition of the Cretaceous to the epoch of numerous fresh-water lakes, which were scattered all over the country west of the Mississippi, and north in British America to the Arctic regions. These rocks were named in 1861, by Meek and Hayden, the Fort Union Group. They consist of beds of clay and sand, with numerous seams and local deposits of lignite and beds of coal. The passage from the marine to the brackish-water deposits, and from the latter to the freshwater deposits, is without abrupt change in the sediment, and with complete conformability. There is no evidence of any important physical or climatic change, beyond the gradual filling up of the basins of the sea and the recession of the salt and brackish water, appearance of fresh-water lakes, and their gradual disappear-The Fort Union Group has been called the Judith River Group, the Bitter ance. Creek Group, the Bear River Group, the Laramie Group, and by divers other names. It has a thickness, in Bitter Creek Valley, Wyoming, of 6,000 feet, and in Bear River Valley, in Utah, of 7,000 feet. Its geographical distribution extends for a thousand miles in length, and a maximum width of 500 miles or more, with a varying thickness from 100 feet or less, to 7,000 feet or more. It abounds in plants belonging to Eocene genera, which connect the Cretaceous and Tertiary flora by insensible degrees, while the Dinosaurian remains demonstrate its Cretaceous age.

§ 183. Before the discovery of this Group, absolute nonconformability was supposed to exist between Cretaceous and Tertiary rocks, and this is the case where marine Tertiary follows the marine Cretaceous, wherever known in the world. But here, where the marine Cretaceous is as recent as elsewhere, and the continuance of the period is represented by brackish-water deposits, and then fresh-water deposits in lakes cut off from the ocean, the rocks are conformable, and the vegetable and animal kingdoms show the slow progress of advancing ages. About one-third of the genera of plants belonging to that period have become extinct, but the living plants, *Corylus americana*, *C. rostrata*, *Davallia tenuifolia*, and *Onoclea sensibilis*, have been identified era with the promay lead to err important fact, them, and sho Among the Ch genera of reptile mammals has co or chasm discovera. No sudde not furnish a co furnished, either couraged to look imperceptible ev Group.

§ 184. The the living, that I Primary and Seco so interwoven with notwithstanding it which it relates. conchological spec the living species a of geological time, rocks generally co pressions in the un continuous strata. order of superposit species. This com per cent of living s things; those conta plies less recent; a Pliocene, which me identical with livin pliocene. Instead of trary course is now Certain species are be, and from the p This subdivision of species and the divis nomenclature.

83

ı Colo**ra**do he Rotten

, where it s, aboundf fish and thickness the North Alabama,

bout 700 its lower Mountain a mile at ar perpen-The Crents on the

ous strata. from the resh-water and north 1861, by and sand. ie passage the freshplete conc change, of the salt lisappearthe Bitter ier names. 1 in Bear ends for a a varying its belong**insensi**ble

> y was supase where rld. But nuance of r deposits table and >-third of the living bilis, have

been identified from the Fort Union Group, thus specifically uniting the Cretaceous era with the present time. It is possible, too much confidence in this identification may lead to error, and better specimens may show specific distinctions; but it is an important fact, they so closely resemble the living forms as to be mistaken for them, and show how closely the living are connected with the ancient dead. Among the Cretaceous genera of invertebrates, about one-third survive; three genera of reptiles, *Crocodilus, Trionyx*, and *Emys* survive; but no genus of birds or mammals has come down from that age to the present. There is no great break or chasm discoverable in vegetable or animal life in passing back to the Cretaceous era. No sudden physical change has taken place over which some deposit may not furnish a connecting bridge. No evidence of any great climatic change is furnished, either in the animal or vegetable world, but on every hand we are encouraged to look at uniformity in the organisms, subject only to a constant, almost imperceptible evolution. Seams of productive coal occur at different places in this Group.

CHAPTER XXXVIII.

TERTIARY SYSTEM.

§ 184. THE organic remains of the Tertiary are so completely blended with the living, that no Quaternary age or period can be distinguished. The words Primary and Secondary have become quite obsolete in Geology, while Tertiary is so interwoven with the science as to be permanently fastened to the nomenclature, notwithstanding its definition, as the third age, has no application to the period to which it relates. The subdivision of the Tertiary, with reference to the survival of conchological species into Eocene, Miocene, Pliocene, and Post-pliocene, brings us to the living species as gradually as the species change within any of the subdivisions of geological time, or within any division of the strata into Groups. The Tertiary rocks generally consist of marls, clays, sands, or other friable material, filling depressions in the underlying rocks, and, though widely distributed, seldom form hard, continuous strata. This condition of the rocks made it difficult to determine the order of superposition, until a comparison of the shells had been made with living species. This comparison led to the naming of the rocks containing about 3 or 4 per cent of living species, the Eocene, which signifies the dawn of the present state of things; those containing 15 to 20 per cent of living species, the Miocene, which implies less recent; and those containing 90 to 95 per cent of living species, the Pliocene, which means more recent; and those having all the imbedded fossil shells identical with living species, though containing extinct mammalian remains, Postpliocene. Instead of determining the rocks by the per cent of living species, the contrary course is now adopted, and the age is determined by the extinct species. Certain species are regarded as types of Eccene age, or Miocene, as the case may be, and from the presence of these the rocks are referred to the proper Group. This subdivision of the Tertiary, with reference to the survival of conchological species and the division into geographical Groups, have made a double system of nomenclature.

§ 185. The marine Eocene, commencing in New Jersey with a thickness of 37 feet, and exposing only a narrow surface area, crosses Maryland by way of Fort Washington; Virginia, by way of Fredericksburg, Richmond, and Petersburg North Carolina, by way of Newbern and Wilmington ; South Carolina, by way of Charleston and Shell Bluff, on the Savannah River; Georgia, by way of Milledge ville; Alabama, by way of Claiborne; and Mississippi, by way of Jackson and Vicks burg. In South Carolina it consists of loose sand, clay, gravel, sandstone, limestone, and marl, covers a area, and has a thickness of 1,100 feet. It is divided into the Buhrstone Group, Santee beds, and Ashley and Cooper beds. It is exposed in Florida, and reaches up into /Tennessee, where it is called the Porter's Creek Group. Conrad subdivided it in Alabama and Mississippi, where it has a thickness of about 900 feet, into the Claiborne Group, Jackson Group, St. Stephen's Group, and Vicksburg Group. It crosses Louisiana, appears in Arkansas, and offers numerous exposures in Texas, Mexico, and California. It is extremely fossiliferous at many places, and nowhere conformable with the underlying rocks.

§ 186. The gradual elevation of the western ranges of mountains through Cretaceous and Tertiary time, the formation of bays and arms of the sea, and lakes which have drained themselves in continuing succession, have linked the Tertiary with the Cretaceous, and bound the Eocene, Miocene, Pliocene, and Post-pliocene with the present, almost as one connected age. In these lake regions the Eocene is divided into the Wahsatch Group, Green River Group, Bridger Group, and Brown's Park Group, and there are numerous synonyms for each one of them. The Wahsatch is characterized by its brick-red color, and has a thickness of 8,000 feet; the Green River Group is quite fossiliferous, and has a thickness of 7,500 feet; the Bridger Group rests conformably on the Green River, consists of Bad Land sandstones, limestones, shells, and marls, and has a thickness of 2,000 feet; and the Brown's Park Group has a thickness of 2,500 feet. The combined thickness of the Eocene in the Western Territories is therefore 20,000 feet.

§ 187. The marine Miocene beginning at Martha's Vineyard, though it may exist as far north as Maine, crosses New Jersey through Cumberland County, and forms a border upon the east and south of the Eocene exposure a large part of the way to the Mississippi River, and west across Louisiana, Texas, and Mexico. It is not conformable with the Eocene, and in some parts does not intervene between it and later deposits. It has its greatest thickness in California, where it exceeds 3,000 feet. The Coast Range of mountains is composed in large part of strata of this age, and hence its elevation has been since the Miocene period. It is highly fossiliferous, and the shells generally belong to living genera, and many of the species still survive in the waters bordering the adjacent coast, thus indicating no material change in the climate since that period. The Miocene lake deposits, like the Eocene, cover great extensions of Territory and reach an enormous thickness. In Nebraska it has been divided into the Wind River Group, which has a thickness of 2,000 feet, and the White River Group, which has a thickness of 1,000 feet. On the divide between the Arkansas and South Platte, where the thickness is from 1,500 to 2,000 feet, it is called the Monument Creek Group, and in Oregon it is called the Truckee Group.

§ 188. The marine Pliocene strata are found in Maryland, superimposed upon the Miocene, in South Carolina, upon the Eocene, and generally forming a narrow border at the east of these outcrops on the Atlantic coast, and a wider border on the south adjoi adjacent coast, a climate and the in California, we evidence, so far this continent, a now, no materia Post-pliocene, so an arbitrary app deposits in Nebr 400 feet and cove thickness of 500 called the Niobra Group and the C

§ 189. The] by drift, sand, an it is confined to a those of species i thickness is 500 thickness may be been formed, as at 1 thick ness. There have a thickness of able with the Plioc In South Carolina other mammals oc At some time durin of his work is found are associated with survived the drift

§ 190. During Bay was submerged clays occurring at 3 too, are striated in a fragments of rock.

of Canada south of was submerged, with are shown at Murri above the bay; like part of Canada. A species in the Gulf of surface of the rocks the St. Lawrence Va New England States, they appear on no otl or fresh-water fauna, of the clays with the

85

ness of 37 y of Fort tersburg by way of Milledge and Vicks one, lime It is et. It is eds. le Porter's e it has a Stephen's insas, and nely fossilks.

s through and lakes a Tertiary st-pliocene he Eocene roup, and em. The ,000 feet; ,500 feet; Bad Land t; and the less of the

> gh it may unty, and art of the ico. It is between it eeds 3,000 ta of this shly fossilpecies still ial change ene, cover iska it has) feet, and le between 100 feet, it ee Group. osed upon a narrow border on

the south adjoining the Gulf Coast. Fossil shells of species now living on the adjacent coast, abound at every point, and demonstrate beyond reasonable doubt the climate and the waters on the eastern and southern coast of the United States, and in California, were then the same that now prevails. There is no palæontological evidence, so far known, that the Pliocene climate was different from the present on this continent, and as the outlines of the continent were then nearly as they are now, no material difference can be inferred. The Pliocene graduates into the Post-pliocene, so that separation of the strata frequently becomes impracticable, and an arbitrary approximating line for separation is assumed. The Pliocene lake deposits in Nebraska, are called the Loup Fork Group, and have a thickness of 400 feet and cover a great extent of territory, and in North-western Kansas have a thickness of 500 feet. In Wyoming they have a thickness of 1,500 feet, and are called the Niobrara Pliocene. In Bear River Valley they are called the Salt Lake Group and the Cache Valley Group, and the thickness is from 500 to 1,500 feet.

§ 189. The Post-pliocene is represented by marine deposits on the coast, and by drift, sand, and gravel, in the middle part of the continent. In South Carolina it is confined to a belt along the coast 8 or 9 miles wide, and the fossil shells are those of species inhabiting the coast. In Los Angeles Valley, in California, the thickness is 500 feet; but where depressions upon the coast have been filled the thickness may be 1,000 or 1,500 feet, and so at the mouths of rivers where a delta has been formed, as at the mouth of the Mississippi, the Post-pliocene becomes of very great thickness. There are some Lake deposits of this age in the great West, which have a thickness of 500 feet or more. The marine Post-pliocene is usually conformable with the Pliocene, and graduates into the present deposits without disturbance. In South Carolina the bones of horses, hogs, dogs, rabbits, beavers, tapirs, and other mammals occur in the layers of blue mud and sand throughout the period. At some time during this age, man made his appearance on this continent, for none of his work is found preceding it, nor preceding the drift; but his stone implements are associated with the remains of the mastodon and mammoth, and such animals as survived the drift period in such condition as to show they lived at the same time.

§ 190. During the Post-pliocene era, a portion of the country about Hudson's Bay was submerged by the ocean, as shown by the fossiliferous marine sands and clays occurring at 300 or 400 feet above the present level of the ocean. The rocks, too, are striated in all directions, as if done by icebergs or shore-ice holding angular fragments of rock. The New England States and New Brunswick, and that portion of Canada south of the St. Lawrence River and east of the vicinity of Montreal, was submerged, with the exception of the mountain elevations. Several beaches are shown at Murray Bay 90 miles below Quebec, varying from 30 to 326 feet above the bay; like beaches occur at Montreal and at various other places in this part of Canada. All these deposits abound in marine fossils belonging to living species in the Gulf of St. Lawrence and on the near coast of the Atlantic. The surface of the rocks below these deposits is polished and striated in the direction of the St. Lawrence Valley. Like phenomena occur over New Brunswick and the New England States, and extending as far south as the mouth of the Hudson; but they appear on no other part of the continent. These deposits contain no terrestrial or fresh-water fauna, and, so far as the marine life is concerned, connect the lowest of the clays with the present time by an unbroken chain of animal existence.

86 -

§ 191. South of the Laurentian Mountains the surface of the rocks beneath the bowlder clay is striated in the direction of the valleys, but there is no connection between these and those occurring north of the mountains in the Hudson's Bay region. The force which produced the scratches did not cross the mountains nor exist upon them. Prof. Dawson has proven the bodies which produced them came from the Atlantic Ocean, and following ups the St. Lawrence drifted to the south, at various angles, some floating over New Brunswick, and others over Maine, and others through Lake Champlain, and re-entering the Atlantic Ocean by the Hudson River, while others were driven beyond Montreal into the mouth of the Ottawa River. In New Brunswick the striæ are related to the contour of the surface of the land, and conform to the direction of the river valleys. A south-easterly course prevails in the western part of Charlotte County, and a south-western course in the valleys east and north-east of St. John. A map of Maine showing the course of the rivers will show the course of the striæ. The appearance of the surface geology of this State early suggested the fact that a great rush of waters poured over it from a northerly source, and transported by its power the surface débris which had accumulated in earlier ages by subaerial forces, and large masses of rock from parent ledges, and deposited them in regions more or less distant from the several sources; and as they passed along they striated and grooved the rocks against which they impinged, or over which they rubbed in the traveled course. The striæ conform to the valleys as a rule, and therefore have their courses in all directions, though some are found deflected at right angles to their original course. The Katahdin Mountains formed an obstruction around which the striating agency operated, but it did not cross the summit. The striæ occur on the north side of the mountains, but not upon the south side. In Vermont, New Hampshire, Massachusetts, and Connecticut, beneath the drift, sand, gravel, bowlders, and clay, the surface of the rocks is grooved and furrowed in a general southern direction, though varying with the contour and course of the valleys. At the Island of New York the current swept from the north-west to the south-east, and the furrows are most strongly marked on the north-western slopes of the hills, and least on the south-eastern. In many instances they are very distinct on the western and north-western slopes, extending to the highest point of the rocks; but no traces exist on the eastern and south-eastern slopes, although both slopes are equally exposed. The striæ are most numerous in the middle part of the island, somewhat less in the western, and least in the east ern, showing the current was deflected southward in the middle part of the island Throughout all this area south of the Gulf of St. Lawrence and the St. Lawrence Valley, we have, in the striæ and furrows and in the distribution of clay, bowlders, gravel, sand, and fossils, the evidence of an overflow of the whole country, except the higher hills and mountains, the overflow resulting from subsidence of the coast, and the evidence that the Arctic current, instead of leaving the coast on approaching the mouth of the gulf, as it does now, flowed into the gulf and across the depressed New England area, transporting its fields of ice, which grounded upon the northen slopes of hills and mountains, and rubbed the rocks in the valleys and plains wher ever the surface soil and subaerial accumulations were swept off by the grinding weight of a mass, driven by a current through water too shallow to float it. the Gaspe Peninsula, ocean-terraces and stratified clay, containing marine testaca occur at the height of 600 feet above the sea. In the Champlain region of Ve

mont, and the form Ottawa Valley, high as 500 feet on the coast of 1 and sand are suc 200 fathoms. T feet, because the the clay, to prot a covering of dr which then swep which have press

§ 192. The spreads out over of the States in t bowlders, and sar which now flouris restrial animals of which show the 1 were stationary fo of sand and clay than it does now have overflowed These terraces and Michigan, Huron. Superior during th Ontario. Here wa large as all of then were rolled into bo and terraces, which spread over Wester Illinois, and Missis sissipi River on the far as the Ohio Rive soon the gravel disa and reach to the G nuded of their suba This is especially the and furrows appear t lakes when occupyin bowlders, that were directions, and frequ been made by one bo

§ 193. Commence hills are from 600 to south over all the high Georgia, Alabama, E Mexico, there is an a

connection on's Bay reains nor exthem came) the south, Maine, and the Hudson the Ottawa rface of the erly course ourse in the e course of face geology over it from ich had acfrom parent ral sources; ich they imconform to hough some idin Mount-, but it did ins, but not Connecticut, is is grooved contour and pt from the rked on the ny instances iding to the outh-eastern numerous in ·in the eastf the island. t. Lawrence y, bowlders, y, except the past, and the oaching the he depressed the northern plains where the grinding float it. h ine testaces, gion of Ver

beneath the

mont, and the triangular area of 9,000 square miles extending from there to the Ottawa Valley, the marine fossiliferous clays and sand occur at all elevations, as high as 500 feet. They form a coating for New Brunswick, and a continuous belt on the coast of Maine 150 feet above the ocean. The marine species in these clays and sand are such as live at moderate depths, or varying from the littoral zone to 200 fathoms. The submergence must therefore have been much more than 600 feet, because the shells and bones must have had some depth of water, as well as the clay, to protect them, in order to produce the fossilization, and they received a covering of drift materials sufficient to protect them from the ocean currents, which then swept over that region, and the disintegrating and denuding agencies which have prevailed during the long train of centuries that have since elapsed.

§ 192. The fresh-water drift surrounds the great central lakes of the continent, spreads out over a large country in British America, and overspreads part of each of the States in the Valley of the Mississippi. This drift consists of clays, gravel, bowlders, and sand, containing no marine organisms, but bearing land vegetation which now flourishes in the same latitude, and fresh-water shells and the bones of terrestrial animals of the Post-pliocene age. There are beaches surrounding the lakes which show the lakes have occupied much higher levels than they now do, and were stationary for a time at each of these beaches. The terraces and lake deposits of sand and clay in Wisconsin show that Lake Superior stood 600 feet higher than it does now, at one time, in the Post-pliocene age, at which time it could have overflowed nearly the whole country south of it to the Gulf of Mexico. These terraces and lake deposits occur at different elevations surrounding Lakes Michigan, Huron, Erie, and Ontario, showing they were elevated as high as Lake Superior during this period. They have been noticed 750 feet higher than Lake Ontario. Here was then one grand central Post-pliocene lake, several times as large as all of them combined are now. Upon the shores of this lake angular rocks were rolled into bowlders and beaten down to gravel and sand, that formed beaches and terraces, which were subsequently swept south by the overflowing lake, and spread over Western Ohio, Western Kentucky, nearly all of Michigan, Indiana, Illinois, and Mississippi, and the eastern part of the States bordering the Mississipi River on the west. Large bowlders are spread over these States south as far as the Ohio River, though they gradually diminish in size in that direction, and soon the gravel disappears, and only the finer materials are spread over Mississippi and reach to the Gulf. Beneath these clays and sands, where the rocks were denuded of their subaerial débris, the surface is frequently scratched and furrowed. This is especially the case where the higher lands were overflowed. The scratches and furrows appear to have been made by shore-ice on the margin of the lake or lakes when occupying different elevations, and by ice carrying angular rocks and bowlders, that were driven against the shores or shallow places. They bear in all directions, and frequently cross each other, which proves they could not have been made by one body, or by any number of bodies moving in the same direction.

§ 193. Commencing in the lower tier of counties in New York, where the hills are from 600 to 800 feet above the level of the narrow valleys, and extending south over all the highlands of Pennsylvania, Virginia, West Virginia, the Carolinas, Georgia, Alabama, Eastern Kentucky, and Tennessee, and south to the Gulf of Mexico, there is an absolutely driftless area, and the surface rocks are free from

scratches and furrows. It was dry land, and much of it high and mountainous, when the marine clays and sands were strewn over the territory adjacent to the Gulf of St. Lawrence and the New England States, and dry land during the period of the drift of the central part of the continent, and for geological ages antecedent thereto. The precipitous ledges and profound valleys of denudation, the overhanging rocks and castellated outliers, furnish incontestable evidence of the ordinary eroding agencies through a period of time commencing anterior to the Tertiary epoch. There are extensive driftless areas in Eastern and Southern Ohio free from scratches and furrows on the surface rocks, and from drift, sand, gravel, and bowlders, and they are characterized by outliers, monument rocks, sharp ridges, and rugged scenery. The drift materials extend from the lakes to the sources of the rivers that flow into the Ohio, and over more or less of the land intervening between the head-waters; but below this they occur only in the valleys of the larger rivers. Wherever the valley was large enough to carry off the flow of water from the north, the adjacent land was not overflowed, and the height of the water in the valley is marked by river terraces. In Eastern Ohio, only those rivers having their sources in the central and northern part of the State have river terraces, as the Scioto, Hocking, and Muskingum, while the smaller tributaries, such as Raccoon, Shade, and little Muskingum, have not a vestige of drift, or scratch, or furrow, from their sources to the Ohio. The Ohio River Valley was large enough to carry off the water that flowed across Ohio and Indiana, and hence no drift crossed the valley until it reached the western part of Kentucky. Throughout the drift area of Ohio, Indiana, and Illinois, it is common in excavations below the drift to find an ancient soil of vegetable mold resting upon stratified rocks in place. Beech, sycamore, hickory, and cedar have been found where they grew prior to the drift; but beneath the ancient soil no striated or furrowed rock has ever been discovered.

§ 194. There is a driftless area in the south-western part of Wisconsin, covering about 13,000 square miles, or nearly one-fourth of the State, and which extends into Northern Illinois, North-eastern Iowa, and Eastern Minnesota. There is no drift, sand, clay, or gravel, and, as in all cases where these do not occur, there are no scratches or furrows on the surface of the rocks. This area was not overflowed by the lake, and is a region of narrow, ramifying valleys, narrow, steep-sided, dividing ridges, whose directions are toward every point of the compass, and whose perfectly coinciding horizontal strata prove conclusively their subaerial erosion. The ravines are all in direct proportion to the relative sizes of the streams in them. North and east of this driftless area, from 25 to 75 miles, there is a scantiness of drift and numerous outliers, attesting the ordinary effects of erosion. The "Stand Rock," in the dells of the Wisconsin, the isolated ridges and peaks in the central part of the State. rising from 100 to 300 feet abruptly from the low ground around them, and composed of horizontally stratified sandstone, or of sandstones capped with limestone, prove the regular erosion for ages, and are quite inconsistent with any single mechanical eroding power that must have operated upon the whole country alike. In Dakota County, Minnesota, there is an outlier of the St. Peter's sandstone known as "Lone Rock," whose summit is 100 feet higher than the surrounding country, and from which many other outliers are in view; and yet in the valleys the drift prevails and bowlders abound. In Wabasha County, the "Twin Mounds," and in Olmsted County the "Sugar Loaf Mound" and the "Lone Mound," attest in like manner

the continuing the south bran rise as high as a inconsistent wit or across it.

§ 195. The British Columbi ain regions, or u of scratched and with bowlders, a of scratched roc ders, as occur in country west of produced upon t rivers that, in th borders of the as various places fre the existence of a of a heavy body that border upon as evidence of erc River Eccene to t White River Mio sandstone towers, Montana, Dakota, Garden of the Go lone mountains, an Mexico to Alaska, ever moved south

§ 196. Indeed the continent; non On account of the if one had ever exi such dimensions the have been such the Had there been a g ing their places as f trary, no such flora present flora and fa and passing back th The scratches and fi exist upon the moun overflowed by water outliers that a glacie The scratches and f glacial period; and (elevations of land an

the continuing erosion since Silurian times. The two lonely towers in the valley of the south branch of Root River, in Fillmore County, known as "Eagle Rocks," rise as high as the rocky walls of the valley, and evidence subaerial erosion, but are inconsistent with the idea that any large body of ice ever passed down the valley or across it.

§ 195. There is no drift in California, nor on the Pacific Coast as far north as British Columbia and Alaska. There are no indications of it in the Rocky Mountain regions, or upon the great plains of the West. There are no such exhibitions of scratched and grooved rocks succeeded by fossiliferous marine clays and sands, with bowlders, as occur in the New England States and St. Lawrence region, nor of scratched rocks and ancient soils succeeded by clay, sand, and gravel, with bowlders, as occur in the central part of the continent; but, on the contrary, the whole country west of the Mississippi Valley is absolutely driftless, except as to local drift produced upon the shores of Tertiary lakes, and more or less distributed by the rivers that, in the course of time, cut out the cañons which drained them. On the borders of the ancient lakes and rivers there are terraces, marking shore-lines at various places from Mexico to Alaska, but they are standing monuments to disprove the existence of a continental ice-sheet; for no one can conceive of the movement of a heavy body of ice across a valley without disturbing the graveled terraces that border upon both sides at different elevations. The natural towers that stand as evidence of erosion from the Wahsatch times to the present; from the Green River Eccene to the present; from the Bridger Eccene to the present; from the White River Miocene to the present; the columnar masses, irregular pyramids, sandstone towers, and turreted outliers of the Bad Lands of Colorado, Wyoming, Montana, Dakota, and British Columbia; the monuments on Monument Creek; the Garden of the Gods; the buttes in all the mountain chains; the transverse ridges, lone mountains, and exalted peaks; and the whole array of cañons from Texas and Mexico to Alaska,-all alike tell us, in language unmistakable, that no glacial sheet ever moved south upon the western plains or mountain ranges.

§ 196. Indeed, there is no evidence a glacial sheet ever existed on any part of the continent; none that gives any warrant to the hypothesis of a glacial period. On account of the valleys, hills, and mountains, no glacial sheet could move; and if one had ever existed, the waters flowing from it would have cut out channels of such dimensions they could have been not only traced, but their dimensions would have been such they could not be mistaken for any of the valleys now existing. Had there been a glacial period, northern plants and shells would be found occupying their places as far south as Florida, Louisiana, and Texas. But, on the contrary, no such flora or fauna is found farther south than it now exists, while the present flora and fauna occur in the same latitude throughout the Post-pliocene age, and passing back through earlier ages, unmolested by any visible climatic changes. The scratches and furrows so often cited as evidence of the glacial period do not exist upon the mountains, but occur only in the valleys and lower lands that were overflowed by water; and in these valleys there are now standing lone rocks and outliers that a glacier moving in the valleys would necessarily have swept away. The scratches and furrows are readily accounted for without the hypothesis of a glacial period; and on account of their position on the northern side of the higher elevations of land and not upon the southern, and their universal course up the

untainous, ent to the the period antecedent overhange ordinary e Tertiary) free from ravel, and ridges, and rces of the ig between ger rivers. r from the ater in the aving their ces, as the s Raccoon, or furrow, to carry off the valley ea of Ohio, an ancient sycamore, out beneath

> in, covering xtends into is no drift, here are no erflowed by .d. dividing se perfectly The ravines North and f drift and lock," in the f the State, id composed tone, prove mechanical In Dakota n as " Lone untry, and rift prevails in Olmsted ike manner

valleys from the lakes without regard to the direction of the valleys, they can not be accounted for as glacial phenomena, for they are wholly inconsistent with it. The glacial epoch is a theoretical blunder, not supported by scientific facts or intelligent reasoning, and contrary to all geographical, geological, and paleeontological information. There is no such geological period, and no gap into which it can possibly be injected.

CHAPTER XXXIX.

NOMENCLATURE.

THE rules of nomenclature are, with few exceptions, firmly established. They have resulted from years of experience and reflection, and tend to secure fixity and convenience in the designation of animals and plants. *Each animal and each plant has a name consisting of two words—the first generic, and the second specific. This is called the binomial system, or Linnæan method of nomenclature. The genera are arranged in families, the families in orders, the orders in classes, and the classes in subkingdoms. These divisions are sometimes further separated into sections or intermediate groups, often distinguished by the prefixes sub and super.

Linnæus first consistently applied the binomial system of nomenclature to all classes of organisms in 1758, in the 10th edition of Systema Nature; but he applied it to botany in Species Plantarum, published in 1753. It had been used intermittingly by earlier authors. Naturalists have generally adopted 1753 as the starting-point for the binomial system in botany, and 1758 for zoology, or, without reason, the 12th edition of Systema Nature, published in 1766. It can make no difference in palæontology which is regarded as the starting-point, for the last precedes the science. The names in the binomial system assume the Latin form by taking a Latin termination.

DENOMINATION OF HIGHER GROUPS THAN GENERA.

The names of groups higher than genera are usually taken from some of the principal characters. They are expressed by single words of Greek or Latin origin, in which a certain harmony of form and termination is preserved for groups of similar nature; as, Phanerogamæ, Cryptogamæ; Cephalopoda, Gasteropoda.

Compounds of Greek and Latin words are not allowable. In cryptogamic botany, ancient names of families, such as *Musci* and *Filices*, have been employed as names of classes or sub-classes. Botanical cohorts or sub-cohorts are designated by the name of one of their principal families, with the termination *ales*.

The families in botany are designated by the name of one of their principal genera, with the termination *aceæ*, as *Rosa*, *Rosaceæ*; *Ranunculas*, *Ranunculaceæ*. To which there are the following exceptions: 1. When the genus from which the

name of the fa the termination Tamarix, Tama is derived has a family formed fi terocarpeæ, from under their exc Compositæ, and but applied only a family name;

Botanical su in them, with the tribes which tak

The names the earliest know families by addin not Strixidæ; Bud but in inæ it is l

Names of hi because their lin therefore allowab And when a gen another family, the the remaining gen

The rules of Latinized by subs the following table

> β γ δ ζ η final %, θ ι χ λ μ ν ξ ζ , ω

^{*}Note.—See Report of the 12th Meeting of the British Association for the advancement of Science, held at Manchester in June, 1842, Reprinted Cin. Quar. Jour. Sci., Vol. I, p. 351; Report of the British Association at Birmingham, in 1865, and Report of the Committee (W. H. Dall) on Zoological Nomenclature, to section B. of the American Association for the Advancement of Science, at the Nashville Meeting in 1877. The authorities are quite fully cited in the latter report.

can not be h it. The intelligent iformation. is injected.

> ed. They fixity and and each nd specific. The genera the classes sections or

ture to all a; but he been used 1753 as the or, without n make no or the last in form by

> some of the atin origin, groups of boda. mic botany, d as names ited by the

culaceæ. To which the

the advance r. Sci., Vol. I, leport of the he American h 1877. The name of the family is taken ends in Latin with ix or is (genitive icis, idis, or iscis), the termination icea, idea, or inear is permitted; as, Salix, Salicinear; Berberis, Berberidear; Tamarix, Tamariscinear. 2. When the genus from whence the name of the family is derived has a name of inconvenient length, and there is not a tribal name in the family formed from the same generic name, the termination ex is admitted; as, Dipterocarpear, from Dipterocarpus. 3. For some very large families universally known under their exceptional names, the ancient designation is preserved; as, Crucifera, Compositar, and Graminear. 4. An old generic name no longer preserving that rank, but applied only to a section, or even a species, may be maintained as the base of a family name; as, Hippocastanear, from Aesculus hippoeastanum.

Botanical sub-families are formed from the name of one of the genera contained in them, with the termination ex or *inex*, and also the names of tribes and subtribes which take the termination ex; as, *Rosex*, from *Rosa*.

The names of zoological families are formed by adding the termination $id\alpha$ to the earliest known, or most characteristic genus contained in them; and of subfamilies by adding the termination $in\alpha$; as, *Terbebratula*, *Terebratulid* α ; *Strix*, *Strigid* α , not *Strixid* α ; *Buceros*, *Bucerotid* α , not *Bucerosid* α or *Bucerid* α . The *i* in *id* α is short; but in *in* α it is long.

Names of higher rank than genera are not rigidly subject to the law of priority, because their limits fluctuate with the advancement of science, and changes are therefore allowable when newly discovered facts have made the name erroneous. And when a genus from whose name a family name has been taken, is removed to another family, the family name may be dropped, and a new one may be coined for the remaining genera.

ORTHOGRAPHY.

The rules of Latin orthography must be adhered to. Greek names are Latinized by substituting for the Greek letters their Latin equivalents, according to the following table:

a	_	a;	$(\beta \tilde{\eta} \tau a)$	Beta.
ß		b;	(βραχίων)	Brachium.
r		g;	(γλῶσσα)	Glossa.
8	=	d ;	$(\delta\iota\psi\dot{a}\varsigma)$	Dipsas.
8		е;	(ύαλέυς)	Hyalea, not Hyalæa.
ζ	_	z;	$(zizv \varphi o v)$	Zizyphus, Zizyphinus.
η		е;	(πειρήνη)	Pirena, not Pirina.
η final		a;	(πειρήνη)	Pirena, not Pirene.
я, Ө		th;	(τηθύς)	Tethys; $(\theta \ell \tau \iota \varsigma)$ Thetis.
٤	-	i;	(βαλιός)	Balia, not Balea.
x		с;	(επποχρήνη)	Hippocrena, not Hippochrenes.
λ		1;	(φυλλίς)	Phyllis.
μ		m;	(μέλας)	Melas.
ν	_	n;	(πειρήνη)	Pirena.
Ę		х;	(56005)	Xenus, Xenophora.
ο, ω		ο;	(φορός)	Phorus; $(\pi \tilde{\omega} \mu a)$ Poma.
π		p;	(ποταμός)	Potamus.

10-				
ρ		r;	(πτερόν)	Pterum.
pρ		rrh;	(φυλλίρ-βοή)	Phyllirrhoa, not Phyllirhoe.
σ, ς		в;	(γλωσσός)	Glossus.
τ	_	t;	(πτερόν)	Pterum.
υ	-	у;	$(\dot{\upsilon}eta\dot{\sigma}\dot{\sigma}\varsigma)$	Hybolithus, not Hibolites.
φ	-	ph;	(φυρύς)	Phorus.
χ		ch;	(xoxlias)	Cochlias.
ψ		ps;	$(\psi \dot{a} \mu \mu \sigma \varsigma)$	Psammus.
at		зе;	(λιμναιος)	Limnæa, not Limnea.
au		au;	(γλαυχός)	Glaucus.
٤ ۱		• e;	(τείνω)	Exotenobranchia.
εı	-	i;	(YEilus)	Chilostoma, not Cheilostoma.
εU		eu;	$(\varepsilon \delta \rho \sigma \varsigma)$	Eurus.
ω, οι		oe;	$(\delta i\varsigma, oix \varepsilon \omega)$	Dioeca, not Dioica.
ov fina	1 ==	um;	(έφίππιον)	Ephippium, not Ephippion.
os fina	l =	us;	('ομφαλος)	Euomphalus, not Euomphalos.
00		u;	(λουτήριον)	Luterium, not Lotorium.
rr		ng;	('αγγαρεία)	Angaria
YX.		nch;	(ἄγχωστόμα)	Anchistoma, not Angistoma.
γx		nc;	(ἄγχιστρον)	Ancistrodon, not Agkistrodon.
·ρ		rh;	('péa)	Rhea.
¢		h;	('ερμαία)	Hermæa, not Ermæa.
		5		

It follows therefore, that Buthotrephis must, according to the laws of etymology, be spelt Bythotrephis; Xenophasia, instead of Zenophasia; Pacocephala, instead of Poiocephala. In Latinizing modern words where the rules of classic usage do not apply, the etymology must be preserved, even though it includes letters and combinations unknown in Latin; thus, woodwardi, instead of vudvardi; knighti, instead of enichti; bullocki, instead of bullocci; eschecholtzi, instead of essolzi; nebraskensis, instead of nebrascensis. But words of barbarous origin should be rendered as classical in appearance as is consistent with the preservation of their original sound; as, toocus, instead of tockus; ansure, instead of ansuree; argunda, instead of argoondat.

In Latinizing proper names and converting them into specific ones, they assume a distinctive character, which they did not before possess. The rule is to use the termination us, genitive *i*, when the name ends with a consonant; as, *Miller*, *milleri*. But when it ends in a vowel, *ius*, genitive *ii*; as, *Moore*, *moorii*. This rule is often violated, but it would be much better strictly to adhere to it.

PRIORITY.

It is of the highest importance that we retain the first defined and illustrated names of genera and species. The British Association said:

"It being admitted on all hands that words are only the conventional signs of ideas, it is evident that language can only attain its end effectually by being permanently established and generally recognized. This consideration ought, it would seem, to have checked those who are continually attempting to subvert the established language of Zoology, by substituting terms of their own coinage. But, forgetting the true value of language, they persist in confounding the *name* of a species or

group with its defin of expression found some new term wh unknown to the sci were to object to s cases where they fa of the names of Ge and should hence p would not act more before us; for, in t we agree to designa stamped with such Zoology, no one per by the person who i hence it is that the of elegance or expr principle to be perm injustice of erasing t owe our first knowle mission of such a pr selves into notice at :

"The name ori a species, should be synonyms."

"As the number science is always incocomplete, fresh gener of genera and other g It thus becomes necess definitions continually justice to the original and it is no less essen its nomenclature show being made to it."

"A generic nam subsequent subdivision constituent portions."

"When a genus retained for that portion acters as at first define species as a fixed point When they omit doing first species mentioned was regarded by them serve to point out the the original type of a g the old genus to its type

group with its *definition*; and because the former always falls short of the fullness of expression found in the latter, they cancel it without hesitation, and introduce some new term which appears to them more characteristic, but which is utterly unknown to the science, and is therefore devoid of all authority. If those persons were to object to such names of men as Long, Little, Armstrong, Golightly, etc., in cases where they fail to apply to the individuals who bear them, or should complain of the names of Gough, Lawrence, or Harvey, that they were devoid of meaning, and should hence propose to change them for more characteristic appellations, they would not act more unphilosophically or inconsiderately than they do in the case before us; for, in truth, it matters not, in the least, by what conventional sound we agree to designate an individual object, provided the sign to be employed be stamped with such an authority as will suffice to make it pass current. Now, in Zoology, no one person can subsequently claim an authority equal to that possessed by the person who is the first to define a new genus or describe a new species; and hence it is that the name originally given, even though it may be inferior in point of elegance or expressiveness to those subsequently proposed, ought as a general principle to be permanently retained. To this consideration we ought to add, the injustice of erasing the name originally selected by the person to whose labors we owe our first knowledge of the object; and we should reflect how much the permission of such a practice opens a door to obscure pretenders for dragging themselves into notice at the expense of original observers."

"The name originally given by the founder of a group, or the describer of a species, should be permanently retained to the exclusion of all subsequent synonyms."

^{ct} As the number of known species which form the ground-work of zoological science is always increasing, and our knowledge of their structure becomes more complete, fresh generalizations continually occur to the naturalist, and the number of genera and other groups requiring appellations is ever becoming more extensive. It thus becomes necessary to subdivide the contents of old groups, and to make their definitions continually more restricted. In carrying out this process, it is an act of justice to the original author that his generic name should never be lost sight of, and it is no less essential to the welfare of the science, that all which is sound in its nomenclature should remain unaltered amid the additions which are continually being made to it."

"A generic name, when once established, should never be canceled in any subsequent subdivision of the group, but retained in a restricted sense for one of the constituent portions."

"When a genus is subdivided into other genera, the original name should be retained for that portion of it which exhibits in the greatest degree its essential characters as at first defined. Authors frequently indicate this by selecting some one species as a fixed point of reference, which they term the 'type of the genus.' When they omit doing so, it may still in many cases be correctly inferred that the *first* species mentioned on their list, if found accurately to agree with their definition, was regarded by them as the type. A specific name or its synonyms will also often serve to point out the particular species, which by implication must be regarded as the original type of a genus. In such cases we are justified in restoring the name of the old genus to its typical signification, even when later authors have done otherwise."

etymology, ad of Poionot apply, ombinations d of cnichti; instead of classical in ; as, toecus, iat. they assume ; is to use as, Miller, This rule

l illustrated

nal signs of being perit, it would established , forgetting & species or

"The generic name should always be retained for that portion of the original genus which was considered typical by the author."

"Example.—The genus Picumnus was established by Temminck, and included two groups, one with four toes, the other with three, the former of which was regarded by the author as typical. Swainson, however, in raising these groups at a later period to the rank of genera, gave a new name, Asthenurus, to the former group, and retained Picumnus for the latter. In this case we have no choice but to restore the name Picumnus Tem., to its correct sense, canceling the name Asthenurus Sw., and imposing a new name on the three-toed group which Swainson had called Picumnus."

"When no type is indicated, then the original name is to be kept for that subsequent subdivision which first received it."

"When the evidence as to the original type of a genus is not perfectly clear and indisputable, then the person who first subdivides the genus may affix the original name to any portion of it at his discretion, and no later author has a right to transfer that name to any part of the original genus."

"When an author infringes the law of priority by giving a new name to a genus, which has already been properly defined and named, the only penalty which can be attached to this act of negligence or injustice, is to expel the name so introduced from the pale of science."

"When two authors define and name the same genus, both making it exactly of the same extent, the later name should be canceled *in toto*, and not retained in a modified sense."

"No special rule is required for the cases in which the later of two generic names is so defined as to be *less extensive* in signification than the earlier; for if the later includes the type of the earlier genus, it would be canceled by the operation of the rule that the generic name should always be retained for that portion of the original genus which was considered typical by the author."

"If the later name be so defined as to be equal in extent to two or more previously published genera, it must be canceled, *in toto*."

"A genus compounded of two or more previously proposed genera, whose characters are now deemed insufficient, should retain the name of one of them. If these original generic names differ in date, the oldest one should be the one adopted."

The committee on zoological nomenclature, appointed by the American Associtation for the Advancement of Science, said:

"A' change in the diagnostic characters, or a revision which carries with it the exclusion of certain elements of a group, or the inclusion of new elements, does not authorize the change of the name or names of a group."

"When a group or genus is divided into two or more groups, the original name must be preserved and given to one of the principal divisions. The division including the typical species of the primitive genus, if any type had been specified, or the oldest, best known, or most characteristic of the species originally included when the primitive genus was first described by its author, is the portion for which the original name is to be preserved. If there is no section specially so distinguished, that which retains the larger number of species should retain the old name, but the latter can not be applied to a restricted group containing none of the species referred to scribed, or when he

The rule that its type a species of to be well settled it under circumsta violate it, are num genus *Retzia*, propeing that *Rhynchoss Rhyhchotreta* for t not been for this ru *Rhynchospira*, and *Rhynchotreta*. If y a genus, I can subsnated characters, th and reliability of generation

When an auth as the type, or if the species may be choosen genus, due regard he species as possible i

In dividing a g typified by the same genus, they should founded on species may have been con divided accordingly which other names

In case of the oldest name must l date, the reviser may to be equal in exte When it is necessary name must retain it

A generic name bear the same name

Publication con acters in a printed k tributed among thos an understanding of nition or it will be in mand in all cases recognized. There a so minute, that an e those conversant w

species referred to the primitive group by its author at the time when it was described, or when he enumerated the species contained in it."

The rule that a subsequent author can not revise a genus and substitute as its type a species different from that relied upon by the founder of the genus seems to be well settled in England and America. The instances of strictly adhering to it under circumstances where it would have seemed to accommodate the author to violate it, are numerous. For instance, Professor Hall, mistaking the type of the genus *Retzia*, proposed and defined the genus *Rhynchospira*; afterward ascertaining that *Rhynchospira* was a synonym for *Retzia*, he abandoned it and proposed *Rhynchotreta* for the form which he had originally mistaken for *Retzia*. Had it not been for this rule he might have abandoned *Retzia evax* as the type of his genus *Rhynchospira*, and substituted *Rhynchonella cuneata*, which became the type of *Rhynchotreta*. If you can substitute another than the original species as the type of a genus, I can substitute another, and so we destroy all *fixity* in the type and designated characters, throw the science into confusion, and seriously impair the value and reliability of generic characters.

When an author has specified no type, the first species defined is to be taken as the type, or if the genus is to be divided, no type having yet been selected, a species may be chosen from among those originally specified as belonging to the genus, due regard being paid to the necessity of retaining as many of the original species as possible in the division which is to retain the old name.

In dividing a genus of which there are already synonyms, if the synonyms are typified by the same species or group of species selected as types of the primitive genus, they should not be again used. When, however, the so-called synonyms are founded on species belonging to different sections of the genus, although the names may have been considered coextensive in their application, and the genus is to be divided accordingly, the so-called synonyms become the proper designations for which other names can not be applied.

In case of the consolidation of two or more groups of the same nature, the oldest name must be retained for the whole. If both, or all, are of the same date, the reviser may select the one to be retained. If a name be so defined as to be equal in extent to two or more previously described, it must be canceled. When it is necessary to divide a species, the form which received the old specific name must retain it.

A generic name must have a single meaning, and therefore two genera can not bear the same name, even though belonging to distinct subkingdoms.

AS TO PUBLICATION.

Publication consists of the insertion of a distinct exposition of essential characters in a printed book which is kept for sale, or which has been generally distributed among those conversant with the subject. Where figures are necessary to an understanding of the character of the organism, they must accompany the definition or it will be invalid. The tendency of the science of palæontology is to demand in all cases both definition and illustration before the publication is to be recognized. There are many species whose characters are so complicated and parts so minute, that an exposition of the essential ones, so they may be understood by those conversant with the fossils in the class, can only be made by illustration

he original

cluded two egarded by ater period up, and rerestore the *nurus* Sw., had called

ot for that

ectly clear x the origa right to

name to a alty which ame so in-

it exactly tained in a

wo generic for if the the operahat portion

o or more

era, whose them. If the the one

ican Asso-

with it the nents, does

he original he division n specified, ly included i for which lly so disin the old none of the

accompanied by proper definition; the science therefore demands the rule shall be co-extensive with its necessities, and good authors refuse to recognize names unless the publication is such that their meaning may be readily comprehended.

A communication in a public assembly or learned society, or the reading of a paper containing new names at such meeting, printing of the names in a catalogue, labeling the fossils in a collection, printing the names and description in a newspaper, either one or all these attempts to introduce the names, does not constitute a publication within the rule, and hence give the names no place in science. Nor does the printing of the names with brief definitions in an obscure pamphlet, or even in the Journal of a learned society, where the definition will not enable an ordinary paleeontologist to identify or distinguish the species at another locality than the typical one, give them any right to claim recognition. Occasional pamphlets independently issued, and insufficiently advertised and distributed, or very small editions that can not reach the students of the science generally, are not publications within the rule.

The date borne by a publication will be presumed to be accurate, though this presumption is only *prima facie*, and may always be contested, and the true date shown, from which time alone do names have any validity.

A species is not to be considered as named unless both generic and specific names are simultaneously applied to it.

Where a genus or species is announced in a publication, and subsequently described in another publication, the latter only is entitled to recognition. It is essential in establishing a genus that some species be referred to it.

NAMES TO BE REJECTED, CHANGED, OR MODIFIED.

A generic name should be rejected when it has been previously applied to another valid genus of organisms, even if it has received general currency. It should also be rejected when it expresses a positively false character in the genus, and is therefore liable to propagate error, and especially is this the case where the definition is so erroneous as not to entitle it to recognition; but where the name has received general circulation, and the error is not such as to seriously mislead, the name is retained; as, *Athyris* and *Atrypa*. So a specific name should be rejected when it is already applied to another species or subdivision in the same genus, or when a geographical name of a country entirely removed from the habitat of the species is used.

A name should be rejected when it is formed of two words belonging to different languages, as en put before a Latin name, sub before a Greek name, oides, opsis suffixed to a Latin name; or when it is identical if properly spelled, according to its true derivation, with a prior valid name, as *Platystoma* of Conrad, being preoccupied, can not be retained simply because he misspelled it *Platyostoma*.

A name should always be rejected when it outrages decency.

It is inelegant and tautological to derive a generic name from the specific name of its typical species. For example, *Corvus pyrrhocorax*, Linn., was afterward advanced to a genus under the name of *Pyrrhocorax*. The name therefore became *Pyrrhocorax pyrrhocorax*. The rule is now to reject all such generic names, except those which, from long usage, have imbedded themselves into science; none of which, however, can claim a place in palæontólogy. When a species species of the same synonym is adopted name is proposed. to another genus, if and the new specifi of the law of prior

When a name other one. He has

SI

The best name guishing characteris it is more consistent Greek and the speci faulty construction, der is given to a spe of a naturalist to co

When a name of real orthography of first syllable and the dictionaries, in alph botanical congress at after the Countess C *Glyptocrinus nealli* in only because its chationaries, but Hall h the fixity of nomenc named after Miss Tu sistent with itself ma-

Names of person is prefixed or *oides* or cause the name is no has no place in science be rejected in all case

The name of a name can not be comp binomial, and can not eminently fit and suit collected. Barbarous have been defended in trades and professions generally in bad taste mythological names for is conceded. Names centennialis for a Hyoli

97

When a species is transferred from one genus to another in which there is a species of the same name, the older specific name is retained, and the oldest tenable synonym is adopted for the other form, if there be one; and if not, a new specific name is proposed. But if the form bearing the prior specific name is transferred to another genus, the original specific name of the later species must be restored, and the new specific name must fall into synonymy. This is the necessary result of the law of priority.

When a name is published, the author has no more control over it than any other one. He has the same rights, no more and no less, than other naturalists.

SELECTION OF NAMES AND MODIFICATION.

The best names are derived from Latin and Greek, and express some distinguishing characteristic of the object to which they are applied. In palæontology it is more consistent with practice and uniformity to derive the generic names from Greek and the specific names from Latin; and if the name as proposed exhibits a faulty construction, any naturalist is authorized to correct it. When a wrong gender is given to a species by its termination, not agreeing with a genus, it is the duty of a naturalist to correct it.

When a name derived from a person has not been written according to the real orthography of his name, it may be changed, provided it does not involve the first syllable and thereby disturb the arrangement of indices, tables, catalogues, and dictionaries, in alphabetical order, or interfere with long-established usage. The botanical congress at London, in 1866, refused to change the name *Cinchona*, named after the Countess Chincon, because of established usage. In 1866 Hall described *Glyptocrinus nealli* in honor of O'Neall; but the name must stand as described, not only because its change would interfere with indices, tables, catalogues, and dictionaries, but Hall had the right to construct the specific name *nealli* as he did, and the fixity of nomenclature will not allow another to change it. *Scalaria turtoni*, named after Miss Turton, may be changed to *S. turtonæ*; and *Viviparus* being inconsistent with itself may be changed to *Vivipara*, because the change is in the end of the name to conform to the rules of grammar.

Names of persons are Latinized and not adopted in Greek form, but where en is prefixed or oides or opsis suffixed, one may not be authorized to change it, because the name is not of Latin origin, though it is in very bad taste. Buffoonery has no place in science; hence Latin puns on names, as faba after Mr. Bean, should be rejected in all cases as a poor joke.

The name of a person must have the termination Latinized, but the specific name can not be composed of the Christian and surname, because it would not be binomial, and can not be made to conform to the rules. Geographical names are eminently fit and suitable when they indicate the locality from which the type was collected. Barbarous names are not in good taste in Palæontology, though they have been defended in other departments of Natural History. Names expressive of trades and professions are not in good taste. Mythological and historical names are generally in bad taste for specific names, though they have been largely used; but mythological names for genera have usually been defended. The right to use both is conceded. Names expressive of something else than a character of the fossil, as *centennialis* for a *Hyolithes* are in very bad taste, and sometimes even absurd. Com-

shall be ies unless

ling of a satalogue, a newsnstitute a nce. Nor nphlet, or ble an orulity than pamphlets ery small t publica-

> ough this true date

d specific

iently de-It is es-

ied to an-It should is, and is he definihe has relead, the rejected genus, or tat of the

ng to difme, oides, 1, accordrad, being na.

cific name rward adre became es, except of which,

parative names are often appropriate; but those expressive of size, as maximus, minor, and minimus, are too frequently rendered inaccurate by after discoveries, and are therefore objectionable.

Both generic and specific names derived from persons engaged in palæontological pursuits are very appropriate. Names of harsh and inelegant pronunciation ought to be avoided, as also words of too great length or having more than five syllables.

Generic names may be compounded from other genera to express the position of the genus as intermediate to or allied with two other genera, care being taken not to adopt such as are of too great length, and not to corrupt them in trying to render them shorter. Aviculopeten and Aviculopinna are examples of the appropriate use of compound words, notwithstanding their length, while Tellinomya is more fanciful than real, and yet not to be discarded.

In compounding words all the radical or essential parts of the constituent members must be retained, and no change made except in the variable terminations. Words coined at random, or without any derivation or meaning, will not be recognized.

The names of genera are in all cases essentially substantive, and hence adjective terms can not be employed for them without doing violence to grammar; for instance, *Anomaloides* proposed as a generic name must be disregarded. The same may be said of names in the genitive case, which are wholly inadmissible, without reformation.

FORMATION OF NAMES.

The generic name always begins with a capital letter, the specific name with a small initial letter, even when derived from person or place. The generic name is a noun, while the specific name has the force of an adjective. The specific name is in no instance a proper noun, but all species are equal, and should therefore be written alike. It is a violation of a plain rule of grammar to write a specific name with a capital letter; beside, there is an advantage in obeying the rule, for by so doing the eye at a glance distinguishes specific from generic names.

The generic name retains the gender which belongs to it in the language from which it is taken. Where no change is made in the termination of the last word in a generic name, the gender of that word determines the gender of the genus. Thus ceras, nema, stoma, and desma are in the Greek of the neuter gender, and consequently all genera ending with these words, such as Orthoceras, Loxonema, Phragmostoma, Lyrodesma, are neuter.

In defining a new genus the etymology should be given, and a species should be selected as the type. There is no excuse for neglecting these rules, except that the author is incapable of giving the etymology of his proposed generic name, and is not sufficiently confident of his definition to dare venture to rely upon one of his species as the type.

When a generic name is derived from the name of a person, it is stripped of all titles and preliminary particles, reduced to the genitive case, and the letter *a* is appended, thus taking on a feminine form. The following examples illustrate the method, viz.: *Names*, Brun, Bruni, Bruno, Brunus, Bruna, Brune, Bruny. Generic form, Brunia, Brunia, Brunoia, Brunusia, Brunæa, Brunæa, Brunia, Brunyia. Y at the end of a word of one syllable is treated as a consonant, as Quoy, Quoyia; Gay, Gayia; and mute *e* final becomes *i*, or is dropped entirely, as Perouse, Perousia. Every specific if an adjective, its the termination is of a common noun of a person or plac

The following 1—*alis.* This I in words already co be annexed to the s

-anus. This be added to proper confined to the form mination should be eux (lescuria), lescuria dius, claudianus; Nea tion must follow the geinitzanus; Meek, ma

-atus. This L the name of which it only; as, costa, costat tus; lobus, lobatus; ro tion sometimes loses from a linguistic star the nomenclature; a

-formis. This confined to Latin wor i; as, laterna, laterni, first given above from necting vowel should more awkward and squama, squamiger; tu

-ensis. This is fore be correctly empl been traversed in few illustration of the fo morsii, being given in ensis, Cardium napoleo terms are formed from become local names, a In using this terminat If the name of the pla word ; as, Clinton clin dropped, and the term nesotensis; Iowa, iower 3d. If the name ends ensis; Missouri, missou chouteauensis. 4th. If

Every specific name agrees in gender with the genus to which it belongs, and if an adjective, its termination must show it. If the specific name is a substantive, the termination is not necessarily changed. The rule is not to change the ending of a common noun or mythological name, but to make an adjective, and the name of a person or place, indicate the gender of the genus to which it belongs.

The following rules govern the use of these terminations:

--alis. This Latin termination, implying resemblance, is seldom used, except in words already compounded in Greek and Latin; and when otherwise, it must be annexed to the stem of the word, as *rectilateralis*, quadrilateralis.

—anus. This Latin termination implies resemblance or association, and may be added to proper names, personal or local; though in science its use is almost confined to the former. If the word is capable of taking a classic form, the termination should be simply annexed to the stem as *Linnœus*, *linnœunus*; *Lesquereux* (*lescuria*), *lescurianus*; in conformity with classic usage; pagus, paganus; Claudius, claudianus; Neapolis, neapolitanus. In other cases, the addition of this termination must follow the same rule as those for ensis, as America, americanus; Geinitz, geinitzanus; Meek, meekanus; Erie, erianus; Italy (ia), italianus.

-atus. This Latin termination strictly implies the possession of the thing to the name of which it is added. It is therefore affixed to the stem of common names only; as, costa, costatus, galea, galeatus; fornix, fornicatus; sinus, sinuatus; stria, striatus; lobus, lobatus; rostrum, rostratus. It is worthy of remark here that this termination sometimes loses its at, to shorten the word. The practice is not commendable from a linguistic stand-point, but some of the terms so made have become fixed in the nomenclature; as, Orthis biloba.

-formis. This Latin termination implies resemblance of shape, and should be confined to Latin words, to the stem of which it is joined by the connecting vowel i; as, *laterna*, *laterniformis*; *pistillum*, *pistilliformis*. In forming terms, such as the first given above from Latin words ending in a, the error of using x as the connecting vowel should be avoided; being inconsistent with classic usage, as well as more awkward and lengthy, thus we have from terra, terricola; gemma, gemmifer; squama, squamiger; tuba, tubiformis; etc.

-ensis. This is a Latin termination, expressive of locality, and can not therefore be correctly employed, except as an affix to the name of a place. This rule has been traversed in few real, but in many apparent instances. Lingula morsensis is an illustration of the former. In accordance with law, this has been changed to L. morsii, being given in honor of Mr. Morse. Zygospira cincinnatiensis, Pupa vermilionensis, Cardium napoleonense, Athyris hannibalensis are apparent exceptions; but these terms are formed from words which, though originally personal or trivial, have now become local names, and consequently no valid objection can be raised against them. In using this termination the following rules have been generally followed: 1st. If the name of the place ends in a consonant, the termination is annexed to the word; as, Clinton clintonensis. 2d. If the name ends in a or e, these letters are dropped, and the termination then annexed; as, Canada, canadensis; Minnesota, minnesotensis; Iowa, iowensis; Indiana, indianensis; Lasalle, lasallensis; Erie, eriensis, 3d. If the name ends in i, o, or u, that vowel is retained; as, Mississippi, mississippiensis; Missouri, missouriensis; Chicago, chicagoensis; Colorado, coloradoensis; Chouteau, chouteauensis. 4th. If the name ends in y, that letter becomes i upon the addition

maximus, eries, and

ntological ion ought syllables. position of cen not to to rendjer priate use e fanciful

ient memminations. ecognized. hence adnmar; for The same e, without

ne with a name is a c name is erefore be cific name c by so do-

uage from last word the genus. , and conua, Phrag-

a species nese rules, ed generic re to rely

stripped of e letter a s illustrate e, Bruny. yia. Y at yia; Gay, 'erousia.

of the termination; as, Kentucky, kentuckiensis; Alleghany, alleghaniensis; in accordance with classic usage, as Sicily, siciliensis.

-i. The terminination *i* is to be considered a mere indication of the Latingenitive case, and custom rather than correctness has, in some sense, legalized its addition to any name. In practice, however, it is almost restricted to proper names. Thus we have *knighti*, *littoni*, *flemingi*, *ivesi*.

—icus. This Greek termination implies resemblance, and may be added to common names under the same rules as those given for —ensis, except that, in forming the word, a yowel is suppressed if it would precede the termination; thus, Macedon, macedonicus; Italy (ia), italicus. It is little used, except as an affix to the name of a river or country; as, euphraticus, anglicus, or in such words as ellipticus.

-eus. This Latin termination has been occasionally employed; but as it implies "made of," it is evidently seldom, if ever, admissible in palæontology. The term eboraceus, from eboraceum, the Latin name for York, is a misnomer and should have been eboraceusis.

-inus. This termination is applied to both common and proper names. Latin usage restricted its application more than modern scientific practice has done, and applied it mainly to proper names, local terms, and living beings; as, caninus, alpinus; but did not sanction such words as rugatinus, sulcatinus, secalinus, taxinus, and velutinus. The termination is used subject to the same laws as --ensis.

—*ites.* This termination expresses the fossil nature of the specimen. It is a contraction of the Greek word *lithos*, a stone. In most instances it coalesces with the last vowel of the root. This and long usage in many words, such as Ammoniites, Belemnites, Pyrites, have completely established the long i, while the gender is determined by that of the Greek word to be masculine. All specific terms in the genus must, therefore, be of this gender.

---oides. This Greek termination, signifying "like," should be added only to the stems of words of Greek origin. No connecting vowel is necessary. Thus we have dactylos, dactyloides; discos, discoides. The Latin form ---oideus obeys the same laws, except the Greek termination is alike in all genders, while the Latin is inflected as Latin adjectives of similar termination.

Compound terms. In forming compound terms care should be taken to connect them rightly. If an adjective of three terminations, or a noun of the second Latin declension, composes the first part of the word, either i or o may be employed as a connecting vowel, the choice being largely determined by the ear. Thus sulcomarginatus is better than sulcimarginatus, and crassicaulis than crassocaulis. If the adjective has but one or two terminations, or the noun be of the first, third, or fourth Latin declension, the connecting vowel i should always be employed; as, tenuistriatus, pinniformis, ilicifolius, retiformis, cornifer. The connecting vowel o is admissible by Greek usage in all declensions; as, Ulodendron, Cycloconcha, Syringodendron, Alethopteris, Dictyonema, Dictyopteris, except that where the first part of the word is an adjective ending in —ys, it is shorter, and at the same time consonant with classic usage to employ no connecting vowel at all; thus, pachyderma, euryteines, Platystoma, etc., are better than pachyderma, euryoteines, Platystoma, etc.

PAL

By the little wo world. But science, added the word "Kin all which have existe and the "Animal Kin

VE

THE Palæozoic Fo Equisetaceæ, Filicaceæ called Sargassites and the leathery marine veg casts, showing, as a rul readily disintegrates ar the sand, so that the 1 exposed to atmospheri isms for more than a yes gelatinous matter in th the living Fucus or Sa representatives of extin

The fossils referre Families. The genera Asterophycus, Astropo phycus, Chondrites, C cophycus, Dystactophy Licrophycus, Palæophy Taonurus, Trichophycus

The Fungi are ce riage). They are flowe as to escape detection w in other cases inclosed Palæozoic rocks is extra zomorpha to it.

The vascular crypt(iferous era, that it has k

in accord-

the Latin galized its per names.

; added to it. in formhus, Macefix to the lipticus. s it implies

The term hould have

es. Latin done, and s. caninus, us, taxinus, 8i8. It is a n. lesces with s Ammonithe gender c terms in

ed only to Thus we s the same Latin is in-

en to conof the seco may be by the ear. crassocaulis. first, third, ployed; as, vowel o is ia, Syringopart of the e consonant pachyderma, pstoma, etc.

NORTH AMERICAN PALÆOZOIC FOSSILS.

By the little words plants and animals we include all the organisms in the world. But science, demanding technical words and controlling characteristics, has added the word "Kingdom" to these common names; and hence all organisms and all which have existed in the past are divided between the "Vegetable Kingdom" and the "Animal Kingdom."

VEGETABLE KINGDOM.

THE Palæozoic Fossil plants are divided into seven classes; viz., Fucoides, Fungi, Equisetaceæ, Filicaceæ, Lycopodiaceæ, Cordaiteæ, and Coniferæ. The Fucoides are also called Sargassites and Thalassophites. They are supposed to have some affinity with the leathery marine vegetation called Fucus or the Sargassum. The fossils are merely casts, showing, as a rule, no structure whatever. Lesquereux says marine vegetation readily disintegrates and passes into a gelatinous, half-fluid matter, which penetrates the sand, so that the lowest strata of the great heaps thrown up by the waves and exposed to atmospheric action, do not generally preserve traces of their organisms for more than a year. The fossil forms may have been harder, and contained less gelatinous matter in their cells, and probably had only a remote resemblance to the living Fucus or Sargassum, though there can be no reasonable doubt they are representatives of extinct marine cryptogamous plants.

The fossils referred to this Class have never been distributed into Orders and Families. The genera are as follows: Archæophyton, Arthraria, Arthrophycus, Asterophycus, Astropolithon (Graptolite?), Blastophycus, Bythotrephis, Calamophycus, Chondrites, Conostichus, Cruziana, Dactylophycus, Dendrophycus, Discophycus, Dystactophycus, Eophyton, Heliophycus, Hippodophycus, Ichnophycus, Licrophycus, Palæophycus, Phytopsis, Protostigma, Rusophycus, Sphenothallus, Taonurus, Trichophycus.

The Fungi are cellular cryptogamus plants (kruptos, hidden; gamos, marriage). They are flowerless plants, in which the fructifying organs are so minute as to escape detection without a microscope. The spores are sometimes naked, and in other cases inclosed in a theca. The evidence of the existence of this Class in Palæozoic rocks is extremely meager, though Lesquereux refers a species of Rhizomorpha to it.

The vascular cryptogamous plants flourished to such an extent in the Carboniferous era, that it has been called the "Age of Acrogens," and the "Age of Coal-8

VEGETABLE KINGDOM.

plants." The Classes and Orders have been named as Latin adjectives in the feminine plural, to agree with plantæ (plants), which is said to be always understood. Thus from Equisetum, by prolonging the termination into aceæ, we have Equisetaceæ; from Filices, Filicaceæ, etc.

The Equisetaceæ are either cellular or vascular flowerless plants, producing spores instead of seeds. The Palæozoic fossils are all referred to one Order, the Calamariæ. The genera are as follows: Anarthrocanna, Annularia, Arthrostigma, Asterophyllites, Bechera, Bornia, Calamites, Calamodendron, Calamostachys, Equisetites, Macrostachya, Nematophyllum, Sphenophyllum, Volkmannia.

The Filicaceæ, or ferns, are too common among existing plants to have escaped the notice of any one. The Palæozoic ferns are divided into Orders as follows:

I. ORDER, NEUROPTERIDEÆ.

Cyclopteris, Dictyopteris, Lesleya, Neuropteris, Odontopteris.

UNCERTAIN RELATION TO THE ORDER.

Baiera, Cardiopteris, Danæites, Idiophyllum, Megalopteris, Neriopteris, Orthogoniopteris, Tæniopteris.

2. Order Alethopterideæ.

Alethopteris, Callipteridium, Callipteris, Lescuropteris, Protoblechnum.

3. ORDER, PSEUDOPECOPTERIDEÆ.

Pseudopecopteris.

4. Order, Pecopterideæ.

Beinertia, Cymoglossa, Lonchopteris, Oligocarpia, Pecopteris, Phyllopteris.

5. Order, Sphenopterideæ.

Eremopteris, Hymenophyllites, Sphenopteris.

6. ORDER, ADIANTITES.

Aneimites, Archæopteris, Triphyllopteris.

FERNS OF UNCERTAIN AFFINITY.

Asteropteris, Crematopteris, Pachypteris, Rhacophyllum.

SEPARATE FRUCTIFICATION OF FERNS.

Sorocladus.

RACHIS OF FERNS.

Rhachiopteris.

RHIZOMA OF FERNS.

Stigmarioides.

STEMS OR TRUNKS OF FERNS.

Caulopteris, Megaphytum, Psaronius, Stemmatopteris.

The existing Ly bogs, or the slopes of a few species, which and opening them Pine," are evergreen Carboniferous plants or more in diameter, of Carboniferous plan

"The leaves of sometimes in their r row, linear-lanceolate midrib. Their point forms, which greatly of the part of the tre tially from the charac been established."

"The fructificati or ovate spikes, sessile base of leaves or blader the outside of the cone small ones (microspore distinct only with mic lizing pollen. Or, and ular seeds, angular on The class may be

Acanthophyton (?), Cy Knorria, Lepidocystis, lum, Lepidostrobus, 1 angites, Sporocystis, U

Didymophyllum, Pinnul Stigmaria, Syringodendı

The Cordaiteæ, an a ally by fragments of rit and flowers. They below intermediate between the

VEGETABLE KINGDOM.

The existing Lycopodiaceæ inhabit the deep shade of the forests, the surface of bogs, or the slopes of mountains, where there is a high degree of humidity, except a few species, which have the power of closing the leaves under the heat of the sun and opening them to receive the rain or fog. Some of them, like the "Ground Pine," are evergreens, and none of them grow beyond a few feet in length. Many Carboniferous plants of this Class, however, were grand and stately trees, two feet or more in diameter, and fifty feet or more in length. Lesquereux says, in speaking of Carboniferous plants :

"The leaves of the Lycopodiaceæ are generally in a spiral order, modified sometimes in their relative disposition, even in the same species. They are narrow, linear-lanceolate, of various length, according to species, all with a strong midrib. Their point of attachment upon the stems is marked by scars of divers forms, which greatly vary in size, according to the age of the fragments, or rather of the part of the tree from which the fragments of bark are derived. It is essentially from the characters of these leaf-scars that species of the Lepidodendræ have been established."

"The fructifications, rarely found attached to their support, are in cylindrical or ovate spikes, sessile or pedicellate, composed of sporanges attached to the anterior base of leaves or blades of various forms, which, curved upward and imbricated, cover the outside of the cones. The sporanges contain organisms of two kinds, either very small ones (microspores), which are like powder, or agglutinated globules of matter, distinct only with microscopes of great power. They may represent the male fertilizing pollen. Or, and more generally, they contain macrospores, large, true globular seeds, angular on one side, and rounded on the other."

The class may be divided into three orders, as follows :

I. ORDER, LEPIDODENDREÆ.

Acanthophyton (?), Cyclostigma, Dechenia, Diplostegium, Glyptodendron, Halonia, Knorria, Lepidocystis, Lepidodendron, Lepidophlœum, Lepidophlöios, Lepidophyllum, Lepidostrobus, Leptophlœum, Lycopodites, Plumalina, Psilophyton, Sporangites, Sporocystis, Ulodendron.

2. ORDER, TÆNIOPHYLLEÆ.

Tæniophyllum.

3. ORDER, SIGILLARIÆ.

Didymophyllum, Pinnularia, Sigillaria, Sigillarioides, Sigillariostrobus, Spirangium, Stigmaria, Syringodendron.

4. ORDER, NOEGGERATHIÆ.

Noeggerathia, Whittleseya.

The Cordaiteæ, an extinct class, are represented in the Coal Measures, generally by fragments of ribbon-like leaves, and most rarely by stems bearing leaves and flowers. They belong to the Gymnosperms, and occupy a position somewhat intermediate between the Noeggerathiæ and Coniferæ. The genera are as follows:

ives in the always uno aceæ, we

, producing Order, the throstigma, chys, Equi-

ave escaped follows :

Orthogoni-

num.

llopteris.

PLANTÆ.

ACA.-ALE.

Antholithes, Asterocarpus, Cardiocarpon, Carpolithes, Cordaianthus, Cordaicarpus, Cordaistrobus, Cordaites, Desmiophyllum, Dicranophyllum, Lepidoxylon, Rhabdocarpus, Trigonocarpum.

FRUIT OF UNCERTAIN AFFINITY.

Gulielmites.

The Coniferæ are exogenous evergreen trees and shrubs, with branching trunks containing a resinous juice. They have a strobile cone or solitary seed. Three Palæozoic genera have been referred to the Conifera : viz., Dadoxylon, Saportaa, and Walchia, but there must be doubt about the reference of Dadoxylon to this Class.

WOOD OF UNCERTAIN AFFINITY.

Celluloxylon, Nematoxylon, Ormoxylon, Prototaxites, Sternbergia, Syringoxylon.

ACANTHOPHYTON, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18. p. 324. [Ety. akantha, thorn; *phyton.*, plant.] Cylindrical branches, ramifying in alternate manner, striated, with scattered tubercles, on which are borne short spines. Type A. spinosum.

spinosum, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18. ps 324, Chemung Gr.

ALETHOPTERIS, Sternberg, 1825, Vers. Darst. Flora der Vorwelt. p. 21. [Ety. alethos, true; pteris, fern.] Fronds polypinnate; pinnules coriaceous, simple, mostly entire, enlarged at the base, connate or free, borders reflexed; midrib distinct, immersed into the epidermis, marked by a groove on the upper surface; prominent on the lower; lateral veins simple or forking once, open, often in right angle to the rachis; fructifications marginal. Type A. lonchitica.

acuta, see Pecopteris acuta.

- ambigua, Lesquereux, 1880, Coal Flora of Pa., p. 182, Coal Meas.
- aquilina, Schlotheim, 1820, (Filicites aquilinus,) Petrefaktenkunde, p. 405, and Coal Flora of Pa., p. 181, Coal Meas.
- bunburyi, Andrews, 1875, Ohio Pal., vol. 2, p. 421, Coal Meas.
- coxana, Lesquereux, 1861, Geo. Sur. Ky., vol. 4, p 433, Coal. Meas. crassa, Lesquereux, 1884, Coal Flora of
- Pa., p. 748, Coal Meas.
- crenulata, Brongniart, as identified by Lesquereux, in Geo. Sur. Ill., vol. 2, p. 439, is Pseudopecopteris subcrenu-lata.
- cristata, see Pecopteris cristata.
- discrepans, Dawson, 1862, Jour. Geo. Soc., vol. 18, p. 222, Devonian.
- distans, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 865, is a variety of A. lonchitica.

emarginata, see Pecopteris emarginata.

erosa, see Pecopteris erosa. evansi, Lesquereux, 1884, Coal Flora of Pa., p. 834, Coal Meas.

falcata, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 396, Coal Meas. gibsoni, Lesquereux, 1880, Coal Flora of

- grassini, Lesquereux, 1869, Coal Fiora of Pa., p. 183, Coal Meas. grandifolia, Newberry, 1873, Ohio Pal., vol. 1, p. 384, Coal Meas. grandis, Dawson, 1863, Can. Nat. & Geol., vol. 8, and Acad. Geol. p. 484, Coal Meas. halli, see Pecopteris halli.
- helenæ, Lesquereux, 1880, Coal Flora of Pa. p. 179, Coal Meas.
- heterophylla, Lindley & Hutton, 1833, Pecopteris heterophylla,) Foss. Flora, vol. 1, p. 113, Coal Meas.
- holdeni, see Protoblechnum holdeni.
- Pseudopecopteris hymenophylloides, see hymenophylloides.

inflata, see Callipteridium inflatum.

Dawson, ingens, 868, Acad. Geol. 553, Devop. nian.

lævis, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 865, Coal Meas.

lanceolata, see Pe-copteris lanceolata.

lonchitica, Schlo-theim, 1820, (Filicites lonchiti-cus,) Nachtrage zur Petrefaktenkunde, p. 411, and Coal Flora of Pa., p. 177,

Coal Meas. longifolia, see Pe-

copteris longifolia.

macrophylla, see Danæites Macrophyllus. massillionis, see Callipteridium massilloneum.

ANA.-ANN.]

maxima, Andrews, p. 421, Coal Meas mazonana, see Ps nana.

muricata, see Pseu nervosa, see Pseudo obscura, Lesquereu vol. 2, p. 865, s.

rugosum. oweni, see Callipter

pectinata, Lesquer Ill., vol. 2, p. 469 pennsylvanica, Le

Sur. Pa., vol. 2, 1 perleyi, Hart, 1868 Devonian.

pluckeneti, see Pse eneti.

preciosa, see Pecopte pteroides, see Pecopt robusta, Lesquereu

Pa., p. 835, Coal rugosa, see Callipter serlii, Brongniart, 18 Hist. d. Veg. Fo

Flora of Pa., p. 17 serrula, see Pecopter serrulata, see Pecopte sheaferi, see Pseudop solida, see Pecopteria spinulosa, see Pseu losa.

stellata, see Pecopter tæniopteroides, see P oides.

urophylla, Brongnia urophylla,) Hist. Meas.

virginiana, Fontaine or Up. Carb. Flora, Permian.

ANARTHROCANNA, Geep Voy. [Ety. an, wit canna, a plant.] more or less swellin ribs flattened and of forming joints as perryana, Dawson, 18

Soc. vol. 19, p. 461, Dev. and Up. Sil. Catskill Gr. ANEIMITES, Dawson, 186

Soc. vol. 17, p. 5, [a genus.] Pinnules or attached by a flabellate venation. closely related to Cy

acadicus, Dawson, 186 Soc., vol. 17, p. 5, a Low. Coal Meas.

bockshii, Gœppert, bockshii,) Syst. Filie Foss. plants of De Can. p. 46, Chemung

obtusus, Lesquereux, 1 obtusa,) Geo. Sur. and Foss. plants of of Can., p. 46, Catsk validus, Dawson, 1862,(

[ACA.—ALE.

rdaicarpus, lon, Rhab-

hing trunks ed. Three , Saportæa, o this Class.

ringoxylon.

eo. Sur. Ill.,

oal Flora of

, Ohio Pal.,

Nat. & Geol., 4, Coal Meas.

oal Flora of

[utton, 1833, Foss. Flora,

noldeni. Idopecopteris



Alethopteris

Macrophyllus. ium massillo-

PLANTÆ

maxima, Andrews, 1875, Ohio Pal., vol. 2, p. 421, Coal Meas.

mazonana, see Pseudopecopteris mazonana.

muricata, see Pseudopecopteris muricata. nervosa, see Pseudopecopteris nervosa. obscura, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 865, syn. for Callipteridium

rugosum. oweni, see Callipteridium oweni.

ANA.-ANN.]

pectinata, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 469, Coal Meas.

- pennsylvanica, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 864, Coal Meas. perleyi, Hart, 1868, Acad. Geol. p. 554,
- perleyi, Hart, 1868, Acad. Geol. p. 554 Devonian.

pluckeneti, see Pseudopecopteris pluckeneti.

preciosa, see Pecopteris preciosa. pteroides, see Pecopteris pteroides. robusta, Lesquereux, 1884, Coal Flora of Pa., p. 835, Coal Meas. rugosa, see Callipteridium rugosum.

serlii, Brongniart, 1828, (Pecopteris serlii,) Hist. d. Veg. Foss. p. 292, and Coal Flora of Pa., p. 176, Coal Meas.

serrula, see Pecopteris serrula.

sheaferi, see Pseudopecopteris sheaferi. solida, see Pecopteris solida.

spinulosa, see Pseudopecopteris spinulosa.

stellata, see Pecopteris stellata.

tæniopteroides, see Pecopteris tæniopteroides.

urophylla, Brongniart, 1828, (Pecopteris urophylla,) Hist. d. Veg. Foss. Coal Meas.

virginiana, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 88, Coal Meas. or Permian.

ANARTHROCANNA, Gœppert, 1845, in Tchih. Voy. [Ety. an, without; arthrom joint; canna, a plant.] Cylindrical stems, more or less swelling at the nodes, with ribs flattened and continuous instead of forming joints as in Calamites.

perryana, Dawson, 1863, Quar. Jour. Geo. Soc. vol. 19, p. 461, and Foss. plants of Dev. and Up. Sil. formations, p. 27, Catskill Gr.

- ANEIMITES, Dawson, 1861, Quar. Jour. Geo. Soc. vol. 17, p. 5.⁸ [Ety. from Aneimia, a genus.] Pinnul'es clustered, petiolate or attached by a narrow base, with flabellate venation. Type A. acadicus, closely related to Cyclopteris.
 - acadicus, Dawson, 1861, Quar. Jour. Geo. Soc., vol. 17, p. 5, and vol. 21, p. 153, Low. Coal Meas.
 - bockshii, Gœppert, 1836, (Adiantites bockshii,) Syst. Filic. Foss. p. 384, and Foss. plants of Dev. and Up. Sil. of Can. p. 46, Chemung Gr.

obtusus, Lesquereux, 1858, (Noeggerathia obtusa,) Geo. Sur. Pa., vol. 2, p. 854, and Foss. plants of Dev. and Up. Sil. of Can., p. 46, Catskill Gr. validus, Dawson, 1862, (Cyclopteris valida.)

- of Can., p. 46, Ham. Gr.

Quar. Jour. Geo. Soc., vol. 18, p. 319,

and Foss. plants of Dev. and Up. Sil.



FIG. 6.-Aneimites obtusus.

ANNULARIA, Sternberg, 1820, Essai d'un exposé Geognostico-botanique d. l. Flore. du monde primitif. 2d Cahier, p. 36. [Ety. annulus, a ring.] Stem articulate, striate, with a strong diaphragm traversing it at the articulations; branches opposite, nearly in right angles from the articulations; leaves verticillate, lanceolate, spathulate, or lingulate, abruptly or gradually acuminate, or obtuse, even emarginate at the apex; fructifications in long cylindrical spikes, with close articulations, and narrowly lanceolate bracts, bearing round sporanges in the axils of the leaves, or double, oval ones, pedicellate and attached in the middle of the internodes. Type A. spinulosa. This name is preoccupied in the subkingdom Mollusca, and Wood in 1860 proposed to substitute Trochophyllum; but Trochophyllum was preoccupied for a genus of corals in 1851, by Edwards and Haine.

acuminata, see Sporangites acuminatus.

antiqua, Dawson, 1861, Can. Nat. and Geol. vol. 6, p. 170, Devonian.

- calamitoidea, Schimper, 1869, Pal. Veget., vol. 1, p. 349, and Coal Flora of Pa., p. 48, Coal Meas.
- clavata, Lesquereux, 1880, (Trochophyllum-clavatum,) Coal Flora of Pa., p. 65, Coal Meas.

cuspidata, Lesquereux, 1884, Coal Flora of Pa., p. 725, Subcarboniferous. dawsoni, Schimper, 1869, Palæontologie

dawsoni, Schimper, 1869, Palæontologie Vegetale, vol. 1, p. 350, and Coal Flora of Pa., p. 51, Devonian. Proposed for Asterophyllites latifolius, of Dawson, because that name was preoccupied; but I have retained Asterophyllites latifolius because it is doubtful whether it is an Annularia. emersoni, Lesquereux, 1880, Coal Flora of Pa., p. 50, Coal Meas.

fertilis, Sternb., 1824, Vers. Darst. Flora der Vorwelt, p. 31, Coal Meas.

inflata, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 423, Coal Meas. laxa, Dawson, 1871, Foss. Plants Canada,

p. 31, Devonian.

longifolia, Brongniart, 1828, Prodrome Hist. Veg. Foss., p. 156, and Coal Flora of Pa., p. 45, Coal Meas. minuta, Bronginart, 1828, Prodr. Hist.

Veg. Foss., p. 155, and Coal Flora of Pa., p. 49, Coal Meas.

radiata, Brongniart, 1822, Class. d. Veg. Foss., p. 35 in Mus. d. Hist. Nat., vol. 8, pl. 13, fig. 7, and Coal Flora of Pa., p. 50, Subconglomerate.

romingeri, Lesquereux, 1877, Trans. Am. Phil. Soc., p. 166, Low. Held. Gr.

sphenophylloides, Zenker, 1833, (Galium sphenophylloides,) in Leonh. v Bronn's Jahrb., p. 398, and Coal Flora of Pa., p. 48, Coal Meas. tuberculata, Sternberg, 1823

(Bruckmannia tuberculata) Vers. Darst. Flor. d. Vorwelt. Fasc. 4, p. 29, and Coral Flora of Pa., p. 723, Coal Meas.

THOLITHES, Brongniart, 1822, Mem. du Mus. d'Hist. Nat., vol. 8, p. 203. [Ety anthos, flower; lithos, stone.] Supposed to be the flowers of Cordaites or other trees. The characters are not very definite. Type A. liliacea.

FIG. 7.-Annularia Sphe-nophylloides.

devonicus, Dawson, 1868, Acad. Geol., p. 566, Devonian. floridus, Dawson, 1871, Foss. Plants Can., p. 63, Devonian.

pitcairniæ, Lindley and Hutton, 1835, Foss. Flora of Great Britain, vol. 2, p. 82, Coal Measure. priscus, Newberry,

1873, Ohio Pal. vol. 1, p. 363, Coal Meas. pygmeus, Dawson, 1863, Can. Nat., vol. 8, and Acad. Geol., p. 477. Coal Meas.

rhabdocarpus, Dawson, 1863, Can. Nat., vol. 8, and Acad.

Geol., p. 477. Coal Meas squamosus, Dawson,

1863, Can. Nat., vol. 8, and Acad. Geol., p. 477, Coal Meas.

spinosus, Dawson,

1868, Acad. Geol., p. 477, Coal Meas. Aphlebia adnascens, see Rhacophyllum adnascens.

FIG. 8. Antholithes priscus.

flabellata, see Rhacophyllum flabellatum. irregularis, see Rhacophyllum irregulare. Araucarites gracilis, see Walchia gracilis.

- ARCHÆOPHYTON, Britton, 1888, Ann. N. Y. Acad. Sci. vol. 4, p. 123. [Ety. archaios, ancient; phyton, plant.] Founded upon black films of graphite in crystalline limestone. Type A. newberryanum. Probably a Graptolite.
 - newberryanum, Britton, 1888, Ann. N. Y. Acad. Sci. vol. 4, p. 123, Taconic.
- ARCH EOPTERIS, Dawson, 1863, Can. Nat. vol. 8, and Foss. 'plants of Dev. and Up. Sil. Can. pp. 48, 98. [Ety. archaios, an-cient; pteris, fern.] Frond bipinnate; pinnules obovate, inequilateral, narrowing to the base and decurrent on the partial petioles, the main petiole often having accessory pinnules, at the bases of the pinnæ. Veins spreading from the base, curved or straight, dividing dichotomously into fine veinlets; fertile pinnæ bearing groups of oval spore-cases instead of pinnules. Type A. hibernica.

acadica, see Ancimites acadicus. alleghaniensis, syn. for A. rogersi.

bockschiana, see Aneimites bockschii.

browni, see Cyclopteris browni.

denticulata, Lesquereux, 1884, Coal Flora of Pa., p. 774, Subcarboniferous. gaspensis, Dawson, 1881, Can. Nat. and

Geol., vol. 10, p. 8, Devonian. hallana, Goeppert, 1852, (Cyclopteris hallana,) Die fossil Flora des

Uebergangsgebirges, p. 145. Proposed as a substitute for Sphenopteris laxa, which latter name was preoccupied in that genus; but when referred to this genus, laxa must be restored.

1863. hartti, Dawson, Palæopteris hartti,)Can. Nat., vol. 8, and Acad. Geol., p. 485, Coal Meas.

hibernica, Forbes, 1852,

(Cyclopteris hibernica,) Proc. Brit. Ass'n, and Coal Flora of Pa., p. 305,

Archeopteris Chemung Gr.

jacksoni, Dawson, 1861, (Cyclopteris jacksoni,) Can. Nat. and Geo., vol. 6, p. 173, Catskill Gr.

FIG. 9

hibernica

- Iaxa, Hall, 1843, (Sphenopteris laxa,) Geo. Rep. 4th Dist. N. Y., p. 275, Chemung Gr. This species has also been named A. hallana.
- macilenta, Lesquereux, 1884, Coal Flora of Pa., p. 775, Catskill Gr.
- minor, Lesquereux, 1858, (Noeggerathia minor,) Geo. Sur. Pa., vol. 2, p. 854, Catskill Gr.

obliqua, Lesquereux, 1880, Coal Flora of Pa., pp. 300, 774, Catskill Gr.

obtusa, see Aneimites obtusus.

rogersi, Dawson, 1863, (Cyclopteris rog-

21

ersi.) Quar. Jour 463, and Coal Fl Catskill Gr. sphenophyllifolia Flora of Pa., p. 7

ART.-AST.]

stricta, Andrews. p. 418, Coal Mean



FIG 10 --Archæopteris stricta

ramosum var german 1878, Cont. to P. Riv. Gr. Probabl ARTHRARIA, Billings, Pal. Foss., vol. 2 Ety. arthron, a Cylindrical stems expansion at each the form of a du Type A. antiquata antiquata, Billings, Pal. Foss., vol. 2 Upper Taconic.

biclavata, S. A. Mil Jour. Sci., vol. 2, 1 ARTHROPHYCUS, Hall, 2, p. 4. [Ety. arthr plant.] Simple or

or subangular, fle ridged or furrowed



FIG. 12.-Arthroph

harlani, Conrad, 1838. Ann. Rep. N. Y., p. vol. 2, p. 5, Medina montalto, Simpson, found in Pa. Med ARTHROSTIGMA, Dawson Canada, p. 41. []

ANT.-ARC.

flabellatum. irregulare. gracilis. Ann. N. Y ty. archaios. unded upon crystalline berryanum.

8, Ann. N. Taconic. an. Nat. vol. v. and Up, archaios, anbipinnate: eral, narrowrent on the petiole often at the bases eading from ht. dividing ilets; fertile oval spore-Type A.

118. rsi. ockschii.

ii.

, Coal Flora rous. n. Nat. and an.



FIG. 9. Archeopteris hibernica.

n. Nat. and ll Gr. is laxa,) Geo. 5. Chemung been named

, Coal Flora

Noeggerathia ol. 2, p. 854,

'oal Flora of Gr.

lopteris rog-

ART.-AST.]

ersi,) Quar. Jour. Geo. Soc., vol. 19, p. 463, and Coal Flora of Pa., pp. 307, 776, Catskill Gr. sphenophyllifolia Lesquereux, 1884, Coal

Flora of Pa., p. 775, Catskill Gr. stricta. Andrews, 1875, Ohio Pal. vol. 2, p. 418. Coal Meas.

Aristophycus, Miller and Dyer, 1878,

Cont. to Pal. No. 2, p. 3. Probably inorganic, and, if fucoidal, too irregular and too little known to be retained as a genus. ramosum, Miller

and Dyer, 1878, Cont. to Pal. No. 2, p. 4. Hud. Riv. Gr. Probably inorganic.

ramosum var germanum, Miller and Dyer, 1878, Cont. to Pal. No. 2, p. 4, Hud.

Riv. Gr. Probably inorganic. ARTHRARIA, Billings, 1874, Pal. Foss., vol. 2, p. 66. [Ety. arthron, a joint.] Cylindrical stems with an

FIG. 10.-Archæopteris stricta.



Type A. antiquata. antiquata, Billings, 1874, Pal. Foss., vol. 2, p. 66, Arthraria antiquata. Upper Taconic.

biclavata, S. A. Miller, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 354, Hud. Riv. Gr. Актнворнусця, Hall, 1852, Pal. N. Y., vol. 2, p. 4. [Ety. arthron, joint; phykos, sea-plant.] Simple or branching, rounded or subangular, flexuous, transversely ridged or furrowed. Type A. harlani.



FIG. 12.-Arthrophycus harlani.

harlani, Conrad, 1838, (Fucoides harlani,) Ann. Rep. N. Y., p. 113, and Pal. N. Y., vol. 2, p. 5, Medina sandstone. montalto, Simpson, 1888, Dict. Foss.,

found in Pa. Medina (?) Gr. ARTHROSTIGMA, Dawson, 1871, Foss. Plants Canada, p. 41. [Ety. arthron, joint;

PLANTÆ.

stigma, a dot or puncture.] Stems elongated, cylindrical, bifurcating, and giving off lateral branches, irregularly furrowed longitudinally, with circular leaf scars arranged in whorls, and bearing linear rigid leaves with circular bases, structure apparently cellular, with a slender vascular axis. Type A. gracile.

- gracile, Dawson, 1871, Foss. Plants Can., p. 41, Devonian.
- Artisia, Sternberg, syn. for Sternbergia. transversa, see Sternbergia transversa.
- Asolanus, Wood, 1860, syn, for Sigillaria, camptotænia, syn. for Sigillaria monostigma. manephleus, a doubtful species of Sigillaria.
- ornithicnoides.see Sigillaria ornithicnoides. Asplenites, Gœppert, 1836, Systema Filicum Fossilium. [Ety. Asplenium, a genus of
 - ferns.]
 - elegans, see Eremopteris elegans, ruber, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 864, Coal Meas. This species does not seem to be recognized by Lesquereux in his later work.
- ASTEROCARPUS, Gœppert, 1836, Syst. Fil. Foss., p. 188. [Ety. aster, star; karpos, fruit.] Fructification on lanceolate pinnules, marked by large star-like sori. Type A. sternbergi.
- grandis, Lesquereux, 1870, Geo. Sur. Ill.,

vol. 4, p. 469, Coal Meas. sternbergi, Gœppert, 1836, Syst. Filic. Foss., p. 188, Coal Meas.



FIG. 13.-Asterophycus Simplex.

- ASTEROPHYCUS, Lesquereux, 1876, 7th Ann. Rep. Geol. Sur. Ind., p. 139. [Ety. aster, star; phykos, a sea-weed.] Stem short, cylindrical; frond expanded and divided star-like from the top of the central axis; segments flattened or inflated. Type A. coxi.
- coxi, Lesquereux, 1876, 7th Ann. Rep. Geol. Sur. Ind., p. 139, Low. and Up. Coal Meas.
- simplex, Lesquereux, 1880, Coal Flora of Pa., p. 13, Coal Meas.

ASTEROPHYLLITES. Brongniart, 1822, Mem. du Mus. t. 8, p, 203. [Ety. aster, star;

phyllon, leaf: lithos, stone.] Stems articulate; branches opposite; central axis hollow or solid; leaves verticillate, free to the base, linear, acuminate, simple nerved; fructifications in elongated ears, bearing round sporanges in the axils of the leaves. Type A. equisetiformis.

- acicularis, Dawson. 1862, Quar. Jour. Geol. Soc., vol. 18, p. 310, Devonian. anthracinus, Heer, 1877, Fl. Foss. Helv.,
- vol. 4, p. 50, and Coal Flora of Pa., p. 36, Coal Meas.
- apertus, see Macrostachya aperta.
- brardi, Brongniart, 1828, Prodr. Hist, Veg. Foss., p. 159, Coal Meas. crassicaulis, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 851, Coal Meas.

curtus, see Bechera curta.

108

equisetiformis, Schlotheim, 1804, (Casuarinites equisetiformis,) Beitrag Zur. Flora der Vorwelt, tab. 1, fig. 1, and

Coal Flora of Pa., p. 35, Coal Meas. erectifolius, Andrews, 1875, Ohio Pal., vol. 2, p. 425, Coal Meas.

fasciculatus, Lesquereux. 1880, Coal Flora of Pa., p. 41, Coal Meas.



FIG. 14.-Asterphylfites foliosus.

foliosus, Lindley & Hutton, 1833, Foss. Flora, vol. 1, p. 77, and Coal Flora of Pa., p. 38, Coal Meas.

gracilis, Lesquereux, 1860, Geo. Sur. Ark., vol. 2, p. 310, Coal Meas.

grandis, see Bechera grandis.

lanceolatus, see Macrostachya lanceolata.

- latifolius, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 311, Devonian. The same form was called by Schimper Annularia dawsoni.
- laxus, Dawson, 1868, Acad. Geol., p. 539, Devonian.
- lentus, Dawson, 1871, Foss. Plants Can., p. 29, Devonian.
- longifolius, Sternberg, 1823, (Bruckman-

longifolius, Sternberg, 1823, (Bruckmannia longifolia,) Vers. Darst. Flora der Vorwelt fasc. 4, p. 58, Coal Meas.
minutus, Andrews, 1875, Ohio Pal., vol. 2, p. 424, Coal Meas.
ovalis, see Calamostachys ovalis.
parvulus, Dawson, 1861, Can. Nat. and Geo., vol. 6, p. 168, and Acad. Geol. p. 539, Chemung Gr.

radiatus, see Annularia radiata.

rigidus, Sternberg, 1824, (Bruckmannia rig-ida,) Vers. Darst. Flor. der Vorwelt, p. 29, and Coal Flora of Pa., p. 37, Coal Meas. scutigerus, Dawson, 1862, Quar. Jour.

Geo. Soc., vol. 18, p. 311, Devonian.

stachioides, Wood, 1860, (Lepidostrobus stachioides,) Proc. Acad. Nat. Sci. Phil., vol. 12, p. 240, Coal Meas. sublævis, Lesque-

reux, 1858, Geo. Sur. Pa., vol. 2, p. 851, Coal Meas. trinervis, Dawson, 1863, Can. Nat., vol. 8, and Acad. Geol. p. 479, Coal

Meas tuberculatus, see Annularia tuberculata.

ASTEROPTERIS, Dawson, 1881, Quar. Jour. Geo. Soc., vol. 37, p. 299. [Ety. aster, star; pteris, fern.] Stems of ferns having the axial portion comradiating plates of scalariform tissue Fig. 15.—Astropolithon hindii.



hindii.

imbedded in pa-renchyma, and having the outer cylinder composed of elongated cells traversed by leaf-bundles similar to those of Zygopteris. Type A. novoboracensis. novoboracensis, Dawson, 1881, Quar. Jour.

Geo. Soc., vol. 37, p. 299, Portage Gr.

ASTROPOLITHON, Dawson, 1888, Geo. Hist. Plants, p. 31. A peculiar impression, supposed by Prof. Dawson to be fucoidal. Judging from the illustration, I would refer it to the Graptolida. Type A. hindii.

hindii, Dawson, 1888,

Die Petrefakten d.

Naturalien Samml.

[Ety. proper name.]

Leaves petiolate,

flabelliform, dicho-

tomous, many parted; nerves in each lacinia, sev-

eral, dichotomous, and proceeding parallel with each



FIG. 16.—Baiera virginiana.

other; leaf sub-stance leathery. Type B. tæniata. virginiana, Fontaine & White, 1880, Perm or Up. Carb. Flora, p. 103, Coal Meas. or Permian.

BEI.-BYT.]

BECHERA, Sternberg, der Vorwelt, p. 3 Like Asterophyl leaves, but distin joints and deeply stems. Type B. grandis, Sternberg Flora der Vorwe Coal Flora of Pa. tenuis, Bunbury, 1 BEINERTIA, Gæppert, ing, and may ha gymnogrammoide

and Acad. Geol. 1

ginatum.

BLASTOPHYCUS, Miller Soc. Nat. Hist., vo. bud; phukos, sea-with a button-like junction. Type I



Blastophycus diadematum.

ing, thinly striat thick; leaves vert lanceolate. Type inornata, Dawson, 18 natus,) Quar. Jour p. 310, Genessee S radiata, Brongniart, diatus,) Hist. d. Ve Coal Flora of Pa., p.

Bornia transitionis, Gœppert transitionis,) Foss. 116, and Quar. Jour p. 309, Ham. Gr.

series, vol. 2, p. 2 p. 273. [Ety. pr guished from Pe flexuous nerves;

tative in the Gyn

gœpperti, Dawson,

Bergeria marginata, se

Bergeria rhombica, rhombicum.
AST.-BEC.

BEI.-BYT.]

mannia rigprwelt, p. 29, Coal Meas. Juar. Jour.



stropolithon indii.

outer cylin-1 cells travr to those of poracensis. Quar. Jour. ortage Gr. Geo. Hist. impression, n to be fullustration, I blida. Type ii. awson, 1888, list. plants, Jp. Taconic. Braun, 1840, trefakten d. ien Samml. oper name.] petiolate, orm, dichois, many nerves in lacinia, sevichotomous, oceeding with each leaf subleathery. tæniata.

Vhite, 1880, p. 103, Coal PLANTÆ.

- BECHERA, Sternberg, 1824, Vers. Darst. Flora Bothrodendron punctatum, see Ulodendron der Vorwelt, p. 30. [Ety. proper name.] Like Asterophyllites in its verticillate punctatum.
 - Brachyphyllum obtusum, see Lepidocystis obtusus.
 - Bruckmannia longifolia, see Asterophyllites longifolius.
 - rigida, see Asterophyllites rigidus.
 - tuberculata, see Annularia tuberculata. BYTHOTREPHIS, Hall, 1847, Pal. N. Y., vol. 1, p. 8. [Ety. buthos, depth of the sea; trephos, to grow.] Stems subcylindrical or compressed; branches numerous, divaricating, sometimes leaf-like. Type B. antiquata.
 - antiquata, Hall, 1847, Pal. N. Y., vol. 1, p. 8, Calcif. Gr.
 - asteroides, Fitch, 1849, Trans, Ag. Soc., and Emmons Am. Geol., p. 101, Upper Taconic.
 - cæspitosa, Hall, 1850, 3d Rep. N. Y. St., Mus. Nat. Hist., p. 178, Trenton Gr.
 - flexuosa, Emmons, 1844, (Fucoides flexuosa,) Taconic system, p. 69, Upper Taconic.



FIG. 19.—Bythotrephis ramulosa, showing the ends, and branches as they appear on a nodule.

- gracilis, Hall, 1843, Geo. Rep., 4th Dist., N. Y., p. 69, and Pal. N. Y., vol. 1, p. 62, Trenton to Clinton Gr.
- gracilis var. crassa, Hall, 1852, Pal. N. Y., vol. 2, p. 19, Clinton Gr.
- gracilis var. intermedia, Hall, 1852, Pal. N. Y., vol. 2, p. 19, Trenton to Clinton Gr.
- granti, Dawson, 1888, Geo. Hist. of Plants, p. 37, Clinton Gr.
- gregaria, Ringueberg, 1888, Proc. Acad. Nat Sci. Phil., p. 131, Niagara Gr. impudica, Hall, 1852, Pal. N. Y., vol. 2, p.
- 20, Clinton Gr.

lesquereuxi, Grote & Pitt, 1876, Bull. Buff. Soc. Nat. Hist., vol. 3, p. 88, Waterlime Gr. palmata, Hall, 1852, Pal. N. Y., vol. 2, p.

20, Clinton Gr.

FIG. 17. Blastophycus diadematum.

tracted; ribs cut square or obtuse at the articulations, continuous, not alternat-

ing, thinly striate; cortical cylinder thick; leaves verticillate, free, linearlanceolate. Type B. radiata.

leaves, but distinguished by its tumid

joints and deeply and widely furrowed

Flora der Vorwelt, fasc. 4, p. 30, and Coal Flora of Pa., p. 41. Coal Meas.

tenuis, Bunbury, 1846, Am. Jour. Sci., 2d

p. 273. [Ety. proper name.] Distinguished from Pecopteris by the treble

flexuous nerves: sometimes anastomosing, and may have its actual represen-tative in the Gymnogramme. Type B.

gœpperti, Dawson, 1863, Can. Nat., vol. 8,

and Acad. Geol. p. 485, Coal Meas.

junction. Type B. diadematum.

Bergeria marginata, see Lepidodendron mar-

Bergeria rhombica, see Lepidodendron

Gr.

ica, vol. 3.

BEINERTIA, Gœppert, 1836, Syst. Filic. Foss.

series, vol. 2, p. 232, Coal Meas.

stems. Type B. grandis.

gymnogrammoides.

ginatum.

rhombicum.

inornata, Dawson, 1862, (Calamites inornatus,) Quar. Jour. Geo. Soc., vol. 18, p. 310, Genessee Slate.

radiata, Brongniart, 1828, (Calamites radiatus,) Hist. d. Veg. Foss., p. 122, and Coal Flora of Pa., p. 30, Subconglomerate.



FIG. 18.—Bornia transitionis. transitionis, Gœppert, 1852, (Calamites transitionis,) Foss. Fl. d. Uebergsg., p. 116, and Quar. Jour. Geo. Soc., vol. 18,

309, Ham. Gr.

- ramulosa, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol.1, p. 235, Utica Slate Gr. rigida, Emmons, 1844, (Fucoides rigi-dus,) Taconic System, p. 69, Upper
- Taconic. subnodosa, Hall, 1847, Pal. N. Y., vol. 1,
- p. 262, Hud. Riv. Gr.
- succulens, Hall, 1847, Pal. N. Y., vol. 1, p. 62, Trenton Gr.
- tenuis, Hall, 1852, Pal. N. Y., vol. 2, p. 18, Trenton Gr. The Trenton form of B. gracilis.
- CALAMITES, Guettard, 1751, Mem. Ac. Sci., Paris. [Ety. calamus, a reed.] Plants arborescent: trunks cylindrical, articulate; articulations variable in distance, rapidly closer toward the narrowed obconical base; surface narrowly ribbed length wise; ribs equal, simple, parallel, contracted or rounded at the articulations: /branches nearly at right angles, verticillate like the leaves, which are lanceblate, acuminate, simple nerved. Type C. suckovi.
 - approximatus, Sternberg, 1820, Essai d'un exposé Geognostico-botanique d. l. Fl. d. Monde primitif 2d Cahier, p. 36, and Coal Flora of Pa. p. 26, Coal Meas.
 - bistriatus, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 850, Coal Meas. This name
 - was preoccupied by Sternberg. canniformis, Schlotheim, 1820, Petrefactenkunde, p. 398, and Coal Flora of Pa., p. 24, Coal Meas.
 - cisti, Brongniart, 1828, Hist. d. Veg. Foss. p. 129, and Coal Flora of Pa., p. 27, Coal Меяя.
 - cruciatus, Brongniart, 1828, Hist. d. Veg. Foss. t. 1. p. 128, Coal Meas.
 - disjunctus, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 850, Coal Meas.
 - dubius, Artis, 1825, Antedil. Phytology pl. 13, and Coal Flora of Pa., p. 27, Coal Meas.
 - gigas, Brongniart, 1828, Hist. d. Veg. Foss., 1, p. 136, and Coal Flora of Pa., p. 25, Coal Meas.
 - gracilis, Lesquereux, 1861, Geo. Sur. Ky., vol. 4, p. 436, Coal Meas.
 - inornatus, see Bornia inornata.
 - major, Weiss, 1872, Fossil Flora d. jungsten Steinkolen formation, p. 119, and Coal Flora of Pa., p. 21, Coal Meas.
 - nodosus, Sternberg, 1820, Essai d'un Exp. Geog. Botan. d. l. Fl. d. Monde primitif 2d Cahier, p. 36, Coal Meas.
 - nova-scoticus, Dawson, 1863, Can. Nat. & Geol., vol. 8, and Acad. Geol. p. 479, Coal Meas.
 - pachyderma, Brongniart, 1828, Hist. d. Veg. Foss., 1, p. 132, and Coal Flora of Pa., p. 28, Coal Meas.

radiatus, see Bornia radiata.

ramifer, Stur, 1875, Culm Flora d. Mährisch-Schlesischen Dachschiefers, p. 82, and Coal Flora of Pa., pp. 23, 703, Coal Meas.

ramosus, Artis, 1825, Antedil. Phytology, pl. 2, and Coal Flora of Pa., pp. 22, 702, Coal Meas.

suckovi, Brong-niart, 1828, Hist. d. Veg. Foss., t. 1, p. 124, and 1, p. Coal Flor. of Pa., p.20, Coal Meas. transitionis, s.e.e Bornia transitiónis.

undulatus, Brongniart, 1828, Hist. d. Veg. Foss. 1. p. 127, Coal Meas.



CAL.

FIG. 20.-Calamites Suckovi.

voltzi, Brougni-art, 1828, Hist. d. Veg. Foss. 1, p. 135, and Acad. Geol. p. 194, Coal Meas

- Calamocladus, Schimper. 1869, Pal. Veget, vol. 1, p. 423. Not clearly distinguished from Asterophyllites and founded upon A. longifolius as the type, and including A. equisetiformis, A. foliosus, A. rigidus, and Bechera grandis.
- CALAMODENDRON, Brongniart, 1828, Hist. d. Veg. Foss. vol. 1, p. 133. [Ety. calamus, reed; dendron tree.] Central cylinder striate lengthwise and articulate, surrounded by a thick, woody cylinder or bark, with outside surface smooth. The structure is allied to Sigillaria, but the appearance is like Calamites. Type C. approximatum.

antiquum, Dawson, 1871, Foss. Plants Canada, p. 24. Devonian.

approximatum, Brongniart, 1828, Hist. d. Veg. Foss., vol. 1, p. 133, Coal Meas. obscurum. Dawson, 1863 Can. Nat., vol. 8, and Acad.

Geol. p. 476, Coal Meas. tenuistriatum, Dawson, 1871, FIG. 21-Calamodendron Foss. Plants Canada, p. 25, approxi-matum. Devonian.

(HELLEY

- Lesquereux, 1877; Proc. CALAMOPHYCUS, Am. Phil. Soc., p. 165. [Etv. cal-amus, reed; phukos, sea-plant.] Fronds simple, elongated, gradually tapering to a point; cavity divided by transverse membranes, either passing through the whole diameter, or connected in the middle to vertical subdivisions.
 - Type C. septum. septum, Lesquereux, 1877, Proc. Am. Phil. Soc. p. 165, Low. Held. Gr.
- CALAMOSTACHYS, Schimper, 1869, Traité de Paleontologie Vegetale, vol. 1, p. 328. [Ety. calamus, reed; stachys, plant.] Spikes doubtfully considered as fructifications (of Asterophyllites. Type C. typicus.
 - brevifolius, Lesquereux, 1884, Coal Flora of Pa., p. 718, Coal Meas.
 - lanceolatus, Lesquereux, 1884, Coal Flora of Pa., p. 715, Subconglomerate.

CAL.-CAR.]

ovalis, Lesquereux, ovalis), Geo. of Flora of Pa., p. 7. prælongus, see Volk

CALLIPTERIDIUM, Wei jungsten Steinko from the genus large, polypinnat to the rachis by decurrent, and th the main rachis, at the base; prim solved below the oblique, curved i ders, dichotomou to the rachis. Ty aldrichi, Lesquereu Pa., p. 171, Coal 1

dournaisi, Brongnia dournaisii), Hist. and Coal Flora of dawsonanum, Font Perm. or Up. Ca Meas. or Permian grandifolium, Fonta Perm. or Up. Car

Meas. or Permian.



FIG. 22.-Callipterid

grandini, Brongniar grandini,) Hist. d. and Coal Flora of P inflatum, Lesquereux inflata,) Geo. Sur. Coal Meas.

inæquale, Lesquereux Pa., p. 168, Coal M mansfieldi, Lesquere of Pa., p. 166, Coal massilloneum, Lesque

opteris massillionis 2, p. 438, Low. Coal

membranaceum, Leso Flora of Pa., p. 172,

neuropteroides, Lesq Flora of Pa., p. 166, oblongifolium, Fonta

Perm. or Up. Carb Meas. or Permian. odontopteroides, Font

Perm. or Up. Carb. Meas. or Permian.

CAL.

Phytology. pp. 22, 702,



alamites tovi.

Foss. 1, p. 194, Coal

Pal. Veget, stinguished anded upon d including A. rigidus,

328, Hist. d. Lty. calamus, ral cylinder culate, surcylinder or ce smooth. igillaria, but nites. Type m. on, 1871, nada, p. 24.

Brongniart, Veg. Foss., oal Meas. ion, 1863. 8, and Acad. bal Meas. awson, 1871, unada, p. 25,

877: Proc. [Ety. calit.] Fronds lly tapering 1 by transsing through onnected in ubdivisions.

Proc. Am. 1. Gr. 9, Traité de 1, p. 328. hys, plant.] ed as fructi-Type C.

Coal Flora

, Coal Flora rate.

PLANTÆ.

ovalis, Lesquereux, 1858, (Asterophyllites ovalis), Geo. of Pa., p. 851, and Coal Flora of Pa., p. 717, Coal Meas. *prælongus*, see Volkmannia prælonga. CALLIPTERIDIUM, Weiss, 1872, Foss. Flora d.

CAL.-CAR.]

- jungsten Steinkohlen formation. [Ety. from the genus Callipteris.] Fronds
- large, polypinnate; pinnules attached to the rachis by the whole base, often decurrent, and the lower descending to the main rachis, connate or disjointed at the base; primary nerve strong, dissolved below the apex; lateral veins oblique, curved in passing to the borders, dichotomous, the basilar attached to the rachis. Type C. sullivanti.
- aldrichi, Lesquereux, 1880, Coal Flora of Pa., p. 171, Coal Meas.
- dournaisi, Brongniart, 1828, (Pecopteris dournaisii), Hist. d. Veg. Foss., p. 282, and Coal Flora of Pa., p. 747, Coal Meas. dawsonanum, Fontaine & White, 1880.
- Perm. or Up. Carb. Flora., p. 56, Coal Meas. or Permian. grandifolium, Fontaine & White, 1880,
- Perm. or Up. Carb. Flora., p. 58, Coal Meas. or Permian.



FIG. 22.-Callipteridium sullivanti.

- grandini, Brongniart, 1828, (Pecopteris grandini,) Hist. d. Veg. Foss., p. 286, and Coal Flora of Pa., p. 748, Coal Meas. inflatum, Lesquereux, 1870, (Alethopteris inflata,) Geo. Sur. Ill., vol. 4, p. 393,
- Coal Meas. inæquale, Lesquereux, 1880, Coal Flora of
- Pa., p. 168, Coal Meas. mansfieldi, Lesquereux, 1880, Coal Flora
- of Pa., p. 166, Coal Meas. massilloneum, Lesquereux, 1866, (Aleth-
- opteris massillionis,) Geo. Sur. Ill., vol. 2, p. 438, Low. Coal Meas.
- membranaceum, Lesquereux, 1880, Coal Flora of Pa., p. 172, Coal Meas. neuropteroides, Lesquereux, 1880, Coal
- Flora of Pa., p. 166, Coal Meas. oblongifolium, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 56, Coal Meas. or Permian.
- odontopteroides, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 59, Coat Meas. or Permian.

- oweni, Lesquereux, 1860, (Alethopteris oweni,) Geo. Rep. of Arkansas, vol. 2, p. 309. Coal Meas.
- pardeei, Lesquereux, 1880, Coal Flora of Pa., p. 169, Coal Meas.
- rigidum, Lesquereux, 1884, Coal Flora of Pa., p. 746, Coal Meas.
- rugosum, Lesquereux, 1858, (Alethopteris rugosa,) Catal. Potts. Ass'n, p. 11, and Coal Flora of Pa., p. 169, Coal Meas.
- sinuatum, Brongniart, 1828, (Pecopteris sinuata,) Hist. d. Veg. Foss., p. 296, and Coal Flora of Pa., p. 745, Coal Meas.
- sullivanti, Lesquereux, 1854, (Callipteris sullivanti.) Bost. Jour. Nat. Hist., vol. 6, p. 423, and Geo. Sur. Pa., vol. 2, p. 866. Coal Meas.
- unitum, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 60, Coal Meas.
- CALLIPTERIS, Brongniart, 1828, Hist. d. Veg Foss., p. 249. [Ety. kallos, beautiful; pteris, fern.] Fronds polypinnate; pinnules sessile and sometimes occurring on the principal rachis, thick; parenchyma dense, nerves immersed, showing creases in the leaf-substance, simple or forking once. Type C. conferta.
- conferta, Sternberg, 1824, (Sphenopteris conferta,) Vers. Darst. Flor. d. Vorwelt and Perm. or Up. Carb. Flora of Pa., p. 54, Coal Meas. or Permian.
- sullivanti, see Callipteridium sullivanti.
- CARDIOCARPON, Brongniart, 1828, Prodr. Hist. Veg. Foss., p. 87. [Ety. kardia, heart; karpos, fruit.] Seeds of various forms, composed of a compressed, generally cordiform or oval nucleus, surrounded by a flattened, fibrous border, or a membranaceous wing. Type C. majum.
 - affine, Lesquereux, 1860, Geo. of Ark. vol. 2, p. 311, Coal Meas. annulare, Sternberg, 1824, (Carpolithes
 - annularis,) Vers. Darst. Flor. d. Vorwelt and Coal Flora of Pa., p. 814, Subconglomerate.
 - annulatum, Newberry, 1873, Ohio Pal., vol. 1, p. 374, Coal Meas.
 - apiculatum, Gœppert & Berger, 1848, De fructibus et seminibus, p. 23, and Coal Flora of Pa., p. 571, Subconglomerate.
- baileyi, Dawson, 1868, Acad. Geol., p. 554, Devonian.
- bicornutum, Lesquereux, 1870, (Ptilocarpus bicornutus,) Geo. Sur. Ill., vol. 4, p. 443, Coal Meas.
- bicuspidatum, Sternberg, 1820, (Carpolithes bicuspidatus,) Flora der Vorwelt,
- and Coal Flora of Pa., p. 573, Coal Meas. bisectum, Dawson, 1863, Can. Nat. and Geol., vol. 8, and Acad. Geol., p. 491, Coal Meas.
- circulare, Lesquereux, 1884, Coal Flora of Pa., p. 812, Coal Meas.
- conglobatum, Lesquereux, 1884, Coal Flora of Pa., p. 810, Coal Meas.
- congruens, Grand Eury, 1877, Flore Car-bonifere, p. 236, and Coal Flora of Pa., p. 573, Coal Meas.

cornutum, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 324, Devonian.

crampi, Hartt, 1868, Acad. Geol., p. 554, Devonian.

crassum, Lesquereux, 1884, Coal Flora of Pa., p. 812, Coal Meas.

dilatatum, Lesquereux, 1884, Coal Flora

of Pa., p. 806, Subcarboniferous. diminutivum, Lesquereux, 1880, Coal Flora of Pa., p. 570, Coal Meas.

diplotesta, Lesquereux, 1884, Coal Flora of Pa., p. 812, Coal Meas.

divergens, Lesquereux, 1884, Coal Flora of Pa., p. 811, Coal Meas.

ellipticum, Sternberg, 1820, (Carpolithes ellipticus,) Flor. d. Vorw., p. 40, and Coal Flora of Pa., p. 814, Coal Meas.

elongatum, Newberry, 1873, Ohio Pal., vol. 1, p. 324, Coal Meas.

1880, Coal fasciculatum, Lesquereux,

Flora of Pa., p. 570, Coal Meas. fluitans, Dawson, 1863, Can. Nat. and Geol., vol. 8, and Acad. Geol., p. 491, Coal Meas.

harveyi, Lesquereux, 1884, 13th Rep. Ind. Geol., p. 102, and Coal Flora of Pa., p. 808, Coal Meas.

ingens, Lesquereux, 1860, Geo. of Ark., vol. 2, p. 311, Coal Meas.

late-alatum, Lesquereux, 1880, Coal Flora of Pa., p. 568, Coal Meas.

latior, Lesquereux, 1884, Coal Meas. of

Pa., p. 811, Coal Meas. latum. Newberry, 1873, Ohio Pal., vol. 1, p. 372, Coal Meas.

lescurianum, n. sp. Coal Meas. Proposed instead of C. ovale Lesquereux, in Coal Flora of Pa., p. 810, which name was preoccupied.

longicollis, Lesquereux, 1884, Coal Flora of Pa., p. 808, Coal Meas.

mamillatum, see Rhabdocarpus mamillatus. marginatum, Artis, 1828, Antedil. Phytol., pl. 22, Coal Meas.

minus, Newberry, 1873, Ohio Pal., vol. 1, p. 372, Coal Meas.

newberryi, Andrews, 1875, Ohio Pal., vol. 2, p. 425, Coal Meas.

obliquum, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 324, Devonian.

orbiculare, Newberry, 1853, Ann. of Sci., vol. 1, p. 374, Coal Meas.

ovale, Dawson, 1871, Foss. Plants Can., p. 60, Devonian.

ovale, Lesquereux, 1884, Coal Flora of Pa., p. 810, Coal Meas. The name was preoccupied. See C. lescurianum.

ovatum, Grand 'Eury, 1877, Flore Car-bonifere, p. 236, Coal Meas.

pachytesta, Lesquereux, 1880, Coal Flora of Pa., p. 565, Coal Meas.

patens, Lesquereux, 1884, Coal Flora of Pa., p. 807, Coal Meas.

plicatum, Lesquereux, 1858, Geo. Sur.
Pa., vol. 2, p. 876, Coal Meas.
punctatum, Gœppert, 1836, Syst. Filic.
Foss., p. 24, and Coal Flora of Pa., 597, Coal Meas. Coal Meas.

pusillum, Lesquereux, 1884, Coal Flora of Pa., p. 815, Coal Meas.

regulare, Sternberg, 1820, (Carpolithes regularis,) Flor. d. Vorw., and Coal Flora

of Pa., p. 572, Coal Meas. retusum, Sternberg, 1820, (Carpolithes retusus,) Flora der Vorwelt, and Ohio Pal., vol. 1, p. 374, Coal Meas.

samariforme, Newberry, 1873, Ohio Pal., vol. 1. p. 375, Coal Meas. simplex, Lesquereux, 1880, Coal Flora of Pa., p. 569, Coal

Meas. speciosus, Les-

1884,

samariforme. quereux Coal

Flora of Pa., p. 807, Coal Meas. tenellum, Dawson, 1873, Rep. Foss. Plants, p. 28, Subcarboniferous.

trevortoni, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 876, Coal Meas. zonulatum, Lesquereux, 1880, Coal Flora

of Pa., p. 568, Coal Meas.

CARDIOPTERIS, Schimper, 1869, Traité de Paléontologie Vegetale, vol. 1, p. 457. [Ety. kardia, heart; pteris, fern.] Leaves simple, pinnate; stipe striated, rounded, base spoon-like, dilated; pinnæ perpendicular, opposite close, imbricated, cordato-ovate, leathery, margins reflexed; primary nerves numerous, equal, dichotomous. Type C. polymorpha.

eriana, Dawson, 1881, Quar. Jour. Geo. Soc. Lond., vol. 37, p. 305, Devonian. CARPOLITHES, Schlotheim, 1820, Petrefacten-

kunde. [Ety. karpos, fruit; lithos, stone.] Seeds of uncertain relation not referable by their characters to other genera. acuminatus, Sternberg, 1821, Flor. d.

Vorw. and Coal Flora of Pa., p. 596, Coal Meas.

bicarpus, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 98, Coal Meas. or Permian.

bicuspidatus, see Cardiocarpon bicuspidatum.

bifidus, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 877, Coal. Meas.

bullatus, see Lepidocystis bullatus.

butleranus, Lesquereux, 1884, Coal Flora of Pa., p. 824, Coal Meas.

cerasiformis, Sternberg, Flor. d. Vorw., vol. 2, p. 208, and Coal Flora of Pa., p. 824, Coal Meas.

cistula, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 451, Coal Meas.

clavatus, see Rhabdocarpus clavatus. compactus, Dawson, 1871, Foss. Plants Canada, p. 63, Devonian.

conicus, Lesquereux, 1884, Coal Flora of Pa., p. 824, Coal Meas.

corticosus, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 462, Coal Meas.

CAS.-CHL.]

disjunctus, Lesquer Pa., vol. 2, p. 87

pon dawesi. fasciculatus, Lesque

Ill., vol. 2, p. 457 fragarioides, Newb

vol. 1, p. 370, Coa granularis, Sternbe

Vorwelt, and Coa Coal Meas.

jacksonensis, see Rhal latior, Lesquereux,

p. 826, Coal Meas lunatus, Dawson, 1

Soc., vol. 19, p. 4 marginatus, Fontain

or Up. Carb. Flo

was preoccupied C. whitianus.

minimus, Sternberg welt and Coal Flo

Meas.

multistriatus, see striatus.

perpusillus, Lesque of Pa., p. 825, Co persicaria, Lesquer Ill., vol. 4, p. 462,

platimarginatus, see marginatus.

retusus, see Cardioca siliqua, Dawson, 18 Soc. Lond., vol. 19

spicatus, Dawson, 1 Soc. Lond., vol. 1 transsectus, Lesque

of Pa., p. 826, Coa trilocularis, see Trig umbonatus, Sternbe

Flora der Vorwel venosus, see Rhabdoo vesicularis, see Lep whitianus n. sp. (

Proposed instead taine & White, 18 Carb. Flora, p.

preoccupied. Casuarinites equisetiform equisetiformis.

Caulerpites, Brongniart d. Veg. Foss., stem; erpo, creep. mose, covered 'with form of leaves do Type C. lycopodio

marginatus, see Taon CAULOPTERIS, Lindley

Flora, vol. 1, p. 12 pteris, a fern.] S disk either marke mains of vessels pa to the base of the impressions of roo shape, or merely without traces vascular lines. Th been, in some case

of the surface or Type C. primæva.



FIG. 23.-Cardiocarpon

[CAR.

[CAR.

Carpolithes d Coal Flora

Carpolithes , and Ohio



diocarpon)rme.

eas. Foss. Plants,

, Geo. Sur.

8. , Coal Flora

Traité de l. 1, p. 457. rn.] Leaves ed, rounded, pinnæ perimbricated, nargins renumerous, e C. poly-

Jour. Geo. Devonian. Petrefactenithos, stone.] not referather genera. 1, Flor. d. , p. 596, Coal

1880, Perm. oal Meas. or

on bicuspi-

- o. Sur. Pa.,
- atus. , Coal Flora
- : d. Vorw., ra of Pa., p.
- o. Sur. Ill.,

avatus. Foss. Plants

oal Flora of

), Geo. Sur.

disjunctus, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 877, syn. for Trigonocarpon dawesi.

CAS.-CHL.]

- fasciculatus, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 457, Coal Meas. fragarioides, Newberry, 1873, Ohio Pal.,
- vol. 1, p. 370, Coal Meas.
- granularis, Stemberg, 1820, Flora der Vorwelt, and Coal Flora of Pa. p. 825, Coal Meas.
- *jacksonensis*, see Rhabdocarpus jacksonensis. latior, Lesquereux, 1884, Coal Flora of Pa., p. 826, Coal Meas.
- lunatus, Dawson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 464, Devonian.
- marginatus, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 98. The name was preoccupied by Artis in 1825. See C. whitianus.
- minimus, Sternberg, 1820, Flora der Vorwelt and Coal Flora of Pa., p. 825, Coal Meas.
- multistriatus, see Rhabdocarpus multistriatus.
- perpusillus, Lesquereux, 1884, Coal Flora of Pa., p. 825, Coal Meas. persicaria, Lesquereux, 1870, Geo. Sur.
- Ill., vol. 4, p. 462, Coal Meas. platimarginatus, see Rhabdocarpus platimarginatus.
- retusus, see Cardiocarpon retusum.
- siliqua, Dawson, 1863, Quar. Jour. Geo. Soc. Lond., vol. 19, p. 465, Devonian.
- spicatus, Dawson, 1863, Quar. Jour. Geo. Soc. Lond., vol. 19, p. 461, Devonian. transsectus, Lesquereux, 1884, Coal Flora
- of Pa., p. 826, Coal Meas. trilocularis, see Trigonocarpon triloculare. umbonatus, Sternberg, 1820, Vers. Darst. Flora der Vorwelt, Coal Meas.
- venosus, see Rhabdocarpus venosus.
- vesicularis, see Lepidocystis vesicularis. whitianus n. sp. Coal Meas. or Perm. Proposed instead of C. marginatus, Fon-
- taine & White, 1880, in Perm. or Up. Carb. Flora, p. 98, which name was preoccupied. Casuarinites equisetiformis, see Asterophyllites
- equisetiformis.
- Caulerpites, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 21. [Ety. kaulos, stem; erpo, creep.] Stem simple or ramose, covered with short branches, in form of leaves doubled or imbricated. Type C. lycopodioides.
- marginatus, see Taonurus marginatus. CAULOPTERIS, Lindley & Hutton, 1833, Foss. Flora, vol. 1, p. 121. [Ety. kaulos, stem; pteris, a fern.] Scars with the inside disk either marked by linear bands, remains of vessels passing from the trunk to the base of the rachis, or covered by impressions of rootlets obliterating its shape, or merely ovate or elliptical, without traces of horseshoeshaped vascular lines. These lines may have been, in some cases, effaced by abrasion of the surface or covered by rootlets. Type C. primæva.

acanthophora, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 458, Coal Meas. It may be a

synonym for Úlodendr o n punctatum. antiqua, Newberry, 1871, Quar. Jour. Geo. Soc., Geo. vol. 27, p. 271. Up. Held. Gr. cisti, Brongniart, 1828, (Sigillaria cisti,) Hist. Veg. Foss. p, 418, and Coal Flora of Pa.,

p. 345, Coal Meas. elliptica, Fon-

FIG. 24.-Caulopteris primæva.

- taine & White, 1880, Perm. or Up. Carb. Flora, p. 95, Coal Meas. or Permian.
- giffordi, Lesquereux, 1880, Coal Flora of Pa., p. 343, Coal Meas.
- gigantea, see Stemmatopteris gigantea. gigantea, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 95, Coal Meas. or Permian.
- insignis, see Stemmatopteris insignis.
- intermedia, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 459, Coal Meas. lacœi, Lesquereux, 1880, Coal Flora of
- Pa., p. 344, Coal Meas.
- lockwoodi, Dawson, 1871, Quar. Jour. Geo. Soc., vol. 27, p. 270, Chemung Gr.
- mansfieldi, Lesquereux, 1880, Coal Flora of Pa., p. 346, Coal Meas. obtecta, Lesquereux, 1870, Geo. Sur. Ill.,
- vol. 4, p. 457, Coal Meas. peregrina, Newberry, 1871, Quar. Jour. Geo. Soc., vol. 27, p. 272, Up. Held. Gr.
- punctata, see Stemmatopteris punctata.

wortheni, see Stemmatopteris wortheni. CELLULOXYLON, Dawson, 1881, Lond. Quar.

- Jour. Geo. Soc., vol. 37, p. 302. Etv. cellula, a small apartment; xylon, wood.] Trunk showing in cross section, large and somewhat unequal cells disposed in narrow concentric bands, between wider bands of fine fibrous tissue; no medullary rays; longitudinal section shows either cells superimposed in vertical rows, or a sort of banded prosenchymatous tissue. The structure appears to have been of exogenous growth. Type C. primævum.
- primævum, Dawson, 1881, Quar. Jour. Geo. Soc., vol. 37, p. 302, Ham. Gr. Penhallow says this is an Algæ, and belongs to the genus Nematophycus.
- Chloephycus, Miller & Dyer, 1878, Cont. to Pal., No. 2, p. 3. Probably inorganic. plumosum, Miller & Dyer, Cont. to Pal.,
- No. 2, p. 3, Hud. Riv. Gr. Probably. inorganic.



- CHONDRITES, Sternberg, 1833, Vers. Darst. Flora der Vorwelt, p. 25. [Ety. from its resemblance to *Chondrus crispus*, or Irish moss.] Fronds cartilaginous, filiform or robust stems, dichotomous, branchy; rounded or compressed. Type C. antiquus.
 - antiquus, Brongniart, 1828, (Fucoides antiquus,) Hist. d. Veg. Foss., vol. 1, p. 63, Devonian.
 - colletti, see Taonurus colletti.
- targioni, Brongniart, 1828, (Fucoides targioni,) Hist. d. Veg. Voss., t. 1, p. 56, Coal Meas.
- CONOSTICHUS, Lesquereux, 1876, 7th Ann. Rep. Geo. Sur. Ind., p. 142. [Ety. konos, cone; stichos, row.] Stipe cylindrical, continuous; frond enlarging from the base upward in the shape of a plate, or of a cup, or increasing by successive superposed layers or concentrical laminæ; top concave, cup-shaped. Type C. ornatus.

broadheadi, Lesquereux, 1880, Coal Flora of Pa., p. 15. Coal Meas.



ornatus, Lesquereux, 1876, 7th Ann. Rep. Geo. Sur. Ind., p.142, Coal Meas. prolifer, Lesquereux, 1880, Coal Flora of Pa., p. 16, Coal Meas. CORDAIANTHUS, Grand 'Eury, 1877, Flore Car-

FIG. 25.—Conostichus ornatus.

[Ety. Cordaites, a bonifere, p. 228. genus; anthos, flower.] Flowers and fruits of Cordaites, found isolated or in fragments where their relation to stem-bearing leaves is unknown. A provisional name only. Type C. gemmifer.

- bracteatus, Lesquereux, 1870, (Schultzia bracteata,) Geo. Sur. Ill., vol. 4, p. 427, Coal Meas.
- dichotomus, Lesquereux, 1880, Coal-Flora of Pa., p. 546, Coal Meas.
- ebracteatus, Lesquereux, 1884, Coal Flora of Pa., p. 844, Coal Meas.
- flexuosus, Lesquereux, 1884, Coal Flora of Pa., p. 802, Coal Meas.
- gemmifer, Grand 'Eury, 1877, Flore Car-bonifere, p. 228, and Coal Flora of Pa., p. 545, Coal Meas.
- ovatus, Lesquereux, 1880, Coal Flora of Pa., p. 545, Coal Meas.
- rugosus, Lesquereux, 1884, Coal Flora of Pa., p. 803, Coal Meas.
- scaber, Lesquereux, 1884, Coal Flora of Pa., p. 844, Coal Meas.
- simplex, Lesquereux, 1880, Coal Flora of Pa., p. 538, Coal Meas.

- spicatus, Lesquereux, 1884, Coal Flora of
- Pa., p. 802, Coal Meas. CORDAICARPUS, Grand 'Eury, 1877, Flore Carbonifere, p. 236. [Ety. Cordaites, a genus; karpos, fruit.] Seeds of variable size and shape. Type C. ovatus. apiculatus, Lesquereux, 1880,
 - Coal Flora of Pa., p. 551,
 - Coal Meas.
 - cinctus, Lesquereux, 1884, Coal Flora of Pa., p. 804, Coal Meas.
 - costatus, Lesquereux, 1880, FIG. 26 (Cordaites costatus,) Coal Cordaicarpus Flora of Pa., p. 540, Coal apiculatus. Meas.
 - gutbieri, Grand 'Eury, 1877, Flore Car-bonifere, p. 236, Coal Meas.
 - lineatus, Lesquereux, 1884, Coal Flora of
 - Pa., p. 805. Coal Meas. ovatus, Grand 'Eury, 1877, Flore Carbon-ifere, p. 236, and Coal Flora of Pa., p. 550, Coal Meas.
- stabilis, Lesquereux, 1884, Coal Flora of Pa., p. 805, Coal Meas.
- CORDAISTROBUS, Lesquereux, 1880, Coal Flora of Pa., p. 551. [Ety. Cordaites, a genus; strobus, cone.] Strobile cylindrical, tapering to a blunt acumen, covered by transversely rhomboidal scars placed in spiral, bearing narrow, linear leaves, with the characters, form, and nervation of leaves of Cordaites. Type C. grandeuryi.
- grandeuryi, Lesquereux, 1880, Coal Flora of Pa., p. 552, Coal Meas.
- CORDAITES, Unger, 1850, Gen. et sp., p. 277. [Ety. proper name.]] Trunks of large size, irregularly branching, formed of a large medullar canal or pith; marked on the outer surface by transverse, narrow, parallel, simple ribs, rarely joined by divisions, covered by double or triple layers of wood and bark, converted by fossilization into thin layers of coal; leaves in spiral order, more or less distant, ribbon-like, of various length and width, linear, or more generally gradually enlarging upward, obtuse, entire or undulate, and split at the apex; borders curving to the sessile, or semi-embracing, somewhat inflated base; surface marked lengthwise by primary and secondary parallel simple nerves, generally more distant in the middle of the leaves, and slightly inflated toward the base; flowers in racemes from the axils of the leaves; fruits generally oval, sessile, of various size. Type C. borassifolius. angustifolius, Dawson, 1861, Can. Nat.,

vol. 6, p. 10, Ham. Gr.

- angustifolius, Lesquereux, see C. diversifolius.
- borassifolius, Sternberg, 1820, (Flabellaria borassifolia,) Essai d. Exp. Geogn-botan. d. l. Flora d. monde primitif, 2d Cahier., p. 36, and Coal Flora of Pa., p. 532, Coal Meas.

communis, Lesque Phil. Soc., p. 320 p. 534, Coal Mean costatus, Lesquer



FIG. 27.-Cordaites costs

- Coal Flora of Pa. diversifolius, Lesqu of Pa., p. 535, instead of C. ang which was preoce flexuosus, Dawson, Soc., vol. 19, p. 46 gracilis, Lesquereu Phil, Soc., p. 322, p. 539, Coal Meas grandifolius, Lesque Phil. Soc., p. 31 Pa., p. 530, Coal 1 lacoei, Lesquereux, Pa., p. 535, Coal I lingulatus, Grand 'H bonifere, p. 218, an
- p. 533, Coal Meas. mansfieldi, Lesquere
- Phil. Soc., p. 321,
- p. 537, Coal Meas. radiatus, Lesquereuz
- Pa., p. 540, Coal M robbi, Dawson, 186 p. 8, Ham. Gr.

serpens, Lesquereux Pa., p. 324, Coal M

- simplex, Dawson, 18 and Acad. Geol., p
- validus, Lesquereu Phil. Soc., p. 317, a p. 529, Coal Meas.
- CREMATOPTERIS, Schim Paleontologie Veg [Ety. krematos, ha Rachis thick; pin oblong, contracted auriculate. Type (pennsylvanica, Leso
- Flora of Pa., p. 30 CRUZIANA, D'Orbigny, l'Amer. Merid. t. 3
 - proper name.] A kled fucoid, much Type C. rugosa.
- linnarsoni, White, Foss., p. 5, and (Merid., vol. 4, p. 3)

CHO.-COR

al Flora of

1877, Flore Cordaites,





Flore Car-

al Flora of

re Carbonof Pa., p.

al Flora of

1880, Coal . Cordaites, obile cylinit acumen, rhomboidal ng narrow, cters, form, Cordaites.

Coal Flora

sp., p. 277. ks of large formed of th; marked transverse, ibs, rarely by double bark, conthin layers er, more or of various or more ng upward, and split ing to the somewhat ed lengthndary pary more disleaves, and base; flowxils of the , sessile, of sifolius. Can. Nat.,

C. diver-

Flabellaria eogn-botan. 2d Cahier., p. 532, Coal PLANTÆ.

communis, Lesquereux, 1878, Proc. Am. Phil. Soc., p. 320, and Coal Flora of Pa., p. 534, Coal Meas.

costatus, Lesquereux, 1878, Proc. Am.



CRE.-CYC.]

Phil. Soc., p. 323, and Coal Flora of Pa. p. 540, Coal Meas. crassinervis, Fontaine & White, 1880,

Perm. or Up. Carb. Flora, p. 97, Coal Meas. o r Perm.

crassus, Lesqueordaites costatus FIG. reux, 1880,

- Coal Flora of Pa., p. 530, Coal Meas. diversifolius, Lesquereux, 1880, Coal Flora of Pa., p. 535, Coal Meas. Proposed instead of C. angustifolius Lesquereux, which was preoccupied.
- flexuosus, Dawson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 462, Catskill Gr.
- gracilis, Lesquereux, 1878, Proc. Am. Phil. Soc., p. 322, and Coal Flora of Pa., p. 539, Coal Meas.
- grandifolius, Lesquereux, 1878, Proc. Am. Phil. Soc., p. 318, and Coal Flora of Pa., p. 530, Coal Meas.
- lacoei, Lesquereux, 1880, Coal Flora of Pa., p. 535, Coal Meas.
- lingulatus, Grand 'Eury., 1877, Flore Carbonifere, p. 218, and Coal Flora of Pa., p. 533, Coal Meas.
- mansfieldi, Lesquereux, 1878, Proc. Am. Phil. Soc., p. 321, and Coal Flora of Pa., p. 537, Coal Meas.
- radiatus, Lesquereux, 1880, Coal Flora of Pa., p. 540, Coal Meas.
- robbi, Dawson, 1861, Can. Nat., vol. 6, p. 8, Ham. Gr.
- serpens, Lesquereux, 1880, Coal Flora of Pa., p. 324, Coal Meas.
- simplex, Dawson, 1863, Can. Nat., vol. 8, and Acad. Geol., p. 490, Coal Meas.
- validus, Lesquereux, 1878, Proc. Am. Phil. Soc., p. 317, and Coal Flora of Pa., p. 529, Coal Meas.
- CREMATOPTERIS, Schimper, 1869, Traité de Paleontologie Vegetale, vol. 1, p. 596. [Ety. krematos, hanging; pteris, fern.] Rachis thick; pinnules sessile, ovateoblong, contracted at the base, and subauriculate. Type C. typicad
- pennsylvanica, Lesquereux, 1880, Coal Flora of Pa., p. 307, Coal Meas.
- RUZIANA, D'Orbigny, 1842, Voy. dans l'Amer. Merid. t. 3, pt. 2, p. 30. [Ety. proper name.] A transversely wrinkled fucoid, much like Rusophyeus. Type C. rugosa.
 - linnarsoni, White, 1874, Rep. Invert. Foss., p. 5, and Geo. Sur. W. 100th Merid., vol. 4, p. 32, Upper Taconic.

rustica, White, 1874, Rep. Invert. Foss., p. 5, and Geo. Sur. W. 100th Merid., vol. 4, p. 32, Up. Taconic.

similis, Billings, 1874, Pal. Foss., vol. 2, p. 68, Up. Taconic.

- CYCLOPTERIS, Brongniart, 1828, Prodr. Hist. Veg. Foss., p. 51. [Ety. kuklos, circle; pteris, fern.] Leaflets orbicular or reniform, large, veins numerous, and not positively referable to other genera. Type C. orbicularis.
 - acadica, see Aneimites acadicus.
 - alleghaniensis, Meek, 1876, Desc. Foss. Plants Va. Syn. for Archæopteris rogersi.
 - antiqua, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol., p. 481, Coal Meas.
 - bockshii, see Aneimites bockshii.
 - browni, see Rhacophyllum browni.
 - crispa, Germ. & Kaulf, 1831, (Filicites crispus,) Nova. Acta. Acad., vol. 15, p. 229, Coal Meas.
 - elegans, Lesquereux, 1858, Bost. Jour. Nat. Hist., vol. 6, p. 416, and Geo. Sur. Pa., vol. 2, p. 856, Coal Meas.



FIG. 28.---Cyclopteris elegans.

fimbriata, see Neuropteris fimbriata. flabellata, Brongniart, 1828, Prodr. Hist.

Veg. Foss., p. 52, Coal Meas. germari, see Neuropteris germari.

hallana, see Archæopteris hallana. hispida, Dawson, 1863, Can. Nat. and

Geol., vol. 8, and Acad. Geol., p. 481, Coal Meas.

hirsuta, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 856, Coal Meas.

incerta, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 320, Ham. Gr.

jacksoni, see Archæopteris jacksoni. laciniata, see Neuropteris laciniata. lescuriana, see Triphyllopteris lescuriana.

oblata, Lindley & Hutton, 1837, Fos Flora, vol. 3, pl. 217, Coal Meas.

obliqua, Brongniart, 1828, Prodr. Hist. Veg. Foss., p. 52, Coal Meas.

orbicularis, Brongniart, 1828, Prodr. Hist.

Veg. Foss., p. 52, Coal Meas. problematica, Dawson, 1871, Foss. Plants Dev. and Up. Sil., p. 47, Devonian.

rogeret, see Archæopteris rogersi.

trichomanoides, see Neuropteris trichomanoides.

undans, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 855, Coal Meas.

2.

valida, see Aneimites validus.

varia, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 319, Devonian. virginiana, see Pseudopecopteris virgin-

iana wilsoni, Wood, 1860, Proc. Acad. Nat.

- Sci., p. 519, Coal Meas.
- CYCLOSTIGMA, Haughton, 1860, Ann. and Mag. Nat. Hist., 3d ser., vol. 5, p. 444 [Ety. kuklos, circle; stigma, a dot gr puncture.] Stems arborescent, surface tuberculate, rugose length wise; tubercles in regular spiral order, small, subglobose, more generally conical, acute, topped with a vascular terminal and prominent point, or more rarely flattened at the top into small, round areoles, with the vascular point in the middle; decorticated surface smooth or obscurely striate lengthwise by the series of tubercles, which are oval, elevated or prominent, and gradually effaced downward or decurring, preserving the impressions of the central vascular scars. Type C. kiltorkense.
 - affine, Dawson, 1881, Quar. Jour. Geo. Soc., vol. 37, p. 301, Chemung Gr.
 - densifolium, Dawson, 1871, Foss. Plants Can., p. 43, Devonian.
- kiltorkense, Haughton, 1860, Ann. and Mag. Nat. Hist., 3d ser., vol. 5, p. 444, Subcarboniferous.
- CYMOGLOSSA, Schimper, 1869, Traité de Paleontologie Vegetale, vol. 1, p. 553. [Ety. kumo, wavy; glossa, tongue.] Frond pinnate, or bipinnate; pinnæ oblong, sessile, alternate, margin lobed; nerves simple or branching, reaching the margin and leaving triangular spaces Type C. goepperwithout nerves. tana.
 - breviloba, Fontaine & White, 1880, Perm. and Up. Carb. Flora, p. 86, Coal Meas. or Permian.
 - formosa, Fontaine & White, 1880, Perm. and Up. Carb. Flora, p. 86, Coal Meas. or Permian.

lobata, Fontaine & White, 1880, Perm. and Up. Carb. Flora, p. 87, Coal Meas. or Permian.

obtusifolia, Fontaine & White, 1880, Perm. and Up. Carb. Flora, p. 85, Coal Meas. or Permian.

FIG. 29.-Dactylo-

DACTYLOPHYCUS, Miller & Dyer, 1878, Cont. to Pal., No. 2, p. 1. [Ety. dactylos, finger; phukos, sea-plant.] Stem divided at one or both ends into three or more short subequal branches, and closely related to Ichnophycus. Type D. tri-

phycus tridigidigitatum. quadripartitum, Miller & Dyer, tatum 1878, Cont. to Pal., No. 2, p. 2,

Utica Slate Gr.

tridigitatum, Miller & Dyer, 1878, Cont. to Pal., No. 2, p. 1, Utica Slate Gr.

CYC.-DEC.

lon. a, bark; b, woody zone of

DADOXYLON, Endlicher, 1840, Syn. Con. [Sig. pine or torch-wood.] Branching trunks, with distinct zones of growth and a pith of Sternbergia

type; wood-cells, with rows of areoles with oval pores; medullary rays with series of

cells.

- acadianum, Dawson, 1863, Can. Nat., vol. 8, and Acad. Geol., p. 473, Coal Meas.
- annulatum, Dawson, 1863, Can. Nat., vol. 8, and Acad. Geol. p. 473, Coal Meas.

antiquum, Dawson, 1863. Can. Nat., vol. 8, and Acad. Geol. p. 473, Coal Meas.

- FIG. 30. Dadoxyclarkii, Dawson, 1882, Foss. Plants Erian and Up. Sil. Forma-tions, pt. 2, p. 124, Genfiber (pleuren-chyma); c, me-dulla or pith; d, cast of hollow pith or sternber-gia esee shales.
- halli, Dawson, 1862, gia. Quar. Jour. Geo. Soc., vol. 18, p. 306, Ham. Gr.
- materiarium, Dawson, 1863, Can. Nat. vol. 8, and Acad. Geol., p. 473, Up. Coal Meas.
- newberryi, Dawson, 1871, Foss. Plants Can., p. 14, Portage Gr.

ouangondianum, Dawson, 1861, Can. Nat., vol. 6. and Acad. Geol, p. 534, Up. Devonian.

DANÆITES, Gœppert, 1836, Syst. Filic. Foss., p. 380. [Ety. from the genus Danza. Fronds pinnate; secondary veins coming out in right angles from the primary straight nerve, simple or dichotomous; sporanges, on the lower side of the lamina, placed in rows from the medial nerve to near the borders along the lateral veins, oval or linear exannulate. Type D. asplenioides.

- asplenioides, var. major, Bun-bury, 1846, Quar. Jour. Geol. Soc., vol. 2, p. 85. Coal Meas.
- emersoni, Lesquereux, 1880, Coal Flora of Pa., p. 157, Coal Meas.
- macrophyllus, Newberry, 1873, (Alethopteris macrophylla,) Ohio Pal., vol. 1, p. 383, Low. Coal Meas.

DECHENIA, Gœppert, 1841, Die FIG. 31.-Gattungen der fossilen Pflan-Dangeites macrophylzen, p. 43. [Ety. proper name.] Stems arborescent;

leaf-scars in continuous spiral lines; bolsters oblong, rounded, marked by obscure concentrical striæ, on the middle DEN -DYS.]

of which were ably cylindrical. ides.

striata, Lesquereux Pa., p. 431, Coal

DENDROPHYCUS, Leso Flora of Pa., vol. dron, tree; phuk composed of tu ments, irregularly spreading from th rhizoma cylindric thick; fronds at : large, tree-like, an when opened; pr branches thick an one side, dichotor sions cylindrical,

Type D. desori. desori, Lesquereux

Pa., p. 699. DESMIOPHYLLUM, Les Flora of Pa., p. band; phyllon, les leaves narrow, sub larged from the ba or joined 3 or 4 to late at the base; leaves irregularly r prominent large buried under the thick, irregularly ting of the coaly gracile.

gracile, Lesquereux, Pa., p. 557, Coal Me

- DICRANOPHYLLUM, Gran Carbonifere, pl. 30. pointed; phyllon, le leaves narrow, linea various length, fork filaments in the u with a few thick p intermediate nerville mersed into the epi dichotomum, Lesquere of Pa., p. 553, Coal
- dimorphum, Lesquer Am. Phil. Soc., p. 329 Pa., p. 554, Coal Mea
- Dictuolites, see Dictyoph Protozoa.

becki see Dictyophyton DICTYOPTERIS, Gutbier, 1

- Schwarzk, p. 63. [pteris, fern.] Frond nules cordate, trun at the base, sessile or oblong, obtuse or la veins flexuous, conn and intersections, for less distinct and of polygonal meshes. niarti.
- cordata, Roemer, in H Steinkohlengeb. am H in Palæontographica,

lus.

CYC.-DEC.

Con. [Sig. ing trunks,



- Dadoxy a, bark; b y zone of (pleuren-ma); c, me-tor pith; d, of hollow or sternber

8, p. 306,

Can. Nat., 3. Up. Coal

oss. Plants Can. Nat.,

deol, p. 534,

1836, Syst. 380. [Ety. 380. s Danæa. secondary it in right e primary mple or diranges, on the lamina, om the mear the borteral veins, exannulate. ides. najor, Bun-Jour. Geol. . 85. Coal

> eux, 1880, a., p. 157,

berry, 1873, acrophylla,) 1, p. 383,

1841, Die silen Pflanty. proper rborescent; piral lines; marked by the middle DEN -DYS.]

striata, Lesquereux, 1880, Coal Flora of Pa., p. 431, Coal Meas.

DENDROPHYCUS, Lesquereux, 1884, Coal Flora of Pa., vol. 3, p. 699. [Ety. dendron, tree; phukos, sea-weed.] Root composed of tubulose flattened filaments, irregularly branching and widely spreading from the base of the rhizoma rhizoma cylindrical, simple, long and thick; fronds at first top-shaped, very large, tree-like, and many times divided when opened; primary and secondary branches thick and somewhat flat on one side, dichotomous; ultimate divisions cylindrical, narrow and pointed. Type D. desori.

desori, Lesquereux 1884, Coal Flora of Pa., #61. 3., p. 699, Devonian.

DESMIOPHYLLUM, Lesquereux, 1880, Coal Flora of Pa., p. 556. [Ety. desmos, band; phyllon, leaf.] Stems slender; leaves narrow, sublinear, gradually en-larged from the base, single and sparse or joined 3 or 4 together and fasciculate at the base; surface of stem and leaves irregularly ribbed lengthwise by prominent large bundles of nerves buried under the epidermis, which is thick, irregularly granulose, by split-ting of the coaly layer. Type D. gracile.

gracile, Lesquereux, 1880, Coal Flora of Pa., p. 557, Coal Meas.

- DICRANOPHYLLUM, Grand 'Eury, 1877, Flore Carbonifere, pl. 30. [Ety. dikranos, two-pointed; phyllon, leaf.] Stems slender, leaves narrow, linear, subcoriaceous, of various length, forking, or dividing in filaments in the upper part, marked with a few thick primary nerves, and intermediate nervilles, more or less immersed into the epidermis.
- dichotomum, Lesquereux, 1880, Coal Flora
- of Pa., p. 553, Coal Meas. dimorphum, Lesquereux, 1878, Proc. Am. Phil. Soc., p. 329, and Coal Flora of Pa., p. 554, Coal Meas.
- Dictuolites, see Dictyophyton in the class Protozoa.

becki see Dictyophyton becki.

- DICTYOPTERIS, Gutbier, 1835, Verst. Zwick. Schwarzk, p. 63. [Ety. dictyon, net; pteris, fern.] Frond bipinnate; pincordate, truncate or rounded nules at the base, sessile or short pedicelled, oblong, obtuse or lanceolate, entire; veins flexuous, connected by flexures and intersections, forming a more or less distinct and close reticulation of polygonal meshes. Type D. brongniarti.
 - cordata, Roemer, in Pflanzen d. prod. Steinkohlengeb am Harz und Piesberg in Palæontographica, vol. 9, p. 186,

and Coal Flora of Pa., p. 833, Coal Meas

neuropteroidea, Gutbier, 1852, Verst. Stein Sachs., p. 23, and Coal Flora of Pa., p. 833, Coal Meas.

- obliqua, Bunbury, 1847, Quar. Jour. Geo. Soc., vol. 3, p. 427, and Coal Flora of Pa., p. 146, Coal
- Meas. rubella, Lesquereux, 1870, Geo. Sur. Ill., vol. 4,

PAANTÆ.

- p. 388, Coal Meas. scheuchziri, H offman, in Roem.
 - Pflanz. d. Kohlengeb. am Harz

in Paleont. IX, p. FIG. 32.-Dictyopteris obliqua 186, and Coal

- Flora of Pa., p. 832, Coal Meas.
- DIDYMOPHYLLUM, Gœppert, 1841, Gatt. der Foss. Pflanzen, p. 35. Foss. Pflanzen, p. 35. [Ety. didymos, double; phyllon, a leaf.] Trunk arborescent, cylindrical; leaves double, united at the base, disposed in spiral order, appressed; areoles prominent, reniform, each resembling a pair of small areoles attached to each other. Type D. schottini.
 - oweni, Lesquereux, 1870, (Sigillaria oweni,) Geo. Sur. Ill., vol. 4, p. 498, Coal Meas.
- reniforme, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 309, Ham. Gr.
- Diplazites emarginatus, see Pecopteris emarginata.
- DIPLOSTEGIUM, Corda, 1845, Beitrage zur Flora der Vorwelt, p. 112. [Ety. diplos double; stepe, a covering; but spelled by Corda Diplotegium.] Thick trunks of trees longitudinally furrowed; bark thick, and imbricated in short cylindrical overlaps. Type D. brownanum.



Beitrage zur Flora der Vorwelt, p. 112, Coal Meas. retusum, Dawson, 1863, Can. Nat., vol. 8, and

brownanum, Corda, 1845,

FIG. 83. Diplostegium retusum.

Acad. Geol., p. 490, Coal Meas. truncatum, Lesquereux, 1860, Geo. Sur. Ark., vol. 2. Syn. for

- Knorria imbricata. DISCOPHYCUS, Walcott, 1879, Trans. Alb. Inst., vol. 10, p. 19. [Ety. diskos, disk;
- phukos, sea-plant.] Frond discoid, slightly convex, and substance coria ceous. Type D. typicale.
- typicale, Walcott, 1879, Trans. Alb. Inst., vol. 10, p. 19, Utica slate.
- DYSTACTOPHYCUS, Miller & Dyer, 1878, Cont. to Pal., No. 2, p. 2. [Ety. dustaktos, hard to arrange; phukos, sea-plant.] Frond mammiform, expanded and concen-trically wrinkled. Type D. mammillanum.





mammillanum, Miller & Dyer, 1878, Cont. to Pal., No. 2, p. 2, Hud. Riv. Gr.



FIG. 84.-Dystactophycus mammillanum.

- EOPHYTON, Torell, 1868, Bidr. t. Sparagm. geogn. och. paleont., p. 36. [Ety. eos, dawn; phyton, a plant.] Slender, cylindawn; phyton, a plant.] drical, reed-like fucoids, longitudinally striated. Type E. linnæanum.
 - explanatum, Dawson, 1870, Can. Nat. and Geol., Low. Arenig rocks. jukesi, Billings, 1874, Pal. Foss, vol. 2, p.
 - 65, Up. Taconic.
 - linnæanum (?), Torell, 1868, Bidr. t. Sparagm. geogn. och. paleont., p. 36, Up. Taconic.
- Equiserires, Sternberg, 1833, Vers. Darst. Flora der Vorwelt, vol. 2, p. 43. [Ety. equus, a horse; seta, a hair or bristle; in allusion to the resemblance to a horse-tail.] Arborescent ; stems articulate; articulations surrounded with costate sheaths, dentate on the border. Type E. gigantea.

columnaris,

Brongniart, 1828, (Equi-setum colum-

nare,) Hist.Veg.

Foss., t. 1, p. 115,

Flora in Can.

Nat., vol. 8, and Acad. Geol., p.

443, Coal Meas.

Dawson, 1863, Syn. Carb.

Coal Meas.

curtus,



FIG. 35.—Equisetites curtus.

elongatus, Fontaine & White, 1880, Perm. or Up. Carb.

- Flora, p. 33, Coal Meas. or Permian. gracilis, Lesquereux, 1884, Coal Flora of Pa., p. 729, Coal Meas. maerodontus, Wood, 1860, Proc. Acad.
- macrodontus, Wood, 1860, Proc. Ac Nat. Sci. Not satisfactorily defined.
- occidentalis, Lesquereux, 1870, Geo. Sur.
- Til., vol. 4, p. 425, Coal Meas. stellifolius, Harlan, 1835, (Equisetum stellifolium,) Trans. Geo. Soc. Pa., vol. 1, p. 261, Coal Meas. Syn. for Annularia longifolia?
- striatus, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 34, Coal Meas. or Permian.

wrightanus, see Echinocaris wrightana. Equisetum, see Equisetites.

EOP.-FUC.

columnare, see Equisetites columnaris. stellifolium, see Equisetites stellifolius. EREMOPTERIS, Schimper, 1869, Traité de

Palæontologie Vegetale, vol. 1, p. 416. [Ety. eremos, isolated; pteris, fern.]

Upper part of fronds dichotomous; pinnæopen or oblique, irregularly pinnatifid; laciniæ long, obovate or wedge-form, the lower ones deeply cut; the lateral veins enter the lobes in acute angles of divergence from the midrib, and passing up to the borders are flabellate, dichotomous, parallel, and close./ Type E. artemisiifolia.

artemisiifolia, Sternberg, 1824, (Sphenopteris arte-misiæfolia,) Vers. Darst. Flora der Vorwelt, p. 44, and Coal Flora of Pa., p. 293, Coal Meas.

- FIG. 36. cheathami, Lesquereux, Eremopteris 1884, Coal Flora of Pa., p. marginata. 770, Coal Meas.
- crenulata, Lesquereux, 1876, Geo. Rep. of Alabama, p. 75, and Coal Flora of Pa., p. 292, Coal Meas.
- dissecta, Lesquereux, 1876, Geo. Rep. of Alabama, p. 75, and Coal Flora of Pa., p. 293, Coal Meas.
- elegans, Ettingshausen, 1852, (Asplenites elegans,) Die Steinkohlen flora v. Stradonitz in Bohmen, p. 15, and Coal Flora of Pa., p. 294, Coal Meas. flexuosa, Lesquereux, 1876, Geo. Rep. of
- Alabama, p. 75, and Coal Flora of Pa., p. 293, Coal Meas.
- marginata, Andrews, 1875, Ohio Pal., vol. 2, p. 422, Coal Meas.
- microphylla, Lesquereux, 188 Flora of Pa., p. 296, Coal Meas. 1880, Coal
- missouriensis, Lesquereux, 1880, Coal Flora of Pa., p. 295, Coal Meas.

Ficoidites scabrosus, Hildreth, 1837, Am. Jour. Sci. and Arts, vol. 31, p. 30, Low. Coal Meas. Not recognized, but probably a Sigillaria.

Filicites, Schlotheim, 1820, Nachtr. zur Petref. It was used for all fossil ferns, and hence is not of generic value. acuminatus, see Neuropteris acuminata. aquilinus, see Alethopteris aquilina. arborescens, see Pecopteris arborescens. crispus, see Cyclopteris crispa. gracilis, see Plumalina gracilis. lonchiticus, see Alethopteris lonchitica. miltoni, see Pecopteris miltoni. penniformis, see Pecopteris penniformis. pluckeneti, see Pseudopecopteris pluckeneti. plumosus, see Pecopteris plumosa. oreopteridis, see Pecopteris oreopteridis. trifoliatus, see Pseudopecopteris trifoliata. Flabellaria borassifolia, see Cordaites borassifolius.

Fucoides, Brongniart, 1822, in Mem. d. Hist.

GAL.-HEL.]

Nat. and Hist. d. It was used to co sites or Thalassop more than generi alleghaniensis, see A auriformis, Hall, 184 bilobatus, see Rusop caudagalli, see Taon demissa, Conrad pro losa.

dentatus, Brongniart tus pristiniformis. filiciformis, see Rhad flexuosus, see Bythoti gracilis, see Rythotre graphica. Not defin mined.

harlani, see Arthroph heterophyllus, Hall. be determined.

retort, see Taonurus r rigidus, see Bythotre secalinus, Hall syn. f plex.

serra, Brongniart, se

noides. simplex, see Diplogra velum, see Taonurus verticalis, see Scolithu

Galium sphenophylloide sphenophylloides.

GLYPTODENDRON, Clayp Sci. and Arts, 3d [Ety. glyptos sculpti Stem thick, covere areoles, the lower p depressed. Type G



FIG. 37.-Glyptodend

eatonense, Claypole, 1 and Arts, 3d. ser., v. ara Gr.

Goniopteris newberryana, s berryana.

oblonga, see Pecopteris Gordia marina, see Palæ GULIELMITES, Geinitz, 188 Rothleig. u. d. Zech 19. [Ety. from the ge

kind of fruit, of unce

orbicularis, Fontaine Perm. and Up. Carb Meas. or Permian.

permianus, Geinitz, 18 d. Rothleig. u. d. Zecl 19, Permian.

3.

EOP.-FUC.



FIG 36 Eremopteris marginata

Geo. Rep. al Flora of

Jeo. Rep. of Flora of Pa., (Asplenites

lora v. Straand Coal feas Jeo. Rep. of lora of Pa.,

nio Pal., vol.

1880, Coal eas. 1880, Coal leas.

1837, Am. p. 30, Low. 1, but prob-

Nachtr. zur fossil ferns, value. cuminata. illina.

orescens. 1.38

nchitica.

iniformis. pluckeneti. 088. opteridis. is trifoliata. laites boras-

em. d. Hist.

Nat. and Hist. d. Veg. Foss., t. 1., p. 50. It was used to comprehend the Sargassites or Thalassophytes, and hence is of more than generic value. alleghaniensis, see Arthrophycus harlani. auriformis, Hall, 1843. Not organic. bilobatus, see Rusophycus bilobatum. caudagalli, see Taonurus caudagalli.

GAL -HEL.]

demissa, Conrad probably phytopsis tubu-1088

- dentatus, Brongniart probably Diplograptus pristiniformis.
- filiciformis, see Rhacophyllum filiciforme. flexuosus, see Bythotrephis flexuosa. gracilis, see Rythotrephis gracilis.
- graphica. Not defined so as to be determined.
- harlani, see Arthrophycus harlani. heterophyllus, Hall. Not defined so as to be determined.
- retort, see Taonurus retortus.
- rigidus, see Bythotrephis rigida.
- secalinus, Hall syn. for Diplograptus sim-
- plex. serra, Brongniart, see Graptolithus bryonoides.
- simplex, see Diplograptus simplex. velum, see Taonurus velum.
- verticalis, see Scolithus verticalis.
- Galium sphenophylloides, see Annularia sphenophylloides.
- GLYPTODENDRON, Claypole, 1878, Am. Jour. Sci. and Arts, 3d ser., vol. 15, p. 302. Ety. glyptos sculptured; dendron, tree. Stem thick, covered with rhomboidal areoles, the lower portions of which are depressed. Type G. eatonense.



FIG. 37.-Glyptodendron eatonense.

eatonense, Claypole, 1878, Am. Jour. Sci. and Arts, 3d. ser., vol. 15, p. 302, Niagara Gr.

- Goniopteris newberryana, see Pecopteris newberrvana.
- oblonga, see Pecopteris oblonga.
- Gordia marina, see Palæochorda marina.
 - GULIELMITES, Geinitz, 1858, Leithpflanzen d. Rothleig. u. d. Zechstein, Sachsen, p. 19. [Ety. from the genus Gulie'ma.] A kind of fruit, of uncertain affinity. orbicularis, Fontaine & White, 1880,
 - Perm. and Up. Carb. Flora, p. 99, Coal Meas. or Permian. permianus, Geinitz, 1858, Leithpflanzen
 - d. Rothleig. u. d. Zechstein, Sachsen, p. 19, Permian.

PLANTÆ.

- HALONIA, Lindley & Hutton, 1835, Foss. Flora, vol. 2, p. 11. [Ety. from its close affinity with *Halonia*.] Stems of medium size, dichotomous; cortex tuberculate; spaces intermediate to the tubercles marked with rhomboidal scars: decorticated surface, covered with punctiform round or oval papillæ, obtuse or perforated in the center, placed in spiral order. Type H. tortuosa.
 - flexuosa, Goldenberg, 1855, (Ulodendron flexuosum,) Flora Sarræpontana fossilis, vol. 1, pl. 2, fig. 10, and Coal Flora of Pa., p. 416, Coal Meas. m a n s fi e l d i,

Lesquereux, 1880. Coal Flora of Pa., p. 414, Coal Meas. pulchella, Lesquereux, 1860, Geo. Sur. Ark., vol. 2, p. 311,

Coal Meas. secreta, Lesquereux. 1880, Coal Flora of Pa., 417, Coal

p. 417 Meas. tortuosa, Lindley & Hut- FIG. 38.-Halonia flexuosa.

ton, 1835, Foss. Flora, vol. 2, p. 11, Coal Meas

1

٨

×

A

b 8 ð ÷.

.

tuberculata, Brongniart, 1838, Hist. d. Veg. Foss., vol. 2. pl. 28, and Coal Flora of Pa., p. 411. Coal Meas. Harlania, syn. for Arthrophycus.

halli, syn. for Arthrophycus harlani.



FIG 39.-Heliophycus stelliforme.

HELIOPHYCUS, Miller & Dyer, 1878, Cont. to Pal. No. 2, p. 2. [Ety. helios, the sun; stelliforme, Miller & Dyer, 1878, Cont. to Pal. No. 2, p. 2, Hud. Riv. Gr. Ниргодорнусця, Hall & Whitfield, 1872, 24th

- Rep. N. Y. St. Mus. Nat. Hist., p. 203. [Ety. hippodos, horse-foot; phukos, seaplant.] Founded upon cavities in sandstone, having a form similar to that which a putty ball will assume, when pressed between thumb and finger, leaving a rounded rim on three sides of the disc, the compressed margin being truncate. Type H. cowlesi. cowlesi, Hall & Whitfield, 1872, 24th Rep.
- N. Y. St. Mus. Nat. Hist., p. 203, Chemung Gr.
- HYMENOPHYLLITES, Gœppert, 1836, Syst. Filic. Foss. [Ety. from the genus Hymenophyllum.] Frond membranaceous, many times regularly pinnately divided or irregularly cut, lobed with pinnatifid or dichotomous divisions, decurring on a broad common rachis, which is sometimes indistinct; veins pinnate, per-current, solitary in each division. Type H. gersdorfi.

adnascens, see Rhacophyllum adnascens.

alatus, see Sphenopteris alata. arborescens, see Rhacophyllum arborescens.

ballantini, Sphenopteris see ballantini.

capillaris, Lesquereux, 1858. Geo. Sur. Pa., vol. 2, p. 863. Coal Meas. clarki, see Rhacoyhyllum clarki.

FIG. 40. Hymeno-phyllites curtilobus

curtilobus, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 321, and Acad. Geol., p. 552;

Devonian. delicatulus, Brongniart, 1828, Hist. d. veg. Foss., p. 185, Coal Meas.

flexicaulis, see Sphenopteris flexicaulis.

furcatus, see Sphenopteris furcata.

gersdorfi, Gœppert, 1836, Syst. Filic. Foss. Devonian.

giganteus, see Rhacophyllum lactuca.

gutbieranus, Unger, 1850, Gen. et. sp., p. 132, Coal Meas.

hildrethi, see Sphenopteris hildrethi. inflatus, see Rhacophyllum inflatum. lactuca, see Rhacophyllum lactuca. mollis, see Rhacophyllum molle.

- myriophyllus, Brongniart, 1828, (Sphenopteris myriophylla,) Hist. d. Veg. Foss., p. 184, Coal Meas.
- obtusilobus, Gœppert, 1836, Syst. Filic. Foss., Devonian.
- pentadactylus, Dawson, 1863, Can. Nat. and Geol., vol. 8, and Acad. Geol., p. 485, Coal Meas.
- pinnatifidus, Lesquereux, 1866, Geo. Sur.
- III., vol. 2, p. 436, Coal Meas. schlotheimi, Brongniart, 1828, (Sphenop-teris schlotheimi,) Hist. d. Veg. Foss., p. 193, Coal Meas.

spinosus, see Sphenopteris spinosa. splendens, see Sphenopteris splendens. strongi, see Rhacophyllum strongi. subfurcatus, Dawson, 1868, Acad. Geol., p. 55, Devonian.

tenuifolius, Brongniart, 1828, (Sphenopteris tenuifolia,) Hist. d. Veg. Foss., p. 190, Coal Meas.

thalliformis, see Rhacophyllum thalliforme. trichomanoides, see Sphenopteris trichomanoides.

tridactylites, see Sphenopteris tridactylites. ICHNOPHYCUS, Hall, 1852

Pal. N. Y., vol. 2, p. 26. [Ety. ichnos, a foot-print; phukos, a seaweed.] Tridactyle impressions somewhat resembling a foot-track, the middle stem being the longer.



HIP.-KNO.

- tridactylum. lum
- tridactylum, Hall, 1852, Pal. N. Y., vol. 2, p. 26, Clinton Gr. IDIOPHYLLUM, Lesquereux, 1880, Coal Flora
 - of Pa., p. 159. [Ety. idios, peculiar; phyllon, leaf] Leaves small, round, or broadly obovate; medial nerve thick, gradually narrowed and effacing in joining the borders; lateral secondary veins sub-opposite, thick, passing in an inside curve toward the borders, gradually effaced in the reticulation; venules more or less continuous; sometimes crossing each other in contrary directions, and forming, by intersections, quadrate or rhomboidal meshes. Type I. rotundifolium.
- rotundifolium, Lesquereux, 1880, Coal Flora of Pa., p. 160, Coal Meas. KNORRIA, Sternberg, 1825, Essai d. Exp. Geogn-botan. d. l. Flor. du Monde prim-

itif fasc. 4, p. 37. [Ety. proper name.] Trunks covered with elongated semiconical or truncate tubercles placed in spiral order more or less imbricated, leaving, after falling off, round convex marks, with a single, vascular scar in the midleaves Knorria imbricata dle; long, linear,

more or less inflated at the base, with a flat medial nerve. Type K. imbricata.

FIG. 42.

- compacta, Lesquereux, 1884, Coal Flora of Pa., p. 839, Coal Meas.
- imbricata, Sternberg, 1825, Flor. d. monde primitif fasc. 4, p. 37, Kaskaskia Gr.

selloni, Sternberg, primitif fasc. 4, p taxina, Lindley &

Flora, vol. 2, p. 3 LEPIDOCYSTIS, Lesque

Pa., p. 454. [Ety. i der.] Spore case in right angle an rachis; or short, upon long, flexu sporanges, detacl unknown charac natus.

angularis, Lesquere Pa., p. 456, Coal I bullatus, Lesquerei bullatus,) Geo. S

Coal Meas. fraxiniformis, Geep (Carpolithes frax

et Sem., p. 26, Coa lineatus, Lesquereu:

Pa., p. 454, Coal M obtusus, Lesquereu lum obtusum,) G 876, Coal Meas.

pectinatus, Lesquere of Pa., p. 454, Coa quadrangularis, Les Flora of Pa., p. 45 vesicularis, Lesquere

vesicularis,) Geo. 8 Coal Meas. LEPIDODENDRON, Sternl

expose Geognosti flore du monde pr 25. [Ety. lepis, so Surface of the ster points of leaf atta (bolsters) rhomboid bark of large trees variable in size acc tion, often disfigure (inside scars) rhon dotted by three po bearing, generally, gin two oval smal bundles of vessels on each side of a which, like the app less distinct, som wrinkled across, s

Type L. dichotomu aculeatum, Sternberg, Geogn-botan. d. l. f

itif, 1st Cahier, p. 2 Pa., p. 371, Coal Me acuminatum, Geepper Uebergangsgebirge, iferous.

andrewsi, Lesquereux Pa., p. 389, Coal Me

alveolare, see Sigillaria binerve, Bunbury 184 Soc., vol. 3, p. 431, C bordæ, Wood, 1860, Pr

p. 239. Coal Meas. brittsi, Lesquereux, 18

Pa., p. 368, Coal Mea

LEP.]

HIP.-KNO.

LEP.]

inosa. plendens. rongi.

Acad. Geol., 8. (Sphenop-

Veg. Foss., p.

n thalliforme. oteris tricho-

tridactylites



ig. 41.—Ichno-ycus tridacty-lum.

inton Gr. 0, Coal Flora ios, peculiar; all, round, or nerve thick, effacing in al secondary passing in an orders, gradreticulation ; uous; somein contrary by intersecidal meshes.

1880, Coal Meas. ssai d. Exp. Monde primoper name.]



nbricata.

e base, with be K. imbri-

Coal Flora of

or. d. monde askia Gr.

PLANTÆ.

- selloni, Sternberg, 1825, Flor. d. monde primitif fasc. 4, p. 37-50, Coal Meas. taxina, Lindley & Hutton, 1833-5, Foss. Flora, vol. 2, p. 37, Coal Meas.
- LEPIDOCYSTIS, Lesquereux, 1880, Coal Flora of Pa., p. 454. [Ety. lepis, scale; kustis, bladder.] Spore cases long, naked, attached in right angle and opposite to a broad rachis; or short, placed in spiral order upon long, flexuous axes; or isolated sporanges, detached from strobiles of unknown character. Type L. pectinatus.
- angularis, Lesquereux, 1880, Coal Flora of Pa., p. 456, Coal Meas.
- bullatus, Lesquereux, 1870, (Carpolithes bullatus,) Geo. Sur. Ill., vol. 4, p. 463, Coal Meas.
- fraxiniformis, Gœppert & Berger, 1848, (Carpolithes fraxiniformis,) De Fruct. et Sem., p. 26, Coal Meas.
- lineatus, Lesquereux, 1880, Coal Flora of Pa., p. 454, Coal Meas.
- obtusus, Lesquereux, 1858, (Brachyphyllum obtusum,) Geo. of Pa., vol. 2, p. 876. Coal Meas.
- pectinatus, Lesquereux, 1880, Coal Flora
- of Pa., p. 454, Coal Meas. quadrangularis, Lesquereux, 1880, Coal Flora of Pa., p. 455, Coal Meas.
- vesicularis, Lesquereux, 1870, (Carpolithes vesicularis,) Geo. Sur. Ill., vol. 4, p. 462, Coal Meas.
- LEPIDODENDRON, Sternberg, 1820, Essai d'un expose Geognostico-botanique de la flore du monde primitif, 1st Cahier, p. 25. [Ety. lepis, scale; dendron, tree.] Surface of the stem marked by scars, points of leaf attachments; leaf scars (bolsters) rhomboidal, oblong, upon the bark of large trees or small branches, variable in size according to their position, often disfigured; central cicatrices (inside scars) rhomboidal, transversely dotted by three points (vascular scars) bearing, generally, under the lower margin two oval small tubercles, scars of bundles of vessels (appendages) placed on each side of a medial line (cauda). which, like the appendages, is more or less distinct, sometimes deep and wrinkled across, sometimes obsolete. Type L. dichotomum,
- aculeatum, Sternberg, 1820, Essai d. Exp. Geogn-botan. d. l. flor. d. monde primitif, 1st Cahier, p. 25, and Coal Flora of Pa., p. 371, Coal Meas. acuminatum, Geppert, 1852, Foss. Fl. d.
- Uebergangsgebirge, p. 185, Subcarboniferous.
- andrewsi, Lesquereux, 1880, Coal Flora of Pa., p. 389, Coal Meas.
- alveolare, see Sigillaria alveolaris.
- binerve, Bunbury, 1847, Quar. Jour. Geo.
- Soc., vol. 3, p. 431, Coal Meas. bordæ, Wood, 1860, Proc. Acad. Nat. Sci., p. 239. Coal Meas.
- brittsi, Lesquereux, 1880, Coal Flora of Pa., p. 368, Coal Meas.

- carinatum, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 875, Coal Meas.
- chemungense, Hall, 1843, (Sigillaria chemungensis,) Geo. Rep. 4th Dist. N. Y., p. 275, Chemung Gr.
- chilalloeum, Syn. for L. distans.
- clypeatum, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 875, Coal Meas.
- conicum, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 874, Coal Meas. corrugatum, Dawson, 1860, Quar. Jour.
- Geo. Soc., vol. 15, p. 313, and Acad. Geol., p. 253, Waverly Gr.
- costatum, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 453, Kaskaskia Gr.
- crenatum, Sternberg, 1820, Flor. d. monde primitif, 1st Cahier, p. 25, and Coal Flora of Pa., p. 394, Coal Meas.
- cruciatum, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 432, Coal Meas.
- cuspidatum, Lesquereux, 1880, Coal Flora of Pa., p. 388, Coal Meas.
- cyclostigma, Lesquereux, 1880, Coal Flora of Pa., p. 394, Coal Meas.
- decurtatum, Dawson, 1863, Can. Nat., vol. 8, and Acad. Geol., p. 487, Coal Meas.
- 8, and Acad. Geol., p. 487, Coal Meas.
 dichotomum, Sternberg, 1820, Flor. d. monde primitif, 1st Cahier, p. 25, and Coal Flora of Pa., p. 384, Coal Meas.
 dikrocheilum, Wood, 1860, Proc. Acad. Nat. Sci., p. 239, Coal Meas.
 diktore Liedlov & Hutton, 1821, Form
- dilatatum, Lindley & Hutton, 1831, Foss. Flora, vol. 1., p. 27, Coal Meas. diplostegiodes, Lesquereux, 1860, Geo.
- Sur. Ark., vol. 2., p. 311, Coal Meas.

distans, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 874, Coal Meas.

drepanaspis, Wood, 1860, Proc. Acad. Nat. Sci., Phil., vol. 12, p. 240, Coal Meas.

dubium, Wood, syn. for L. rimosum.

elegans, Sternberg, 1824, (Lycopodi-

olithes elegans,) Vers. Darst. Flor.

d. Vorwelt 4 fasc., FIG. 43.– Lepidodendron n. 8. Coal Meas distans. p. 8, Coal Meas.

- forulatum, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 431, Coal Meas.
- gaspanum Dawson, 1859, Quar. Jour. Geo. Soc., vol. 15, p. 484, and Acad. Geol., p. 541, Catskill Gr. Probably the same as Vanuxem's Sigillaria simplicitas.
- giganteum, Lesquereux, 1858, Geo. Sur.
- Pa., vol. 2., p. 874, Coal Meas. gracile, Lindley & Hutton, 1831, Foss. Flora, vol. 1, p. 30, Coal Meas.
- greeni, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 43, Coal Meas. harcourti, Witham, 1832, Trans. Nat. Hist. Soc., New, upon Tyne, p. 51, Coal Meas. ichthyolepis, Wood, 1860, (Lepidophloios
- ichthyolepis,) Proc. Acad. Nat. Sci. Phil., p. 240, Coal Meas.





- of Pa., p. 369, Coal Meas.
- latifolium, Lesquereux, 1880, Coal Flora of Pa., p. 370, Coal Meas. lesquereuxi, Wood, syn. for L. clypeatum.
- longifolium, Brongniart, 1828, Prodr. Hist.
 - Veg. Foss., p. 85, and Coal Flora of Pa., p. 373, Coal Meas.
- magnum, Wood, 1860, Proc. Acad. Nat. Sci., Phil., p. 239, Coal Meas. mammillatum, Lesquereux, syn. for L. vel-
- theimanum.
- marginatum, Presl, 1826, (Bergeria marginata,) in Sternberg Flor. d. Vorw., p. 134, and Coal Flora of Pa., p. 784, Coal Meas
- mekiston, Wood, syn. for L. modulatum.
- mielcki, Gæppert, 1836, Syst. Filic. Foss. p. 465, and Coal Flora of Pa., p. 395, Coal Meas.
- modulatum, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 874, Coal Meas
- morrisanum, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 430, Coal Meas.
- obovatum Sternberg, 1820, Flor. d. monde primitif, 1st Cahier, p. 25, Coal Meas.
- obscurum, Lesquereux, 1866, Geo. Sur. 111., vol 2, p. 453, Kaskaskia Gr. obtusum, Lesquereux, 1858, Geo. Sur. Pa.,
- vol. 2, p. 875, Coal Meas.
- oculatum, Lesquereux, syn. for L. distans. ow+ni, Wood, syn. for L. vestitum
- personatum, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol., p. 488, Coal Meas.
- pictoense, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol. p. 487, Coal Meas.
- plicatum, Dawson, 1863, Can. Nat. and Geo. vol. 8, and Acad. Geol., p. 488, Coal Meas.
- plumarium, Lindley & Hutton, 1835, Foss. Flora, vol. 3, p. 151, Coal Meas.

politum, syn. for. L. modulatum.

- primævum, Rogers, 1858, Geo. Sur. Pa., vol. 2, p. 675, Ham. Gr.
- quadrangulatum, Schlotheim, 1820, (Palmacites quadrangulatus,) Petrefactenkunde, p. 395, and Coal Flora of Pa., p. 383, Coal Meas.
- quadrilaterale, Lesquereux, 1880, Coal
- Flora of Pa., p. 389, Coal Meas. radiato-plicatum, Dawson, 1873, Rep. Foss.
- Plants, p. 32, Subcarboniferous. radicans, Lesquereux, 1866, Geo. Sur. Ill.,
- vol. 2, p. 454, Coal Meas. rectangulum, Wood, 1860, Proc. Acad. Nat. Sci. Phil., vol. 12, p. 519, Coal Meas.
- rhombicum, Presl, 1833, (Bergeria rhombica,)in Sternberg's Flor. d. Vorw., vol. 2, p. 184, Coal Meas.
- rigens, Lesquereux, 1870, Geo. Sur. Ill., vol. 4/p. 429, Coal Meas.
- rigidum, Lesquereux, 1884, Coal Flora of Pa., p. 839, Coal Meas.
- rimosum, Sternberg, 1820, Flor. d. monde primitif, 1st Cahier, p. 25, and Coal Flora of Pa., p. 392, Coal Meas.

rugosum, syn. for L. dichotomum.

- rushvillense, Andrews, 1875, Ohio Pal., vol. 2, p. 423, Coal Meas.
- salebrosum, Wood, 1860, Proc. Acad. Nat. Sci., Phil., p. 520, Coal Meas.
- scobiniforme, Meek, 1876, Bull. Phil. Soc. Wash., p. 13, Waverly Gr. Probably a syn. for L. corrugatum.

scutatum, Lesque. reux, 1880. Coal Flora

of Pa., p. 369, Coal Meas. selaginoides, Sternberg, 1820, Flor. d. monde primitif, 2d Cahier, p. 35, Coal Meas. s i gillarioides, Lesque-reux, 1858,

founded upon a dec o rticated specimen of L. vestitum or L.

latifolium. FIG. 44.--Lepidodendron sternbergi. simplex,

- Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 454, Coal Meas.
- squamiferum, Lesquereux, 188 Flora of Pa., p. 376, Coal Meas 1880, Coal
- sternbergi, Brongniart, 1828,/Prodr. Hist.
- Veg. Foss., p. 85, Coal Meas. tetragonum, Sternberg, 1821, Flor. d. monde primitif, 2d Cahier, p. 35, Coal Meas.
- tijoui, Lesquereux, 1870, Geo. Sur. Ill.,
- vol. 4, p. 431, Coal Meas. tumidum, Bunbury, 1847, (Lepidophloios tumidum,) Quar. Jour. Geo. Soc., vol. 3, p. 432, Coal Meas.
- turbinatum, Lesquereux, 1866, Geo. Sur. Ill., vol 2, p. 453, Kaskaskia Gr.
- undulatum, Sternberg, 1820, Flor. d. monde primitif, 1st Cahier, p. 25, Coal Meas.
- uræum, Wood, 1860, Proc. Acad. Nat. Sci., p. 240, Coal Meas.
- veltheimanum, Sternberg, 1823, Vers. Darst. Flora der Vorwelt, vol. 1, p. 12.
- Kaskaskia Gr. venust m, Wood, syn. for L. obtusum.
- vestitum, Lesquereux, 1858, Geo. Sur. Pa., vol. 2; p. 874, Coal Meas.
- wortheni, Lesquereux, 1866, Geo. Sur.
- Ill., vol. 2, p. 452, Coal Meas. LEPIDOPHLOIOS, Sternberg, 1823, Vers. Darst. Flora der Vorwelt. [Ety. lepis, scale; phloios, the bark.] Stems arborescent, erect, with four ranked branches disposed in spiral order; leaves coriaceous, linear, long, narrow, with a thick medial

- acadianus, Dawso Geo., vol. 8, an Coal Meas. antiquus,' Dawsor
- Canada, p. 36, I auriculatus, Lesqu Ill., vol. 4, p. 43 crassicaulis, Corda,
- der Vorwelt, p. dilatatus, Lesquere Pa., p. 781, Coal
- ichthyoderma, Le Flora of Pa., p. 4 ichthyolepis, see Le
- lepis. irregularis, Lesque Ark. vol. 2, p. 3]
- laricinus, Sternberg laricinum,) Flor. Cahier, p. 25, Coa lesquereuxi, Andr vol. 2, p. 423, Con macrolepidotus, Gc sarræpontana fo Coal Meas.

FIG. 45.-Lepidophlo macrolepidotus.

- platystigma, Dawson Geo., vol. 8, and Coal Meas.
- prominulus, Dawson Geo., vol. 8, and Coal Meas.
- protuberans, Lesque Ill., vol. 4, p. 440,
- sigillarioides, Lesque of Pa., p. 425, Coal
- tetragonum, Dawson
- Geo., vol. 8, and Coal Meas.
- tumidus, Lesquereux, tumidum. LEPIDOPHYLLUM, Brong
- Hist. Veg. Foss., scale; phyllon, leaf either joined to sp giophores of Lepide Type L. majum.

LEP.]

LEP.



LEP.

LEP.]

mum. 5. Ohio Pal.,

oc. Acad. Nat. ·88. ull. Phil. Soc. Probably a



dodendron ergi. r. Ill., vol. 2,

1880, Coal Meas. Prodr. Hist.

98 21, Flor. d. , p. 35, Coal

eo. Sur. Ill.,

epidophloios eo. Soc., vol.

36, Geo. Sur. ia Gr. 10, Flor. d. , p. 25, Coal

Acad. Nat.

1823, Vers. vol. 1, p. 12.

obtusum. Geo. Sur.

as. Geo. Sur. 98.

, Vers. Darst. lepis, scale; arborescent, ranches diss coriaceous, thick medial

PLANTÆ..

- nerve, bearing at base thick, subcrect or recurved bolsters, inflated in the upper part and dotted with small vascular points; leaf-scars transversely rhomboidal, marked horizontally by three vascular scars, minutely papil-lose under the cortex. Type L. laricinus.
- acadianus, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol. p. 489, Coal Meas.
- antiquius, Dawson, 1871, Foss. Plants Canada, p. 36, Devonian. auriculatus, Lesquereux, 1870, Geo. Sur.
- Ill., vol. 4, p. 439, Coal Meas. crassicaulis, Corda, 1845, Beitrage zur Flora der Vorwelt, p. 18, Coal Meas.
- dilatatus, Lesquereux, 1884, Coal Flora of Pa., p. 781, Coal Meas.
- ichthyoderma, Lesquereux, 1880, Coal Flora of Pa., p. 426, Coal Meas.
- ichthyolepis, see Lepidodendron ichthyolepis.
- irregularis, Lesquereux, 1860, Geo. Sur. Ark. vol. 2, p. 311, Coal Meas.
- laricinus, Sternberg, 1820, (Lepidodendron laricinum.) Flor. d. monde primitif, 1st Cahier, p. 25, Coal Meas.
- lesquereuxi, Andrews, 1875, Ohio Pal., vol. 2, p. 423, Coal Meas.
- macrolepidotus, Goldenberg, 1862, Flora sarræpontana fossilis, vol. 3, p. 37, Coal Meas.

Lesque-reux, 1866,

Geo. Sur.

Ill., vol. 2

p. 457, Coal Meas.

son, 1863,

vol. 8, and

Acad. Geol.,

Nat. and Geo.

Can.

obcordatus. parvus, Daw-

FIG. 45.—Lepidophloios macrolepidotus.

- p. 490, Coal Meas. platystigma, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol., p. 490, Coal Meas.
- prominulus, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol., p. 489, Coal Meas.
- protuberans, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 440, Coal Meas.
- sigillarioides, Lesquereux, 1880, Coal Flora of Pa., p. 425, Coal Meas.
- tetragonum, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol., p. 490, Coal Meas.
- tumidus, Lesquereux, see Lepidodendron tumidum.
- LEPIDOPHYLLUM, Brongniart, 1828, Prodr. d. Hist. Veg. Foss., p. 87. [Ety. lepis, scale; phyllon, leaf.] Blades or bracts, either joined to sporanges, or sporangiophores of Lepidostrobus, or isolated. Type L. majum.

- acuminatum, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 875. The name was preoccupied by Gutbier in 1843, but as it is a Lepidostrobus the name may be
- retained. affine, Lesquereux, 1858, Geo. Sur. Pa.,
- vol. 2, p. 875, Coal Meas.
- auriculatum, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 457, Coal Meas. brevifolium, Lesquereux, 1858, Geo. Sur.
- Pa., vol. 2, p. 876, Coal Meas. campbellanum, Lesquereux, 1884, Coal
- Flora of Pa., p. 786, Coal Meas.
- coriaceum, Lesquereux, 1884, Coal Flora of Pa., p. 787, Coal Meas.
- cultriforme, Lesquereux, 1884, Coal Flora of Pa., p. 785, Coal Meas.
- elegans, Lesquereux, 1884, Coal Flora of Pa., p. 787, Coal Meas.
- fallax, Lesquereux, 1884, Coal Flora of Pa., p. 786, Coal Meas.
- foliaceum, see Lepidostrobus foliaceus.
- gracile, Lesquereux, 1884, Coal Flora of Pa., p. 786, Coal Meas.
- hastatum, see Lepidostrobus hastatus.
- intermedium, Lindley & Hutton, 1831, Foss. Flora, vol. 1, p. 125, Coal Meas. *lanceolatum*, see Lepidostrobus lanceolatus.
- linearifolium, Lesquereux, 1880, Coal Flora of Pa., p. 452, Coal Meas.
- majum, Brongniart, 1828, Prodrome d'une Hist. Veg. Foss., p. 87, and Coal_p Flora of Pa., p. 449, Coal Meas. mansfieldi, Lesquereux, 1880, Coal Flora
- of Pa., p. 449, Coal Meas. minutum, Lesquereux, 1884, Coal Flora of Pa., p. 787, Coal Meas.
- morrisanum, Lesquereux, 1880, Coal Flora
- of Pa., p. 448, Coal Meas. obtusum, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 875, Coal Meas.
- plicatum, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 876, Coal Meas. rostellatum, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 443, Coal Meas.
- striatum, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 443, Coal Meas.
- trinerve, Brongniart, 1828, Prodr. Hist. Veg. Foss., p. 87, and Lindley & Hut-ton's Foss. Flora, vol. 2, p. 195, Coal Meas.
- truncatum, see Lepidostrobus truncatus. tumidum, Lesquereux, 1880, Coal Flora of Pa., p. 448, Coal Meas.
- LEPIDOTROBUS, Brongniart, 1828, Prodr. d. Hist.Veg. Foss., p. 87. [Ety. lepis, scale; strobus, cone.] Strobiles cylindrical or ovate, oblong, conical; composed of sporanges (spore-cases) subcylindrical or clavate, emarginate at the apex, supported in the middle lengthwise by bracts formed of a pedicel, attached like the sporanges in right angle to the axis, linear or oblanceolate, either simple, not longer than the sporanges, or prolonged into lanceolate, obtuse or acuminate laminæ, curved upward on the outside of the strobiles and imbricated on their sides, or merely inflated

- phous. Type L. ornatus. acuminatus, Lesquereux, 1858, (Lepidophyllum acuminatum,) Geo. Pa., vol. 2,
- p. 875, Coal Meas. aldrichi, Lesquereux, 1880, Coal Flora of Pa., p. 441, Coal Meas.
- butleri, Lesquereux, 1884, Coal Flora of Pa., p. 840, Coal Meas.
- connivens, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 442, Coal Meas.
- foliaceus, Lesquereux, 1870, (Lepidophyl-lum foliaceum,) Geo. Sur. IN., vol. 4, p. 444, Coal Meas.

globosus, Dawson, 1861, Can. Nat. and Geo., vol. 6, p. 174, Devonian. goldenbergi, Schimper, 1872,

- Traité de Paleontologie Vegetale, vol. 2, p. 61, Coal Meas.
- hastatus, Lesquereux, 1858, (Lepidophyllum hastatum,) Geo. Sur. Pa., vol. 2, p. 876, Coal Meas.
- incertus, Lesquereux, 1880, Coal Flora of Pa., p. 442, Coal Meas. lacoei, Lesquereux, 1880, Coal

Flora of Pa., p. 439, Coal

FIG. 46. Lepidostrobus hastatus.

- Meas. lanceolatus. Brongniart, 1828, (Lepidophyllum lanceolatum,) Profr. d. Hist. d. Veg. Foss., p. 87, and Coal Flora of Pa., p. 436, Coal Meas.
- lancifolius, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 442, Coal Meas.
- latus, Lesquereux, 1884, Coal Flora of Pa., p. 841, Coal Meas.
- Jongifolius, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol. p. 489, Coal Meas.
- mansfieldi, Lesquereux, 1880, Coal Flora
- of Pa., p. 444, Coal Meas. mirabilis, Newberry, 1873, (Polysporia mirabilis,) Ohio Pal., vol. 1, p. 362, Low. Coal Meas.
- oblongifolius, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 441, Coal Meas.



FIG. 47.-Lepidostrobus ornatus. Cone ½ size.

- ornatus, Parkinson, 1811, Organic Re-mains, vol. 1, pl. 9, fig. 1, and Coal Flora of Pa., p. 440, Coal Meas.
- ovatifolius, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 441, Coal Meas.
- pinaster, Lindley & Hutton, 1837, Foss. Flora, vol. 3, p. 129, Coal Meas.
- prælongus, Lesquereux, 1880, Coal Flora of Pa., p. 433, Coal Meas.

- princeps, Lesquereux, 1866, Geo. Sur. Ill., vol. 2. p. 455, Coal Meas.
- quadratus, Lesquereux, 1880, Coal Flora
- of Pa., p. 444, Coal Meas. richardsoni, Dawson, 1861, Can. Nat. and Geo., vol. 6, p. 174, Devonian.
- salisburyi, Lesquereux, 1880, Coal Flora of Pa., p. 443, Coal Meas.
- spectabilis, Lesquereux, 1880, Coal Flora of Pa., p. 435, Coal Meas.
- squamosus, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol., p. 489, Coal Meas.
- stachioides, see Asterophyllites stachioides.
- trigonolepis, Bunbury, 1847, Quar. Jour. Geo. Soc., vol. 3, p. 432, Coal Meas. truncatus, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 442, Coal Meas. variabilis, Lindley & Hutton, 1833, Foss.
- Flora, vol. 1, p. 31, and Coal Flora of Pa., p. 434, Coal Meas.
- LEPIDOXYLON, Lesquereux, 1878, Proc. Am. Phil. Soc., p. 334, and Coal Flora of Pa., p. 557. [Ety. lepis, scale; xylon, wood.] Stems large, tapering to a point; bark thin, covered with leafy scales; leaves variable, sublinear, narrowed or on larged to the point of attachment enlarged to the point of attachment, forking upward in two or more laciniæ; nervation distinct with the glass; primary nerves parallel, buried in the epidermis, inflated or half round; intermediate veinlets thin, visible on the decorticated face. Type L. anomalum. anomalum, Lesquereux, 1880, Coal Flora
 - of Pa., p. 557, Coal meas.
- LEPTOPHLŒUM, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 316. [Ety. leptos, slender; phlois, the bark of a tree.] [Ety. leptos, Stem covered with continuous rhombic areoles, each with a single small scar a little above its center, and above this a very slight furrow; decorticated stems, with spiral punctiform scars in slight depressions; bark thin, pith cylinder very large, with transverse markings of the character of Sternbergia. Type L. rhombicum.
 - rhombicum, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 316, Devonian.
- LESCUROPTERIS, Schimper, 1869, Palæontologie Vegetale, vol. 1, p. 465. [Ety. proper name; pteris, a fern.] Fronds large, bi



Lescuropteris adiantites.

tripinnate; rachis broad; foliate; pinnæ pinnatifid, close, oblique; divisions ovate, acute, inclined outside, connate

to the middle. de primary nerve lower pairs of 1 from the rachis, from the midrib, f forking once or si adiantites, Lesque teris adiantites,) vol. 6, p. 419, and 163, Coal Meas.

moorii, Lesquereu moori,) Geo. Sur. Meas.

LESLEYA, Lesquereux Pa., p. 142. [Ety næ simple, very gradually narrow traversed by a tl der the apex; equal, repeatedly

L. grandis. grandis, Lesquereu Pa., p. 143, Coal M microphylla, Lesque of Pa., p. 831, Coa



LICROPHYCUS, Billings, 1 1, p. 99. [Ety. lik sea-weed.] Compo elongated, subcyline ing from a common ing single, or brand angle. Type L. ott flabellum, Miller & Dy Soc. Nat. Hist., vo Riv. Gr. [LEP.-LES

B, Geo. Sur

88 , Coal Flora

an. Nat. and

, Coal Flora

an

), Coal Flora

an. Nat. and teol., p. 489,

s stachioides. Quar. Jour. oal Meas.), Geo. Sur. 88.

1833. Foss 'oal Flora of

3, Proc. Am. bal Flora of cale; xylon, g to a point; eafy scales; narrowed or attachment, more lacih the glass; uried in the ound; interible on the anomalum. , Coal Flora

Quar. Jour. [Ety. leptos, of a tree. us rhombic small scar a above this a ated stems, rs in slight th cylinder e markings rgia. Type

Juar. Jour. evonian. Palæontolo-Ety. proper ds large, bi

tites.

liate; pin-; divisions le, connate

LES.-LYC.]

to the middle, decurrent to the rachis, primary nerve thin, dichotomous; lower pairs of lateral veins emerging from the rachis, the other alternately from the midrib, forking twice, the upper forking once or simple. Type L. moorii. adiantites, Lesquereux, 1854, (Neuropteris adiantites.) Bost. Jour. Nat. Hist., vol. 6, p. 419, and Coal Flora of Pa., p.

- 163, Coal Meas. moorii, Lesquereux, 1858, (Neuropteris moori,) Geo. Sur. Pa., vol 2, p. 860, Coal
- Meas. LESLEYA, Lesquereux, 1880, Coal Flora of Pa., p. 142. [Ety. proper name.] Pinnæ simple, very entire, sublanceolate, gradually narrowing toward the base, traversed by a thick costa effaced under the apex; veins oblique, curved, equal, repeatedly dichotomous. Type L. grandis.
 - grandis, Lesquereux, 1880, Coal Flora of Pa., p. 143, Coal Meas.

microphylla, Lesquereux, 1884, Coal Flora of Pa., p. 831, Coal Meas.



FIG. 49.-Licrophycus ottawense.

LICROPHYCUS, Billings, 1862, Pal. Foss., vol. [Ety. likros, a fan; phykos, Composed of numerous, 1, p. 99. sea-weed.] elongated, subcylindrical stems, radiating from a common root, and remaining single, or branching at an acute angle. Type L. ottawense.

flabellum, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 25, Hud. Riv. Gr.

- formosum, Billings, 1866, Catal. Sil. Foss. Antic., p. 72, Hud. Riv. Gr.
- hiltonense, Billings, 1862, Pal. Foss., vol. 1, p. 101, Black Riv. and Trenton Gr.
- hudsonicum, Billings, 1862, Pal. Foss., vol. 1, p. 101, Hud. Riv. Gr.
- minor, Billings, 1862, Pal. Foss., vol. 1, p. 100, Trenton Gr. ottawense, Billings, 1862, Pal. Foss., vol.
- 1, p. 99, Trenton Gr.
- robustum, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 72, Hud. Riv. Gr. Antic., p. 72, Hud. Riv. Gr.
- Lithodictuon becki, Conrad. Not properly defined; but see Dictyophyton becki.
- LONCHOPTERIS, Brongniart, 1828, Prodr. Hist. Veg. Foss., p. 59. [Ety. lonche, spear; pteris, fern.] Pinnate or bipinnate; pinnules contiguous at the base, nearly at right angles to petiole, oblong-elon-gate, obtuse, middle-sized veins reticulated with finer ones. Type L. bricei. tenuis, Dawson, 1863, Can. Nat. and Geol.,
 - vol. 8, and Acad. Geol., p. 483, Coal Meas.
 - Lycopodiolithes elegans, see Lepidodendron elegans.
 - LYCOPODITES, Brongniart, 1822, Mem. du Mus. d'Hist. Nat. de Paris, and Lycopodiolithis of Schlotheim and Sternberg. [Ety. from Lycopodium, the club moss.] Plants herbaceous; leaves of the same or of two differ ent forms upon the same branches, distichous or in spiral order; fructifications in small cylindrical spikes. Type L. pinniformis.
 - annulariifolius, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 426, Coal Meas.
 - arborescens, Lesquereux, 1884, Coal Flora of Pa., p. 778, Coal Meas.
 - asterophyllitifolius. Lesquereux, 1866 Geo. Sur. Ill., vol. 2, p. 447, Coal Meas.
 - cavifolius, Lesquereux, 1861, Geo. Sur.
 - Ky, vol. 4, p. 437, Coal Meas. comosus, Dawson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 462, Devonian.
 - flexifolius, Lesquereux, 1884, Coal Flora of Pa., p. 779, Coal Meas.
 - lacoei, Lesquereux
 - 1884, Coal Flora of Pa., p. 780, Coal
 - Meas.

matthewi, Dawson, 1861, Can. Nat. and

Geo., vol. 6, p. 171, and Acad. Geol., p. 540, De-

- meeki, Lesquereux, 1870, Fig. 50.-Lyco-podites mateeki, Lesquereux, 1870, polites mat-Geo. Sur. Ill., vol. 4, p. thewi; a, branch 426. Coal Meas. 426, Coal Meas. leaves.
- ortoni, Lesquereux, 1880, Coal Flora of Pa., p. 357, Coal Meas. pendulus, Lesquereux, 1880, Coal Flora of Pa., p. 357, Coal Meas.



5.

► 10

plumula, see Plumalina plumula.

- riehardsoni, Dawson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 461, Devonian.
- simplex, Lesquereux. 1884, Coal Flora of Pa., p. 779, Coal Meas.
- strictus, Lesquereux, 1880, Coal Flora of Pa., p. 360, Coal Meas.
- uncinatus, Lesquereux, 1866, (Selaginites uncinatus,) Geo. Sur. Ill., vol. 2, p. 446, Coal Meas.
- vanuxemi, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 314, Syn. for Plumalina plumula.
- MACROSTACHYA, Schimper, 1869, Traité de Paléontologie Vegetale, vol. 1, p. 332. [Ety. makros, long; stachys, a plant.] Plants arborescent, articulate; articulations close; cortex thin, smooth or striate; impressions of the internal surface plano-costate; furrows narrow, alternating at the articulations; leaves appressed, linear, carinate or marked with a medial nerve, acuminate, finely truncate; leaf scars marked upon the articulations by transversely oval rings, like the links of a chain; scars of branches verticillate, large, round, umbonate, with a stigmarioid central mamilla; spikes very large, cylindrical; bracts lanceolate, costate in the middle, imbricate, scarcely longer than the internodes. Type M. infundibuliformis.
 - aperta, Lesquereux, 1858, (Asterophyllites apertus,) Geo. Sur. Pa., vol. 2, p. 852, Coal Meas.
- communis, Lesquereux, 1884, Coal Flora of Pa., p. 828, Coal Meas. infundibuliformis, Brongniart,
- 1828 Equisetum infundibuliforme,) Hist.
- Vég. Foss., t. 1, p. 119, Coal Meas. lanceolata, Lesquereux, 1858, (Astero-phyllites lanceolatus,) Geo. Sur. Pa., vol. 2, p. 852, Coal Meas. minor, Lesquereux, 1884, Coal Flora of
- Pa., p. 829, Coal Meas.
- MEGALOPTERIS, Dawson, 1871, Foss. Plants Dev. and Up., Sil. Formations, p. 51. [Ety. megale, great; pteris, fern.] Fronds very large, pinnate, ultimate pinnæ oblique, sublinear or lanceolate, entire, the lower side broadly decurrent on the rachis, which thus becomes alate, the upper narrowed in a curve, confluent; midrib thick, canaliculate on the upper surface, half cylindrical on the lower, gradually narrowed, but distinct to the apex of the leaves; veins open, emerging from the rachis in a more open angle of divergence, curving upward in reaching the borders, close dichotomous. Type M. dawsoni.
- abbreviata, Lesquereux, 1880, Coal Flora of Pa., p. 151, Coal Meas. dawsoni, Hartt, 1868, (Neuropteris daw-
- soni,) Acad. Geol., p. 550, Devonian.
- dentata, Lesquereux, 1884, Coal Flora of Pa., p. 833, Coal Meas.
- fasciculata, Lesquereux, 1880, Coal Flora of Pa., p. 150, Coal Meas.

hartti, Andrews, 1875, Ohio Pal., vol. 2, p. 416, Coal Meas.

MAC.-MEG.

- lata, Andrews, 1875, Ohio Pal., vol. 2, p. 417, Coal Meas.
- marginata, Lesquereux, 1880, Coal Flora of Pa., p. 152, Coal Meas. minima, Andrews, 1875, Ohio Pal., vol. 2,
- p. 416, Coal Meas.
- ovata, Andrews, 1875, Ohio Pal., vol. 2, p. 417, Coal Meas.
- rectinervis, Lesquereux, 1884, Coal Flora of Pa., p. 744, Coal Meas. serrata, Lesquereux, 1884, Coal Flora of
- Pa., p. 834, Coal Meas.



FIG. 51.-Megalopteris southwelli.

- southwelli, Lesquereux, 1880, Coal Flora of Pa., p. 148, Coal Meas.
- MEGAPHYTON, Artis, 1828, Antedil. Phytol., p. 20. [Ety. megas, great; phyton, a plant.] Scars large, round-quadrate in outline, mostly contiguous, placed in opposite biserial rows; internal disks convex, with central or vascular impressions in the form of a horseshoe, or a medial band dividing the disks into two lobes, joined

in the middle. Type M. frondosum. goldenbergi, Weiss, 1860, Zeitsch d. deutsch Geo. Ge-sellsh. XII, p. 510, Coal Meas. grandeuryi, Lesque-

reux, 1880, Coal Flora of Pa., p. 350, Coal Meas.

humile, Dawson, 1863, Can. Nat. and Geol., vol. 8, and Acad Geol. p. 486, Coal Meas.

- Meas. FIG. 52.—Megaphy-maclayi, Lesquereux, ton protuberans. 1866, Geo. Sur. Ill., vol. 2, p. 458, Coal Meas.
- magnificum, Dawson, 1863, Can. Nat. and Geol., vol. 8, and Acad. Geol., p. 486, Coal Meas.



NEM.-NEU.]

protuberans, Leso Ill., vol. 2, p. 44 Nematophycus, Cari Micro. Jour. Sy logani, see Protota NEMATOPHYLLUM, F Perm. or Up. C. nema, thread; p ered with a th epidermis, inter leaves verticilla and thread-like, out, finely sti united at the ba band. Type N. angustum, Fonte Perm. or Up. C Meas. or Permis NEMATOXYLON, Daw Geo. Soc., vol.] a thread; xylon Penhallow, and belongs to the A Nematophycus. with a smooth b composed of elor with irregular p pith ring crass crassu Jour 466, tenue, Jour 467, Nephropte Tab. elegans gans fimbria fimb german mari hirsuta. lacinia cinia orbiculo orbic

trichom trich undans, dans. NERIOPTE Ohio [Ety. pteris. nate

strong

lance

media

tendi

mit;s

off at

FIG. 53.-Neriopteris lanceolata Single pinnule

> mero base, parallel, e marginal. Type N lanceolata, Newberr

1, p. 381, Coal Me

MAC.-MEG. io Pal., vol. 2. Pal., vol. 2, p. 30, Coal Flora io Pal., vol. 2, o Pal., vol. 2, 84, Coal Flora Coal Flora of

thwelli. 0, Coal Flora

tedil. Phytol., it; phyton, a d-quadrate in us, placed in aternal disks vascular ima horseshoe, ng the disks



2.-Megaphyorotuberans

an. Nat. and leol., p. 486,

NEM.-NEU.]

protuberans, Lesquereux, 1866, Geo. Sur. | NEUROPTERIS, Brongniart, 1822, Mem. du Ill., vol. 2, p. 458, Kaskaskia Gr. Nematophycus, Carruthers, 1872, Month.

Micro. Jour. Syn. for Prototaxites. logani, see Prototaxites logani.

- NEMATOPHYLLUM, Fontaine & White, 1880, Perm. or Up. Carb. Flora, [p. 35. [Ety. nema, thread; phyllon, leaf.] Stem cov-ered with a thick, very finely striate epidermis, internodes femote, swollen; leaves verticillate, numerous, very long and thread-like, of equal width throughout, finely striate, without nerves, united at the base in a narrow annular band. Type N. angustum.
 - angustum, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 35, Coal Meas. or Permian.
- NEMATOXYLON, Dawson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 466. [Ety. nema, a thread; xylon, wood.] Carruthers, Penhallow, and others say this genus belongs to the Algæ, and is a syn. for Nematophycus. Fragments of wood, with a smooth bark and a tissue wholly composed of elongated cylindrical cells, with irregular pores or markings; no

pith, medullary rays or rings of growth. Type N. crassum.

- crassum, Dawson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 466, Devonian.
- tenue, Dawson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 467, Devonian.
- Nephropteris, Brongniart, 1828, Tab. des gener.
- elegans, see Cyclopteris elegans.

fimbriata, see Neuropteris fimbriata.

- germari, see Cyclopteris germari.
- hirsuta, see Cyclopterishirsuta. laciniata, see Cyclopteris laciniata.
- orbicularis, see Cyclopteris orbicularis.
- trichomanoides, see Cyclopteris trichomanoides.
- undans, see Cyclopteris undans.
- NERIOPTERIS, Newberry, 1873, Ohio Pal., vol. 1, p. 378. [Ety. nerion, the oleander; pteris, a fern.] Frond pinnate or bipinnate; rachis strong, punctate; pinnules lanceolate, simple, entire; medial nerve strong, extending from base to summit; secondary nerves given off at an acute angle, nu-

merous simple or forked at base, parallel. equal; fructifications marginal. Type N. lanceolata. lanceolata, Newberry, 1873, Ohio Pal., vol. 1, p. 381, Coal Meas.

FIG. 53.-Neriopteris lanceolata.

Single pin-nule.

Mus. d'Hist. Nat. de Paris, t. 8, p. 203, and Prodr. d. Hist. d. Veg. Foss, p. 52. [Ety. neuron, nerve; pteris, fern.] Fronds simple, bi, tri-pinnate; pinnules varying from round to ovate, obtuse, or obtusely acuminate, mostly entire, rounded, cordate, or auricled at the base, attached to the rachis by the middle; sessile, or rarely short pediceled; veins either from the base of the pinnules or from a costa, diverging fanlike and arched backward, in passing toward the borders, many times dichotofnous; costa generally dissolved at or below the middle; basilar veins simple or in fascicles. Type N. acuminata.

- acuminata, Schlotheim, 1820, (Filicites acuminatus,) Petrefactenkunde, p. 412, and Coal Flora of Pa., p. 123, Coal Meas.
- acutifolia, Brongniart, 1828, Hist, d. Veg. Foss., p. 229, Coal Meas.
- adiantites, see Lescuropteris adiantites.
- agassizi, Lesquereux, 1880, Coal Flora of Pa., p. 117, Coal Meas. angustifolia, Brongniart, 1828, Hist. d.
- Veg. Foss., p. 231, and Coal Flora of Pa., p. 89, Coal Meas. anomala, Lesquereux, 1880, Coal Flora of
- Pa., p. 118, Coal Meas.
- aspera, Lesquereux, 1880, Coal Flora of Pa., p. 121, Coal Meas.
- attenuata, Lindley & Hutton, 1837, Foss. Flora, vol. 3, p. 65, Coal Meas.
- auriculata, Brongniart, 1828, Hist. d. Veg. Foss., p. 236, Coal Meas.
- biformis, Lesquereux, 1880, Coal Flora of Pa., p. 121, Coal Meas.
- blissi, Lesquereux, 1884, Coal Flora of Pa., p. 737, Coal Meas.
- callosa, Lesquereux, 1880, Coal Flora of Pa., p. 115, Coal Meas.
- capitata, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 383, Coal Meas.
- carri, Lesquereux, 1884, Coal Flora of Pa., p. 731, Coal Meas.
- cisti, Brongniart, 1828, Hist. d. Veg. Foss., p. 238, Coal Meas.
- clarksoni, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 857, Coal Meas.
- collinsi, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 382, Coal Meas.
- cordata, Brongniart, 1828, Hist. Veg. Foss., p. 229, and Coal Flora of Pa., p. 91, Coal Meas.
- cordato-ovata, see Pseudopecopteris cordato-ovata.
- coriacea, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 387, Coal Meas.
- crassa, Dawson, 1868, Acad. Geol., p. 551, Devonian.
- crenulata. Brongniart, 1828, Hist. Veg. Foss., p. 234, and Coal Flora of Pa., p. 116, Coal Meas.
- cyclopteroides, Dawson, 1863, Can. Nat. and Geol., vol. 8, and Acad. Geol. p. 482, Coal Meas.
- dawsoni, see Megalopteris dawsoni.

- of Pa., p. 93, Coal Meas. delicatula, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 858, Coal Meas.
- dentata, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 859, Coal Meas. desori, Lesquereux, 1854, Bost. Jour. Nat.
- Hist., vol. 6, p. 418, and Geo. Sur. Pa., vol. 2, p. 859, Coal Meas.
- dictyopteroides, Fontaine & White, 1880. Perm. or Up. Carb. Flora, p. 49, Coal Meas. or Permian.
- dilatata, Lindley & Hutton, 1835, (Cyclopteris dilatata,) Foss. Flora, vol. 2,
- elrodi, Lesquereux, 1880, Coal Flora of Pa., p. 107, Coal Meas.
- eveni, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 430, Coal Meas. fasciculata, Lesquereux, 1870, Geo. Sur.
- Ill., vol. 4, p. 381, Coal Meas.
- fimbriata, Lesquereux, 1854, (Cyclopteris fimbriata,) Jour. Bost. Soc. Nat. Hist., p. 416, and Coal Flora of Pa., p. 81, Coal Meas.
- fissa, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 857, Coal Meas. flexuosa, Sternberg, 1825, Vers. Darst.
- Flora der Vorwelt, p. 16, Coal Meas.
- germari, Gœppert, 1836, (Adiantites ger-mari,) Systema Filicum Fossilium, p. 218, and Coal Flora of Pa., p. 113, Coal Meas.
- gibboss, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 858, Coal Meas.
- gigantea, Sternberg, 1825, Vers. Darst. Flora der Vorwelt, p. 16, Coal Meas. grangeri, Brongniart, 1828, Hist. Veg. Foss., p. 237, and Coal Flora of Pa., p. 105, Coal Meas.
- griffithi, Lesquereux, 1884, Coal Flora of Pa., p. 737, Coal Meas.
- heterophylla, Brongniart, 1822, (Filicites heterophylla) Mem. du Mus. d'Hist. Nat. de Paris, t. 8, p. 203, Coal Meas.



FIG. 54.—Neuropteris hirsuta.

- hirsuta, Lesquereux, 1854, Bost. Jour. Nat. Hist., vol. 6, p. 417, and Coal Flora of Pa., p. 88, Coal Meas.
- inflata, Lesquereux, 1866, Geo. Sur. Ill.,
- vol. 2, p. 431, Coal Meas. ingens, Lindley & Hutton, 1833, Foss. Flora, vol. 2., p. 29, Coal Meas.

lacerata, syn. for Neuropteris fimbriata.

- laciniata, Lesquereux, 1858, (Cyclopteris laciniata,) Geo. Sur. Pa., vol. 2, p. 855, Coal Meas.
- loshi, Brongniart, 1828, Hist. d. Veg. Foss., p. 242, and Coal Flora of Pa., p. 98, Coal Meas. (
- microphylla, Brongniart, 1828, Hist. Veg. Foss., p. 245, Coal Meas.

- minor, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 859, Coal Meas. missouriensis, Lesquereux,
- 1880, Coal Flora of Pa., p. 104, Coal Meas.

moori, see Lescuropteris moorii.

- oblongifolia, Lesquereux, 1884, Coal Flora of Pa., p. 732, Coal Meas. obscura, Lesquereux, 1880, Coal Flora of
- Pa., p. 108, Coal Meas.
- odontopteroides, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 50, Coal Meas. or Permian.
- pachyderma, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 430, Coal Meas. perelegans, Dawson, 1863, Can. Nat. and
- Geol., vol. 8, and Acad. Geol., p. 482, Coal Meas.
- platynervis, Fontaine & White, 1880, Perm. or Up. Carb. Flora, pl. 8, fig. 2, Coal Meas. or Permian.
- plicata, Sternberg, 1825, Vers. Darst. Flora der Vorwelt, p. 74, and Coal Flora, of Pa., p. 96, Coal Meas.
- polymorpha, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 320, Devonian. rarinervis, Bunbury, 1847, Quar. Jour.
- Geo. Soc., vol. 3, p. 425, and Coal Flora of Pa., p. 109, Coal Meas.
- reniformis, Brongniart, 1828, (Cyclopteris reniformis,) Hist. d. Veg. Foss., p. 216, and Coal Flora of Pa., p. 77, Coal Meas.
- retorquata, Dawson, 1871, Foss. Plants Canada, p. 50, Devonian.
- rogersi, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 856, Coal Meas.
- rotundifolia, Brongniart, 1828, Hist. Veg. Foss, p. 238, and Coal Flora of Pa., p. 97, Coal Meas.
- selwyni, Dawson, 1871, Foss. Plants Canada, p. 50, Devonian. serrulata, Dawson, 1862, Quar. Jour. Geo.
- Soc., vol. 18, p. 320, Devonian.
- smilacifolia, Sternberg, 1824, Vers. Darst. Flora der Vorwelt, vol. 2, p. 29, Coal Meas.
- smithsi, Lesquereux, 1876, Geo. Rep. of Alabama, p. 76, and Coal Flora of Pa., p. 106, Coal Meas.
- soreti, Brongniart, 1828, Prodr. Hist. Veg. Foss., p. 53, and Hist. d. Veg. Foss., t. 1, p. 244, Coal Meas.
- speciosa, Lesquereux syn. for N. rogersi.
- subfalcata, Lesquereux, 1880, Coal Flora of Pa., p. 102, Coal Meas. tenuifolia, Sternberg, 1825, Vers. Darst.
- Flora der Vorwelt, p. 17, and Coal Flora of Pa., p. 100, Coal Meas.
- tenuinervis, see Odontopteris tenuinervis.
- trichomanoides, Brongniart, 1828, (Cyclop-
- teris trichomanoides,) Hist. d. Veg. Foss., p. (217, and Coal Flora of Pa., p. 79, Coal Meas.
- undans, Lesquereux, 1854, Bost. Jour. Nat. Hist., vol. 6, p. 418, and Geo. Sur. Pa., vol. 2, p. 859, Coal Meas.
- verbenifolia, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 431, Coal Meas.

NEU.

vermicularis, Lese Ky., vol. 4, p. 4 villiersi, Brougni Veg. Foss, p. 52 NEGGERATHIA, Steri expose Geogne Flore du monde 37. [Ety. prope a slender rachis attached to the base, dilated up and dichotomou beinertiana, Gœpj Pflanzen, Coal M bockschii, see Anei bockschiana, syn. fc dispar, Dawson, Geol., vol. 8, and Coal Meas.



Nœggerathia dispar.

d'Hist. Nat. de Pa odous, tooth; palarge, bipinnate; subalternate; pin generally oblong, rachis by their w decurrent, either arate to the base middle, generally toward the top of ually effaced in p leaflet; lower pin tached to the main veins emerging fr rarely from a mi dichotomous, dive curve, in passing t O. brardi.

abbreviata, Lesquere of Pa., p. 138, Coal æqualis, Lesquereux.

- vol. 2, p. 434, Coal affinis, Lesquereux, Pa., p. 742, Coal M alata, Lesquereux, 18 Foss., p. 6, and Co 131, Coal Meas.
- alpina, Sternberg, 18 pina,) Flora d. Vo and Coal Flora of Meas.

NEU.

NŒG.]

eo. Sur. Pa.

1880. Coal Meas. prii.

84, Coal Flora

Coal Flora of

White, 1880 a, p. 50, Coal

66. Geo. Sur.

88. an. Nat. and feol., p. 482,

White, 1880. , pl. 8, fig. 2,

Darst. Flora oal Flora of

Quar. Jour. levonian. Quar. Jour. 1 Coal Flora

(Cyclopteris Foss., p. 216, p. 77, Coal

Foss. Plants

o. Sur. Pa.,

; Hist. Veg. a of Pa., p.

oss. Plants

· Jour. Geo. an.

Vers. Darst. p. 29, Coal

eo. Rep. of lora of Pa.,

· Hist. Veg. r. Foss., t. 1,

N. rogersi. Coal Flora

Ters. Darst. | Coal Flora

nuinervis. 28, (Cyclopit. d. Veg. a of Pa., p.

Bost. Jour I Geo. Sur. s.

Geo. Sur. ₹.

PLANTÆ.

vermicularis, Lesquereux, 1861, Geo. Sur. Ky., vol. 4, p. 434, Coal Meas. villiersi, Brongniart, 1828, Prodr. Hist.

Veg. Foss, p. 53, Coal Meas. Neggerathia, Sternberg, 1828, Essai d'un

expose Geognostico-botanique de la Flore du monde primitif, 2d Cahier, p. 37. [Ety. proper name.] Branch with a slender rachis bearing pinnate leaves attached to the stem by a semi-twisted base. dilated upward, veins flabellate and dichotomous. Type N. foliosa. beinertiana, Gœppert, 1842, Gatt. d. Foss.

Pflanzen, Coal Meas.

bockschii, see Aneimites bockschii. bockschiana, syn. for Aneimites bockschii. dispar, Dawson, 1863, Can. Nat. and Geol., vol. 8, and Acad. Geol., p. 480, Coal Meas.

flabellata, Lind-ley & Hutton, 1832,Foss. Flora, vol. 1, p. 89, Coal Meas. gilboensis, Dawson, 1871, Quar. Jour. Geo. Soc., vol. 27, p. 273, Chemung Gr.

> obligua, see Archæopteris obliqua. obtusa, see Aneimites obtusus.

minor, see Archæopteris minor.

ODONTOPTERIS FIG. 55. Brongniart, 1822, Nœggerathia dispar.

d'Hist. Nat. de Paris, t. 8, p. 203. [Ety. odous, tooth; pteris, fern.] Fronds large, bipinnate; pinnæ opposite or subalternate; pinnules of various forms. generally oblong, obtuse, joined to the rachis by their whole base, sometimes decurrent, either disjointed and sep-arate to the base or connate to the middle, generally becoming confluent toward the top of the pinnæ, and gradually effaced in passing to a terminal leaflet; lower pinnules sometimes attached to the main rachis and difform; veins emerging from the rachis, more rarely from a midrib; veinlets thin, dichotomous, diverging straight or in curve, in passing to the borders. Type O. brardi.

abbreviata, Lesquereux, 1880, Coal Flora of Pa., p. 138, Coal Meas.

æqualis, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 434, Coal Meas.

affinis, Lesquereux, 1884, Coal Flora of Pa., p. 742, Coal Meas.

alata, Lesquereux, 1858, Catal. Pottsville Foss., p. 6, and Coal Flora of Pa., p. 131, Coal Meas.

alpina, Sternberg, 1825, (Neuropteris alpina,) Flora d. Vorwelt, vol. 2, p. 76, and Coal Flora of Pa., p. 126, Coal Meas.

antiqua, Dawson, 1863, Can. Nat. and Geo., Coal Meas.

bradleyi, Lesquereux, 1870, Geo. Sur. III... vol. 4, p. 390, Coal Meas.

- brardi, Brongniart, 1822, Mem. du, Mus. d'Hist. Nat. de Paris, t. 8, p. 205, tab. 2, fig. 5, and Coal Flora of Pa., p. 132, Coal Meas.
- britannica, Gutbier, 1842, Abdrucke u. Verst. d. Zwick. Schwarzk. u. sei. Umgeb. Zwick., p. 68, and Coal Flora of Pa., p. 830, Coal Meas.
- cornuta, Lesquereux, 1880, Coal Flora of Pa., p. 128, Coal Meas.
- crenulata, of Brongniart, as indentified by Lesquereux in Geo. Sur. Pa., vol. 2, p. 860, is O. subcrenulata.
- dawsonana, n. sp. Devonian. Proposed instead of O. squamosa, in Quar. Jour. Geo. Soc. Lond., vol. 37, p. 305, which was preoccupied.

deformata, Lesquereux, 1880, Coal Flora of Pa., p. 141, Coal Meas.

densifolia, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 54, Coal Meas. or Permian.

dilatata, Lesquereux, 1884, Coal Flora of Pa., p. 831, Coal Meas. ubia, Lesque-

dubia, Lesque-reux, 1858, Geo. Sur. Penn., vol. 2, p. 860, Coal

Meas. gracillima, Newberry, 1873, Ohio Pal., vol. 1, p. 382, Coal

Meas heterophylla, Les-

quereux, 1866, Geo. Sur. Ill., vol. 2, p. 433, Coal Meas.

intermedia, Les-quereux, 1860, Geo. Sur. Ark.,

vol. 2, p. 313, Odontopteris gracillima. Coal Meas.

- lescurei, Wood, 1860, Trans. Am. Phil. Soc., vol. 13, p. 348, Coal Meas.
- monstruosa, Lesquereux, 1884, Coal Flora of Pa. p. 741, Coal Meas.
- nervosa, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 52, Coal Meas. or Permian.
- neuropteroides, Newberry, 1873, Ohio Pal., vol. 1, p. 381. The name was preoccupied by Roemer, and the species has been named O. newberryi.
- newberryi, Lesquereux, 1880, Coal Flora of Pa., p. 127, Low. Coal Meas.
- obtusiloba var rarinervis, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 52, Coal Meas. or Permian.
- pachyderma, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 53, Coal Meas. or Permian.

patens, Lesquereux, 1884, Coal Flora of Pa., p. 740, Coal Meas.





Pa., p. 831, Coal Meas.

rotundifolia, Wood, 1866, Trans. Am. Phil. Soc., vol. 13, p. 348, Coal Meas. schlotheimi, Brongniart, 1828, Hist. d. Veg.

Foss., p. 256, and Coal Flora of Pa., p. 136, Coal Meas. sphenopte roides.

FIG. 57.--Odontopteris

schlotheimi

Lesquereux, 1880, Coal Flora of Pa., p. 139, Coal Meas. squamosa, Lesquereux, 1854, Bost. Jour. Nat. Hist. vol. 6, p. 419, and Geo. Sur. Pa., vol. 2, p. 860, Coal Meas. squamosa, Dawson,

1881, Quar. Jour. Geo. Soc. Lond., vol. 37, p. 305, The Devonian. name was preoccupied. See O. dawsonana.

- subcrenulata, Lesquereux, 1880, Flora of Pa., p. 137, Coal Meas. Coal
- subcuneata, Bunbury, 1847, Quar. Geo. Jour., vol. 3, p. 427, and Coal Flora of Pa., p. 134, Coal Meas.
- tenuinervis, Lesquereux, 1858, (Neuropteris tenuinervis,) Geo. Sur. Pa., vol. 2,
- tenis tenumervis, J Geo. Bur. La., vol. 2, p. 859, Coal Meas.
 wortheni, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 432, Coal Meas.
 OLIGOCARPIA, Gœppert, 1841-48, Die Gattun-gen der fossilen Pflanzen, p. 3. [Ety. oligos, few; *karpos*, fruit.] Fronds bi-pinnet og tripinnegifd : pinner pinne pinnate or tripinnatifid; primary pinnæ oblong-lanceolate; secondary divisions, open, linear, pinnately divided in oblong or half round lobes or leaflets, connate at the base, crenulate; primary and secondary veins nearly of the same size, thin but distinct; lateral veins curved to the borders, simple or forked. Type O. gutbieri.
 - alabamensis, Lesquereux, 1875, Geo. Rep. Ala., p. 76, and Coal Flora of Pa., p. 266, Coal Meas.
 - flagellaris, Lesquereux, 1858, (Sphenopteris flagellaris,) Geo. Sur. Pa., vol. 2, p. 862, Coal Meas.
 - gutbieri, Gœppert, 1841-48, Die Gattungen der fossilen Pflanzen, p. 3, Coal Meas.
- ORMOXYLON, Dawson, 1871, Foss. Plants Canada, p. 14. [Ety. ormos, a chain, a cord; xylon, wood.] Woody stems, with cells of the character of those of Dadoxylon, very thick walled, with three rows of hexagonal areoles, having oval pores and medullary rays of one row of cells. Pith cavity composed of a series of spherical chambers, separated by thick, transverse cellular partitions. Type O. erianum.
 - erianum, Dawson, 1871, Foss. Plants Canada, p. 14, Portage Gr.

OLI.-PAL

reichiana, Lesquereux, 1884, Coal Flora of ORTHOGONIOPTERIS, Andrews, 1875, Ohio Pal., vol. 2, p. 418. [Ety. orthogoniopteris, rectangular-fern.] Frond simply pinrectangular-fern.] nate; pinnules alternate, lanceolate or oblong-linear, rounded and tapering to an acute point, enlarged and decurrent on the lower side to an auricle rounded in the upper part in joining the lamina a little above its point of attachment to the rachis; medial nerve thick, ascending to the apex; nervules fine and numerous, uniform, at right angle to the midrib, decurring to it at the point of attachment, forking once near the base. Type O. clara. clara, Andrews, 1875,

Ohio Pal., vol. 2, p. 419, Coal Meas.

gilberti, Andrews, 1875, Ohio Pal., vol. 2, p. 420, Coal M. as.

Pachyphyllum, Lesquereux, 1858, Geo. Sur. Pa., vol. 2. [Ety. pachys, thick; phyllon, a leaf.] This name was preoccupied in the class Polypi. See Rhacophyllum.

affine, see Rhacophyllum affine.

fimbriatum, see Rhacophyllum fimbriatum. hirsutum, see Rhaco-

phyllum kirsutum. laceratum, see Rhaco-

phyllum laceratum. lactuca. see Rhaco-

phyllum lactuca.

PACHYPTERIS, Brongniart, 1828, Prodr. Hist. Veg. Foss., p. 49. [Ety. pachys, thick; pteris, fern.] Frond pinnate or bipinnate, bearing opposite coriaceous pinnules, with a medial nerve or without nervation, narrowed toward the base, not joined to the rachis. Type P. lanceolata.

FIG. 58.

Orthogoniopteris

clara, part of a

pinnule.

- gracillima, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 419, Coal Meas. PALEOPHYCUS, Hall, 1847, Pal. N. Y., vol. 1,
- p. 7. [Ety. palaios, ancient; phykos, seaweed.] Stems simple or dichotomous, branches cylindrical or slightly flattened, obtuse, surface smooth or dotted.
- Type P. tubulare. articulatum, Winchell, 1864, Am. Jour. Sci. and Arts, 2d series, vol. 37, p. 231, Potsdam Gr.
- beauharnoisense, Billings, 1862, Pal.
 Foss., vol. 1, p. 98, Calcif. Gr.
 beverleyense, Billings, 1862, Pal. Foss., vol. 1. p. 97, Potsdam Gr.
 congregatum, Billings, 1861, Pal. Foss., 1862, Pal.
- vol. 1, p. 3, Potsdam Gr. divaricatum, Lesquereux, 1876, 7th Ann.
- Rep. Geol. Sur. Ind., p. 138, Coal Meas.
- funiculus, Billings, 1862, Pal. Foss., vol. 1, p. 98, Calcif. Gr.

Jour. p. 232. irregula N. Y., milleri, Ann. p. 136 FIG. 59. Palæophyobscurut cus gracile. Foss. occidentale, Whitfie Black Hills, p. 7, p. 332, Potsdam (plumosum. Whitfie Geo. Sur. Wis., I vol. 4, p. 169, Pot rugosum, Hall, 1847 63, Trenton Gr. simplex, Hall, 1847, 63, Trenton Gr. striatum, Hall, 1852. 22, Clinton Gr. tortuosum, Hall, 18 p. 6, Medina sand tubulare, Hall, 1847 7, Calcif. Gr. virgatum, Hall, 1847 263, Hud. Riv. Gr. Palxopteris, Schimper

incipien

informe

Foss.,

by Geinitz, see Ar acadica, see Aneimite hartii, see Archæopte Palæoxyris, Brongniart, d. Veg. Foss., p. 1 cient; xyris, plant Type P. regularis. have been referred American palæozoi ferred to Spirangiu appendiculata, see Spi

corrugata, see Spirang prendeli, see Spirangi Palmacites oculatus, see næggerathi, see Trig rathi.

Foss. in Mem. du Paris, tom. 8, p. 203 pteris, fern.] Frond pinnæ long, pinna hering to the rachis often more or less (decurring; borders ous, or nearly so; i rived from the me pinnules, simple, bi P. longifolia is the tioned in the Prod Foss., and the first Coal Flora of Pa. is penniformis is a rep abbreviata, Brongnia

Veg. Foss., p. 337, a Pa., p. 248, Coal Mea

PAL.-PEC.] gracile, Lesquereu: Geol. Sur. Ind., F 6. latum. PECOPTERIS, Brongniart

OLI.-PAL.

1875, Ohio thogonicpteris, simply pinanceolate or tapering to pd decurrent ricle rounded g the lamina ttachment to nick, ascendes fine and ht angle to at the point ce near the



FIG. 58. ogoniopteris 'a, part of a pinnule.

Prodr. Hist. *chys*, thick; ie or bipinaceous pinor without 1 the base, 'ype P. lan-

, Geo. Sur.

I. Y., vol. 1, *phykos*, seachotomous, lightly flath or dotted.

Am. Jour. . 37, p. 231,

1862, Pal. Xh

Pal. Foss.,

Pal. Foss.,

, 7th Ann. 138, Coal

Foss., vol.

gracile, Lesquereux, 1876, 7th Ann. Rep. Geol. Sur. Ind., p. 137, Coal Meas.

PAL.-PEC.]

FIG. 59.

16.

- incipiens, Billings, 1861, Pal. Foss., vol. 1, p. 2, Potsdam Gr. informe, Winchell, 1864, Am. Jour. Sci. and Arts, vol. 37, p. 232, Potsdam Gr.
- p. 252, Fotsdam Gr.
 irregulare, Hall, 1847, Pal.
 N. Y., vol. 1, p. 8, Calcif. Gr.
 milleri, Lesquereux, 1876, 7th

Ann. Rep. Geol. Sur. Ind., p. 136, Coal Meas. obscurum, Billings, 1862, Pal.

- Palæophycusgracile. obscurum, Billings, 1862, Pal. cusgracile. Foss.,vol. 1, p. 98, Trenton Gr. occidentale, Whitfield, 1877, Rep. Pal. Black Hills, p. 7, and Geol. Black Hills, p. 332, Potsdam Gr.
 - plumosum. Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 50, and Geo. Wis., vol. 4, p. 169, Potsdam Gr.
 - rugosum, Hall, 1847, Pal. N. Y., vol. 1, p. 63, Trenton Gr.
 - simplex, Hall, 1847, Pal. N. Y., vol. 1, p. 63, Trenton Gr.
- striatum, Hall, 1852, Pal. N. Y., vol. 2, p. 22, Clinton Gr.
- tortuosum, Hall, 1852, Pal. N. Y., vol. 2, p. 6, Medina sandstone. tubulare, Hall, 1847, Pal. N. Y., vol. 1, p.
- 7, Calcif. Gr.
- virgatum, Hall, 1847, Pal. N. Y., vol. 1, p. 263, Hud. Riv. Gr.
- Palxopteris, Schimper, being preoccupied by Geinitz, see Archæopteris.
- acadica, see Aneimites acadicus.
- hartii, see Archæopteris harti.
- Palxoxyris, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 137. [Ety. palaios, ancient; xyris, plant.] An inflorescence. Type P. regularis. The fossils which have been referred to this genus in the American palæozoic rocks are now referred to Spirangium.
- appendiculata, see Spirangium appendiculatum.

corrugata, see Spirangium corrugatum.

- prendeli, see Spirangium prendeli.
- Palmacites oculatus, see Sigillaria oculata. næggerathi, see Trigonocarpum næggerathi.
- PECOPTERIS, Brongniart, 1822, Class d. Veg. Foss. in Mem. du Mus. d'Hist. Nat. d. Paris, tom. 8, p. 203. [Ety. peko, comb; pteris, fern.] Fronds. bi, tripinnate; pinnæ long, pinnatifid; pinnules adhering to the rachis by the whole base, often more or less deeply connate, not decurring; borders generally contiguous, or nearly so; secondary veins derived from the medial nerve of the pinnules, simple, bi or trifurcate. Type, P. longifolia is the first species mentioned in the Prodr. d. Hist. d. Veg. Foss., and the first mentioned in the Coal Flora of Pa. is P. unita, while P. penniformis is a representative species. abbreviata, Brongniart, 1828, Hist. d. Veg. Foss., p. 337, and Coal Flora of Pa., p. 248, Coal Meas.

- - acuta, Brongniart, 1828, Hist. d. Veg. Foss., p. 350, and Coal Flora of Pa., p. 241, Coal Meas.
 - æqualis, Brougniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 58, Coal Meas.
 - alata, see Sphenopteris alata.
 - alata, Schimper, 1869, Pal. Veg., t. 1, p. 531, syn. for Pseudopecopteris decurrens
 - angustipinna, Fontaine & White, 1880, Perm. or Up Carb. Flora, p. 76, Coal Meas. or Permian.
 - angustissima, Sternberg, 1820, Vers. Darst. Flor. d. Vorw., p. 18, and Coal Flora of Pa., p. 257, Coal Meas.
 - aquilina, see Alethopteris aquilina.
 - arborescens, Schlotheim, 1820, (Filicites arborescens,) Petrefaktenkunde, p. 404, and Coal Flora of Pa., p. 230, Coal "Meas.
 - arguta, Sternberg, 1820, Vers. Darst. Flor. d. Vorw., p. 19, and Coal Flora of Pa., p. 227, Coal Meas.
 - aspera, Brongniart, 1828, Hist. d. Veg. Foss., p. 339, and Coal Flora of Pa., p. 242, Coal Meas.
 - aspidioides, Brongniart, 1828, Hist. d. Veg. Foss., p. 311, and Coal Flora of Pa., p. 756, Coal Meas.
 - asplenioides, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 72, Coal Meas. or Permian.
 - bucklandi, Brongniart, 1828, Hist. d. Veg. Foss., p. 319, and Coal Flora of Pa., p. 244, Coal Meas.
 - callosa, see Pseudopecopteris callosa.
 - candollana, Brongniart, 1828, Hist. d. Veg. Foss, p. 305; Coal Flora of Pa. p. 243, Coal Meas.
 - carri, Lesquereux, 1884, Coal Flora of Pa., p. 758, Coal Meas.
 - chærophylloides, see Sphenopteris chærophylloides.
 - cisti, Brongniart, 1828, Hist. d. Veg. Foss., p. 330, and Coal Flora of Pa., p. 243, Coal Meas.
 - clarki, Lesquereux, 1880, Coal Flora of Pa., p. 261, Coal Meas.
 - clintoni, Lesquereux, 1880, Coal Flora of Pa., p. 251, Coal Meas.
 - concinna, Lesquereux, 1854, Bost. Jour. Soc. Nat. Hist., vol. 6, p. 424, and Gen. Sur. Pa., vol. 2, p. 867, Coal Meas. But the name was preoccupied by Presl in 1833.
 - crenulata, Brongniart, not American. The form sometimes referred to it is Pseudopecopteris subcrenulata.
 - cristata, Gutbier, 1843, Gaea von Sachsen, p. 80, and Coal Flor. of Pa., p. 256, Coal Meas.
 - cristata, see Sphenopteris cristata.
 - cyathea, Schlotheim, 1820, (Filicites cyatheus,) Petrefaktenkunde, p. 403, Coal Meas.
 - decurrens, see Pseudopecopteris decurrens. decurrens, Dawson, 1862. The name being preoccupied, it was changed to P. discrepans.

densifolia, Dawson, 1874, Foss. Plants of Canada, p. 56, Devonian.

132

- dentata, Brongniart, 1828, Hist. d. Veg. Foss., p. 346, and Coal Flora of Pa., p. 240, Coal Meas.
- distans, Lesquereux, 1854, Bost. Jour. Soc. Nat. Hist., vol. 6, p. 423, and Geo. Sur. Pa., vol. 2, p. 866, Coal Meas. The name was preoccupied by Rost in 1839.
- dournaisi, see Callipteridium dournaisi. dubia, Sternberg, 1820, Tent. Flor. Primord, p. 19, and Gutbier in Gaea von
- Sachsen, Coal Meas. elegans, Gœppert, 1836, (Polypodites elegans,) Syst. Filic. Foss., p. 344, and Coal Flora of Pa., p. 228, Coal Meas.
- elliptica, Bunbury, 1846, Quar. Jour. Geo. Soc., vol. 2, p. 82, and Coal Flora of Pa., p. 245, Coal Meas.
- elliptica, Fontaine & White, 1880, (Goniopteris elliptica,) Perm. or Up. Carb. Flora, p. 83, Coal Meas. or Permian. The name was preoccupied.
- emarginata, Gœppert, 1836, (Diplazites emarginatus,) Syst. Filic. Foss., p. 274, and Coal Flora of Pa., p. 225, Coal Meas.
- erosa, Gutbier, 1843, Gæa. von Sachsen p. 81, and Coal Flora of Pa., p. 255, Coal Meas
- flavicans, Presl, 1833, in Sternberg, Vers. Darst. Flor. d. Vorw., vol. 2, p. 127. Probably not American.
- georgiana, Lesquereux, 1884, Coal Flora
- of Pa., p. 759, Coal Meas. germari, Weiss, 1869, (Cyatheites ger-mari,) Foss. Flora d. Jungsten Steink. Form., Up. Coal Meas. or Permian.
- germari var. crassinervis, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 70, Coal Meas. or Permian.
- germari var. cuspidata, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 70, Coal Meas. or Permian.
- goniopteroides, Fontaine & White, 1880. Perm. or Up. Carb. Flora, p. 80, Coal Meas. or Permian.
- halli, Lesquereux, 1870, (Alethopteris halli,) Geo. Sur. Ill., vol. 4, p. 394, Coal Meas.
- heerana, Fontaine & White, 1880, Perm. * or Up. Carb. Flora, p. 77, Coal Meas. or Permian.
- hemiteloides, Brongniart, 1828, Hist. d. Veg. Foss., p. 314, Coal Meas. heterophylla, see Alethopteris heterophylla.
- imbricata, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 72, Coal Meas. or
- Permian. inclinata, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 80, Coal Meas.
- or Permian. incompleta, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 868, Coal Meas.
- ingens, Dawson, 1862, Quar. Jour. Geo.
- Soc., Lond., vol. 18, p. 322, Devonian. lanceolata, Lesquereux, 1870, (Alethopteris lanceolata,) Geo. Sur. Ill., vol. 4, p. 398, Coal Meas.

- lanceolata, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 79, Coal Meas, or Permian. The name was preoccupied; beside, it is probably a syn. for P. unita.
- latifolia. Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 79, Coal- Meas. or Permian.
- lepidorachis, Brongniart, 1828, Hist. d.
- Veg. Foss., p. 313, Coal Meas. lescuriana, n. sp. Coal Meas. Proposed instead of P. obsoleta, Lesquereux, 1884, Coal Flora of Pa., p. 758, which name was preoccupied.
- longifolia, Brongniart, 1828, Hist. d. Veg. Foss. p. 273, and Coal Flora of Pa., p. 226, Coal Meas.
- loschi, Brongniart, 1828, Hist. d. Veg. Foss. p. 355, Coal Meas.
- lyratifolia, Gœppert, 1841, (Sphenopteris lyratifolia,) Die Gattungen d. Foss. Pflanzen, p. 71, and Coal Flora of Pa., p. 259, Coal Meas. mantelli, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 57, Coal Meas. marginata, see Alethopteris marginata.

- merianopteroides, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 78, Coal Meas. or Permian.
- microphylla, Brongniart, 1828, Hist. d. Veg. Foss. p. 340, and Coal Flora of Pa., p. 263, Coal Meas. milleri, Harlan, 1835, Trans. Geo. Soc. Pa., Coal Meas.
- Miltoni, Artis, 1825, (Filicites miltoni,) Anted. Phytol. pl. 4, and Coal Flora of Pa., p. 247, Coal Meas.
- muricala, see Pseudopecopteris muricata.
- murrayana, Brongniart, as identified by Lesquereux in Geo. Sur. Ill., vol. 2, p. 443, see Sphenopteris pseudo-murravana.
- nervosa, see Pseudopecopteris nervosa.
- newberryana, Fontaine & White, 1880, (Goniopteris newberryana,) Perm. or Up. Carb. Flora, p. 84, Coal Meas. or Permian.
- newberryi, see Pseudopecopteris new berryi. nodosa, Gœppert, 1836, (Aspidites no-
- dosus,) Systema Filicum Fossilium, p. 372, and Coal Flora of Pa., p. 233, Coal Meas.
- notata, Lesquereux, 1854, Bost. Jour. Soc. Nat. Hist., vol. 6, p. 424, and Geo Sur. Pa., vol. 2, p. 866, Coal Meas.
- oblonga, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 83, Coal. Meas. or Permian.
- obsoleta, Harlan, 1835, Trans. Geo. Soc. Pa., Coal Meas.
- obsoleta, Lesquereux, 1884, Coal Flora of Pa., p. 758. The name was preoccu-pied. See P. lescuriana.
- oreopteroidea, Schlotheim, 1820, (Filicites oreopteridius,) Petrefaktenkunde, p. 407, and Coal Flora of Pa., p. 238, Coal Meas.
- ornata, Lesquereux, 1884, Coal Flora of Pa., p. 760, Coal Meas.

Obscura, see Viethopteris obscuri

PEC.

ovata, Brongniar Veg. Foss, p. 5 ovoides, Fontain Flora of Pa., p mian.

pachypteroides, Perm. or Up. Meas. or Permi

- penniformis, Bro pennæformis,) (
- Mem. du Mus. tom. 8, p. 203, at
- 239, Coal Meas. platynervis, Fon
- Perm. or Up. C Meas. or Permia
- platyrachis, Bron Veg. Foss. p. 312 p. 232, Coal Mea
- pluckeneti, see Ps eneti.
- plumosa, Artis, 182 Anted. Phytol., 1
- polymorpha, Bron Hist. d. Veg. For preciosa, Hartt, 18
- Devonian. pteroides, Schloth
- pteridius,) Petre and Coal Flora Meas.
- pusilla, see Pseudor quadratifolia, Les Flora of Pa., p. 23
- rarinervis, Fontaii Perm. or Up. Ca
- Meas. or Permian
- rigida, Dawson, 1863 vol. 8, and Acad Meas.
- robusta, Lesquereuz
- Pa., p. 229, Coal M rotundifolia, Fonta Perm. or Up. Ca.
- Meas. or Permian. rotundiloba, Fontai
- Perm. or Up. Car Meas. or Permian.
- schimperana, Fonta Perm. or Up. Carl
- Meas. or Permian. schimperi, Lesqueren
- of Pa., p. 835, Coal serlii, see Alethopteri
- serpillifolia, Lesquere of Pa., p. 237, Coal serrula, Lesquereux,
- serrula,) Geo. Sur.
- Coal Meas. serrulata, Hart, 1868,

Devonian. sheaferi, see Pseudope sillimani, see Pseudop sinuata, see Callipteric solida, Lesquereux,

- solida,) Geo. Sur.
- Coal Meas.
- squamosa, Lesquereu Ill., vol. 4. p. 400, Co

PEC.

te, 1880, Perm. Coal Meas. or s preoccupied; a syn. for P.

e, 1880, Perm. 9, Coal- Meas.

1828, Hist. d. Ieas.

as. Proposed Lesquereux, p. 758, which

Hist. d. Veg.

(Sphenopteris gen d. Foss.

- Prodr. d. Hist. Meas. marginata.

I Flora of Pa.,

18. Geo. Soc.

tes miltoni,) Coal Flora of

ris muricata. identified by Ill., vol. 2, p.

a nervosa White, 1880, .) Perm. or oal Meas. or

is newberryi. spidites no-Fossilium, p. p. 233, Coa

st. Jour. Soc. nd Geo/Sur.

Coal. Meas.

oal Flora of as preoccu-

ıktenkunde, Pa., p. 238,

lora of Pa., p.

Hist. d. Veg.

Flora of Pa.,

e & White, Flora, p. 78,

828, Hist. d.

pseudo-mur-

1880, Perm.

s. Geo. Soc.

1820, (Fili-

oal Flora of

s obscur

- PLANTÆ.
- ovata, Brongniart, 1828, Prodr. d. Hist. d. stellata, Lesquereux, 1866, (Alethopteris stellata,) Geo. Sur. Ill., vol. 2, p. 440. ovoides, Fontaine & White, 1880, Coal Flora of Pa., p. 79, Coal Meas. or Per-Low. Coal Meas.
 - strongi, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 399, Coal Meas. subfalcata, Fontaine & White, 1880,
 - Perm. or Up. Carb. Flora, p. 70, Coal Meas. or Permian.
 - tæniopteroides, Bunbury, 1847, Quar. Jour. Geo. Soc., vol. 3, p. 428, Coal Meas.
 - tenuinervis, Fontaine & White, 1880, Perm. or Up. Ca Flora, p. 77, Coal Meas. Permian.
 - tenuis, Brongniart, 1828, Pro d. Hist. d. Veg. Foss., p. Coal Meas.
 - unita, Brongniart, 1828, H d. Veg. Foss., p. 342, C Meas.
 - urophylla, see Alethopt urophylla.
 - vellutina, Lesquereux, 18 Bost. Jour. Soc.
 - Coal Meas.
 - vestita, Lesquereux, 1880, Coal Flora of Pa., p. 252, Coal FIG. 60. Mons Pecopteris Meas.
 - unita. villosa, Brongniart, 1828, Hist.
 - d. Veg. Foss., p. 316, and Coal Flora of Pa., p. 253, Coal Meas.
 - PHYLLOPTERIS, Brongniart, 1849, Table d. Gen. d. Veget. Foss., pp. 22, 103. [Ety. phyllon, leaf; pteris, fern.] Pinnate,

long or lanceolate, pointed, attached by the middle of the base; midrib strong, ex-tending to the point, giving off ob-

FIG. 61.-Phyllopteris antiqua.

obliquely pinnate nervules not anasto-mosing. Type P. phillipsi.

antiqua, Dawson, 1863, Can. Nat., vol. 8, and Acad. Geol., p. 484, Coal Meas.

Physophycus, Schimper, 1869. Syn. for Taonurus.

marginatus, See Taonurus marginatus.

Phytolithus, Martin, 1809, Petrificata Derbiensia. [Ety. phyton, plant; lithos, stone.] Applied indiscriminately to fossil wood.

cancellatus, syn. for Lepidodendron cancellatum.

notatus, see Sigillaria notata.

tessellatus, see Sigillaria tessellata. transversus, see Sternbergia transversa.

10

rD.	GALLY.
or	AN A
odr. 57,	NA AN
ist.	
oal	
eris	
354.	34
ist.,	13 Les
Sur.	
eas.	ANA
380,	
230,	

vol. 6, p. 423, and Pa., vol. 2, p. 866, venulosa, Lesquere Coal Flora of H

pinnules ob-

lique nerves,

which have

Nat. Hist.,	BUR	1
d Geo. Sur.	RIA)	
Coal Meas.	(A)(A)	
eux, 1880.	GAR	
Pa., p. 230.	NR	
, <u>r</u> ,	UNS.	



133

mian.

Veg. Foss, p. 58, Coal Meas.

Meas. or Permian.

239, Coal Meas.

Meas. or Permian.

p. 232, Coal Meas.

eneti.

Devonian.

Meas.

Meas.

pachypteroides, Fontaine & White, 1880,

penniformis, Brongniart, 1822, (Filicites

Perm. or Up. Carb. Flora, p. 76, Coal

pennæformis,) Class des Veg. Foss., in Mem. du Mus. d'Hist. Nat. de Paris,

tom. 8, p. 203, and Coal Flora of Pa., p.

platynervis, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 73, Coal

platyrachis, Brongniart, 1828, Hist. d. Veg. Foss. p. 312, and Coal Flora of Pa.,

pluckeneti, see Pseudopecopteris pluck-

plumosa, Artis, 1825, (Filicites plumosus,)

polymorpha, Brongniart, 1828, Prodr. d.

Hist. d. Veg. Foss., p. 56, Coal Meas. preciosa, Hartt, 1868, Acad. Geol., p. 553,

pteroides, Schlotheim, 1820, (Filicites pteridius,) Petrefaktenkunde, p. 406, and Coal Flora of Pa., p. 249, Coal

quadratifolia, Lesquereux, 1880, Coal

rarinervis, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 71, Coal

rigida, Dawson, 1863, Can. Nat. and Geo.,

robusta, Lesquereux, 1880, Coal Flora of

rotundifolia, Fontaine & White, 1880.

rotundiloba, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 74, Coal

schimperana, Fontaine & White, 1880.

schimperi, Lesquereux, 1884, Coal Flora

serpillifolia, Lesquereux, 1880, Coal Flora of Pa., p. 237, Coal Meas.

serrula, Lesquereux, 1858, (Alethopteris serrula,) Geo. Sur. Pa., vol. 2, p. 865,

serrulata, Hart, 1868, Acad. Geol., p. 553,

sillimani, se¢ Pseudopecopteris sillimani.

solida, Lesquereux, 1870, (Alethopteris solida,) Geo. Sur. Ill., vol. 4, p. 397,

squamosa, Lesquereux, 1870, Geo. Sur. Ill., vol. 4. p. 400, Coal Meas.

sheaferi, see Pseudopecopteris sheaferi.

sinuata, see Callipteridium sinuatum.

Perm. or Up. Carb. Flora, p. 75, Coal

Perm. or Up. Carb. Flora, p. 73, Coal

vol. 8, and Acad. Geol., p. 485, Coal

pusilla, see Pseudopecopteris pusilla.

Flora of Pa., p. 234, Coal Meas.

Meas. or Permian.

Pa., p. 229, Coal Meas.

Meas. or Permian.

Meas. or Permian.

Meas. or Permian.

Coal Meas.

Devonian.

Coal Meas.

of Pa., p. 835, Coal Meas. serlii, see Alethopteris serlii.

Anted. Phytol., pl. 17, Coal Meas.

PHY.]

PLANTÆ.

or

ap-

with

deter-

PHYTOPSIS, Hall, 1847, Pal. N. Y., vol. 1, p. | PLUMALINA, Hall, 1858, Can. Nat. and Geo. 38. [Ety. phyton, plant; opsis, resemblance.] Stems

cylindrical

subcylin drical,

straight or flex-

uous, erect or

procumbent',

branched; branches diverg-

ing and anasto-

mosing; struccellular,

parently of thin

transverse divis-

ions, or having a

reticulated struc-

ture. This struc-

ture is too ob-

scure for satis-

ture

consisting

laminæ,



134

b

FIG. 62.—Phytopsis tubulosa.

factory mination. Type P. tubulosa. cellulosa, Hall, 1847, Pal. N. Y., vol. 1, p. 39, Birdseye Gr.

tubulosa, Hall, 1847, Pal. N. Y., vol. 1, p. 38, Birdseye Gr.

- PINNULARIA, Lindley & Hutton, 1835, Foss. Flora, vol. 2, p. 81. [Ety. pinna, a feather.] Roots or rootlets divided in filament, of variable length and thick-ness, and generally possessing few definable characters. Type P. capillacea.
 - calamitarum, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 878, Coal Meas.
 - capillacea, Lindley & Hutton, 1835, Foss. Flora, vol. 2, p. 81, Coal Meas.
 - confervoides, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 878, Coal Meas.
- crassa, Dawson, 1863, Can. Nat., vol. 8, and Acad. Geol., p. 480, Coal Meas.
- dispalans, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 312, Devonian. elongata, Dawson, 1871, Foss. Plants Can.,

p. 33, Devonian.

- ficoides, Lesquereux, 1868, Geo. Sur. Pa., vol. 2, p. 878, Coal Meas.
- horizontalis, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 878, Coal Meas.
- nodosa, Dawson, 1871. Foss. Plants Can., p. 33, Devonian.

palmatifida, Lesquereux, 1860, (Rhizo-lithes palmatifidus,) Geo. Sur. Ark., vol. 2, p. 313, Coal Meas.

pinnata, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 878, Coal Meas.



FIG. 63.--Pinnularia ramosissima.

ramosissima, Dawson, 1863, Can. Nat. vol. 8, and Acad. Geol., p. 480, Coal Meas.

vol. 3, p. 175. [Ety. pluma, a small feather.] Simple fronds, with linear pinnules diverging, from each side, in

the same plane, and more or less ascending. It is a peculiar plant, described, originally, as a Graptolite, to which opinion Prof. Hall still adheres. On the other hand, Prof. Dawson claims the characters prove it is a vegetable, and in this he is supported by the fact that all Graptolites had become extinct, as shown by their absence in several



- groups of rocks be- Plumalina plumaria. fore the appearance
- of this form. Type P. plumaria. densa, Hall, 1879, 30th Rep. N. Y. St.
- Mus. Nat. Hist., pl. 4, fig. 6, Ham. Gr. gracilis, Shumard, 1855, (Filicites gracilis,) Geo. Rep. Mo., p. 208, Waverly Gr. in Lithographic limestone.
- linearis, Lesquereux, 1880, (Trochophyl-lum lineare,) Coal Flora of Pa., p. 64, Waverly Gr.
- plumaria, Hall, 1843, (Filicites?) Geo. Rep. p. 273, and 4th Dist. N. Y.,

Can. Nat. and Geo., vol. 3, p. 175, Chemung Gr. plumula, Daw-son, 1873, (Lycopodites plumula, Rep. Foss. plants Low. Carb. and Millstone Grit, p. 24, Su bcarboniferous. Polyporites, Lind-ley & Hutton, 1833, Foss. Flora, vol. 1, p. 181. This genus was founded upon a fishscale, and the form referred to it in Geo. Sur. Pa., vol.

2, p. 847, is quite a dif-

ferent thing.

FIG. 65. Protoblechnum holdeni.

Polysporia, Newberry, syn. for Lepidostrobus. mirabilis, see Lepidostrobus mirabilis. PROTOBLECHNUM, Lesquereux, 1880, Coal Flora of Pa., p. 188. [Ety. protos, first;

PHY.-PRO

Blechnum, a ge nate; rachis th pinnæ long, acuminate, ent the lower side generally free: lateral veins o ders, forking t holdeni, Andre holdeni,) Ohic Meas.

PROTOSTIGMA, Lesqu Phil. Soc., p. stigma, a branc rhomboidal sca without vascula Not a land-plan sigillarioides.

sigillarioides, Leso Phil. Soc., p. 16 PROTOTAXITES Daws

Geo. Soc., vol. first; taxus, yev the spirally m istic of the genu branching trunk of growth and r pleurenchyma cylindrical, thick series of spiral fil pores few, circul specimens found with the bark in P. logani.

logani, Dawson, 18 Soc., vol. 15, p. 4 the oldest know America, accord Carruthers says and has named it

PSARONIUS, Cotta, ziehung, p. 27. Stems of tree-fer adventive roots, superposition the trunks; cortex th woody cylinder branches compose sels either half cy plicate, immersed tissue. Type P. h erianus, Dawson, 18

- p. 58, Ham. Gr. textilis, Dawson, 18 p. 59, Ham. Gr.
- PSEUDOPECOPTERIS, Les

Flora of Pa., p. false; Pecopteris, rachis forking nea ing branches of e cate and dichotom pinnate, ultimate forked; pinnules co the base, of vario tuse or ovate-lanc right angle, decurr bordering it by a n veins oblique, gener lowest pair twice.

PRO.-PSE.]

PHY.-PRO

at. and Geo. ma, a small with linear each side, in



FIG. 64 ina plumaria.

maria. . N. Y. St. 3, Ham. Gr. ites gracilis,) verly Gr. in

Trochophyl-Pa., p. 64,

ites?) Geo. bist. N. Y., Jan. Nat. and Heo., vol. 3, nung Gr. mula, Dawon, 1873. Lycopodites lumula. lep. Foss. lants Low. larb. and **fillstone** irit, p. 24, lu bcarbonifrous. orites. Lindey & Hut-1833. on, 'oss. Flora, ol. 1, p. 181. 'his genus 7as founded pon a fishcale, and the orm referred o it in Geo. ur. Pa., vol. p. 847, is uite a diferent thing. pidostrobus. nirabilis.

1880, Coal protos, first;

PRO.-PSE.]

Blechnum, a genus.] Fronds large, pinnate; rachis thick, scaly toward the base; pinnæ long, narrow linear-lanceolate, acuminate, entire, enlarged at base on the lower side to a decurring auricle, generally free; medial nerve percurrent; lateral veins open, curving to the borders, forking twice. Type P. holdeni. holdeni, Andrews, 1875, (Alethopteris holdeni,) Ohio Pal., vol. 2, 420, Coal Meas.

PROTOSTIGMA, Lesquereux, 1877, Proc. Am. Phil. Soc., p. 169. [Ety. protos, first; stigma, a brand or dot.] Stems with rhomboidal scars as in Sigillaria, but without vascular scars in the middle. Not a land-plant, but a fucoid. Type P. sigillarioides.

sigillarioides, Lesquereux, 1877, Proc. Am. Phil. Soc., p. 169, Hud. Riv. Gr. PrototAxites Dawson, 1859, Quar. Jour.,

- Geo. Soc., vol. 15, p. 484. [Ety. protos, first; taxus, yew-tree; so named from the spirally marked cells characteristic of the genus Taxites.] Woody and branching trunks, with concentric rings of growth and medullary rays; cells of pleurenchyma not in regular lines, cylindrical, thick-walled, with a double series of spiral fibers; discs or bordered pores few, circular and indistinct. The specimens found are usually silicified, with the bark in a coaly state. Type P. logani.
- logani, Dawson, 1859, Quar. Jour. Geo. Soc., vol. 15, p. 484, Devonian. This is the oldest known exogenous tree in America, according to Dawson, but Carruthers says it is a huge sea-weed and has named it Nematophycus logani.
- PSARONIUS, Cotta, 1832, Dendrol in Beziehung, p. 27. [Ety. *psaros*, speckled.] Stems of tree-ferns, covered below by adventive roots, increasing by their superposition the conical base of the trunks; cortex thick, parenchymatous; woody cylinder, subdivided into branches composed of fascicles of vessels either half cylindrical or diversely plicate, immersed in cellular medullar tissue. Type P. helmintholithus. erianus, Dawson, 1871, Foss. Plants Can.,
 - p. 58, Ham. Gr.
- textilis, Dawson, 1871, Foss. Plants Can., p. 59, Ham. Gr.
- PSEUDOPECOPTERIS, Lesquereux, 1880, Coal Flora of Pa., p. 189. [Ety. pseudo, falso Peropteris. a genus.] Primary false; *Pecopteris*, a genus.] Primary rachis forking near the base in diverging branches of equal size, or divaricate and dichotomous; branches polypinnate, ultimate divisions sometimes forked; pinnules connate or separated to the base, of various shape, oblong-obtuse or ovate-lanceolate, oblique or in right angle, decurring to the rachis and bordering it by a narrow wing; lateral veins oblique, generally forking once, the lowest pair twice. Type P. mazonana.

abbreviata, Lesquereux, 1854, (Sphenopteris abbreviata,) Bost. Jour. Soc. Nat. Hist., vol. 6, p. 419, and Geo. Sur. Pa., vol. 2, p. 861, Coal Meas.

135

- acuta, Brongniart, 1828, (Sphenopteris acuta,) Hist. d. Veg. Foss., p. 207, and Coal Flora of Pa., p. 215, Coal Meas. anceps, Lesquereux, 1880, Coal Flora of
- Pa., p. 207, Coal Meas.
- andræana, Roehl, 1868, (Sphenopteris andræana,) Fossile Flora der Steinkohlen formation Westphalens, p. 62, and Coal Flora of Pa., p. 754, Coal Meas.
- callosa, Lesquereux, 1866, (Pecopteris callosa,) Geo. Sur. Ill., vol. 2, p. 442, Low. Coal Meas.
- cordato-ovata Veiss, 1869, (Neuropteris cordato-ovata,) Foss. Flor. d. jungst. Steink. form., p. 28, and Coal Flora of Pa., p. 205, Coal Meas.
- decipiens, Lesquereux, 1854, (Sphenopteris decipiens,) Bost. Jour. Soc. Nat. Hist., vol. 6, p. 420, and Geo. Sur. Pa., vol. 2, p. 862, Coal Meas.
- decurrens, Lesquereux, 1854, (Pecopteris decurrens,) Bost. Jour. Soc. Nat. Hist.. vol. 6, p. 424, and Geo. Sur. Pa., vol. 2, p. 867, Coal Meas.
- denudata, Lesquereux, 1880, Coal Flora of Pa., p. 212, Coal Meas.
- dimorpha, Lesquereux, 1880, Coal Flora of Pa., p. 201, Coal Meas.
- glandulősa, Lesquereux, 1854, (Sphenopteris glandulosa,) Bost. Jour. Soc. Nat. Hist., vol. 6, p. 420, and Geo. Sur. Pa., vol. 2, p. 862, Coal Meas. hispida, Lesquereux, 1884, Coal Flora of
- Pa., p. 755, Coal Meas.
- hymenophylloides, Lesquereux, 1870, (Alethopteris hymenophylloides,) Geo. Sur. Ill., vol. 4, p. 393, Coal Meas.
- irregularis, Sternberg, 1833, (Sphenop-teris irregularis,) Vers.
- teris irregularis,) Vers. Geog. Darst. Flor. d. Vorw.,
- vol. 2, p. 68, Coal Meas. latifolia, Brongniart, 1828, (Sphenopteris latifolia,) Hist. d. Veg. Foss., p. 205, and Coal Flora of Pa., p. 215, Coal Meas.
- macilenta, Lindley & Hutton, 1835, Foss. Flora, vol. 2, pl. 151, and Coal Flora of Pa., p. 219, Coal Meas. mazonana,
- 1870, (Alethopteris mazonana,) Geo. Sur. Ill., vol. 4, p. 391, Low. Coal Meas. muricata, Brongniart, 1828,
- Pecopteris muricata, Hist. d. Veg. Foss., p. 352, and Coal Flora of Pa., p.
- 203, Coal Meas. nervosa, Brongniart, 1828, Pseudopecop-(Pecopteris nervosa,) Hist. teris mazo
- d. Veg. Foss., p. 297, and nana. Coal Flora of Pa., p. 197, Coal Meas. newberryi, Lesquereux, 1854, (Sphenopteris newberryi,) Bost. Jour. Soc. Nat.





FIG. 66.

- nummularia, Gutbier, 1842, Abdrucke u. Verst. d. Zwick. Schwarzk. u. Seiner. Umgebungen, p. 43, and Coal Flora of Pa., p. 752, Coal Meas.
- obtusiloba, Brongniart, 1828, (Sphenopteris obtusiloba,) Hist. d. Veg. Foss., p. 204, and Coal Flora of Pa., p. 753, Coal Meas.
- pluckeneti, Schlotheim, 1820, (Filicittes pluckeneti,) Petrefaktenkunde, p. 410, and Coal Flora of Pa., p. 199, Coal Meas.
- polyphylla, Lindley & Hutton, 1835, (Sphenopteris polyphylla,) Foss. Flora, vol. 2, pl. 147, and Coal Flora of Pa., p. 218, Coal Meas.
- pusilla, Lesquereux, 1854, (Pecopteris pusilla,) Bost. Jour. Soc. Nat. Hist., vol. 6, p. 424, and Geo. Sur. Pa., vol. 2, p. 866, Coal Meas.
- sheaferi, Lesquereux, 1858, (Pecopteris sheaferi,) Catal. Potts. Ass'n, p. 11, and Coal Flora of Pa,, p. 194, Coal Meas.
- sillimani, Brongniart, 1828, (Pecopteris sillimani,) Hist. d. Veg. Foss., p. 353, and Coal Flora of Pa., p. 206, Coal Meas.
- speciosa, Lesquereux, 1880, Coal Flora of Pa., p. 216, Coal Meas.
- spinulosa, Lesquereux, 1870, (Alethopteris spinulosa,) Geo. Sur. Ill., vol. 4, p. 396, Coal Meas.
- subcrenulata, Lesquereux, 1880, Coal Flora of Pa., p. 193, Coal Meas.
- subnervosa, Roemer, F. A., 1860, Paleontographica, vol. 9, p. 192, and Coal Flora of Pa., p. 198, Coal Meas.
- trifoliata, Artis, 1825, (Filicites trifoliatus,) Anted. Phytol., pl. 2, and Coal Flora of Pa., p. 217, Coal Meas.
- of Pa., p. 217, Coal Meas. virginiana, Meek, 1875, (Cyclopteris virginiana,) Bull. Phil. Soc. of Washington, p. 18, and Coal Flora of Pa., p. 217, Waverly Gr.
- PSILOFHYTON, Dawson, 1859, Quar. Jour. Geo. Soc., vol. 15, p. 478. [Ety. psilon, smooth; phylon, stem.] Stems dichotomous; young branches carinate; rhizomes cylindrical, villous or scaly; marked with round scars, points of attachment of cylindrical rootlets; leaves in spiral order, small or rudimentary, acicular, squarrose, open; fructifications in small, naked sporanges, spindleshaped or clavate, axillary, or in pairs at the extremity of the branches. Type P. princeps.
- cornutum, Lesquereux, 1877, Proc. Am. Phil. Soc., p. 165, Low. Held. Gr.
- elegans, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 315, Devonian.
- glabrum, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 315, Devonian. gracillimum, see Dendrograptus gracil-
- gracilimum, see Dendrograptus gracillimus.
- princeps, Dawson, 1859, Quar. Jour. Geo. Soc., vol. 15, p. 479, Upper Silurian and

Devonian. This is the oldest known plant in America. It is supposed to have grown in a marsh.

PSI.-RHA



FIG. 67 -- Psilophyton princeps.

- princeps var. ornatum, Dawson, 1871, Foss. Plants, p. 38, Devonian.
- robustium, Dawson, 1859, Quar. Jour. Geo. Soc., vol. 15, p. 479, Devonian.
- Ptilocarpus, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 493, Syn. for Cardiocarpon.
- bicornutus, see Cardiocarpon bicornutum. Ptilophyton, Dawson, 1878, Scottish Devonian Plants in Can. Nat., vol. 8. This is founded upon Lycopodites vanuxemi as the type, which is the same as Plumalina plumula, and falls therefore as a synonym.

gracile, see Plumalina gracilis.

lineare, Lesquereux, see Plumalina linearis. plumula, see Lycopodites plumula.

- vanuxemi, syn. for Plumalina plumula. RHABDOCARPUS, Gœppert & Berger, 1848, De Fruct. et Sem., p. 20. [Ety. rhabdos, stria; karpos, fruit.] Seeds ovate or oblong, costate or striate, acute or acuminate, surrounded by a putamen sometimes deficient. Type R. tunicatus.
 - abnormalis, Lesquereux, 1884, Coal Flora of Pa., p. 818, Coal Meas.
 - acuminatus, Newberry, 1873, Ohio Pal., vol. 1, p. 378, Coal Meas.
 - amygdaliformis, Geppert & Berger, 1848, de Fruct et Sem., p. 21, Coal Meas.
 - apiculatus, Newberry, 1873, Ohio Pal., vol. 1, p. 377, Coal

Meas. arcuatus, Lesquereux, 1861, Geo. Sur. Ky., vol. 4, p. 434, Coal Meas. beinertianus, Gœppert & Berger, 1848, De Fruct. et. Semin., p. 20, and Coal Flora of Pa., p. 844, Coal Meas. bockshianus, Gœppert & Berger, 1848, De Fruct. et Semin. p. 21, and Coal Flora of Pa.,

Coal Flora of Pa., p. 844, Coal Meas. FIG. 68.—Rhabdocarpus carinatus, New- carinatus.

- berry, 1873, Ohio Pal., vol. 1, p. 376, Coal Meas.
- clavatus, Sternberg, 1820, (Carpolithes clavatus,) Vers. Darst. Flora der Vor-



welt, and Coal Meas.

cornutus, Lesque Pa., p. 583, Co costatus, Newbe

1, p. 378, Co. acuminatus.

danai, Foster, 18 p. 129, and O

Coal Meas. emarginatus, Les of Pa., p. 818, hpwardi, Lesquer Pa., p. 575, Coa

inflatus, Lesquere Pa., p. 815, Cóa insignis, Dawson Geo, vol.

Geo., vol. 8, aı Coal Meas.

insignis, Lesquere Pa., p. 575. Tł pied, it has beer jacksonensis, Les lithes jacksoner 2, p. 461, Low. (lævis, Newberry,

p. 377, Coal Me laticostatus, Lesqu

of Pa., p. 815, C lescurianus, S. A.

Am. Pal. Foss., posed instead of

which was preod mammillatus, Lesq

Ill., vol. 4, p. 461 minutus, Lesquer

- Ark., vol. 2, p. 31 multistriatus, Pres
- multistriatus,) ii

Vorw., vol. 2, p. Pa., p. 578, Coal 1

oblongus, Fontaine or Up. Carb. Flor Permian.

pachytesta, Lesquer of Pa., p. 816, Co.

platimarginatus, Le polithes platimar

Ark., vol. 2, p. 31 subglobosus, Lesque

of Pa., p. 817, Coa tenax, Lesquereux,

- Pa. p. 818, Coal M venosus, Sternberg, a quereux, 1858, Ge 870, Coal Meas.
- Flora of Pa., and ican. RHACHIOPTERIS, Dawson
- Geo. Soc., vol. 18, p stalk; *pteris*, fern.] of ferns; stipes h less; unevenly str posite branches, broken off at shor stipe. Type R. pin affinis, Lesquereux, affinis, Geo. Sor

affinis,) Geo. Sur. Coal. Meas.

PSI.-RHA.

ldest known supposed to



iceps

awson, 1871, an.

ir. Jour. Geo. ian. teo. Sur. Ill., diocarpon. bicornutum ish Devonian . 8. This is es vanuxemi ame as Plutherefore as

lina linearis. nula. plumula. ger, 1848, De Ety. rhabdos, ls ovate or cute or acutamen someunicatus. I, Coal Flora

, Ohio Pal.,

Berger, 1848, al Meas. Ohio Pal.,



Rhabdocarpus inatus. l. 1, p. 376,

(Carpolithes ra der VorRHA.]

- welt, and Coal Flora of Pa., p. 581, Coal Meas. cornutus, Lesquereux, 1880, Coal Flora of
- Pa., p. 583, Coal Meas. costatus, Newberry, 1873, Ohio Pal., vol. 1, p. 378, Coal Meas., syn. ? for R.
- acuminatus. danai, Foster, 1854, Ann. of Sci., vol. 1,
- p. 129, and Ohio Pal., vol. 1, p. 376, Coal Meas.
- emarginatus, Lesquereux, 1884, Coal Flora of Pa., p. 818, Coal Meas.
- howardi, Lesquereux, 1880, Coal Flora of Pa., p. 575, Coal Meas.
- inflatus, Lesquereux, 1884, Coal Flora of Pa., p. 815, Coal Meas.
- insignis, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol., p. 478, Coal Meas.
- insignis, Lesquereux, 1880, Coal Flora of Pa., p. 575. The name being preoccupied, it has been called R. lescurianus.
- jacksonensis, Lesquereux, 1866, (Carpolithes jacksonensis,) Geo. Sur. Ill., vol. 2, p. 461, Low. Coal Meas.
- lævis, Newberry, 1873, Ohio Pal., vol. 1, p. 377, Coal Meas.
- laticostatus, Lesquereux, 1884, Coal Flora of Pa., p. 815, Coal Meas. lescurianus, S. A. Miller, 1883, 2d. Ed.
- Am. Pal. Foss., p. 256, Coal Meas. Pro-posed instead of *R. insimis*, Lesquereux, which was preoccupied.
- mammillatus, Lesquereux, 1870, Geb. Sur. Ill., vol. 4, p. 461, Coal Meas.
- minutus, Lesquereux, 1860, Geo. Sur: Ark., vol. 2, p. 313, Coal Meas.
- multistriatus, Presl, 1833, (Carpolithes multistriatus,) in Steruberg's Flor. d. Vorw., vol. 2, p. 208, and Coal Flora of Pa., p. 578, Coal Meas.
- oblongus, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 98, Coal Meas. or Permian.
- pachytesta, Lesquereux, 1884, Coal Flora of Pa., p. 816, Coal Meas.
- platimarginatus, Lesquereux, 1860, (Car-
- polithes platimarginatus,) Geo. Sur. Ark., vol. 2, p. 312, Low. Coal Meas. subglobosus, Lesquereux, 1884, Coal Flora of Pa., p. 817, Coal Meas.
- tenax, Lesquereux, 1884, Coal Flora of Pa. p, 818, Coal Meas.
- venosus, Sternberg, as identified by Les-quereux, 1858, Geo. Sur. Pa., vol. 2, p. 870, Coal Meas. Not noticed in Coal Flora of Pa., and probably not American.
- RHACHIOPTERIS, Dawson, 1862. Quar. Jour. Geo. Soc., vol. 18, p. 323. [Ety. rachis, a stalk; pteris, fern.] Detached leaf-stalks of ferns; stipes half an inch wide or less; unevenly striate, giving off opposite branches, which are abruptly broken off at short distances from the stipe. Type R. pinnata.
 - affinis, Lesquereux, 1870, (Stigmarioides affinis,) Geo. Sur. Ill., vol. 4, p. 455, Coal. Meas.

- cyclopteroides, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 323, Catskill Gr. gigantea, Dawson, 1871, Foss. Plants Can., p. 57, Ham. Gr.
- palmata, Dawson, 1871, Foss. Plants of
- Canada, p. 57, Ham. Gr. pinnata, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 323, Catskill Gr.
- punctata, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 323, Catskill Gr.
- selago, Lesquereux, 1870, (Stigmarioides selago,) Geo. Sur. Ill., vol. 4, p. 456, Coal Meas
- squamosa, Lesquereux, 1884, Coal Flora
- of Pa., p. 838, Coal Meas. striata, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 323, Chemung Gr. tenuistriata, Dawsen, 1862, Quar. Jour.
- Geo. Soc., vol. 18, p. 323, Ham. Gr.
- RHACOPHYLLUM, Schimper, 1869, Palæontologie Vegetale, vol. 1, p. 684. [Ety. rakos, rugged; phyllon, leai.] Fronds either flabelliform, many times subdivided or pinnate, irregularly pinnatifid, bipin-natifid; rachis flat, often much dilated, scarcely thicker than the foliaceous lamina, which is very variable in the size and the mode of its divisions; veins numerous, more or less indistinct, following the rachis in parallel bundles, dichotomous in the foliaceous divisions. Type, R. flabellatum.
 - adnascens, Lindley & Hutton, 1835, (Schizopteris adnascens.) Foss. Flora, vol. 2, p. 57, and Coal Flora of Pa., p. 321, Coal Meas.
 - affine, Lesquereux, 1858, (Pachyphyllum affine,) Geo. Sur. Pa., vol. 2, p. 863, Coal Meas.
 - arborescens, Lesquereux, 1870, (Hymenophyllites arborescens,) Geo. Sur. Ill., vol. 4, p. 415, Coal Meas.
- browni, Dawson, 1861, (Cyclopteris browni,) Quar. Jour. Geo Soc., vol. 17, p. 32, Portage Gr.
- clarki, Lesquereux, 1866, (Hymenophyllites clarki,) Geo. Sur. Ill., vol. 2, p. 438, Coal Meas.
- corallinum, Lesquereux, 1880, Coal Flora of Pa., p. 317, Coal Meas. Misspelled corralum in the text.
- cornutum, Lesquereux, 1880, Coal Flora of Pa., p. 317, Coal Meas.
- expansum, Lesquereux, 1880, Coal Flora of Pa., p. 313, Coal Meas.
- filiciforme, Gutbier, 1842, (Fucoides filiciformis,) Abdr. u. Verst. d. Zwick. Schwarzk. u. sein. Umg., p. 11, and Coal Flora of Pa., p. 316, Coal Meas.
- filiforme, Gutbier, 1842, (Fucoides filiformis,) Abdr. u. Verst. d. Zwick.
- Schwarzk. u. sein. Umg., p. 12, and Coal Flora of Pa., p. 838, Coal Meas. fimbriatum, Lesquereux, 1858, (Pachy-phyllum fimbriatum,) Geo. Sur. Pa., vol. 2, p. 863, Coal Meas.
- flabellatum, Sternberg, 1833, (Aphlebia flabellata,) Flor. d. Vorw., vol. 2, p. 112, and Coal Flora of Pa., p. 311, Coal Meas.

- fucoideum, Lesquereux, 1880, Coal Flora of Pa., p. 325, Coal Meas.
- hamulosum, Lesquereux, 1880, Coal Flora of Pa., p. 321, Coal Meas.
- hirsutum, Lesquereux, 1858, (Pachyphyllum hirsutum,) Geo. Sur. Pa., vol. 2, p. 863, Coal Meas.
- inflatum, Lesquereux, 1870, (Hymenophyllites inflatus,) Geo. Sur. Ill., vol. 4, p. 414, Coal Meas.
- irregulare, Germar, 1844, (Aphlebia irreg-ularis,) Verst. d. Steink. v. Wettin u. Löbejün, p. 57, and Coal Flora of Pa., p. 326, Coal Meas.
- laceratum, Lesquereux, 1858, (Pachyphyllum laceratum,) Geo. Sur. Pa., vol. 2, p. 863, Coal Meas.
- laciniatum, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 94, Coal Meas. or Permian.



FIG. 69.--Rhacophyllum lactuca.

- lactuca, Sternberg, 1833, (Schizopteris lac-tuca,) Flor. d. Vorw. vol. 2, p. 112, and Coal Flora of Pa., p. 315, Coal Meas.
- membranaceum, Lesquereux, 1880, Coal Flora of Pa., p. 312, Coal Meas.
- molle, Lesquereux, 1870, (Hymenophyl-lites mollis,) Geo. Sur. Ill., vol. 4, p. 418, Coal Meas.
- scolopendrites, Lesquereux, 1858, (Scolopendrites dentatus,) Geo. Sur. Pa., vol. 2, p. 868, Coal Meas.
- spinosum, Lesquereux, 1880, Coal Flora of Pa., p. 320, Coal Meas. strongi, Lesquereux, 1870, (Hymenophyl-
- lites strongi,) Geo. Sur. Ill., vol. 4, p. 417, Coal Meas.
- thalliforme, Lesquereux, 1870, (Hymen-ophyllites thalliformis,) Geo. Sur. Ill., vol. 4, p. 417, Coal Meas.
- trichoideum, Lesquereux, 1880, Coal Flora of Pa,, p. 322, Coal Meas.
- truncatum, Lesquereux, 1880, Coal Flora of Pa., p. 311, Coal Meas.
 Rhizolithes, F. Braun, 1847, in Flora, etc. [Ety. rhiza, root; lithes, stone.]
- palmatifidus, see Pinnularia palmatifidus. Rhizomopteris, Schimper, 1869, Traité de Paléontologie Vegetale, vol. 1, p. 699. [Sig. the rhizomas of ferns.] This genus, as the name indicates, comprehends the

rhizomas of ferns. Type, R. lycopodioides. Some of the species of Lycodites as L. uncinatus have been referred to it.

- RHIZOMORPHA, Roth, as identified by Lesquereux, Coal Flora of Pa., p. 3. [Ety. rhiza, root; morpha, form.] Fungous filaments of hard substance, disposed in branches abnormally divided, and often anastomosing; generally living under the decaying bark of trees.
 - sigillariæ, Lesquereux, 1877, Proc. Am. Phil. Soc., p. 174, and Coal Flora of Pa., p. 3, Coal Meas.
- Rotularia longifolia, see Sphenophyllum longifolium.
- RUSOPHYCUS, Hall, 1852, Pal. N. Y., vol. 2, p. 23. [Ety. rusos, rugose; phykos, sea-plant.] Simple or branched stems, transversely wrinkled, and often possessing a central longitudinal depres-sion. Type R. clavatum.

asperum, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1., p. 25, Utica Slate.

bilobatum, Vanuxem, 1842, (Fucoides bilobatus,) Geo. Rep. N. Y., p. 79, Hud. Riv. and Clinton, Gr.

clavatum, Hall, 1852, Pal. N. Y., vol. 2, p. 23, Clinton Gr. renvillense, Bil-fings, 1862, Pal. Foss., vol. 1, p. 101, grenvillense, Chazy Gr. pudicum, Hall, 1852, Pal. N. Y., vol. 2, p. 24, Hud. Riv. and

Clinton Gr.

subangulatum, Hall, 1852, Pal. N. Y., Fig. 70.--Rusophycus vol. 2, p. 23, ('lin-bilobatum. ton Gr.

- Sagenaria veltheimiana, see Lepidodendron veltheimianum.
- SAPORTEA, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 99. [Ety. proper name.] Leaves simple, subreniform, flabellate or suborbicular, cuneate, bordered at the base with a woody rim, terminal margin incised; petiole long, slender, and grooved on the upper surface; nerves parting flabellately from the summit of the petiole and the woody basal margin, all passing into the laminæ ; leaf substance thin. Type S. grandifolia. grandifolia, Fontaine & White, 1880, Perm.
 - or Up. Carb. Flora, p. 101, Coal Meas. or Permian.
 - salisburioides, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 102, Coal Meas. or Permian.
- Schizopteris, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 63. [Ety. schizo, I cleave; pteris, fern.] Frond laciniate,

or cut in linear ions, sometime marked with th branching, bein

SCH.—SIG.]

the divisions. adnascens, see Rha lactuca, see Rhaco

Schutzia, Gœppert, 161. [Ety. prop single or brand alternate pedice biles of an ovat

pound of imb pointed scales, u S. anomala. bracteata, see Cord

Scolopendrites, Lesqu Pa., vol. 2, p. 86 doned.

dentatus, see R drites.

Selaginites Brongniar Veg. Foss., p. 84 leaves small, sometimes enlar leaving any vi patens. The synonymous wit cavifolius, see Lyco

crassus, Lesquereu vol. 2, p. 446, sy ifolius.

formosus, Dawson, p. 176. Not a p a crustacean.

uncinatus, see Lyco SIGILLARIA, Brongnia

Foss. in Mem. d Paris, tom. 8, p. seal; from the s leaves stamped u large, simple or apex, marked by series, separated spiral order, eith or less distant, ve shape, round, ova nate, hexagonal boidal, with three simple, medial, others lateral of shape. Leaves 1

carinate, or plane nerve. Type S. j acuminata, Newber

land Acad. Sci., 1 of Pa., p. 496, Coa alternans, Sternberg vol. 2, p. 50, Coal alveolaris, Sternber

dron alveolare,) Geognostico-botar monde primitif, Meas.

angusta, Brongniart Foss.; Coal Meas. approximata, Fonta Perm. or Up. Ca Meas.

[RHI.-SCH.

R. lycopoies of Lycove been re-

led by Lesp. 3. [Etv. Fungous disposed in ed, and often iving under

Proc. Am. Flora of Pa.,

hyllum lon-

I. Y., vol. 2, phykos, seahed stems, l often posinal depres-

, Jour. Cin. p. 25, Utica



Rusophycus batum.

pidodendron

1880, Perm. Ety. proper ubreniform, uneate, borwoody rim, petiole long, e upper surllately from le and the passing into thin. Type

, 1880, Perm. Coal Meas.

Vhite, 1880, p. 102, Coal

odr. d. Hist. y. schizo, I id laciniate, PLANTÆ.

or cut in linear erect or curved divisions, sometimes enlarged at the top, marked with thin parallel veins without branching, being split in fascicles with

the divisions. Type S. anomala. adnascens, see Rhacophyllum adnascens. lactuca, see Rhacophyllum lactuca.

SCH.-SIG.]

Schutzia, Gœppert, 1848, Permian Flora, p. 161. [Ety. proper name.] Stems either single or branching, bearing on short alternate pedicels small cones or strobiles of an ovate, truncate form, a compound of imbricate, broadly linear pointed scales, united at the base. Type S. anomala.

bracteata, see Cordaianthus bracteatus.

Scolopendrites, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 868. This name is abandoned.

dentatus, see Rhacophyllum scolopendrites.

- Selaginites Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 84. Stems dichotomous; leaves small, numerous, imbricated, sometimes enlarged at the base, scarcely leaving any visible scars. Type S. patens. The genus is regarded as synonymous with Lycopodites. cavifolius, see Lycopodites cavifolius.
 - crassus, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 446, syn. for Lycopodites cavifolius.
 - formosus, Dawson, 1861, Can. Nat., vol. 6, p. 176. Not a plant, but a fragment of a crustacean.

uncinatus, see Lycopodites uncinatus.

- SIGILLARIA, Brongniart, 1822, Class. des Veg. Foss. in Mem. du Mus. d'Hist. Nat. de Paris, tom. 8, p. 203. [Ety. sigillum, a seal; from the seal-like scars of fallen leaves stamped upon the bark.] Trunks large, simple or dichotomous near the apex, marked by leaf-scars in vertical series, separated by furrows or placed in spiral order, either contiguous or more or less distant, very variable in size and shape, round, oval, truncate, or emargi-nate, hexagonal, transversely rhomboidal, with three vascular scars, one simple, medial, punctiform, the two others lateral of semi-lunar or linear shape. Leaves linear, long, triplicate, carinate, or plane, with a distinct medial
- acuminate, or plane, with a distinct medial nerve. Type S. punctata. acuminata, Newberry, 1874, Proc. Cleve-land Acad. Sci., p. 164, and Coal Flora of Pa., p. 496, Coal Meas.
- alternans, Sternberg, 1833, Flor. der Vorw., vol. 2, p. 50, Coal Meas.
- dvolaris, Sternberg, 1820, (Lepidoden-dron alveolare,) Essai d'un exposé Geognostico-botanique de la Flore du monde primitif, 1st Cahier, p. 25, Coal Meas.
- angusta, Brongniart, 1828, Hist. d. Veg. Foss.; Coal Meas.
- approximata, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 96, Coal Meas.

attenuata, Lesquereux, 1858, Catal. Potts. Foss., p. 17, and Coal Flora of Pa., p. 488, Coal Meas.

biercei, syn. for S. ichthyolepis.

- brardi, Brongniart, 1822, Class. des Veg. Foss. tab. 1, fig. 5, and Coal Flora of Pa., p. 477, Coal Meas.
- bretonensis, Dawson, 1865, Quar. Jour. Geo. Soc., vol. 20, p. 148, and Acad. Geol., p. 475, Coal Meas.
- brochanti, Brongniart, 1828, Hist. d. Veg. Foss., p. 442, and Coal Flora of Pa., p. 842, Coal Meas.

brongniarti, Gei-nitz, 1855, Die Verst. d. Steink.

form. Sachsen, 47, Coal p. 4 Meas.

browni, Dawson, 1861, Quar. Jour. Geo. Soc., vol. 17, and Acad. Geol., p. Coal Meas. 180, catenoides, Daw-son, 1865, Quar.

F10. 71.—Sigillaria brardi. Jour. Geo. Soc..

- vol. 20, p. 147, and Acad. Geol., p. 474, Coal Meas.
- catenulata, Lindley & Hutton, 1831, Foss. Flora, vol. 1, p. 163, Coal Meas.

chemungensis, see Lepidodendron chemungense.

cisti, see Caulopteris cisti.

- corrugata, Lesquereux, 1861, Geo. Sur. Ky., vol. 4, p. 437 : redefined 1870, Geo. Sur. Ill., vol. 4, p. 445. Coal Meas.
- cortei, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 64, and Coal Flora of Pa., p. 495, Coal Meas.
- cuspidata, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 65, and Coal Flora of Pa., p. 486, Coal Meas. cymatoides, Wood, 1860, Proc. Acad. Nat.
- Sci., vol. 12, p. 520, Coal Meas.
- defrancii, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 66, Coal Meas.
- dentata, Newberry, 1874, Proc. Cleveland Acad. Sci., p. 165, Coal Meas.
- dilatata, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 871, Coal Meas.
- discoidea, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 873, Coal Meas.
- dournaisi, Brongniart, 1828, Hist. d. Veg. Foss., p. 441, Coal Meas.
- dubia, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 872, syn. for S. cortei.
- elegans, Sternberg, 1826, (Favularia elegans,) Tent. flor. primord., p. 14, Coal Meas.
- elliptica, Brongniart, 1828, Hist. d. Veg. Foss., p. 447, and Coal Flora of Pa., p. 494, Coal Meas
- elongata, Brongniart, 1822, Ann. des Sci. Nat., tom. 4, p. 23, Coal Meas.
- eminens, Dawson, 1863, Can. Nat., vol. 8, and Acad. Geol. p. 475, Coal Meas.



- flexuosa, Lindley & Hutton, 1837, Foss. Flora, vol. 3, p. 147, Coal Meas.
- grandeuryi, Lesquereux, 1884, Coal Flora of Pa., p. 795, Coal Meas.
- hexagona, Schlotheim, 1820, (Palmacites hexagonus,) Petrefaktenkunde, p. 394, and Coal Flora of Pa., p. 483, Coal Meas.
- ichthyolepis, Sternberg, 1833, Flora d. Vorw., vol. 2, p. 38, and Coal Flora of Pa., p. 482, Coal Meas.
- intermedia, Brongniart, 1828, Hist. d.
- Veg. Foss., p. 474, Coal Meas. knorri, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 65, Coal Meas.
- lacoei, Lesquereux, 1880, Coal Flora of Pa., p. 499, Coal Meas.
- lævigata, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 64, and Coal Flora of Pa., p. 500, Coal Meas.
- leioderma, Brongniart, 1828, Hist. d. Veg. Foss., p. 422, and Coal Flora of Pa., p. 476, Coal Meas.
- 10, Coal Artas.
 lepidodendrifolia, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 426, and Coal Flora of Pa., p. 477, Coal Meas.
- leptoderma, Lesquereux, 1880, Coal Flora of Pa., p. 489, Coal Meas.
- lescurii, Schimper, 1869, Trait. de Paléontologie Vegetale, vol. 2, p. 85, Coal Meas. leveretti, Lesquereux, 1884, Coal Flora of
- Pa., p. 800, Coal Meas. lorenzi, Lesquereux, 1880, Coal Flora of
- Pa., p. 473, Coal Meas.
- lorwayana, Dawson, 1873, Rep. on Foss. Plants, p. 43, Subcarboniferous.
- mammillaris, Brongniart, 1828, Hist. d. Veg. Foss., p. 451, and Coal Flora of Pa., p. 483, Coal Meas.
- marginata, Lesquereux, 1880, Coal Flora of Pa., p. 498, Coal Meas.
- marineria, Hildreth, 1837, Am. Jour. Sci. and Arts, vol. 31, p. 30, Low. Coal Meas. massiliensis, Lesquereux, 1870, Geo. Sur.
- Ill., vol. 4, p. 446, Coal Meas. menardi, Brongniart. 1828, Hist. d. Veg.
- Foss., p. 430, and Coal Flora of Pa., p. 479, Coal Meas. monostigma, Lesquereux, 1866, Geo. Sur.
- Ill., vol. 2, p. 449, Coal Meas. notata, Steinhaur, 1818, (Phytolithus no-
- tatus,) Trans. Am. Phil. Assoc., vol. 1, p. 294, and Coal Flora of Pa., p. 486, Coal Meas.
- obliqua, Brongniart, 1828, Hist. Veg. Foss., p. 429, and Coal Flora of Pa., p. 470, Coal Meas.
- obovata, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 872, Coal Meas. oculata, Schlotheim, 1820, (Palmacites
- oculatus,) Petrefaktenkunde, p. 394, Coal Meas.
- orbicularis, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 65, Coal Meas. organum, Sternberg, 1820, (Syringoden-dron organum,) Flor. der Vorw., p. 23, and Lindley & Hutton, 1831, Flora, Vol. 1, p. 199, Coal Meas. Foss.

- ornithicnoides, Wood, 1860, Proc. Acad. Nat. Sci., vol. 12, p. 238, and Trans. Am. Phil. Soc., vol. 13, p. 348, Coal Meas.
- ovalis, Lesquereux, 1880, Coal Flora of Pa., p. 495, Coal Meas.
- oueni, see Didymophyllum oweni.
- pachyderma, see Syringodendron pachyderma.
- palpebra, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 307, and Acad. Geol. p. 536, Devonian.
- perplexa, Wood, 1866, Proc. Acad. Nat. Sci. Phil. vol. 12. p. 237, Coal Meas.
- pittstonana, Lesquereux, 1880, Coal Flora of Pa., p. 493, Coal Meas.
- planicosta, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol., p. 474, Coal Meas.
- polita, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 872, Coal Meas.
- vol. 2, p. 872, Coal Meas.
 pulchra, Newberry, 1874, Proc. Cleveland Acad. Sci. p. 165, Coal Meas.
 pyriformis, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 65, and Coal Flora of Pa., p. 799, Coal Meas.
 reniformis, Brongniart, 1822, Ann. des Sci. Nat., t. 4, p. 32, and Coal Flora of Pa., p. 501 Cool Meas.
- p. 501, Coal Meas.
- reticulata, Lesquereux, 1860, Geo. Sur. Ark., vol. 2, p. 310, Coal Meas.
- rugosa, Brongniart, 1828, Prodr. Hist. Veg. Foss., p. 64, and Coal Flora of Pa., p. 497, Coal Meas. saulli, Brongniart, 1828, Hist. Veg. Foss.,
- vol. 1, p. 456, and Coal Flora of Pa., p. 842, Coal Meas.
- schimperi, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 871, Coal Meas.
- schlotheimana, Brongniart. 1828, Hist. Veg. Foss., p. 469, Coal Meas. American Sp. (?)
- sculpta, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 871, Coal Meas. Syn. tor 8. obliqua?
- scutellata, Brongniart, 1822, Class. des Veg. Foss., tab. 1, fig. 4, Coal Meas. semina, Lesquereux, 1870, Geo. Sur. Ill.,
- vol. 4. p. 463, Coal Meas.
- serlii, Brongniart, 1828, Hist. d. Veg. Foss., p. 433, and Coal Flora of Pa., p. 480, Coal Meas.
- Foss., p. 459, and Coal Flora of Pa., p. 493, Coal Meas.
- simplicitas, Vanuxem, 1843, Geo. Rep. 3d Dist. N. Y., p. 190, Catskill Gr. solanus, Wood, 1860, Proc. Acad. Nat. Sci.,
- Coal Meas. [Solanus in text; solenotus on plate; solena in Trans. Am. Phil. Soc., vol. 13.]
- spinulosa, Germ., 1844, Vers. v. Wettin, etc., p. 58, Coal Meas.
- stellata, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 871, Coal Meas. striata, Dawson, 1863, Can. Nat. and Geol.,
- vol. 8, and Quar. Jour. Geo. Soc., vol. 15, p. 147, Coal Meas. sydenensis, Dawson, 1863, Can. Nat. and

SIG.

Geol., vol. 8, and Coal Meas.

tessellata, Steinhau tessellatus,) Tran

vol. 1, p. 295, an 481, Coal Meas.

- anuxemi, Gœppe
- Flora des Uebei and Coal Flora of
- enosa, Brongniart
 - Foss., p. 424, and 842, Coal Meas.
 - voltzi, Brongniart,
- Veg. Foss., p. 65,
- p. 492, Coal Mean williamsi, Lesquere Pa., p. 488, Coal 1
- yardleyi, Lesquereu
- Foss., p. 17, and 491, Coal Meas. SIGILLARIOIDES, Lesqu
- Ill., vol. 4, p. 44 semblance to th Fragments of roo leaves attached boidal scars. Typ radicans, Lesquereu
- vol. 4, p. 449, Coa
- stellaris, see Stigmar SIGILLARIOSTROBUS, Le Flora of Pa., p. 7
- Sigillaria; strobus, tached in horizont axis, supported by ophores, with lan up and imbricate.
- laurencianus, Lesque of Pa., p. 794, Coal Solenoula, Wood, 1860,
- vol. 12, p. 238. [] oulos, entire.] Pro

Syringodendron. psilophlæus, Wood, 18 Sci., p. 238, Coal M

- SOROCLADUS, Lesqueret of Pa., p. 327. [Et of the fruit dots frond; klado, I b name proposed for not well understoo



FIG. 72.-Soroclad

asteroides, Lesquereu: teris asteroides,) G p. 406, Coal Meas.

SIG.

Proc. Acad. i, and Trans. p. 348, Coal

Coal Flora of

oweni. idron pachy-

ar. Jour. Geo. Acad. Geol. p.

c. Acad. Nat. oal Meas. 30. Coal Flora

Can. Nat. and Geol., p. 474,

leo. Sur. Pa.,

oc. Cleveland 88.

28, Prodr. d. 65, and Coal Meas. Ann. des Sci. Flora of Pa.,

10, Geo. Sur. Meas. dr. Hist. Veg. ora of Pa., p.

t. Veg. Foss., ora of Pa., p.

58, Geo. Sur. 688.

1828, Hist. leas. Amer-

ieo. Sur. Pa., Syn. for S.

Class. des oal Meas. ieo. Sur. Ill.,

list. d. Veg. ora of Pa., p.

, Hist. Veg. ora of Pa., p.

Geo. Rep. 3d 1 Gr. cad. Nat. Sci., ; solenotus on n. Phil. Soc.,

s. v. Wettin,

leo. Sur. Pa.,

it. and Geol., PO. Soc., vol.

an. Nat. and

PLANTÆ.

- ophioglossoides, Lesquereux, 1880, Coal Geol., vol. 8, and Acad. Geol., p. 475, Flora of Pa., p. 329, Coal Meas. tessellata, Steinhaur, 1818, (Phytolithus tessellatus,) Trans. Am. Phil. Assoc.,
 - sagittatus, Lesquereux, 1870, (Staphylopteris sagittatus,) Geo. Sur. Ill., vol. 4, p. 407. Coal Meas.
 - stellatus, Lesquereux, 1860, (Staphylopteris stellata,) Geo. Sur. Ark., vol. 2, p. 309, Coal Meas.
 - wortheni, Lesquereux, 1870, (Staphylopteris wortheni,) Geo. Sur. Ill., vol. 4, p. 405, Coal Meas.
 - SPHENOPHYLLUM, Brongniart, 1828, Prodr. d. Hist. Veg. Foss., p. 68. [Ety. sphen, a wedge; phyllon, a leaf.] It was called Sphenophyllites by Brongniart in 1822. Plant herbaceous; stems articulate, inflated at the articulations, pinnately, bipinnately divided; leaves verticillate, sessile, wedge-form, with lateral borders entire, crenulate, dentate, or laciniate-lobate at the upper margin; medial nerve none; veins straight dichotomous; fructifications in cylindrical spikes, with bracts curved upward in a sharp flexure from near the base; sporanges globular in the axils of the bracts. Type S. schlotheimi.
 - angustifolium, Germar, 1844, Verst. d. Steink. v. Wett., u. Löbejün, and Coal Flora of Pa., p. 726, Coal Meas.
 - antiquum, Dawson, 1861, Can. Nat., vol. 6, p. 170, Devonian.
 - bifurcatum, Lesquereux, 1860, Geo. Sur. Ark., vol. 2, p. 309, Coal Meas.
 - brevifolium, Newberry, not defined.
 - cornutum, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 421, Coal Meas. densifoliatum, Fontaine & White, 1880,
 - Perm. or Up. Carb. Flora, p. 37, Coal Meas. or Permian. Syn. (?) for S. angustifolium.
 - emarginatum, Brongniart, 1828, Prodr. d. Hist. Veg. Foss., p. 68, and Coal Flora of Pa., p. 53, Coal Meas. erosum, Lindley & Hutton, 1833, Foss.
 - Flora, vol. 1, p. 43, and Coal Flora of Pa., p. 55. Coal Meas.
 - filiculme, Lesquereux, 1858, Geo. Rep. Pa., vol. 2, p. 853, Coal Meas.
 - fontainianum, S. A. Miller, 1883, 2d. Ed. Am. Pal. Foss., p. 258, Up. Coal Meas. Proposed instead of S. latifolium, in Perm. or Up. Carb. Flora, p. 36, which was preoccupied.
 - latifolium, Wood, 1866, Trans. Am. Phil. Soc., vol. 13, p. 347, Coal Meas. lati/olium, Fontaine & White, 1880. The
 - name was preoccupied. See S. fontainianum.
 - longifolium, Germar, 1831, (Rotularia longifolia,) Isis, p. 426, and Coal Flora of Pa., p. 53, Coal Meas.
 - oblongifolium, Germar, 1844, Verst. d. Steink. v. Wett., u. Löbejün, p. 12, and Coal Flora of Pa., p. 57, Coal Meas.
 - primævum, Lesquereux, 1877, Proc. Am. Phil. Soc., p. 167, Hud. Riv. Gr. I think this is not a plant.

141

\$1G.-**SPH**.]

Coal Meas.

481, Coal Meas.

842. Coal Meas.

Pa., p. 488, Coal Meas.

vol. 1, p. 295, and Coal Flora of Pa., p.

anuxemi, Gœppert, 1852, Die fossile

Flora des Uebergangsgebirges, p. 546, and Coal Flora of Pa., p. 505, Coal Meas. enosa, Brongniart, 1828, Hist. d. Veg.

Foss., p. 424, and Coal Flora of Pa., p.

Veg. Foss., p. 65, and Coal Flora of Pa., p. 492, Coal Meas.

williamsi, Lesquereux, 1880, Coal Flora of

vardleyi, Lesquereux, 1858, Catal. Potts.

SIGILLARIOIDES, Lesquereux, 1870, Geo. Sur.

boidal scars. Type S. radicans.

vol. 4, p. 449, Coal Meas. stellaris, see Stigmaria stellaris.

Foss., p. 17, and Coal Flora of Pa., p. 491, Coal Meas.

Ill., vol. 4, p. 449. [Ety. from its re-

semblance to the genus Sigillaria.]

Fragments of roots bearing stigmariod

leaves attached to sigillarioid rhom-

radicans, Lesquereux, 1870, Geo. Sur. Ill.,

SIGILLARIOSTROBUS, Lesquereux, 1884, Coal Flora of Pa., p. 794. [Ety. the genus, Sigillaria; strobus, cone.] Sporanges at-

tached in horizontal rows to a vertical axis, supported by persistent sporangi-

ophores, with lanceolate scales, turned

up and imbricate. Type S. laurencianus.

vol. 12, p. 238. [Ety. solen, a channel; oulos, entire.] Probably a decorticated

Syringodendron. Type S. psilophlœus.

of Pa., p. 327. [Ety. soros, a heap: one of the fruit dots on the back of the

frond; klado, I break in pieces.] A

name proposed for fruiting fragments

not well understood. Type S. stellatus.

FIG. 72.-Sorocladus asteroides.

p. 406, Coal Meas.

asteroides, Lesquereux, 1870, (Staphylop-

teris asteroides,) Geo. Sur. Ill., vol. 4,

psilophlæus, Wood, 1860, Proc. Acad. Nat.

SOROCLADUS, Lesquereux, 1880, Coal Flora

Sci., p. 238, Coal Meas.

laurencianus, Lesquereux, 1884, Coal Flora of Pa., p. 794, Coal Meas. Solenoula, Wood, 1860, Proc. Acad. Nat. Sci.,

voltzi, Brongniart, 1828, Prodr. d. Hist. d.

FIG. 78

saxifragifolium, Sternberg, 1825, (Rotularia saxifragifolia,) Vers. Darst. Flora

der Vorwelt, and Coal Flora of Pa., p. 726, Coal Meas.

Schlotheimi, Brongniart, 1828, Prodr. Hist. Veg. Foss., p. 68, and Coal Flora of Pa., p. 52, Coal Meas.

tenerrimum, Stur, 1877. Culm. Flora, p. 108, and Coal Flora of Pa., p. 728, Coal Meas.

trifoliatum, Lesquereux, 1858, Geo. Sur. Pa., vol. Sphenophyllum schlotheimi.

Schlotheimi. 2, p. 853, Coal Meas. SPHENOPTERIS, Brongniart, 1822, Mem. du Mus. d'Hist. Nat. de Paris, tom. 8, p. 203. [Ety. sphen, wedge; pleris, fern.] Fronds bi, tri, polypinnate; divisions open or in right angles; pinnules narrowed at base, often decurring or cuneiform, pinnately lobed; lobes rarely entire, crenulate, dentate, or laciniate; primary nerve slender, alternately dichotomous, simple, branches entering the base of each lobe to pass by branchlets into the subdivisions of the lamina. Type S. elegans.

abbreviata, see Pseudopecopteris abbreviata.

acrocarpa, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 40, Coal Meas. or Permian.

acuta, See Pseudopecopteris acuta.

adiantoides, Lindley & Hutton, 1835, Foss. Flora, vol. 2, p. 91, Coal Meas.

- alata, Brongniart, 1828, (Pecopteris alata,) Hist. d. Veg. Foss., p. 361, Coal Meas. alabamensis, see Oligocarpia alabamensis.
- artemesiæfolia see Eremopteris artemesiifolia.
- auriculata, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 42, Coal Meas. or Permian.
- ballantini, Andrews, 1875, (Hymenophyl-lites ballantini,) Ohio Pal., vol. 2, p. 422, Coal Meas.
- brittsi, Lesquereux, 1880, Coal Flora of Pa., p. 277, Coal Meas.
- canadensis, Dawson, 1863, Can. Nat. and Geol., vol. 8, and Acad. Geol. p. 243, Coal Meas.
- chærophylloides, Brongniart, 1828, Pecopteris chærophylloides,) Hist. d. Veg. Foss., p. 357, and Coal Flora of Pa., p. 270, Coal Meas.
- communis, Lesquereux, 1884, Coal Flora of Pa., p. 762, Coal Meas.
- coriacea, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 41, Coal Meas. or Permian.
- crenata, Lindley & Hutton, 1835, Foss. Flora, vol. 2, pl. C., and Coal Flora of Pa., p. 835, Coal Meas.

cristata, Brongniart, 1828, (Pecopteris cristata,) Hist. d. Veg. Foss., p. 356,

and Coal Flora of Pa., p. 273, Coal

PLANTÆ.

- Meas. davallana, Gœppert, 1841, Gatt. d. Foss.
- Pflanzen, Coal Meas. decipiens, see Pseudopecopteris decipiens.
- delicatula, see Hymenophyllites delicatulus.
- dentata, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 42, Coal Meas. or Permian.
- dilatata, as identified by Lesquereux. Syn. for Pseudopecopteris decipiens.
- dissecta, Brongniart, 1828, Hist. d. Veg. Foss., p. 183, and Coal Flora of Pa., p. 836, Coal Meas.
- divaricata, Gœppert, 1836, (Cheilanthes divaricatus,) Syst. Filic. Foss., p. 238, and Coal Flora of Pa., p. 767, Coal Meas.
- dubuissoni, Brongniart, 1828, Hist. d. Veg. Foss., p. 195, and Coal Flora of Pa., p. 275, Coal Meas.
- elegans, Brongniart, 1822, Class. d. Veg. Foss. pl. 2, fig. 2, and Coal Flora of Pa., p. 287, Coal Meas.
- fascicularis, Roemer, 1866, Beitr. in Pal-eont., vol. 9, p. 179, and Coal Flora of Pa., p. 837, Coal Meas.
- flaccida, Crepin, 1874, Bull. Acad. Roy. of Belgium, p. 7, and Coal Flora of Pa., p. 291, Coal Meas.



FIG. 74.-Sphenopteris crenata.

- flagellaris, see Oligocarpia flagellaris. flexicaulis, Lesquereux, 1860, (Hymeno-phyllites flexicaulis,) Geo. Sur. Ark.,
- vol. 2, p. 309, Coal Meas. foliosa, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 44, Coal Meas. or Permian.
- fuciformis, Lesquereux, 1884, Am. Natu-ralist, vol. 18, p. 921, Carboniferous. furcata, Brongniart, 1828, Hist. d. Veg.
- Foss., p. 179, and Coal Flora of Pa., p. 282, Coal Meas.

gersdorfii, see Hymenophyllites gersdorfii. glandulosa, see Pseudopecopteris glandulosa

- goniopteroides, Lesquereux, 1880, Coal Flora of Pa., p. 269, Coal Meas. gracilis, Brongniart, 1828, Hist. d. Veg.
- Foss., p. 197, and Coal Flora of Pa., p. 276, Coal Meas.
- gravenhorsti, Brongniart, 1828, Hist. Veg. d. Foss., p. 191, and Coal Flora of Pa., p. 274, Coal Meas.

SPH.]

- hartti, Dawson, 18 Soc., vol. 18, p. 32 harveyi, Lesquereu Pa., p. 766, Coal 1
- hastata, Fontaine & or Up. Carb. Flor or Permian.
- hildrethi, Lesquere phyllites hildreth
- vol. 2, p. 863, Coa hitchcockana, Daws
- Geol. Soc., vol. 18 hœninghausi, Brong
- d. Fess., p. 199, ar p. 288, Coal Meas.
- hymenophylloides, Prodr. d. Hist. and Coal Flora Meas.
- inæquilateralis, Les Flora of Pa., p. 76
- intermedia, Lesquere Pa., vol. 2. The n in 1852 by Ettings mediana.
- irregularis, see Pse ularis.
- larischii, Stur, 1877, ischii,) Culm Flo Flora of Pa., p. 28 latifolia, see Pseudop
- latior, Dawson, 186 and Acad. Geol., I
- laxa, Hall, 1843, Geo. Chemung Gr. Th cupied by Sternber hallana.
- lescuriana, Fontaine or Up. Carb. Flora or Permian.
- lesquereuxi, Newbe Pa., vol. 2, p. 862, linearis, Sternberg, 18
- d. Vorw., p. 15, Lo lyratifolia, see Pecopt
- macilenta, see Psei lenta. marginata, Dawson,
- Geo. Soc., vol. 18, 1 mediana, Lesquereux
- Pa., p. 271, Coal M microcarpa, Lesquere of Pa., p. 280, Coal
- microloba, Gœppert Foss., p. 238, Coal
- minutisecta, Fontain Perm. or Up. Car Meas. or Permian.
- mixta, Schimper, 186 tologie Veg- tale, p.
- of Pa., p. 276, Coal munda, Dawson, 1863 vol. 8, and Acad.

Meas.

myriophylla, see Hyr ophyllus.

newberryi, see Pseu berryi.

SPH.

SPH.

, p. 273, Coal

Gatt. d. Foss.

teris decipiens.

yllites delica-

te. 1880. Perm 42, Coal Meas.

 Lesquereux. is decipiens. Hist. d. Veg. Flora of Pa., p.

(Cheilanthes Foss., p. 238, p. 767, Coal

1828, Hist. d. Coal Flora of

Class. d. Veg. al Flora of Pa.,

Beitr. in Pal-Coal Flora of

Acad. Roy. of Flora of Pa., p.



crenata.

lagellaris. 360, (Hymenoeo. Sur. Ark.,

1880, Perm. or Coal Meas. or

184, Am. Natu-·boniferous. Hist. d. Veg. Flora of Pa., p.

lites gersdorfii. opteris glandu-

1880, Coal I Meas. Hist. d. Veg. Flora of Pa., p.

828. Hist. Veg. I Flora of Pa., PLANTÆ.

- obovata, Lindley & Hutton, 1835. Foss. hartti, Dawson, 1862, Quar. Jour. Geol. Flora, vol. 2, p. 75, and Coal Flora of harveyi, L-squereux, 1884, Coal Flora of
 - Pa., p. 769, Coal Meas. obtusiloba, see Pseudopecopteris obtusiloba.
 - pachynervis, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 46, Coal Meas. or Permian.
 - paupercula, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 435, Coal Meas.
 - pilosa, see Callipteris pilosa.
 - plicata, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 862, Coal Meas.
 - polyphylla, see Pseudopecopteris polyphylla.
 - pseudomurrayana, Lesquereux, 1880, Coal Flora of Pa., p. 271, Coal Meas.
 - pterota, Wood, 1866, Trans. Am. Phil. Soc., vol. 13, p. 348, Coal Meas.
 - quercifolia, Gœppert, 1836, Syst. Filic. Foss., p. 252, and Coal Flora of Pa., p. 286, Coal Meas.
 - recurva, Dawson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 464, Devonian.
 - rigida, Brongnis rt, 1828, Hist. Veg. Foss., p. 201, Coal Meas.
 - royi, Lesquereux, 1884, Coal Flora of Pa., p. 768, Coal Meas.
 - scaberrima, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 408, Coal Meas. schlotheimi, see Hymenophyllites schlot-
 - heimi.
 - solida, Lesquereux, 1884, Coal Flora of Pa., p. 769, Coal Meas.
 - spinosa, Gœppert, 1841, Gatt. Foss. Pflanzen, p. 70, and Coal Flora of Pa., p. 281, Coal Meas.
 - splendens, Dawson, 1871, Foss. Plants Canada, p. 53, Devonian.
 - splendens, Lesquereux, 1870, (Hymeno-phyllites splendens,) Geo. Sur. Ill., vol.

 - 4, p. 413, Coal Meas. squamosa, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 862, Coal Meas. subalata, Weiss, 1869, Foss. Flora d. jungst. Steink. form., p. 57, and Coal Flora of Pa., p. 272, Coal Meas.
 - tenella, Brongniart, 1828, Hist. Veg. Foss. p. 186, and Coal Flora of Pa., p. 836, Coal Meas.
 - tenuifolia, see Hymenophyllites tenuifolius.
 - tracyana, Lesquereux, 1884, Coal Flora of Pa., p. 766, Coal Meas.
 - trichomanoides, Brongniart, 1828, Hist. d. Veg. Foss., p. 182, and Coal Flora of Pa., p. 286, Coal Meas.
 - tridactylites, Brongniart, 1828, Hist. d. Veg. Foss. p. 181, and Coal Flora of Pa., p. 284, Coal Meas.
 - trifoliata, see Pseudopecopteris trifoliata.
 - SPHENOTHALLUS, Hall, 1847, Pal. N. Y., vol. 1, p. 261. [Ety. sphen, a wedge; thallos, a branch or frond.] Stem with diverging wedge-formed leaves, thickened, and sometimes subcoriaceous. Type S. angustifolius.

SPH.]

Soc., vol. 18, p. 321, Devonian.

hastata, Fontaine & White, 1880, Perm.

hildrethi, Lerquereux, 1858, (Hymeno-phyllites hildrethi,) Geo. Sur. of Pa.,

hitchcockana, Dawson, 1862, Quar. Jour. Geol. Soc., vol. 18, p. 321, Devonian.

hæninghausi, Brongniart, 1828, Hist.Veg.

hymenophylloides, Brongniart, 1828, Prodr. d. Hist. d. Veg. Foss., p. 51,

inæquilateralis, Lesquereux, 1884, Coal

Flora of Pa., p. 765, Coal Meas. intermedia, Lesquereux, 1858, Geo. Sur.

d. Foss., p. 199, and Coal Flora of Pa., p. 288, Coal Meas.

and Coal Flora ot Pa., p. 764, Coal

Pa., vol. 2. The name was preoccupied

in 1852 by Ettingshausen. It is now S.

irregularis, see Pseudopecopteris irreg-

larischii, Stur, 1877, (Calymmotheca lar-

latifolia, see Pseudopecopteris latifolia. latior, Dawson, 1863, Can. Nat., vol. 8,

laxa, Hall, 1843, Geo. Rep. 4th Dist. N. Y.,

lescuriana, Fontaine & White, 1880, Perm.

lesquereuxi, Newberry, 1858, Geo. Sur.

marginata, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 321, Devonian.

mediana, Lesquer-ux, 1880, Coal Flora of

microcarpa, Lesquereux, 1880, Coal Flora

microloba, Gœppert, 1836, Syst. Filic. Foss., p. 238, Coal Meas.

minutisecta, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 43, Coal

mixta, Schimper, 1869, Traité de Paléon-

munda, Dawson, 1863, Can. Nat. and Geo.

myriophylla, see Hymenophyllites myri-

newberryi, see Pseudopecopteris new-

tologie Veg. tale, p. 382, and Coal Flora

vol. 8, and Acad. Geol., p. 483, Coal

Pa., vol. 2, p. 862, Coal Meas. linearis, Sternberg, 1820, Vers. Darst. Flor. d. Vorw., p. 15, Low. Coal Meas.

lyratifolia, see Pecopteris lyratifolia. macilenta, see Pseudopecopteris maci-

Pa., p. 271, Coal Meas.

Meas. or Permian.

of Pa., p. 280, Coal Meas.

of Pa., p. 276, Coal Meas.

or Up. Carb. Flora, p. 44, Coal Meas.

Chemung Gr. This name was preoc-

cupied by Sternberg. See Archæopteris

and Acad. Geol., p. 483, Coal Meas.

ischii,) Culm Flora, p. 168, and Coal Flora of Pa., p. 288, Coal Meas.

or Up. Carb. Flora, p. 46, Coal Meas.

Pa., p. 766, Coal Meas.

vol. 2, p. 863, Coal Meas.

or Permian.

Meas.

mediana.

ularis.

hallana.

lenta.

Meas.

berryi.

ophyllus.

or Permian.

1, p. 261, Hud. Riv. Gr.



FIG. 75.--Sphenothallus angustifolius.

latifolius, Hall, 1847, Pal. N. Y., vol. 1, p. 262, Hud. Riv. Gr.

- SPIRANGIUM, Schimper, 1874, Traité de Paléontologie Vegetale, vol. 2, p. 514. [Ety. speira, that which is twisted; from the coiled marking around the pod.] Oblong or spindle shaped bodies formed of narrow linear leaves, interwoven or twisted in spiral, with the ends united into a pedicel, which joins them horizontally or in umbels. Type S. carbonarium.
- appendiculatum, Lesquereux, 1870, (Palæoxyris appendiculata,) Geo. Sur. Ill., vol. 4, p. 465, Coal Meas.
- corrugatum, L +squereux, 1870, (Palæoxyris corrugata,) Geo. Sur. Ill., vol. 4, p. 466, Coal Meas.
- intermedium, Lesquereux, 1880, Coal Flora of Pa., p. 521, Coal Meas.
- multiplicatum, Lesquereux, 1880, Coal Flora of Pa., p. 520, Coal Meas.

prendeli, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 464, Coal Meas.

Spirophyton, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist. p. 78. [Ety. speira, a coil; phyton, a plant.] Syn. for Taonurus.

cauda-galli, see Taonurus caudagalli.

crassum, see Taonurus crassus.

typus, see Taonurus typus.

velum, see Taonurus velum.

- SPORANGITES, Dawson, 1863, Can. Nat. and Geol., vol. 8, and Proc. Geo. Soc. Lond., vol. 15, p. 164. [Sig. seed-vessel.] Spores and spore-cases of Lepidodendron, Calamites, and similar plants, which can not be otherwise referred. Type S. papillatus.
 - acuminatus, Dawson, 1861, (Annularia acuminata,) Can. Nat., vol. 6, and Acad. Geol., p. 540, Portage Gr.

bilobatus, Dawson, 1883, Proc. Am. Ass. Ad. Sci., vol. 32, p. 260, Marcellus Shale. glaber, Dawson, 1863, Can. Nat., vol. 8,

- and Acad. Geol., p. 491, Coal Meas. huronensis, Dawson, 1871, Am. Jour. Sci.
- and Arts, p. 257, Ham. Gr. papillatus, Dawson, 1863, Can. Nat., vol.

8, and Acad. Geol., p. 491, Coal Meas.

angustifolius, Hall, 1847, Pal. N. Y., vol. | SPOROCYSTIS, Lesquereux, 1880, Coal Flora of Pa., p. 458. [Ety. sporos, seed; kustis, bladder.] Agglomæ erations of

sphores grouped together or cohering or agglutinate by the borders, more generally without cases, and Sporangites therefore of uncertain papillatureference. Type S. planus.

- planus, Lesquereux, 1880, Coal Flora of Pa., p. 458, Coal Meas.
- Staphylopteris, 1838, Presl, in Sternb. Vers. Darst. Flora der Vorwelt. [Ety. staphyle, bunch of grapes; pteris, fern.] Not an American palæozoic genus. asteroides, see Sorocladus asteroides.

sagittata, see Sorocladus sagittatus. stellata, see Sorocladus stellatus. wortheni, see Sorocladus wortheni.

- STEMMATOPTERIS, Corda, 1845, Beiträge zur Flora der Vorwelt, p. 76. [Ety. stemmatos, a wreath; pteris, fern.] Trunks erect, cylindrical; scars large, disciform, oval, round, or ovate, not contiguous, disposed in quincuncial or spiral order; outside borders or rings flat; internal disk formed by impressions of fascicles of vascular tissues, shaped like a horseshoe, the horns curving inward in the upper part of the scars, either short and hooked, or descending below the middle of the scars, and there united. Type S. peltigera.
 - anceps, Lesquereux, 1884, Coal Flora of Pa., p. 838, Coal Meas.
 - angustata, Lesquereux, 1880, Coal Flora of Pa., p. 339, Coal Meas.

cyclostigma, Lesquereux, 1880, Coal Flora of Pa, p. 341, Coal Meas.

emarginata, Lesquereux, 1880, Coal Flora of Pa., p. 337, Coal Meas.

gigantea, Lesquereux, 1858, (Caulopteris gigantea,) Geo. of Pa., vol. 2, p. 869, Coal Meas.

hirsuta, Lesquereux, 1880, Coal Flora of Pa., p. 337, Coal Meas.

insignis, Lesquereux, 1870, (Caulopteris insignis,) Geo. Sur. 111., vol. 4, p. 459,

Coal Meas. microstigma, Lesquereux, 1884, Coal Flora of Pa., p. 838, Coal Meas.

mimica, Lesque-reux, 1880, Coal Flora of Pa., p. 341, Coal Meas. polita, Lesquereux, 1880, Coal Flora of Pa., p. 342, Coal Meas.

FIG. 77.-Stemmatopteris punctata, Lesmimica, leaf scar. quereux, 1858,

(Caulopteris punctata,) Geo. Sur. Pa., vol. 2, p. 869, Coal Meas.

schimperi, Lesquereux, 1880, Coal Flora of Pa., p. 338, Coal Meas.

STE. -STI.]

squamosa, Lesquere of Pa., p. 339, Coa wortheni, Lesquereu wortheni,) Geo. Si Coal Meas.

STERNBERGIA, Artis, Phytology, p. 8. The piths of Dado

other plants usual in sandstone, reta perfectly the trans which the pith cy in the process o

transversa. transversa, Steinhau transversus,) Tran

vol. 1, p. 295, Coal var. angularis, Dawse Geo. Soc., vol. 22,



FIG. 78. -Sternber pith of Dad

var. approximata, D Jour. Geo. Soc., v Meas.

var. distans, Dawson Geo. Soc., vol. 22, var. obscura, Dawson La Geo. Soc., vol. 22, STIGMARIA, Brongniart,

Foss. in Mem. du. Paris, tom. 8, p. 2 dot or puncture.] roots, generally gr distantly dichotome scarcely variable in length, subcylindri pith, a woody cyl trical, composed of disposed star-like; le linear when flattene ruption, on the sur round scars compos trical rings, with a mammilla, pitted ir punctiform vascula

ficoides. amœna, Lesquereux, Pa., p. 516, Coal Me

anabathra, Corda, 1845 der Vorwelt, p. 34, areolata, Dawson, 1871

ada, p. 23, Devonian costata, Lesquereux, 1 vol. 2, p. 870, Coal M elliptica, Lesquereux, vol. 4, p. 451, Coal M

eveni, see Stigmarioides




[SPI.-STE.

STE. -STI.]

880, Coal Flora . sporos, seed;



d FIG. 76. n papillatus

, Coal Flora of

in Sternb. Vers. . [Ety. staphyle, fern.] Not an us.

steroides. gittatus. latus. ortheni. 5, Beiträge zur

76. [Ety. stemfern.] Trunks large, disciform, not contiguous, or spiral order; s flat; internal ons of fascicles ed like a horseinward in the sither short and slow the middle nited. Type S.

Coal Flora of

80, Coal Flora

. 880. Coal Flora

000, 000. . . .

880, Coal Flora

8, (Caulopteris vol. 2, p. 869,

Coal Flora of

), (Caulopteris vol. 4, p. 459, Coal Meas. crostigma, Lesuereux, 1884, loal Flora of a., p. 838, Coal leas. nica, Lesqueeux, 1880, Coal 'lora of Pa., p. 41, Coal Meas. Lesqueita. eux, 1880, Coal 'lora of Pa., p. 42, Coal Meas. nctata, Lesuereux, 1858, Geo. Sur. Pa.,

30, Coal Flora

PLANTÆ.

- squamosa, Lesquereux, 1880, Coal Flora of Pa., p. 339, Coal Meas.
- wortheni, Lesquereux, 1866, (Caulopteris wortheni,) Geo. Sur. Ill., vol. 2, p. 459, Coal Meas.

STERNBERGIA, Artis, 1825, Antediluvian Phytology, p. 8. [Ety. proper name.] The piths of Dadoxylon, Sigillaria, and other plants usually preserved as casts in sandstone, retaining more or less perfectly the transverse partitions into which the pith cylinders were divided in the process of growth. Type S. transversa.

transversa, Steinhaur, 1818, (Phytolithus transversus,) Trans. Am. Phil. Ass'n., vol. 1, p. 295, Coal Meas.

var. angularis, Dawson, 1865, Quar. Jour. Geo. Soc., vol. 22, p. 165, Coal Meas.



FIG. 78.—Sternbergia angularis, pith of Dadoxylon.

var. approximata, Dawson, 1865, Quar. Jour. Geo. Soc., vol. 22, p. 165, Coal Meas.

var. distans, Dawson, 1865, Quar. Jour. Geo. Soc., vol. 22, p. 165, Coal Meas. rar. obscura, Dawson, 1865, Quar. Jour. * Geo. Soc., vol. 22, p. 165, Coal Meas. STIGMARIA, Brongniart, 1822, Class. d. Veg. Foss. in Mem. du. Mus. d'Hist. Nat. d. Paris, tom. 8, p. 203. [Ety. stigma, a dot or puncture.] Floating stems or roots, generally growing horizontally, distantly dichotomous; branches long, scarcely variable in size in their whole length, subcylindrical or compressed; pith, a woody cylinder, often eccentrical, composed of fascicles of vessels disposed star-like ; leaves long, tubulose, linear when flattened, leaving after disruption, on the surface of the stems, round scars composed of two concentrical rings, with a central umbonate mammilla, pitted in the middle by a punctiform vascular scar. Type S. ficoides.

- amœna, Lesquereux, 1880, Coal Flora of Pa., p. 516, Coal Meas.
- anabathra, Corda, 1845, Beiträge zur Flora der Vorwelt, p. 34, Coal Meas.
- areolata, Dawson, 1871, Foss. Plants Canada, p. 23, Devonian.
- costata, Lesquereux, 1858, Geo. Sur. Pa.,
- vol. 2, p. 870, Coal Meas. elliptica, Lesquereux, 1870, Geo. Sur. 111., vol. 4, p. 451, Coal Meas.
- eveni, see Stigmarioides eveni.

- exigua, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 308, Chemung Gr.
- ficoides, Brogniart, 1822, Mem. du. Mus. d'Hist. Nat. de Paris, tom. 8, p. 203, Coal Meas.
- ficoides var. a, b, c, d, e, f, g, h, i, k, l, Dawson, 1865, Quar. Jour. Geo. Soc., vol. 22, p. 148, Coal Meas.
- ficoides var. reticulata, Gœppert, 1841, Gatt. d. Foss. Pflanzen, p. 13, Coal Meas.
- ficoides var. stellata, Gœppert, 1841, Gatt. d. Foss. Pflanzen, p. 13, Coal Meas.
- ficoides var. undulata, Goppert, 1841, Gatt. d. Foss. Pflanzen, p. 13, Coal Meas.
- irregularis, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 870, Coal Meas. [Ety. from the irregularity of the scars.]
- minor, Gæppert, 1841, Gatt. d. Foss. Pflanzen, p. 13, Coal Meas.
- minuta, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 871, Coal Meas.
- minutissima, Dawson, 1871, Foss. Plants Can., p. 23, Devonian.
- perlata, Dawson, 1871, Foss. Plants Canada, page 22, Devonian.
- pusilla, Dawson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 460, Devonian.
- radicans, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 870, Coal Meas.
- stellaris, Lesquereux, 1870, (Sigillarioides stellaris,) Geo. Sur. Ill., vol. 4, p. 450, Coal Meas.

umbonata, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 870, Coal Meas.



FIG. 79.-Stigmaria ficoides, 1/4 diam.

- STIGMARIOIDES, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 452. [Ety. from its resemblance to Sligmaria.] Fragments of rhizomas, with surface marked by small round impressions, irregularly disposed and without central vascular points, base of detached radicles or filaments. Type S. eveni.
 - affinis, see Rachiopteris affinis.
 - eveni, Lesquereux, 1866, (Stigmaria eveni,) Geo. Sur. Ill., vol. 4, p. 448, Coal Meas.
- linearis, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 455, Coal Meas.
- rugosus, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 470, Coal Meas.
- selago see Rachiopteris selago.

- vol. 4, p. 453, Coal Meas. villosus, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 454, Coal Meas.
- Strobilus caryophyllus, Hildreth, 1837, Am. Jour. Sci. and Arts, vol. 31, p. 32, Coal Meas. Possibly a Stigmaria.
- SyringoDENDRON, Sternberg, 1820, Essai d'un exposé Geognostico-botanique de la Flore du monde primitif, 1st Cahier, p. 26. [Ety. syrinx, a pipe; dendron tree.] Cortex costate; vascular scars united in one; resembles decorticated stems of Sigillaria. Type S. pes capreoli. bistriatum, Wood, 1860, Proc. Acad. Nat. Sci., vol. 12, p. 521, Coal Meas.
 - brongniarti, Geinitz, 1855, (Sigillaria brongniarti,) Verst. d. Steink form. in Sachsen, p. 47, and Coal Flora of Pa., p. 504, Coal Meas.
 - cyclostigma, Brongniart, 1828, Hist. d. Veg. Foss., p. 480, and Coal Flora of Pa., p. 505, Coal Meas.

 - Fa., p. 505, Coal Meas.
 gracile, Dawson, 1862, Quar. Jour. Geo.
 Soc., vol. 18, p. 308, Waverly Gr.
 kirtlandium, Hildreth, 1837, Am. Jour.
 Sci. & Arts, vol. 31, p. 29, Coal Meas.
 magnificum, Wood, 1866, Trans. Am.
 Phil. Soc., vol. 13, p. 352, Coal Meas.
 - organum, see Sigillaria organum.
 - pachyderma, Brongniart, 1828, (Sigillaria pachyderma,) Prodr. d. Hist. d. Veg. Foss., p. 65, and Coal Flora of Pa., p. 503, Coal Meas.
 - pescapreoli, Sternberg, 1820, Essai d'un expose Geognostico-botanique de la Flore du monde primitif, 1st Cahier, p. 26, Coal Meas.
- porteri, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 448, Coal Meas.
- Vol. 4, p. 446, Coal Meas.
 Syringoxylon, Dawson, 1862, Quar. Jour.
 Geo. Soc., vol. 18, p. 305. [Ety. syrinx, a pipe; xylon, wood.] Woody tissue close, thick-walled; ducts many times the diameter of the wood-cells, thin walled, with transverse pores in several series; medullary rays of two or more series of muriform cells; growth rings, distinct. Type S. mirabile.
- distinct. Type S. mirable. mirabile, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 305, Ham. Gr. TENIOPHYLLUM, Lesquereux, 1878, Proc. Am. Phil. Soc., p. 330. [Ety. tainia, ribbon; phyllon, leaf.] Stems large, leaves crowded, fistular, flat by compression, thick, exactly linear, decurring at the base; surface smooth, opaque, or shining. Type T. decurrens.
 - brevifolium, Lesquereux, 1880, Coal Flora of Pa., p. 788, Coal Meas.
 - contextum, Lesquereux, 1878, Proc. Am. Phil. Soc., p. 332, Coal Meas. decurrens, Lesquereux, 1878, Proc. Am.
 - Phil. Soc., p. 331, and Coal Flora of Pa., p. 464, Coal Meas. *f* deflexum, Lesquereux, 1878, Proc. Am.
 - Phil. Soc., p. 331, Coal Meas.

- truncatus, Lesquereux, 1870, Geo. Sur. | TENIOPTERIS, Brongniart, 128, Prodr. Hist. d. Veg. Foss., p. 61. [Evy. tainia. ribbon; pteris, fern.] Fronds simple, large, linear; medial nerve canaliculate, strong; veins open, or in right angle, thin, forking a little above the base or more generally simple, parallel, sometimes joined to a marginal nerve. Type T. vittata.
 - lescuriana, Fontaine & White, 1880, Perm. or Up. Carb. Flora, p. 91, Coal Meas. or Permian.
 - newberryana, Fontaine & White, 1880. Perm. or Up. Carb. Flora, p. 91; (loal Meas. or Permian.
 - smithi, Lesquereux, 1875, Geo. Rep. Ala., p. 78, and Coal Flora of Pa., p. 153, Coal Meas.



FIG. 80.-Tæniopteris smithi.

truncata, Lesquereux, 1884, Coal Flora of Pa., p. 743, Coal Meas. TAONURUS, Fisher-Ooster, 1858, Foss. Fucoi-

den d. Schweizer Alpen, p. 41. [Ety. taon, peacock; oura, tail.] Frond membranaceous, derived from utricules attached to a lateral or central axis, erected or twisted in spiral, flattened in various ways, ribbed; ribs or striæ curved, scythe-shaped, converging to the borders, which are either free, naked or attached on one side or all around to the axis or its branches. Type T. caudagalli.



FIG. 81.—Taonurus caudagalli.

archimedes, Ringueberg, 1884, (Spirophyton archimedes,) Proc. Acad. Nat. Sci. Phil., p. 144, Medina Gr.

caudagalli, Vanuxem, 1842, (Fucoides

TRI.]

[STR.-TAO.

caudagalli,) Geo. 1 p. 128, Devonian.

- colletti, Lesquer-ux colletti,) Geo. Sur Coal Meas.
- crassus, Hall, 1863, sum,) 16 Rep. N. Y p. 83, Waverly Gr.
- marginatus, Lesquer pites marginatus,)
- vol. 13, p. 314, Sub retortus, Vanuxem, 1 Geo. Rep. 3d Dis Portage Gr.
- typus, Hall, 1863, (16 Rep. N. Y. St. N
- Ham. or Chemung velum, Vanuxem, 18 Geo. Rep. 3d Dist. N TRICHOMANITES, Geeppe Foss. [Ety. from manes.] This genu
- America by fragm nules attached to are of doubtful ger filicula, Dawson, 186
- Soc., vol. 19, p. 464 TRICHOPHYCUS, Miller Cin. Soc. Nat. Hist. trichos, hair; phukos branching stems ha by the folding down T. lanosum.



1878 His Riv sulcat 1878 2, p venos 1879 Hist

Riv. FIG. 82.-Tri-TRIGONO chophycus lanosum. 1828 Foss., p. 137. [Et karpos, fruit.] Frui at the base point of six costate, the rib prominent toward disappearing above small, round or tr cavity. Type T. pa adamsi, Lesquereux,

Pa., p. 820, Coal Mampulliforme, Lesqu Flora of Pa., p. 823

- avellanum, Dawson, Geo., vol. 8, and Coal Meas.
- bertholletiforme, For of Sci., vol. 1, and 369, Coal Meas.

carbonarium, King, Nat. Sci., vol. 7, p. dawsi, Lindley & H Flora, vol. 3, p. 321 Pa., p. 586, Coal Mo

lanosu

[STR.-TAO.

TRI.]

28, Prodr. Hist. [Etv. tainia Fronds simple, ve canaliculate. in right angle, ove the base or parallel, someal nerve. Type

ite. 1880, Perm. , Coal Meas. or

& White, 1880. ora, p. 91; (foal

Geo. Rep. Ala., Pa., p. 153, Coal



smithi.

4, Coal Flora of

58, Foss. Fucoin, p. 41. [Ety.] Frond memm utricules atcentral axis. spiral, flattened ; ribs or striæ converging to ther free, naked e or all around iches. Type T.



dagalli. 884, (Spirophy-

Acad. Nat. Sci.

842, (Fucoides

PLANTÆ.

- caudagalli,) Geo. Rep. 3d Dist. N. Y., p. 128, Devonian.
- colletti, Lesquer-ux, 1870, (Chondrites colletti,) Geo. Sur. Ill., vol. 4, p. 379, Coal Meas.
- crassus, Hall, 1863, (Spirophyton cras-sum,) 16 Rep. N. Y. St. Mus. Nat. Hist., p. 83, Waverly Gr.
- marginatus, Lesquereux, 1866, (Caulerpites marginatus,) Trans. Am. Phil. Soc.,
- vol. 13, p. 314, Subcarb. retortus, Vanuxem, 1842, (Retort fucoid,) Geo. Rep. 3d Dist., N. Y., p. 176, Portage Gr.
- typus, Hall, 1863, (Spirophyton typus,) 16 Rep. N. Y. St. Mus. Nat. Hist., p. 80, Ham. or Chemung Gr.

velum, Vanuxem, 1842, (Fucoides velum,) Geo. Rep. 3d Dist. N. Y., p. 176, Ham. Gr. TRICHOMANITES, Geeppert, 1836, Syst. Filic. Foss. [Ety. from the plant Tricho-manes.] This genus is only known in America by fragments of slender pinnules attached to long petioles, which

are of doubtful generic affinity.

ale of doubted generic annity. filicula, Dawson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 464, Devonian. Твіснорнусця, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 24. [Ety. trichos, hair; phukos, sea-weed.] / Simple branching stems having markings as if by the folding down of filaments. Type T. lanosum.

lanosum, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 24, Hud. Riv. Gr. sulcatum, Miller & Dyer, 1878, Cont. to Pal., No. 2, p. 4, Hud. Riv. Gr.

- venosum, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 112, Hud. Riv. Gr.
- F1G. 82.-Tri-TRIGONOCARPUM, Brongniart, chophycus lanosum. 1828, Prodr. d. Hist. Veg. Foss., p. 137. [Ety. trigon, triangle karpos, fruit.] Fruits ovoid, compressed at the base point of insertion, three or six costate, the ribs more distinct and prominent toward the base, sometimes disappearing above; apex pitted by a small, round or triquetre mammillate
- cavity. Type T. parkinsoni. adamsi, Lesquereux, 1884, Coal Flora of Pa., p. 820, Coal Meas.
- ampulliforme, Lesquereux, 1884, Coal Flora of Pa., p. 823, Coal Meas.
- avellanum, Dawson, 1863, Can. Nat. and Geo., vol. 8, and Acad. Geol., p. 478, Coal Meas.
- bertholletiforme, Foster, 1853, Ann. of of Sci., vol. 1, and Ohio Pal., vol. 1, p. 369, Coal Meas.
- carbonarium, King, 1854, Proc. Acad.
- Nat. Sci., vol. 7, p. 66, Coal Meas. dawsi, Lindley & Hutton, 1837, Foss.
- Flora, vol. 3, p. 321, and Coal Flora of Pa., p. 586, Coal Meas.

giffordi, Lesquereux, 1880, Coal Flora of Pa., p. 592, Coal Meas.

- grande, Lesquereux, 1884, Coal Flora of
- Pa., p. 821, Coal Meas. hildrethi, Lesquereux, 1858, Geo. Sur. Pa., vol. 2, p. 877, Coal Meas.
- hildrethi, Dawson, syn. (?) for Trigonocarpon triloculare.
- hookeri, Dawson, 1861, Quar. Jour. Geol. Soc., vol. 17, p. 525, Coal Meas.
- intermedium, Dawson, 1863, Can. Nat. vol. 8, and Acad. Geol., p. 478, Coal Meas. juglans, Lesquereux, 1866, Geo. Sur. Ill.,
- vol. 2, p. 460, Low. Coal Meas.
- kansaseanum, Lesquereux, 1884, Coal Flora of Pa., p. 822, Coal Meas.
- magnum, Newberry, 1873, Ohio Pal., vol. 1, p. 369, Coal Meas.
- mentzelianum, Gœppert & Berger, 1848, De Fruct. et. Sem., p. 19, and Coal Flora of Pa., p. 590, Coal Meas.
- minus, Dawson, 1863, Can. Nat. and Geol. vol. 8, and Acad. Geol., p. 478, Coal Meas.
- multicarinatum, Newberry, 1873, Ohio Pal., vol. 1, p. 478, Carb. Conglomerate.
- multistriatum, Lesquereux, 1884, Coal Flora of Pa., p. 823, Coal Meas.
- neggerathi, Sternberg, 1820, (Palmacites neggerathi,) Flor. d. Vorw., p. 55, and Coal Flora of Pa., p. 584, Coal Meas. oblongum, Lindley & Hutton, 1837, Foss.
- Flora, vol. 3, p. 193, Coal Meas.
- oliviforme, Lindley & Hut-ton, 1837, Foss. Flora, vol. 3, p. 222, and Coal Flora of
- Pa., p. 590, Coal Meas. ornatum, Newberry, 1873, Ohio Pal., vol. 1, p. 368,
- parkinsoni, Brongniart, 1828. Prodr. Hist. Veg. Foss., p. 137, and Coal Flora of Pa., p. 589, Coal Meas.
- perantiquum, Dawson, 1871, Foss. Plants Canada, p. 62,
- FIG. 83. Devonian. Lesquereux, Trigonocarperpusillum, Lesquereux, ^{Trigonocar-pon} 1884, Coal Flora of Pa., p. oliviforme. 820, Coal Meas.
- racemosum, Dawson, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 324, Devonian.
- rostellatum, Lesquereux, 1866, Geo. Sur. Ill., vol. 2, p. 460, Up. Coal Meas.
- rotundum, Dawson, 1863, Can. Nat., vol. 8, and Acad. Geol., p. 478, Coal Meas.
- saffordi, Lesquereux, 1880, Coal Flora of Pa., p. 587, Coal Meas.
- schultzanum, Gœppert & Berger, 1848. De Fruct., etc., p. 19, and Coal Flora of Pa., p. 819, Coal Meas.
- sigillariæ, Dawson, 1863. Can. Nat., vol. 8. and Acad. Geol., p. 477, Coal Meas.
- tricuspidatum, Newberry, 1873, Ohio Pal., vol. 1, p. 368, Coal Meas.
- triloculare, Hildreth, 1837, (Carpolithes trilocularis,) Am. Jour. Sci., vol. 31, p. 29, Conglomerate and Low. Coal Meas.







TRIPHYLLOPTERIS, Schimper, 1874, Traité de Paléontologie Vegetale, vol. 2, p. 40. [Ety. tria, three; phyllon, a leaf; pteris, a fern.] Lower pinnules subopposite, tripartite or trifoliate, upper ones simple, all narrowed or contracted to a flat, slightly decurring pedicel; veins all equal, simple or dichotomous, diverging fan-like. Type T. lescuriana.

cheathami, Les-

quereux, 1884.

13th Rep. Geo.

Sur. Ind., p. 70, Coal Meas.

ana,) Bull. Phil.

Soc. Wash, p. 16, and Coal

Flora of Pa., p.

297, Coal Meas.

Nat. Sci. This

name was pro-

posed as a sub-

stitute for An-

nularia,Sternb.,

ochophyllum,

Wood.

Proc.

lescuri-

1860

Acad.

lescuriana. Meek. (Cyclop-

1875.

teris



FIG. 84.—Triphyllopteris cheathami.

because the latter was preoccupied as a generic name in the subkingdom Mollusca; but Trochophyllum was preoc-cupied for a genus of fossil corals by Edwards & Haine, in 1851.

clavatum, see Annularia clavata. lineare, see Plumalina linearis.

ULODENDRON, Rhode, 1823, Beiträge z. Pflanz. d. Vorwelt. [Ety. ule, wood; dendron, tree.] Arborescent; rarely branching; bearing in two opposite rows round or

oval scars, impressions of the base of strobiles, marked with concentrical scales and a central mammilla; leaves short lanceolate, leaf scars disposed in spiral, small, rhomboidal or subrhomboidal; fructifications in long, cylindrical strobiles. Type U. majus. commutatum, Schimper, 1874,

Pal. Veg., vol. 2. p. 40, Coal 2, p. 40, Meas.



elongatum.

ellipticum, Sternberg, 1838, Vers. Darst. Flora der Vorwelt, vol. 2, p. 186, and Coal Flora of Pa., p. 405, Coal Meas.

FIG. 86.-Volk mannia fertilis.

proper

elongatum, Lesquereux, 1870, Geo. Sur. Ill., vol. 4, p. 437, Coal Meas.

flexuosum, see Halonia flexuosa.

lindleyanum, Presl, 1833, in Sternberg. Vers. Darst. Flora der Vorwelt, p. 185, Coal Meas. majum, Rhode, 1823, Beitr. z. Pflanz. d. Vorw., pl. 3, fig. 1, and Coal Flora of Pa., p.

401, Coal Meas. minus, Lindley & Hut-ton, 1831, Foss. Flora, vol. 1, p. 6, Coal Meas. punctatum, Lindley & Hutton, 1833, (Bothrodendron punctatum,) Foss. Flora, vol. 2, p. 80, and Coal Flora of Pa., p. 405, Coal Meas.

VOLKMANNIA, Sternberg, 1823, Tent. Flor.



formis. fertilis, Lesquereux, 1884, Coal Flora of Pa., p. 720, Coal Meas.

FIG. 87.-



prælonga, Lesquereux, 1880, (Calamos-tachys prælongus,) Coal Flora of Pa., p. 59, Coal Meas.

WAL.-WHIT.]

WALCHIA, Sternberg Flora der Vorwel name.] Arbores branches with fe iles oblong, cyli with ovate scales seed minute. ov formis. gracilis, Dawson, 1 cilis,) Can. Nat., p. 474, Coal Meas

robusta, Dawson, 18 ward Island, p. 4

THE Animal K Protista, Cœlenterat Vertebrata.

The Palæozoic 1 Porifera.

CLA

The Rhizopoda generally microscopic. naked eye. They abo mass, constantly chan processes, but visible occur in marshes, pon greatest depths to the and have tiny shells th in the sands of every shell or investing men an extensile and cont organic bodies in gene mold), and resembles character it is called fixed organs of any k Rhizopoda, says:

"If the views wh living substance be cor as is necessary to const

TRI.-WHI.

1870, Geo. Sur.



Volk mannia fertilis.

23, Tent. Flor. Primord., p. 30. [Ety. proper name.] Stems striated, articulated, and the inflorescence spiked. Closely related to Asterophyllites. Type V. polystachya. assa, Lesquereux, 1884, Coal Flora of Pa., p. 719, Coal Meas Coal Flora of



legans 80, (Calamos-Flora of Pa., WAL.-WHIT.]

PROTOZOA.

- WALCHIA, Sternberg, 1825, Vers. Darst, Flora der Vorwelt, p. 22. Ety. proper name.] Arborescent, like Araucaria: branches with feathery foliage; strobiles oblong, cylindrical, or elongated, with ovate scales, sharp or lanceolate; seed minute, ovate. Type W. pinniformis.
 - gracilis, Dawson, 1863, (Araucarites gracilis,) Can. Nat., vol. 8, and Acad. Geol. p. 474, Coal Meas.

robusta, Dawson, 1871, Rep. on Prince Edward Island, p. 43, Coal Meas.

WHITTLESEYA, Newberry, 1874, Proc. Cleveland Acad. Sci., p. 43. [Ety. proper name.] Frond simple or pinnate, nerves fasciculate, confluent to the base, not dichotomous. Type W. elegans.

elegans, Newberry, 1874, Proc. Cleveland Acad. Sci., p. 43, Coal Meas. integrifolia, Lesquereux, 1880, Coal Flora,

of Pa., p. 524, Coal Meas. microphylla, Lesquereux,

1884, Coal Flora of Pa., p. 843, Coal Meas.

undulata, Lesquereux, 1880, Coal Flora of Pa., p. 525, Coal Meas.

ANIMAL KINGDOM.

THE Animal Kingdom is divided into seven Subkingdoms, viz. : Protozoa or Protista, Cœlenterata, Echinodermata, Molluscoidea, Mollusca, Articulata, and Vertebrata.

SUBKINGDOM PROTOZOA.

(protos, first; zoon, animal).

The Palæozoic Protozoa are included in two Classes, viz.: Rhizopoda and Porifera.

CLASS RHIZOPODA (riza, root; pous, foot).

The Rhizopoda are the simplest and lowest forms of animal life. They are generally microscopic, though some of them are more or less conspicuous to the naked eye. They abound in fresh-water ponds, where each consists of a shapeless mass, constantly changing its form, and shooting out and withdrawing finger-like processes, but visible only under the magnifying power of a microscope. They occur in marshes, ponds, lakes, and seas, and wherever dampness exists, from the greatest depths to the snow-line of the mountains. The greater portion are marine. and have tiny shells that enter into the composition of the ocean mud, and abound in the sands of every ocean shore. The simplest kinds are not provided with a shell or investing membrane, but consist of a fluid, viscid, albuminoid jelly, having an extensile and contractile power, which is regarded as the elementary basis of organic bodies in general. This jelly is called protoplasm (protos, first; plasso, I mold), and resembles in motive power the flesh of higher animals, from which character it is called sarcode (sarx, flesh; eidos, form). The protoplasm has no fixed organs of any kind, internal or external. Dr. Carpenter, speaking of the Rhizopoda, says:

"If the views which I have expressed as to the nature and relations of their living substance be correct, that substance does not present any such differentiation as is necessary to constitute what is commonly understood as 'organization' even

PROTOZOA.

of the lowest degree and simplest kind; so that the physiologist has here a case in which those vital operations which he is accustomed to see carried on by an elaborate apparatus are performed without any special instruments whatever—a little particle of apparently homogeneous jelly changing itself into a greater variety of form than the fabled Proteus, laying hold of its food without members, swallowing it without a mouth, digesting it without a stomach, appropriating its nutritious material without absorbent vessels or a circulating system, moving from place to place without muscles, feeling (if it has any power to do so) without nerves, propagating itself without genital apparatus; and not only this, but in many instances forming shelly coverings of a symmetry and complexity not surpassed by those of any testaceous animals."

The fresh-water, shapeless, gelatinous mass is called the *Amæba*, and it shows a voracious disposition by seizing upon minute substances and appropriating them to the nutrition of its own jelly. This it does by surrounding and inclosing the food supply, which is retained until it is dissolved or the desired part appropriated.

The lowest Order of Rhizopoda has received the name of Monera (moneres, simple), of which Prof. Haeckel says:

"In a state of rest most Monera appear as small globules of slime, invisible, or barely visible, to the naked eye, and at most about the size of a pin-head. When the Moner moves, there are produced on the surface of the little slime-ball fingerlike processes, or very fine radiating threads, the so-called false feet, or pseudopods. The latter are simple continuous processes of the structureless, albumen-like mass of which the body consists. We are unable to perceive different parts in it, and we can obtain direct proof of the absolute simplicity of the semi-fluid mass of albumen; for, with the aid of the microscope, we can follow the Moner as it receives its nourishment. When minute bodies suitable for food, as, for instance, small particles of decayed organic bodies or microscopic plants and infusoria, accidentally come into contact with the Moner, they remain hanging to the sticky surface of the semi-fluid mass of slime, and here produce an irritation, which is followed by a strong afflux from the slimy mass of the body, and they become finally completely inclosed by it, or they are drawn into the body of the Moner by displacement of the several albuminous particles, and there digested, being absorbed by simple diffusion (endosmosis).

"Just as simple as is the nourishment is the mode of reproduction of these primitive beings, which one can not positively call animal or plant. All Monera propagate themselves only in an asexual manner by self-division. When such a speck—for example, a Protamœba or a Protogenes—has attained a certain size by the assimilation of foreign albuminous matter, it falls into two pieces; there is formed a constriction around the middle, which finally leads to the separation of the two halves. Each half becomes rounded, and then appears as an independent individual, which commences anew the simple play of the vital phenomena of nutrition and propagation. In other Monera (*Vampyrella*) the body, in the process of propagation, instead of two, falls into four equal parts; and in others again (*Protomonas, Protomyxa, Myxastrum*), at once into a large number of small globules of slime, each of which again, by simple growth, becomes like the parent body."

The marine Rhizopoda are usually furnished with a horny shell, and live, singly or socially, in shells having a series of chambers. The Sub-class Monothalamia (monos, one; thalam single shell, and ha cesses by which mo ing calcareous shell communicate with up. Each chamber vidual animals may the cells, as to consi only a single extern pierced by minute truded.

The Order Radii ing and swimming in have a complex silic death the skeletons a chief part of the mut thickness, consisting posed of the silicious Archipelago, consisti 2,000 feet in thicknes Order.

The Order Fora families of Palæozoic bearing animals, livin and swimming on the incessant rain to the a few are several inc any of the living forn Nonionina from an ou lantic City. In anoth in an ounce from the were 280,000 shells o Ocean is so largely con ally called Globigerin shells of Foraminifera made of the shells of mulite limestone of dif is the Fusulina limestor of the Palæozoic rocks læozoic Foraminifera, s

> FAMILY CALCISPH FAMILY EOZOONII FAMILY FUSULINI FAMILY GLOBIGEE FAMILY LITUOLID FAMILY AFFINITY

PROTOZOA.

here a case in h by an elabotever—a little ter variety of rs, swallowing its nutritious from place to nerves, propnany instances sd by those of

, and it shows priating them inclosing the appropriated. nera (moneres,

e, invisible, or head. When ne-ball fingeror pseudopods. men-like mass arts in it, and mass of albuas it receives nstance, small a, accidentally surface of the ed by a strong letely inclosed int of the sevmple diffusion

iction of these

All Monera When such a certain size by eces; there is separation of n independent nomena of nuin the process n others again small globules rent body." nd live, singly Monothalamia (monos, one; thalamos, chamber), includes those Rhizopoda which are inclosed in a single shell, and have a minute opening for the extrusion of the filamentous processes by which motion is effected. The Sub-class Polythalamia includes those having calcareous shells, consisting of a series of distinct chambers, which sometimes communicate with each other, and at other times appear to be completely closed up. Each chamber is supposed to contain an independent animal, though the individual animals may be so connected, through the openings communicating between the cells, as to constitute a common mass. In some genera each chamber presents only a single external opening, but in most genera the substance of the shell is pierced by minute pores, like a sieve, through which delicate filaments are protruded.

The Order Radiolaria (*radiolus*, a litle ray,) includes many beautiful forms, living and swimming in vast multitudes near the surface of the ocean. Most of them have a complex silicious skeleton of great beauty of form and symmetry, and after death the skeletons sink to the bottom of the ocean, where they often furnish the chief part of the mud. On the island of Barbadoes, Tertiary strata 1,100 feet in thickness, consisting of marls, tripoli, and ferruginous sandstone, are largely composed of the silicious skeletons of Radiolaria. The Nicobar Islands of the Indian Archipelago, consisting of clays, marls, and arenaceous marls, to the extent of 2,000 feet in thickness of Tertiary age, are largely composed of the remains of this Order.

The Order Foraminifera (foramen, an aperture; fero, I bear,) includes all the families of Palæozoic Rhizopoda noticed in this work. They are marine shellbearing animals, living at the bottom of oceans and seas, attached, free, or pelagic, and swimming on the surface of the water, from whence their dead shells form an incessant rain to the bottom of the ocean. They are generally microscopic, though a few are several inches in diameter. Some extinct genera are much larger than any of the living forms. Prof. Leidy obtained 18,700 shells of a single species of Nonionina from an ounce of mud scraped from the surface, between tides, at Atlantic City. In another sample, from Cape May, he obtained 38,400 shells; and in an ounce from the bathing beach at Newport, Rhode Island, he estimated there were 280,000 shells of several genera and species. The sediment of the Atlantic Ocean is so largely constituted of one kind of foraminiferous shell, that it is generally called Globigerina ooze. Common chalk is almost wholly composed of the shells of Foraminifera. The building stone of the city of Paris is almost wholly made of the shells of Foraminifera belonging to the Sub-order Miliola. The Nummulite limestone of different countries is composed of foraminiferous shells, and so is the Fusulina limestone of Carboniferous age. The microscopic genera and species of the Palæozoic rocks have not been much studied. The classification of the Palæozoic Foraminifera, so far as they have been investigated, is as follows:

FAMILY CALCISPHÆRIDÆ.—Calcisphæra. FAMILY EOZOONIDÆ.—Eozoon. FAMILY FUSULINIDÆ.—Fusulina, Loftusia, Mœllerina. FAMILY GLOBIGERINIDÆ.—Calcarina. FAMILY LITUOLIDÆ.—Endothyra, Nodosinella, Valvulina. FAMILY AFFINITY, UNCERTAIN.—Rhabdaria.

CLASS PORIFERA (poros, canal; phero, I bear).

The Porifera include the Sponges, and are not to be regarded as any more highly organized than the Rhizopoda. A sponge consists of a congeries of horny filaments, interlaced in every direction so as to form an intricate network of intercommunicating cells. Imbedded in these filaments, in the majority of sponges, are a number of minute needle-shaped, or forked, or radiated silicious, or calcareous particles of various forms, called spiculæ. The spiculæ may be acicular and pointed at both ends, or have a small knob at one end, while the opposite end is pointed; or one end may be a fork, with two or three prongs. The horny filaments, with their contained spiculæ, constitute the skeleton which supports the living sponge. The living sponge consists of a mere coating of gelatinous matter spread over all the filaments, of the consistence of the white of an egg, which runs freely away from the skeleton or framework of the sponge when taken out of the water. Under the microscope this gelatinous matter is found to consist of an aggregation of sarcode cells, and each cell appears to possess an independent existence; and even when detached from its fellows it has the power to move by the extension of its substance in various directions. In a living sponge there is an infinite number of minute holes, and a lesser number of larger openings. The water is imbibed through the smaller pores, and thrown out from the larger ones. The circulation results from the action of cilia, in much the same way motion is effected by the Rhizopoda.

Sponges attach themselves to all kinds of objects, whether fixed or floating. Some cover rocks and shells with a spongy incrustation; others hang from floating sea-weeds, and others shoot up branched stems, or a massive, globular framework. The *Cliona* is a boring sponge, that imbeds itself in shells or other calcareous substances. Sponges of the same species assume very different forms. In fact, there are no animals in which the variations are as great in a single species. They attain their greatest development in tropical seas, but occur in the most northern latitudes.

The genera and species of living sponges are largely founded upon the framework and spiculæ, and of course the same characters are sought in fossil sponges for the purpose of classification. Among the Palæozoic sponges, form is of much more importance than it is among living sponges, as we may believe, because we find so many specimens of the same form and size in a given species, not only at one locality, but at distant places, even hundreds or thousands of miles apart, in the same Group of rocks; as, for instance, Astylospongia proemorsa, on the Island of Gottland, in the Baltic Sea, and in Tennessee and Indiana. When Silurian sponges are silicified, the surface is generally very poorly preserved, and the spicular perfectly preserved; but calcareous and unsilicified specimens of the same species will show a well-preserved exterior and no spiculæ. It is therefore impossible to determine whether the sponge in its living state had calcareous or silicified spicula. In the fossilization of sponges and other bodies, and even long after fossilization has taken place, silica will be taken up, and lime will be deposited in its place in some waters; while in other waters lime will be taken up, and silica will be deposited in its stead. An original calcareous sponge, when converted into a silicious fossil, will preserve the spiculæ; but if a sponge bears silicious spiculæ, and is converted

ANT.]

into a calcareous foss possible exception mi were converted into termination of gener specimens can be ob

The arrangemen FAMILY ANTH

Streptosolen FAMILY ARCHÆ FAMILY ASTRE FAMILY ASTYL terium, Cya Trichospong FAMILY BEATRI FAMILY BRACHI FAMILY DICTYO tenodictya, Rauffella, R FAMILY DYSTAC. FAMILY LEPTON FAMILY MICROSI FAMILY PALÆAC FAMILY PASCEOI FAMILY PATTERS FAMILY PHARET spongia. FAMILY RECEPTA FAMILY STROMA stroma, Mega ringostroma. FAMILY AFFINIT tomitus.

ANTHASPIDELLA, Ulrich d Geo. Sur. Ill., vol anthos, flower; aspi minutive.] Saucer supported by a sh stem; inosculating, numerous, and thos face form radical through the spongethe channels of t radiating canals close tical series, separated of spicules; oscula face; spicules bifid bifurcations directed gle, and slightly cu ranged as to leave m angular, quadrate, o surface sometimes c mal layer. Type A. into a calcareous fossil, the spiculæ will disappear in the coarser lime materials. A possible exception might exist if, in the process of change, the interior of the sponge were converted into calcspar. The spiculæ, therefore, are of importance in the determination of genera and species among Palæozoic sponges, only when silicified specimens can be obtained.

The arrangement of the Palæozoic sponges into families is as follows:

- FAMILY ANTHASPIDELLID.E.—Anthaspidella, Climacospongia, Edriospongia, Streptosolen, Zittelella.
- FAMILY ARCHÆOCYATHIDÆ.—Archæocyathus, Ethmophyllum.
- FAMILY ASTRÆOSPONGIDÆ.—Astræospongia.
- FAMILY ASTYLOSPONGIDÆ.—Astylospongia, Aulocopina, Calathium, Conopterium, Cyathospongia, Eospongia, Palæomanon, Palæospongia, Trachyum, Trichospongia.
- FAMILY BEATRICIDE. --- Beatricea.
- FAMILY BRACHIOSPONGIDÆ. -Brachiospongia, Chirospongia.
- FAMILY DICTYOSPONGIDÆ.—Cleodictya, Cyathophycus, Dictyophyton, Ectenodictya, Lyriodictya, Phragmodictya, Physospongia, Protospongia, Rauffella, Rhombodictyon, Thamnodictya, Uphantænia.
- FAMILY DYSTACTOSPONGIDÆ.—Dystactospongia, Heterospongia, Saccospongia.
- FAMILY LEPTONITIDE.—Leptonitus.
- FAMILY MICROSPONGIDÆ.—Hindia, Microspongia.
- FAMILY PALÆACIDÆ.—Palæacis.
- FAMILY PASCEOLIDE.—Pasceolus.
- FAMILY PATTERSONIIDÆ.—Pattersonia.
- FAMILY PHARETRONES.—Batospongia, Camarocladia, Cylindroccelia, Streptospongia.
- FAMILY RECEPTACULITIDÆ.—Cerionites, Receptaculites.
- FAMILY STROMATOPORID.F. Caunopora, Cœnostroma, Cryptozoon, Dictyostroma, Megastroma, Strephochetus, Stromatocerium, Stromatopora, Syringostroma.
- FAMILY AFFINITY UNCERTAIN.—Astroconia, Fungispongia, Lepidolites, Leptomitus.
- ANTHASPIDELLA, Ulrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 256. [Ety. anthos, flower; aspis, shield; ellus, di-minutive.] Saucer or funnel-shaped, supported by a short, subcylindrical stem; inosculating, radiating channels numerous, and those on the upper surface form radical canals that pass through the sponge-wall, and open into the channels of the lower surface; radiating canals closely arranged in ver-tical series, separated by vertical sheets of spicules; oscula on the upper surface: spicules bifid at each end, the bifurcations directed nearly at right angle, and slightly curving, and so arranged as to leave minute canals of triangular, quadrate, or polygonal form; surface sometimes covered with a dermal layer. Type A. mammulata.
- fenestrata, Ulrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 264. Trenton Gr. firma, Ulrich & Everett, #(in press,) Geo. Sur. Ill. vol. 8, p. 263. Trenton Gr.

153

- Sur. Ill., vol. 8, p. 263, Trenton Gr. florifera, Ulrich & Everett, (in press.) Geo. Sur. Ill., vol. 8, p. 259, Trenton Gr. grandis, Ulrich & Everett, (in press.) Geo.
- grandis, Ulrich & Everett, (in press.) Geo. Sur. Ill., vol. 8, p. 262, Trenton Gr. magnifica, Ulrich & Everett, (in press.)
- magnifica, Ulrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 265, Trenton Gr.
- mammulata, Ulrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 258, Trenton Gr.
- obliqua, Ulrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 265, Trenton Gr.
- parvistellata, Ulrich & Everett, (ir. press,) Geo. Sur. Ill., vol. 8, p. 260, Tren-
- scutula, Ulrich & Everett, (in press.) Geo. Sur. Ill., vol. 8, p. 261, Trenton Gr.

as any more ries of horny ork of intersponges, are or calcareous r and pointed d is pointed; aments, with iving sponge. read over all freely away f the water. aggregation ce; and even tension of its e number of r is imbibed The circulais effected by

i or floating. from floating r framework. .lcareous sub-In fact, there becies. They host northern

on the framefossil sponges m is of much ieve. because cies, not only f miles apart, on the Island **Then Silurian** d the spiculæ same species impossible to cified spiculæ. ssilization has place in some be deposited ilicious fossil, l is converted

PROTOZOA.

- Archeeocyathellus, Ford, 1873, Am. Jour. Sci. ASTYLOSPONGIA, Roemer, 1860, Sil. Fauna d. and Arts, 3d ser., vol. 6, p. 135, syn. West Tenn., p. 7. [Ety. astylos, without for Ethmophyllum.
- ARCHÆCCYATHUS, Billings, 1861. Pal. Foss., vol. 1, p. 3, and 354. [Ety. arche, be-ginning; cyathus, cup.] An elongated, cylindrical, sponge-like body; large end open; central cavity lined by an endotheca and external surface by an epitheca; intervening space being filled with poriferous and cellular tissue; walls perforated. Type A. atlanticus.



IG. 89.—Archæocyathus atlanticus. a, reduced ; b, transverse section. FIG. 89.

18.

- atlanticus, Billings, 1861, Pal. Foss., vol.
- attainteda, Binnage, Rock, Park Possi, Possi,
 1, p. 5, Up. Taconic.
 billingsi, Walcott, 1886, Bull. U. S. Geo.
 Sur., No. 30, p. 74, Up. Taconic.
 minganensis, see Ethmophyllum minganense, though Hinde has made it the type of a new genus, Archæoscyphia. profundus, see Ethmophyllum profundum.
- rensselæricus, see Ethmophyllum rensselæricum.
- ASTRÆOSPONGIA, Roemer, 1860, Sil. Fauna d. West Tenn., p. 13. [Ety. aster, star; spongia, sponge,] Globular or disk-like, free sponge composed of regular starshaped spicules, without order, no epitheca or canals. Type A. meniscus.
- hamiltonensis, Meek & Worthen, 1866, Proc. Chi. Acad. Sci., vol.1, p. 12, Ham. Gr.
- meniscus, Roemer, 1848, (Blumenbachium meniscus,) Leonh. and Bronn's Jahrb., p. 683, Niagara Gr.



FIG. 90.-Astreeospongia meniscus.

- ASTROCONIA, Sollas, 1881, Quar. Jour. Geo. Soc. Lond., vol. 37, p. 254. [Ety. aster, star; konia, dust.] Founded upon the appearance of various spiculæ in a grayish silicious dolomite. Characters not distinct. Type A. granti. The name was preoccupied by Edwards & Haime in 1848.
 - granti, Sollas, 1881, Quar. Jour. Geo. Soc. Lond., vol. 37, p. 254, Niagara Gr.

- a pillar; spongia, sponge.] Globular or disk-like, free sponge; inner texture formed of small, regular, star-shaped spicules, connected by their rays; canals running from the center to the surface crossed by concentric canals. Type A. præmorsa.
 - bursa, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 105, Niagara Gr. christiana, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 344, Niagara Gr.

 - imbricato-articulata, Roemer, 1848, (Siph-onia imbricato-articulata,) Leonh. and
 - Bronn's Jahrb., p. 685, and Sil. Fauna d. West Tenn., p. 12, Niagara Gr. inciso-lobata, Roemer, 1848, (Spongia in-ciso-lobata,) Leonh. and Bronn's Jahrb., p. 685, and Sil. Fauna d. West Tenn., p. 11, Niagara Gr.
 - inornata, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 70, syn. for Hindia fibrosa.
 - parvula, Billings, 1861, Pal. Foss., vol. 1, /9
 - p. 20, Trenton Gr. perryi, Billings, 1861, Geo. Vermont, p. 20 957, Black Riv. Gr.
 - præmorsa, Goldfuss, 1826, (Siphonia præ-morsa,) Petref. Germ., p. 17, and Sil. Fauna. d. West Tenn., p. 8, Niagara Gr.



FIG. 91.—Astylospongia præmorsa. Vertical section, showing cup.

- stellatim-sulcata, Roemer, 1848, (Spongia Stellatim-sulcata, Roemer, 1845, (Spongla stellatim-sulcata,) Leonh. and Bronn's Jahrb., p. 686, and Sil. Fauna West Tenn., p. 11, Niagara Gr.
 AULOCOPINA, Billings, 1875, Can. Nat. and Geol., vol. 7, p. 230. [Ety. aulokopeo, cut into pipes.] Elongate, ovate, or puriform i upper face encours with an encourse.
- pyriform; upper face concave, with an osculum in the center, from which ridges radiate over the surface and descend to the base; the osculum is the opening of a central cavity, from which smaller branching canals radiate. Type A. granti. granti, Billings, 1875, Can. Nat. and Geol., 2
- vol. 7, p. 231, Niagara Gr.
- BATOSPONGIA, Ulrich, (in press.) Geo. Sur. Ill., vol. 8. p. 246. [Ety. batos, prickly bush; spongia, sponge.] Subhemispherical or subglobose, consisting of small, inosculating, subcylindrical or flattened

branches, which base; base cove which exhibits work of sub branched spicul bifid, trifid, or spicata. spicata, Ulrich,

- Ill., vol. 8, p. 24 BEATRICEA, Billings, Geo. Sur. Can., name.] This ge Hyatt (Am. Jou to belong to t and he proposed genus, to-wit: (a honey-comb; family Ceriolidæ long, cylindrical B. nodulosa.
- 12. nodulosa, Billings Geo. Sur. Can., Hud. Riv. Gr.
- 23. undulata, Billings, Geo. Sur. Can., p Belemnospongia, Ul
 - Sur. Ill., vol. 8, 1 a dart; spongia, s elongate acerate i upward and out base; spicules lan other by short pi cicularis.
- fascicularis, Ulrich. Ill., vol. 8, p. 248 Blumenbachium, Konij

sectiles. meniscus, see Astræd

BRACHIOSPONGIA, Ma Sci. and Arts, 2 [Ety. brachium, a A short vase or h throwing out larg are closed at the skeleton compara ing a network of specimens are sili face therefore d

digitata.



FIG. 92.—Brachiospongia ing large gas

digitata, Owen, 1857 Geo. of Ky., vol. 2 hoveyi, Marsh, 1874, Sci., p. 344, syn.

ARC.-BAT.

0, Sil. Fauna d. astylos, without Globular or inner texture ar, star-shaped their rave: e center to the centric canals.

Rep. N. Y. St. Niagara Gr. hen, 1868, Geo. liagara Gr. er, 1848, (Siph-a,) Leonh. and and Sil. Fauna ıgara Gr. 8, (Spongia in-Bronn's Jahrb., d. West Tenn.,

Rep. N. Y. St. syn. for Hindia

1. Foss., vol. 1, /

o. Vermont, p. 2

(Siphonia præ-pl 17, and Sil. p). 8, Niagara Gr.



norsa. Vertical sup.

1848, (Spongia h. and Bronn's il. Fauna West

Can. Nat. and Ety. aulokopeo, gate, ovate, or oncave, with an er, from which surface and deosculum is the ity, from which s radiate. Type

, Nat. and Geol.,

ress,) Geo. Sur. y. batos, prickly Subhemisphersisting of small, ical or flattened

BEA -CAL.]

branches, which arise from a reticulated base; base covered with a dermal layer, which exhibits on its inner side a network of substellate or irregularly branched spicule fiber; spicules acerate, bifid, trifid, or four-rayed. Type B. Type B. spicata.

- spicata. spicata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p. 246, Coal Meas. BEATRICEA, Billings, 1875, Rep. of Progr. Geo. Sur. Can., p. 343. [Ety. proper name.] This genus was supposed by Hust (Am. Lour. Sci. and Arts 1865.) Hyatt (Am. Jour. Sci. and Arts, 1865,) to belong to the class Cephalopoda, and he proposed a new order for the genus, to-wit: Ceriolites, from kerion, a honey-comb; lithos, a stone; and a family Ceriolidæ. They are, however, long, cylindrical spongeoid bodies. Type B. nodulosa
- 12. nodulosa, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 344, Trenton and Hud. Riv. Gr.
- 23.
- Hud. KW. GF.
 undulata, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 344, Trenton Gr.
 BELEMNOSPONGIA, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p. 248. [Ety. belemnos, a dart; spongia, sponge.] Composed of clonerto correte primers, which radiate elongate acerate spicules, which radiate upward and outward from a pointed base; spicules large, and joined to each other by short processes. Type B. fascicularis.

fascicularis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p. 248, Burlington Gr. Blumenbachium, Konig, 1820, Icones fossiles,

sectiles.

meniscus, see Astræospongia meniscus. BRACHIOSPONGIA, Marsh, 1867, Am. Jour. Sci. and Arts, 2d ser., vol. 44, p. 88. [Ety. brachium, arm; spongia, sponge.] A short vase or hollow central nucleus, throwing out large, hollow arms, which are closed at the distal extremities; skeleton comparatively thin and bearing a network of spicules; all observed specimens are silicious, and outer surface therefore destroyed. Type B. digitata.



FIG. 92.—Brachiospongia digitata. ¼ diam., show-ing large gastral cavity.

digitata, Owen, 1857, (Scyphia digitata,) Geo. of Ky., vol. 2, p. 111, Trenton Gr. hoveyi, Marsh, 1874, Trans. Kansas Acad. Sci., p. 344, syn. for B. digitata, but founded on a specimen having twelve arms

- lyoni, Marsh, 1867, Am. Jour. Sci. and Arts, 2d ser., vol. 44, p. 88, syn. for B. digitata, but founded on a specimen having eleven arms.
- roemerana, Marsh, 1867, Am. Jour. Sci. and Arts, 2d ser., vol. 44, p. 88, syn. for B. digitata.
- CALATHIUM, Billings, 1865, Pal. Foss., vol. 1, p. 208. [Ety. kalathos, a small wicker basket.] Cylindro-turbinate in form, perforated by small canals arranged in longitudinal and transverse rows; apertures round, oval, or quadrangular; cup'deer. Type C. formosum.

affine, Billings, 1865, Pal. Foss. vol. 1, p. 209, Quebec Gr.

- anstedi, Billings. 1865, Pal. Foss., vol. 1, p. 201 and 337, Quebec Gr.
- canadense, Billings, 1865, Pal. Foss., vol. 1, p. 377, Chazy Gr.
- fittoni, Billings, 1865, FIG. 93. Calathium Pal. Foss., vol. 1, p. canadense. Verti-cal section, showing canadense. Verti-cal section, showing 211, Quebec Gr.

1865, Pal. Foss., vol. 1, p. 209, Quebec Gr. infelix, Ulrich & Everett, (in press.) Geo. Sur. Ill., vol. 8, p. 274, Trenton Gr.

cup.



FIG. 94 -- Calathium formosum.

pannosum, Billings, 1865, Pal. Foss., vol. 1, p. 335, Quebec Gr.

- paradoxicum, Billings, 1865, Pal. Foss., vol. 1, p. 358, Calcif. Gr. Hinde, in 1889, Quar. Jour. Geo. Soc., p. 144, made this species the type of a new genus, Nipterella.
- CALCARINA, D'Orbigny, 1826, Tableau Methodique de la Classe des Cephalopodes, in Annales des Sciences Naturelles, tome 7. [Ety. calcis, limestone.] Free, convoluted, depressed, spire-coiled, supplemental growths of the interior shell, aperture slit in the terminal chamber close to the penultimate convolution.
 - A living genus in tropical seas. ambigua, Brady, 1878, Monograph of Carboniferous and Permian foraminifera, p. 141, Carboniferous.
- CALCISPHÆRA, Williamson, 1880, Mem. Org. of the plants of the Coal Meas., pt. 10. [Ety. calcis, limestone; sphæra, sphere.] A minute globular test, having an aperture; wall composed of minute calcareous grains. Type C. robusta.

29.

30.

24.

27.

28.





FIG. 95.-Calcisphæra robustas a, natural size; **b**, magnified, showing sculpture; c, showing aperture; d, magnified, showing aperture; e, section of wall magnified.

- CAMAROCLADIA, Ulrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 280. [Ety. kamara, arching chamber; klados, twig.] Small, subcylindrical branching stems; interior canals irregular, separated by thin, cribrose walls; spicules three-rayed. Type C. dichotoma. dichotoma, Ulrich & Everett, (in press,)
 - Geo. Sur. Ill., vol. 8, p. 281, Trenton Gr.
- CAUNOPORA, Phillips, 1841, Pal. Foss., Cornwall and Devon. and W. Somerset, p. 18. [Ety. chaunos, loose; poros, perforation.] Amorphous, composed of con-centric or nearly plain masses, per-forated by flexuous or vermiform small tubuli, and by larger, straight, subparallel or radiating open tubes, persistent through the mass. Type C. placenta.

 - hudsonica, Dawson, 1879, Quar. Jour. Geo. Soc., vol. 35, p. 52, Niagara Gr. incrustans, Hall & Whitfield, 1873, (Strom-atopora incrustans,) 23d Rep. N. Y. St. Mus. Nat. Hist., p. 227, Chemung Gr.
- mirabilis, Spencer, 1884, Bull. No. 1,
- Univ. St. Mo., p. 47, Niagara Gr. planulata, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 228, Chemung Gr.
- walkeri, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 46, Niagara Gr.



FIG. 96.-Caunopora walkeri, vertical and horizontal section enlarged.

CERIONITES, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 346. [Ety. kerion, honey-comb; lithos, stone.] Founded upon casts apparently holding an intermediate position between Pasceolus and Receptaculites. The pits are hexagonal and upon the convex side, perforated in the center by a minute circular opening, while those upon the CAM.-CHI.

under side are imperforate. Type (dactyloides.

dactyloides, Owen, 1844, (Lunulites dacty-

PROTOZOA.

loides,) Rep. on Min. Lands, p. 69, Niagara Gr.



CHIROSPONGIA, n. gen. FIG. 97.-Cerionites [Etv. cheir. hand: dactyloides. [Ety. cheir, hand;

spongia, sponge.] General form hand-like, or somewhat like a compressed goblet; composed of internal filamentous or fibrous substance, which is covered with a thin, lobed, vesicular parenchyma; it was firmly fastened by an expanded base to a solid rock or the sea-bottom; above the base it is a flattened obconoidal cup, with a deep sulcus down the middle of each side, bringing the sides nearly together; on each side of the sulcus the interior of the sponge is hollow, showing a large gastral cavity; the whole skeleton is openly vesicular or porous. The type species is silicified, and does not show the surface markings, but a calcareous specimen, supposed to belong to the same genus, is finely papillated. No microscopic sections have been made to ascertain the character of the spicules, but doubtless both parenchyma and fibrous substance bear spicules similar to those of Brachiospongia. In the surface lobes and filaments it resembles Pattersonia, but is distinguished by its vesicular and porous substance and coarser filaments. In its large gastral cavity, thin skeleton, and vesicular parenchyma, it resembles Brachiospongia. Type C. wenti.



FIG. 98.-Chirospongia wenti.

faberi, n. sp. This species is founded upon a calcareous fragment of the parenchyma, about one-third of which is shown in the figure. It is thin, and CLE.-CRY.]

belonged to the specimen. The s nearly equal in tributed in roy The surface is papillæ, presenti appearance of a tration shows r instead of papil with Pattersoni sponge filament the Hud. Riv. Gi low-water mark lector, Charles F wenti, n. sp. Th: upon a silicified characters above and being well il The fibrous sul sulcus formed th the parenchymat not appear at th are large, some outline, of unequ disposed, but not sonia. The substa parenchyma, as off and weathere tom of the specir lose or irregular to the naked eye ance of Alveolite cies is named in Went, of Frankfo in the Trenton G



FIG. 99.—Chirospongia fal sions should in

CLEODICTYA, Hall, 1884 Mus. Nat. Hist., closed up; dictuon, expanding from globose or hemisp a row of large, ro periphery; tube above, and extend or slightly expand composed of regula rayed spicules and rods. Type C. glo

CAM.-CHI.

ate. Type (



97.-Cerionites

or somewhat composed of fibrous subwith a thin, yma; it was **xpanded** base ottom; above conoidal cup, the middle of les nearly tohe sulcus the 10llow, showr; the whole lar or porous. ied, and does rkings, but a posed to bei finely papilections have the character ubtless both ubstance bear of Brachioobes and filarsonia, but is ular and porer filaments. thin skeleton, ı, it resembles wenti.



venti.

is founded nt of the pad of which is is thin, and CLE.-CRY.]

belonged to the side of a large, hollow

specimen. The semi-elliptical lobes are nearly equal in size, and regularly distributed in rows over the surface.

The surface is reticulated with fine papillæ, presenting to the naked eye the appearance of a^{*} bryozoum. The illustration shows rhomboidal depressions

instead of papillæ. Found associated with Pattersonia and fragments of

sponge filaments near the middle of

the Hud. Riv. Gr., about 350 feet above

low-water mark at Cincinnati. Col-

upon a silicified specimen having the

characters above ascribed to the genus.

and being well illustrated in the figure.

The fibrous substance shown in the

sulcus formed the basal attachment, as

the parenchymatous surface tissue does

not appear at the bottom. The lobes

are large, somewhat semi-elliptical in

outline, of unequal size, and irregularly

disposed, but not pendent as in Patter-

sonia. The substance of the filaments and

parenchyma, as shown, where broken

off and weathered at the top and bot-

tom of the specimen, is openly vesicu-

lose or irregularly porous, resembling

to the naked eye somewhat the appear-

ance of Alveolites goldfussi. The species is named in honor of Mr. C. E.

Went, of Frankfort, Ky., who found it

in the Trenton Group near that city.

Fig. 99.—Chirospongia faberi ; reticulated depres-sions should indicate papillæ.

CLEODICTYA, Hall, 1884, 35th Rep. N. Y. St.

Mus. Nat. Hist., p. 467. [Ety. kleo, closed up; dictuon, net.] Frond rapidly

expanding from the base to a subglobose or hemispherical form, bearing

a row of large, rounded nodes on the

periphery; tube abruptly contracted above, and extending in a cylindrical or slightly expanded form. Substance

composed of regular lattice-work of six-

rayed spicules and bundles of acicular

rods. Type C. gloriosa.

lector, Charles Faber. wenti, n. sp. This species is founded

PROTOZOA.

- gloriosa, Hall, 1884, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 479, Keokuk Gr. mohri, Hall, 1884, 35th Rep. N. Y. St.
- Mus. Nat. Hist., p. 479, Keokuk, Gr.
- Cnemidium, Goldfuss, 1826, Petref. Germ., p. 15. [Ety. knemidos, armor for the legs, a sort of boot.] Type C. lamellosum. trentonensis, see Palæospongia trentonensis.
- CGENOSTROMA, Winchell, 1867, Proc. Am. Ass. Ad. Sci., p. 91. [Ety. koinos, shared in common; stroma, layer.] Distinguished from Stromatopora by the absence of central, simple, radiating tubes, which in this genus is represented by a group of more or less divergent ascending tubuli, so that the surface of the last layer presents eminences, not with a single large pore at the summit, but with several small pores diverging from their sides. Type C. monticuliferum.
 - botryoideum, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 50, Niagara Gr. constellatum, Hall, 1852,
 - (Stromatopora constel-lata,) Pal. N. Y., vol. 2, p. 324, Coralline limestone, Niagara Gr.
 - galtense, Dawson, 1879, Quar. Jour. Geo. Soc., vol. 35, p. 52, Guelph Gr. monticuliferum, Winchell,

Ham. Gr.



ticulifera,) Rep. Low. AIG. 100.-Cœn-Penin. Mich., p. 91, ostroma con-stellatum. stellatum, horizontal Winchell, section

- pustuliferum, 1866, (Stromatopora pustulifera,) Rep. Low. Penin. Mich., p. 90, Ham. Gr.
- ristigouchense, Spencer, 1884, Bull. No. 1, Univ. St. Mo., p. 49 Low. Held. Gr. solidulum, Hall & Whitfield, 1873, (Stro-matopora solidula,) 23d Rep. N. Y. St.
- Mus. Nat, Hist., p. 227, Chemung Gr.
- CONOPTERIUM, Winchell, 1865, Proc. Acad. Nat. Sci., p. 110. [Ety. konos, cone; poterion, cup.] Cells crowded, inseparable, rapidly enlarging, walls marked by vertical striæ, and a few pores communicate between the cells; epitheca exterior. Type C. effusum. effusum, Winchell, 1865, Proc. Acad. Nat.
- Sci., p. 111, Waverly Gr. or Lithographic limestone.
- Coscinopora infundibuliformis, see Receptaculites infundibuliformis.
- Coscinopora sulcata, Owen, 1844, see Receptaculites oweni.
- CRYPTOZOON, Hall, 1884, 36th Rep. N. Y. St. Mus. Nat. Hist., p. 95. [Ety. kruptos, hidden; zoon, animal.] Composed of irregular, concentric laminæ, resembling Stromatopora, substance traversed by minute canals, which branch and anastomose irregularly. Type C. proliferum. minnesotense, Winchell, 1886, 14th Ann.
 - Rep. Geo. Minn., p. 313, Calciferous Gr. proliferum, Hall, 1884, 36th Rep. N. Y. St. Mus. Nat. Hist., p. 95, Calciferous

CYATHOPHYCUS, Walcott, 1879, Trans. Alb. Inst., vol. 10, p. 18. [Ety. kuathos, cup; phukos, sea-weed,] Hollow, cyathiform, with a reticulated structure. Type C.

158

- reticulatum. reticulatum, Walcott, 1879, Trans. Alb. Inst., vol. 10, p. 18, Utica Slate. subsphericum, Walcott, 1879, Trans. Alb. Inst., vol. 10, p. 19, Utica Slate. CYATHOSPONGIA, Hall, 1882, Foss. Corals
- Niagara and Up. Held. Grs., p. 15. [Ety. kualhos, cup; spongia, sponge.] Body solid, turbinate, cyathiform; structure similar to Astylospongia. Type C. excrescens.
- excrescens, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 15, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 419, Niagara Gr.
- CYLINDROCCELIA, Ulrich, 1889, Am. Geo., vol. 3, p. 245. [Ety. kulindros, cylinder; koilos, belly.] Cylindrical; central cloaca; walls thick, radiating canals. Type C. endoceroidea.
 - covingtonensis, Ulrich, 1889, Am. Geo., vol. 3, p. 247, Hud. Riv. Gr.
 endoceroidea, Ulrich, 1889, Am. Geo., vol.
 - 3, p. 246, Trenton Gr.
 - wol. 3, p. 248, Trenton Gr. minor, Ulrich, 1889, Am. Geo., vol. 3, p. 248, Trenton Gr. 248, Trenton Gr.
- Dentalina, D'Orbigny, 1826, Ann. Des. Sci. Nat., t. 7, p. 89. [Ety. dentale, tooth; inus, implying resemblance.]

priscilla, see Nodosinella priscilla.

- DICTYOPHYTON, Hall, 1863, 16th Rep. N. Y. St. Mus., p. 87. [Ety. dictyon, net; phyton, plant.] Turbinate or infundibuliform, with nodose or conical protuberances or hollow stems externally, and marked by minute rectangular spaces, and consisting of a reticulate
- abacus, Hall, 1884, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 474, Waverly Gr. annulatum, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 90, Chemung Gr. baculum, Hall, 1884, 35th Rep. N. Y. Mus. Nat. Hist., p. 471, Chemung Gr.
- Mus. Nat. Hist., p. 471, Chemung Gr. becki, Conrad, 1837, (Lithodictuon becki,) Ann. Rep. N. Y., p. 167, and Pal. N. Y., vol. 2, p. 6, Medina Sandstone.
- catilliforme, see Phragmodictya catilli-
- formis. cinctum, Hall, 1884, 35th Rep. N. Y. St.
- Mus. Nat. Hist., p. 472, Chemung Gr. conradi, Hall, 1863, 16th Rep. N. Y. St.
- Mus. Nat. Hist., p. 89, Chemung Gr. cylindricum, Whitfield, 1881, Bull., No. 1, Am. Mus. Nat. Hist., p. 19, Keokuk Gr.
- fenestratum, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 90, Chemung Gr. filitextile, Hall, 1863, 16th Rep. N. Y. St.
- Mus. Nat. Hist., p. 88, Chemung Gr. hamiltonense, Hall, 1884, 35th Rep. N. Y.
- St. Mus. Nat. Hist., p. 468, Ham. Gr. irregulare, Hall, 1884, 35th Rep. N. Y. St.
- Mus. Nat. Hist., p. 470, Chemung Gr.

newberryi, see Thamnodictya newberryi. nodosum, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 91, Chemung Gr.

[CYA.—DYS.

- parallellum, Hall, 1884, 35th Rep. N. Y St. Mus. Nat. Hist., p. 471, Chemung Gr. patulum, Hall, 1884, 35th Rep. N. Y. St.
- Mus. Nat. Hist., p. 469, Chemung Gr. prismaticum, Hall, 1884, 35th Rep. N.
- St. Mus. Nat. Hist., p. 469, Chemung, Gr. ramosum, Lesquereux, 1884, Coal Flora
- of Pa., p. 827, Up. Chemung Gr. redfieldi, Hall, 1863, 16th Rep. N. Y. St.
- Mus. Nat. Hist., p. 88, Waverly Gr.
- Nat. Hist., p. 80, Wavery of Mus. Nat. Hist., p. 90, Chemung Gr. sacculus, Hall, 1884, 35th Rep. N. Y. St.
- Mus. Nat. Hist., p. 473, Waverly Gr. telum, Hall, 1884, 35th Rep. N. Y. St. Mus.
- Nat. Hist., p. 470, Chemung Gr. tenue, Hall, 1884, 35th Rep. N. Y. St. Mus.
- Nat. Hist., p. 474, Waverly Gr. tuberosum, Conrad, 1842, (Hydnoceras tuberosum,) Jour. Acad. Nat. Sci. Phil., vol. 8, p. 267, Chemung Gr.
- DICTYOSTROMA, Nicholson, 1875, Ohio Pal. vol. 2, p. 254. [Ety.

dictyon, net; stroma, Allied to layer.] Stromatopora, but the upper surface of each lamina is developed into conical points, which support the lamina above instead of pillars. The laminæ have horizontal canals, and are probably minutely per-forate. Type D.

- undulatum. reticulatum, Spencer, stroma undulatum. 1884, Bull. Mus.
- Univ. St. Mo., p. 51, Niagara Gr. undulatum, Nicholson, 1875, Ohio Pal., vol. 2, p. 254, Niagara Gr.



FIG. 102. Dystactospongia insolens.

DYSTACTOSPONGIA, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 42. [Ety. dystaktos, hard to arrange; spongia,



- sponge.] Mass tached with a work. Structu insolens.
- insolens, S. A. Mil Nat. Hist., vol.
- minima, Ulrich, p. 243, Hud. Riv minor, Ulrich & H
- Sur. Ill., vol. 8,
- rudis, Ulrich & Sur. Ill., vol. 8,
- ECTENODICTYA, Hall St. Mus. Nat. H stretched out; a late frond irregu
- E. implexa. burlingtonensis, H
- Gr. excentrica, Hall,
- Gr.
- implexa, Hall, 18 Mus. Nat. Hist.,
- EDRIOSPONGIA, Ulric Geo. Sur. Ill., edrion, a seat; s ive, lobate, atta sides irregularl canals, connected ones; minute o ules; sides cover
- Type E. basalis. basalis, Ulrich & E
- Polytech. Soc. W p. 279. [Ety. end Free, spiral, rot merous, texture forate, aperture

baileyi, Hall, 1858, Alb.

> 1882. p. 42 Eospong Foss eos, d

Subg subh pore

bailèyi, magnified. from of va

roem roemeri, Billings, 1 p. 19, Chazy Gr. varians, Billings, 18

19, Chazy Gr. Eozoon, Dawson, 186 2d ser., vol. 2, p zoon, animal.] M patches or irregu at the surface, by



expansa, Hall, 188 Mus. Nat. Hist.,

Y. St. Mus. Nat

planate; reticula ing radiating and

- St. Mus. Nat.

CYA.-DYS.

a newberryi Rep. N. Y. St. emung Gr. th Rep. N. Y Chemung Gr. Rep. N. Y. St. hemung Gr. th Rep. N. Y. Chemung, Gr. 4, Coal Flora ing Gr. Rep. N. Y. St. averly Gr. N. Y. St. Mus. g Gr. Rep. N. Y. St.

- averly Gr. N. Y. St. Mus.
- ng Gr. N. Y. St. Mus.

y Gr. (Hydnoceras Nat. Sci. Phil.,

75, Ohio Pal.,



. 101.-Dictyo na undulatum ;ara Gr.

5, Ohio Pal.,



lens.

er, 1882, Jour. ol. 5, p. 42. ange; spongia,

Massive, hemispherical, atsponge.] tached with a strong radiating framework. Structure vesicular. Type D. insolens.

ECT.-ETH.]

- insolens, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 43, Hud. Riv. Gr. minima, Ulrich, 1889, Am. Geol., vol. 3, p. 243, Hud. Riv. Gr.

- p. 243, huo. Kiv. Gr.
 minor, Ulrich & Everett, (in press,) Geo.
 Sur. Ill., vol. 8, p. 278, Trenton Gr.
 rudis, Ulrich & Everett, (in press,) Geo.
 Sur. Ill., vol. 8, p. 279, Trenton Gr.
 ECTENODICTYA, Hall, 1884, 35th Rep. N. Y.
 St. Mus. Nat. Hist., p. 466. [Ety. ektense,
 stratekind out: diatum net 1 A retion. stretched out; dictuon, net.] A reticulate frond irregularly expanded or explanate; reticulation irregular present ing radiating and concentric striæ. Type E. implexa.
 - burlingtonensis, Hall, 1884, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 476, Waverly Gr.
 - excentrica, Hall, 1884, 35th Rep. N.Y. St. Mus. Nat. Hist., p. 476, Keokuk Gr.
 - expansa, Hall, 1884, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 475, Waverly Gr. implexa, Hall, 1884, 35th Rep. N. Y. St.
- Mus. Nat. Hist., p. 475, Waverly Gr. EDRIOSPONGIA, Ulrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 271. [Ety. Geo. Sur. Ill., vol. 8, p. 271. [Ety. edrion, a seat; spongia, sponge.] Massive, lobate, attached by a broad base; sides irregularly dented; radiating canals, connected by tortuous, vertical ones; minute canals formed by spicules; sides covered with a dermal layer. Type E. basalis.

 basalis, Ulrich & Everett, (in press.) Geo.
 Sur. Ill., vol. 8, p. 272, Trenton Gr.
 ENDOTHYRA, Phillips, 1845, Proc. Geol. and Polytech. Soc. W. Riding Yorks., vol. 2, p. 279. [Ety. endos, within; thura, door.] Free, spiral, rotaliform, segments numerous, texture subarenaceous, imperforate, aperture simple. Type E. bowmani.

baileyi, Hall, 1858, (Rotalia baileyi,) Trans. Alb. Ins., vol. 4, p. 34, and 1882, Bull. Mus. Nat. Hist.,

p. 42, Warsaw Gr. EOSPONGIA, Billings, 1861, Pal. Foss., vol. 1, p. 18. [Ety. eos, dawn; spongia, sponge.] Subglobular, pyriform or subhemispherical, not free, pores radiating irregularly from the central axis; cup of variable depth. Type E. roemeri.

roemeri, Billings, 1861, Pal. Foss., vol. 1, p. 19, Chazy Gr. varians, Billings, 1861, Pal. Foss, vol. 1, p.

FIG. 103.

Endothyra

bailevi magnified.

19, Chazy Gr.

Eozoon, Dawson, 1865, Can. Nat. and Geo., 2d ser., vol. 2, p. 54. [Ety. eos, dawn; zoon, animal.] Massive, in large sessile patches or irregular cylinders, growing at the surface, by the addition of suc-

cessive laminæ, internally, the chambers are flattened, irregular, with numerous rounded extensions, and separated by walls of variable thickness, pene-trated by septal orifices irregularly disposed; thicker parts of the walls with fine branching tubuli; the appearance to the naked eye is some-thing like Stromatopora. Type E. canadense.

canadense, Dawson, 1865, Can. Nat. and Geo., 2d ser., vol. 2, p. 54, Laurentian. The most ancient organism.



FIG. 104.-Ezoon canadense.

ETHMOPHYLLUM, Meek, 1868, Am. Jour. Sci. and Arts, 2d ser., vol. 45, p. 62. [Ety. ethmos, sieve; phyllon, plant.] Body simple, elongate, turbinate, cup-shaped, clavate or cylindro-conical, curved or straight, corrugated, lobed, or ribbed, penetrated by round or oval pores, in vertical or horizontal rows; vertical septa numerous, originating at the outer wall, and extending to the inner one, poriferous; inner wall with or without vesicular tissue, extending into the central cup; series of septa and walls sometimes repeated; spiculæ branching. Type E. whitneyi. gracile, Meek, syn. for E. whitneyi.



FIG. 105-Ethmophyllum profundum. Longitudinal and transverse section of a fragment.

minganense, Billings, 1859, (Petraia min-ganensis,) Can. Nat. and Geol., vol. 4, p. 346, and Pal. Foss., vol. 1, p. 354. Calciferous Gr. Hinde, in 1889, Quar. Jour. Geo. Soc., p. 142, proposed this species as the type of a new genus Archæoscyphia.

3%

PROTOZOA.

32.

profundum, Billings, 1861, (Archæocyathus profundus,) Pal. Foss., vol. 1, p. 4, Up. Taconic.

rarum, Ford, 1878 (Protocyathus rarus,) Am. Jour. Sci. and Arts, 3d ser., vol. 15, p. 124, Up. Taconic. rensselæricum, Ford, (Archæocya-1873. thellus rensselæricus,) Am. Jour. Sci. and Arts, 3d ser., vol. 5, p. 211, Up. Taconic. whitneyi, Meek, 1868, Am. Jour. Sci. and Arts, 2d ser., vol. 45, p. 62, Up. Taconic.

phyllum pro-fundum. Base of attachment. FUNGISPONGIA,

FIG. 106.-Ethmo-

- GISPONGIA, Ringueberg, 1884, Proc. Acad. Nat. Sci., p. 147. [Ety. fungus, a mushroom; spongia, a sponge.] D.f. nition very poor. Type F. irregularis. irregularis, Ringueberg, 1884, Proc. Acad. Nat. Sci., p. 147, Clinton Gr. Very poorly defined.
- FUSULINA, Fischer, 1837, Oryct. du Gouv. de Moscou. p. 126. [Ety. fusus, spindle; inus, little.] Snell fusiform, symmet-rically involute, surface furrowed coincident with the septa within; aperture a narrow slit in the middle part, fora-mina passing through the walls; septa widening toward the extremities. Type F. cylindrica.

cylindrica, Fischer, 1837, Orvet. du. Gouv. de Moscou., p. 126, Coal Meas.



FIG. 107 - Fusulina cylindrica. Natural size, magnified, and transverse section

cylindrica var. ventricosa, see F. ventricosa. depressa, Fischer, 1837, Oryct. du Gouv. de Moscou., p. 127, Coal Meas.

- elongata, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 297. Permian Gr. gracilis, Meek, 1864, Pal. of California, vol. 1, p. 4, Coal Meas.
- hyperborea, Salter, 1855, Belch-r's Last Arctic Voyage, vol. 2, p. 380, Carboniferous.
- robusta, Meek, 1864, Pal. California, vol. 1, p. 3, Coal Meas.
- ventricosa, Meek & Hayden, 1864, Pal. Upper Mo., p. 14, Coal Meas. HETEROSPONGIA, Ulrich, 1889, Am. Geol.,
- spongia, sponge.] Sublobate, com-pressed branches, covered with mouths of tortuous canals; skeleton composed of loosely interwoven spicule fibers. Type H. subramosa.
- aspera, Ulrich, 1889, Am. Geol., vol. 3, p. 241, Hud. Riv. Gr.

- subramosa, Ulrich, 1889, Am. Geol., vol 3, p. 240, Hud. Riv. Gr.
- HINDIA, Duncan, 1879, Ann. and Mag. Nat Hist., 5th ser., vol. 4, p. 91. [Ety proper name.] Free, spheroidal, with out involution of texture; small cen tral space occupied by spicules which form a series of bifurcating, long. straight canals, that open at the surface spicules more or less in shape of a stemmed tripod, with four limbs, and swollen or fringed at the ends. Type H. fibrosa. This may be a synonym for Microspongia; but as the latter is calcareous, and the spicules have not been determined, both generic names are retained.
- fibrosa, Roemer, 1860, (Calamopora fibrosa,) Sil. Fauna W. Tenn., p. 20, Niagara Gr. inæqualis, Ulrich & Everett, (in press,)
- Geo. Sur. Ill., vol., 8, p. 275, Trenton Gr.
- spheriodalis, Duncan, 1879, Ann. and Mag. Nat. Hist., 5th ser., vol. 4, p. 91, syn. for H. fibrosa.

parva, see Microspongia parva.

- YSTRISPONGIA, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p. 245. [Ety. hystrix, porcupine; spongia, sponge.] Subglobular or ovoid; spicules arranged radiately
- from the base, most of them biacerate and taper each way to pointed ends, some trifid at one end, and others four-
- rayed. Type H. carbonaria. carbonaria, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, p. 245, Coal Meas. Ischadites tessellatus, see Receptaculites tes-
- sellatus.
- LASIOCLADIA, Hinde, 1884. [Ety. Jusios, shaggy; klados, twig.] Skeleton composed of elongate, slender, straight, acerate spicules, pointed at both ends. Type L. compressa
- hindii, Ulrich, (in press,) Geo. Sur. Ill.,
- vol. 8, p. 249, Keokuk Gr. LEPIDOLITES, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 20. [Ety. lepis, scale; lithos, stone.] Subspherical or subcylindrical bodies, hollow within and consisting of exteriorly imbricating scales. Type L. dickhauti. The name was preoccupied in mineralogy.
- dickhauti, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2. p. 21, Hud. Riv. Gr. elongatus, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 22, Hud. Riv. Gr. This is not distinct from L. dickhauti.
- LEPTOMITUS, Walcott, 1886, Bull. U. S. Geo. Sur. No. 30, p. 89. [Ety. leptos, fine; mitos, thread.] Elongate bodies, formed of fine, thread-like, longitudinal lines, apparently imbedded in a delicate membrane, slowly expanding from a narrow base. Type L. zitteli. zitteli, Walcott, 1886, Bull. U. S. Geo.
 - Sur. No. 30, p. 89, Georgia Gr.

LEP.-PAL.]

Leptopterion, Ulrich, p. 239. [Etv. le Obconical, annu thin, outer sur L. mammiferum mammiferum, Ulrie 3, p. 239, Hud. 1 LOFTUSIA, Carpenter Roy. Soc., p. 74 Small foraminit tical test, cons continuous lam with interspaces Type L. persica columbiana, Daw

Geo. Soc., vol. 3 Lunulites? dactyloide tyloides.

LYRODICTYA, Hall, St. Mus. Nat. H lyre; dictuon, ne late fronds com ules, with broa bands of acicula alternating bifu mingeri.

romingeri, Hail, St. Mus. Nat. Hi

MEGASTROMA, Dawso path Mus. No. great; stroma, Stromatopora; membranes, bes

ing inwards like other; membran

Type M. lamino laminosum, Daws

path Mus. No. 2, MICROSPONGIA, Mille Cin. Soc. Nat. Hi micros, small; s no epitheca; co

openings; struc



FIG. 108.-Microspongia gregaria,

MELLERINA, Ulrich Pal., p. 34. [Ety sisting of two su chambers, outer inner one smoot outer chamber t ing, surrounded where the ridges greenei.

greenei, Ulrich, 18 35, Up. Held. Gr Nodosinella, Brad Carb. and Perm

[Ety. nodus, kn Free, straight, o constricted at in FUN.-LEP

eol., vol. 3, p

m. Geol., vol

nd Mag. Nat p. 91. [Ety eroidal, with e; small cen vicules which cating, long. t the surface 1 shape of a ur limbs, and ends. Type a synonym the latter is les have not eneric names

pora fibrosa,), Niagara Gr. t, (in press,) o. 275, Tren

nn. and Mag. 4, p. 91, syn.

Va. press,) Geo. [Ety. hystrix, e.] Subglobged radiately iem biacerate pointed ends. d others four-'ia.

s,) Geo. Sur. 388. taculites tes

Ety. Jasios ton composed ight, acerate ends. Type

eo. Sur. Ill.,

ir. Cin. Soc. [Ety. lepis, spherical or ollow within rly imbricakhauti. The mineralogy. ur. Cin. Soc. d. Riv. Gr. r. Cin. Soc Hud. Riv. rom L. dick-

11. U. S. Geo. leptos, fine; idies, formed idinal lines, a delicate ding from a eli. U. S. Geo. Gr.

PROTOZOA.

Leptopterion, Ulrich, 1889, Am. Geol., vol. 3, 5. 239. [Ety. leptos, thin; poterion, cup.] Obconical, annulated free sponge; wall thin, outer surface reticulated. Type L. mammiferum. Not well defined. mammiferum, Ulrich, 1889, Am. Geol., vol.

LEP.-PAL.]

- 3, p. 239, Hud. Riv. Gr. LOFTUSIA, Carpenter & Brady, 1869, Trans. Roy. Soc., p. 742. [Ety. proper name.] Small foraminifer, with oval or elliptical test, consisting, primarily, of a continuous lamina coiled upon itself. with interspaces divided into chambers. Type L. persica.
- columbiana, Dawson, 1879, Quar. Jour. Geo. Soc., vol. 35, p. 74, Coal Meas.
- Lunulites? dactyloides, see Cerionites dactyloides.
- LYRODICTYA, Hall, 1884, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 466. [Ety. lyra, lyre; dictuon, net.] Cyathiform, reticulate fronds composed of stellate spicules, with broad, strong, longitudinal bands of acicular spicules, showing an alternating bifurcation. Type L. romingeri.
- romingeri, Hall, 1884, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 476, Keokuk Gr. MEGASTROMA, Dawson, 1883, Report on Red-path Mus. No. 2, p. 12. [Ety. megas, great; stroma, layer.] Somewhat like Stromatopora; layers consisting of two
 - membranes, beset with spicules, pointing inwards like two brushes facing each other; membranes porous or reticulate. Type M. laminosum.

laminosum, Dawson, 1883, Rep. on Redpath Mus. No. 2, p. 12, Subcarboniferous. MICROSPONGIA, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 37. [Ety. micros, small; spongia, sponge.] Free, no epitheca; compact, without large openings; structure radiate. Type M. gregaria.



FIG. 108.-Microspongia gregaria,

spongia gregaria, 244, Trenton Gr. MCELLERINA, Ulrich, 1886, Cont. to Am. Pal., p. 34. [Ety. proper name.] Consisting of two suborbicular, thin-walled chambers, outer one with spiral ridges, inner one smooth; at the ends of the outer chamber there is a round opening, surrounded by an elevated border, where the ridges terminate. Type M. greenei.

parva,)

Am. Geol., vol. 3, p.

greenei, Ulrich, 1886, Cont. Am. Pal., p. 35, Up. Held. Gr.

Nodosinella, Brady, 1876, Monograph Carb. and Perm. Foraminifera, p. 102. 1876, Monograph [Ety. nodus, knot; ellus, diminutive.] Free, straight, or arcuate, not spiral; constricted at intervals, test imperforate, texture finely arenaceous, aperture simple or compound. Type N. digitata.

priscilla, Dawson, 1868, (Dentalina priscilla,) Acadian Geology, p. 285, Carboniferous.

Nullipora, Lamarck, 1801, Système des Anin. sans Vert. [Ety. nullus, no; poros, pore.] Not American Palae ozoic.

fobtexta, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 33, Burlington Gr.

Orbiculites ? reticulata. see Receptaculites reticulatus.

- Edwards & FIG. 109.-Nodo See Hist Nat sinella priscilla PALÆACIS, Haime, 1860, Hist. Nat. sinella priscula. des Coralliaires, vol. 3, enlarged. p. 171. [Ety. palaios, ancient; akis, barb.] Skeleton cuneate
 - or turbinate, adherent, cups 1 to 12, cell-like, margins crenulate, separated by depressions; substance pierced by microscopic tubuli. Type P. cuneiformis.
 - compressus, Meek & Worthen, 1860, (Sphenopterium compressum,) Proc. Acad. Nat. Sci. Phil., p. 448, and Geo. Sur. Ill., vol. 2, p. 234, Keokuk Gr. cuneatus, Meek & Worthen, 1860, (Sphe-nopoterium cuneatum,) Proc. Acad.

Nat. Sci., p. 448, syn. for P. cuneiformis. cuneiformis, M. Edwards,

1860, Hist. Nat. d. Corollairs, tome 3, p. 171, Warsaw Gr.



F16. 110. enormis, Meek, & Worthen, (Sphenopoterium cuneiformis. 1860, enorme,) Proc. Acad. Nat.

Sci., p. 448, and Geo. Sur. Ill., vol. 2, p. 146, Kinderhook Gr.

- enormis, var. depressus, Meek &Worthen, 1866, (Sphenopoterium enorme var. depressum,) Geo. Sur. Ill., vol. 2, p. 146, Kinderhook Gr.
- obtusus, Meek & Worthen, 1860, (Sphenopoterium obtusum,) Proc. Acad. Nat. Sci., p. 448, and Geo. Sur. Ill., vol. 2, p. 233, Keokuk Gr.



cratera.

large, dispersed openings, with inter-



a genus of sponges.] Cylindrical or ir-





162PROTOZOA. trentonensis, Gr. P. globosus. Riv. Gr. Riv. Gr. FIG. 112.-Palæospongia trentonensis. View of calice. ton Gr. vening space minutely porous. Type P. cratera. Antic., p. 72, Anticosti Gr. cratera, Roemer, 1848, (Siphonia cratera,) Leonh. und Bronn's Jahrb., p. 685, Niagara Gr. roemeri, Walcott, 1885, Monog. U. S. Geo. Sur., vol. 8, p. 99, Devonian. PALÆOSPONGIA, D'Orbigny, 1850, Prodr. d. Paléont., t. 1, p. 26. [Ety. palaios, an-cient; spongia, sponge.] Cyathiform, irregular, surface reticulated irregu-larly, by concentric and transverse lines. Type P. cyathiformis. Fig. 115.— Pasceolus darwini. Upper

cyathiformis, Hall, 1847, (----- cyathi-formis,) Pal. N. Y., vol. 1, p. 72, Trenton Gr.

PAL-PAS

Worthen 1875, (Cnemidium tren tonense,) Geo. Sur. Ill. vol. 6, p. 491, Trenton

PASCEOLUS, Billings, 1857. Rep. of Progr. Geo. Sur. Can., p. 342." [Ety. pasceolus, leather moneybag.] Sub-globularbod FIG. 114. ies marked ceolus on the cast claudii. as if by polygonal plates, and with a scar or depression for an attaching stem. Type

- claudii, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 6, Hud.
- darwini, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 5, Hud.
- globosus, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 343, Tren-

gregarius, Billings, 1866, Catal. Sil. Foss.



surface.

FIG. 116.— Pasceolus darwini. Under surface.

halli, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 342, Anticosti Gr. intermedius, Billings, 1866, Catal. Sil. Foss. Antic., p., 72, Anticosti Gr.



PAT.-REC.]

PATTERSONIA, S. Α. Cin. Soc. Nat. [Ety. proper nam no large opening pansions on the bundles of fine and in the interio into the parencl spicules unknow aurita, Beecher, 1 aurita,) Mem. Pe Trenton Gr. difficilis, S. A. Mi Soc. Nat. Hist., v

Gr. tuberosa, Beecher, tuberosa,) Mem. 1 Trenton Gr.



FIG. 118.-Pattersonia upper

- PHRAGMODICTYA, Hal Y. St. Mus. Nat. phragmos, a parti Cylindrical or cuj a concave diaphra expanded base. of a reticulate tis rayed spicules a rods. Type P. ca catilliformis, Whitfi
 - ton catilliformis,)
- Nat. Hist., p. 18, 1 lineata, Hall, 1884, Mus. Nat. Hist., p patelliformis, Hall,
- St. Mus. Nat. H Gr.
- Physospongia, Hall, 1 N. Y. St. Mus. Na physa, bladder; sp cylindrical, expan surface divided in tudinal areas by spicules, and into concentric bands bullate; spicules terzonate tissue fir P. dawsoni.
- alternata, Hall, 1884 Mus. Nat. Hist., p.
- colletti, Hall, 1884, Mus. Nat. Hist., p dawsoni, Whitfield, dawsoni,) Bull. I Hist., p. 16, Keok



PAL-PAS.

Worthen. midium tren Geo. Sur. Ill. 491, Trenton

illings, 1857. Progr. Geo.



FIG. 114. ed Pasceolus ast claudii)0-

tes, and with lepression for ng stem. Type 8.

A. Miller. Quar. Jour. 1, p. 6, Hud.

A. Miller, Quar. Jour. 1, p. 5, Hud.

illings, 1857, 33 Geo. Progr. p. 343, TrenÐ

tal. Sil. Foss. 34



- Pasceolus . Under irface.

Progr. Geo. i Gr. illings, 1866, 36 Foss. Antic., sti Gr.



ceolus

PAT.-REC.]

Trenton Gr.

Trenton Gr.

Gr.

Gr.

P. dawsoni.

and in the interior, which do not merge into the parenchyma of the sponge;

aurita,) Mem. Pea. Mus., vol. 2, p. 28,

Soc. Nat. Hist., vol. 5, p. 43, Hud. Riv.

tuberosa,) Mem. Pea. Mus., vol. 2, p. 28,

spicules unknown. Type P. difficilis. aurita, Beecher, 1889, (Strobilospongia

difficilis, S. A. Miller, 1882, Jour, Cin.

tuberosa, Beecher, 1889, (Strobilospongia

FIG. 118.-Pattersonia difficilis. Fragment of

upper surface.

PHRAGMODICTYA, Hall, 1884, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 466. [Ety. phragmos, a partition; dictuon, a net.] Cylindrical or cup-shaped fronds, with

a concave diaphragm near the broadly

expanded base. Substance composed

of a reticulate tissue of six and three

rayed spicules and long cylindrical rods. Type P. catilliformis. catilliformis, Whitfield, 1881, (Dictyophy-

ton catilliformis,) Bull. No. 1, Am. Mus.

Nat. Hist., p. 18, Keokuk Gr. lineata, Hall, 1884, 35th Rep. N. Y. St.

Mus. Nat. Hist., p. 478, Keokuk Gr. patelliformis, Hall, 1884, 35th Rep. N. Y.

PHYSOSPONGIA, Hall, 1884, Abstr. 35th Rep. N. Y. St. Mus. Nat. Hist., p. 467. [Ety.

St. Mus. Nat. Hist., p. 478, Keokuk

physa, bladder; spongia, sponge.] Frond

cylindrical, expanding from the base; surface divided into from 8 to 24 longi-

tudinal areas by bands of tubular spicules, and into regular quadrules by concentric bands of spicules; surface

bullate; spicules anchor-shaped. In-

terzonate tissue finely reticulated. Type

alternata, Hall, 1884, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 481, Keokuk Gr.

colletti, Hall, 1884, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 480, Keokuk Gr. dawsoni, Whitfield, 1881, (Uphantænia

dawsoni,) Bull. No. 1, Am. Mus. Nat.

Hist., p. 16, Keokuk Gr.

PROTOZOA.

- PATTERSONIA, S. A. Milller, 1882, Jour. Protocyathus, Ford, 1878, Am. Jour. Sci. and Cin. Soc. Nat. Hist., vol. 5, p. 43. [Ety. proper name.] Solid, amorphous, Arts, 3d ser., vol. 15, p. 124, syn. for Ethmophyllum. PROTOSPONGIA, Salter, 1864, Quar. Jour. Geo. Soc., vol. 20, p. 238. [Ety. protos, first; no large openings; lobed, pendent expansions on the upper surface, and bundles of fine filaments at the base
 - spongia, sponge.] Skeleton loose, reticulate formed of cruciform spiculæ in one plane. Type P. fenestrata.
 - fenestrata, Salter, 1864, Quar. Jour. Geo. Soc., vol. 20, p. 238, and Mon. U. S. Geo. Sur., vol. 8, p. 11, Up. Taconic. rarus, see Ethmophyllum rarum.

 - RAUFFELLA, Ulrich, 1889, Am Geol., vol. 3,
 p. 235. [Ety. proper name.] Hollow cylindrical stems or 'radially arranged leaves; wall thin, composed of two layers of spicule tissue, inner one por-ous, outer one composed of large spicules appearing as threads interwoven. Type R. filosa.
 - filosa, Ulrich, 1889, Am. Geol., vol. 3, p. 237, Trenton Gr.
 - palmipes, Ulrich, 1889, Am. Geol., vol. 3, p. 238, Trenton Gr.
 - RECEPTACULITES, DeFrance, 1827, Dict. Sci. Nat., tome 45, p. 5. [Ety. receptaculum, receptacle; lithos, stone.] Subglobular, discoid, or infundibuliform; composed of cylindrical columns, connected at their upper and lower ends by transverse stolons. Type R. neptunei. arcticus, Etheridge, 1878, Quar. Jour. Geo.

 - Soc., vol. 34, p. 576, Lower Silurian. bursiformis, Hall, 1883, Rep. St. Geol., pl. 23, fig. 12-14, Schoharie Grit.
 - calciferus, Billings, 1865, Pal. Foss., vol. 1, p. 351, Calcif. Gr.
 - canadensis, Billings, 1863, (Ischadites canadensis,) Geo. of Can., p. 309, Anticosti Gr.
 - circularis, Emmons, 1856, Am. Geol., p. 230, Hud. Riv. Gr.
 - dactyloides, see Cerionites dactyloides.
 - devonicus, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 198, Up. Held. Gr.
 - eatoni, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 68-226, Schoharie Grit.
 - elegantulus, Billings, 1865, Pal. Foss., vol. 1, p. 360, Calcif. Gr. ellipticus, Walcott, 1885, Monog. U. S.
 - Geo. Sur., vol. 8, p. 67, Chazy Gr. elongatus, Walcott, 1885, Monog. U. S.
 - Geo Sur., vol. 8, p. 66, Chazy Gr. formosus, Meek & Worthen, 1870, Proc.
 - Acad. Nat. Sci., p. 23, and Geo. Sur. Ill., vol. 6, p. 500, Niagara Gr. fungosus, Hall, 1861, Geo. Rep. Wis., p.
 - 15, Galena Gr.
 - globularis, Hall, 1861, Supp. Geo. Sur. Wis., p. 16, and Geo. Sur. Ill., vol. 3, p. 301, Galena Gr.
 - hemisphericus, Hall, 1861, Geo. Rep. Wis., p. 16, and Geo. Wis., vol. 4, p. 269, Niagara Gr.
 - infundibuliformis, Eaton, 1832, (Coscinopora infundibuliformis,) Geo. Text Book, p. 44, Low. Held. Gr.

27.

38.

39.

infundibulum, Hall, 1861, Geo. Rep. Wis., p. 16, Niagara Gr.

insularis, Billings, 1866, Catal. Sil. Foss.

Antic., p. 29, Anticosti Gr. iowensis, Owen, 1852, (Selenoides iowen-sis,) Geo. Sur. Wis., Iowa, and Minn., p. 587, Trenton Gr.

jonesi, Billings, 1865, Pal. Foss., vol. 1, p. 41. 389, Low. Held. Gr.



FIG. 119.--Receptaculites occidentalis, showing the tubes

mammillaris, Walcott, 1885, Monog. U. S. Geo. Sur., vol. 8, p. 65, Chazy Gr. monticulatus, Hall, 1883, Rep. St. Geol., pl. 23, fig. 3-11, Low. Held. Gr.

ohioensis, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 123, Niagara Gr. oweni, Hall, 1861, Geo. Rep. Wis., p. 13, and Geo. Sur. Ill., vol. 3, p. 302,

Galena Gr.

species.

neptunei, DeFrance, 1827, Dict. des. Sci.

Nat., vol. 45, p. 5. Not an American

occidentalis, Salter,

1859, Can. Org.

Rem., Decade 1, p. 45, Trenton Gr.

DeFrance,

FIG. 120. -- Receptaculites occidentalis, showing the endorhin, the pores at the angles of the plates, and deeply concave nucleus.

reticulatus, Owen, 1844, (Orbituloides reticulata,) Rep. on Owen, Minn. Lands, p. 70, Niagara Gr.



FIG. 121.—Receptaculites occidentalis, showing the nucleus and ectorhin.

- sacculus, Hall, 1879, Desc. New Species Foss. from Waldron, Ind., p. 1, and 11th Rep. Geo., and Nat. Hist. Ind., p. 222, Niagara Gr.
- squami er, Hall, 1859, (Dictyocrinus squamifer,) Pal. N. Y., vol. 3, p. 135, Low. Held. Gr.
- subturbinatus, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 224, Niagara Gr. sulcatus, Owen, 1844. This name was pre-
- occupied by Goldfuss, and the species is now named R. oweni.

- tessellatus, Winchell & Marcy, 1865, Menn. Bost. Soc. Nat. Hist., vol. 1, p. 85. Niagara Gr.
- RHABDARIA, Billings, Pal. Foss., vol. 1, p. 357. [Ety. rhabdos, rod.] Small, cylin-drical bodies, with a rough surface and a perforation in the center. Type R. fragilis.
 - fragilis, Billings, 1865, Pal. Foss., vol. 1. p. 357, Calciferous Gr.
 - furcata, Billings, 1865, Pal. Foss., vol. 1. p. 358, Calciferous Gr.
- RHOMBODICTYON, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 347. [Ety. rhombos, rhomb; dictyon, net.] Globular, discoid, or cyathiform, composed of two or more sets of rods crossing each other at various angles, but not dividing, and leaving rhombic spaces filled with another substance. Type R. reniforme.
 - discum, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 348, Utica Slate. reniforme, Whitfield, 1886, Bull. Am. Nat. Hist., vol. 1, p. 347, Utica Slate.
 - reniforme var. rhombiforme, Whitfield,
 - 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 348, Utica Slate.
- Rotalia, Lamarck, 1804, Ann. Mus. [Ety. rota, wheel.] Not Palæozoic.

 baileyi, see Endothyra baileyi.
 Saccammina, Sars, 1868, Vidensk-Selsk.
 Forhandl., p. 248, [Ety. diminutive of sakkos, a bag.] Not American Palaeozoic.

- eriana, Dawson, 1881, Can. Nat., vol. 10, syn for Calcisphæra robusta.
- SACCOSPONGIA, Ulrich, 1879, Am. Geo., vol. 34, p. 242. [Ety. sakkos, bag; spongia, sponge.] Subcylindrical, with a central cloacal cavity extending through it; walls porous, traversed with tortuous branching canals intercommunicating with each other. Type S. rudis.
 - danvillensis, Ulrich, 1889, Am. Geol., vol. 3, p. 243, Trenton Gr.
- rudis, Ulrich, 1889, Am. Geol., vol. 3, p. 242, Trenton Gr. Scyphia, Oken, 1815. Not American Palæ-
- ozoic.
- digitata, see Brachiospongia digitata.
- stellata, Troost, 1840, not properly defined.
- Selenoides, Owen, 1852, syn. for Receptaculites.
- iowensis, see Receptaculites iowensis. Siphonia, Parkinson, 1820, Organ. Rem.

Not American Palæozoic. cratera, see Palæomanon cratera.

imbricato-articulata, see Astylospongia imbricato-articulata.

præmorsa, see Astylospongia præmorsa. Sphenopterium, Meek & Worthen, 1860, syn. for Palæacis.

compressum, see Palæacis compressus. cuneatum, see Palæacis cuneiformis.

enorme, see Palæacis enormis.

enorme var. depressum, see Palæacis enormis var. depressus.

obtusum, see Palæacis obtusus.

SPO.-STR.]

Spongia, Linnæus. ozoic.



122. FIG. - Strephoche richmondensis, showi several specimens ou slab.

> twine; ochetos, careous sponge, layers composed twining canals. latus.

atratus, Seely, 1885 Sci. and Arts, vo Black Riv. Gr.

brainerdi, Seely, Jour. Sci. and A

vol. 32, p. 32, Cha ocellatus, Seely, 188 Sci. and Arts, vol Chazy Gr.

richmondensis, S. 1882, (Stromatoce mondense,) Jour Nat. Hist., vol. 5, Riv. Gr.

STREPTOSOLEN, Ulrich (in press,) Geo. Su p. 273. [Ety. strep solen, a channel.] pedunculate; cer having thin walle tending to the ba surrounded with canals, between w are vertical ones.

obconicus, Ulrich & Geo. Sur. Ill., vol. (

STREPTOSPONGIA, Ulrich 3, p. 244. [Ety. stre sponge.] Massive, twining vertical la tortuous linear in labyrinthica. Poor

labyrinthica, Ulrich, 3, p. 244, Hud. Riv Strobilospongia, Beecher Mus., vol. 2, p. 14,

aurita, see Pattersoni tuberosa, see Patterson STROMATOCERIUM, Hall,

1, p. 48. [Ety. str honey-comb.] He posed of numerous layers, more or les the pores that cha pora. Type S. rugo richmondense, see Stre

densis.

rugosum, Hall, 1847, 1 48, Birdseye and Bl

164

40.

RHA.-SPH.

rcy, 1865, Menn. vol. 1, p. 85.

oss., vol. 1, p. Small, cylingh surface and

nter. Type R. Foss., vol. 1.

I. Foss., vol. 1.

886, Bull. Am. p. 347. [Ety. net.] Globun, composed of crossing each but not dividc spaces filled Type R. reni-

ull. Am. Mus. Utica Slate. Bull. Am. Nat. 1 Slate. ne, Whitfield. t. Hist., vol. 1,

. Mus. [Ety. zoic. •yi. Vidensk-Selsk.

diminutive of merican Palæ-

'Nat., vol. 10, ısta. Am. Geo., vol. bag; spongia, with a central g through it: with tortuous ommunicating 3. rudis. Am. Geol., vol.

eol., vol. 3, p.

merican Palæ-

digitata. perly defined. for Recepta-

iowensis. Organ. Rem.

atera. vlospongia im-

præmorsa. 1en, 1860, syn.

mpressus. iformis. Palæacis enor-

us.

SPO.-STR.]

ozoic.



FIG. 122. -- Strephochetus richmondensis, showing several specimens on a slab.

[Ety. strepho, I twine; ochetos, canal.] A free calcareous sponge, showing concentric layers composed of minute twining canals. Type S. ocellatus.

atratus, Seely, 1885, Am. Jour. Sci. and Arts, vol. 32, p. 32, Black Riv. Gr.

brainerdi, Seely, 1885, Am. Jour. Sci. and Arts, 3d ser., vol. 32, p. 32, Chazy Gr. ocellatus, Seely, 1885, Am. Jour.

Sci. and Arts, vol. 30, p. 357, Chazy Gr. richmondensis, S. A. Miller,

1882, (Stromatocerium richmondense,) Jour. Cin. Soc. Nat. Hist., vol. 5, p. 41, Hud. Riv. Gr.

STREPTOSOLEN, Ulrich & Everett. (in press,) Geo. Sur. Ill., vol. 8 p. 273. [Ety. streptos, twisted; solen, a channel.] Obconical, pedunculate; central oscula having thin walled tubes extending to the base; oscula surrounded with radiating canals, between which there

are vertical ones. Type S. obconicus. obconicus, Ulrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 274, Trenton Gr. STREPTOSPONGIA, Ulrich, 1889, Am. Geo., vol.

3, p. 244. [Ety. streptos, twisted; spongia, sponge.] Massive, composed of intertwining vertical lamellæ, separated by Type S. tortuous linear interspaces. labyrinthica. Poorly defined. labyrinthica, Ulrich, 1889, Am. Geo., vol.

3, p. 244, Hud. Riv. Gr.

Strobilospongia, Beecher, 1889, Mem. Pea. Mus., vol. 2, p. 14, syn. for Pattersonia. aurita, see Pattersonia aurita. tuberosa, see Pattersonia tuberosa

STROMATOCERIUM, Hall, 1847, Pal. N. Y., vol. 1, p. 48. [Ety. stroma, layer; kerion, honey-comb.] Hemispherical, composed of numerous concentric vesicular layers. more or less wrinkled, without the pores that characterize Stromatopora. Type S. rugosum.

richmondense, see Strephochetus richmondensis.

rugosum, Hall, 1847, Pal. N. Y., vol. 1, p. 48, Birdseye and Black Riv. Gr.

PROTOZOA.

inciso-lobata, see

incisolobata.

sulcata.

stellatim-sulcata,

see Astylospon-

gia stellatim-

REPHOCHETUS, Seely, 1885, Am.

Jour. Sci. and

Arts, 3d ser., vol. 30, p. 355.

Astylospon gia

Spongia, Linnæus. Not American Palæ- STROMATOPORA, Goldfuss, 1826, Petref. Germ.,

p. 22. [Ety. stroma, stratum; poros, pore.] Dimorphous masses or extended sheets composed of delicate calcareous laminæ, in successive layers, separated by minute, vertical pillars, dividing the interval into minute subquadrangular cavities; the whole is perforated by canals irregularly disposed and possessed of exhalant apertures. Type S. concentrica. cæspitosa, Winchell, 1866, Rep. Low. Penin. Mich., p. 91, Ham. Gr.

compacta, Billings, 1862, Pal. Foss., vol. 1, p. 55, Black Riv. Gr. There is some doubt about the reference of this species to this genus. Possibly it is a bryozoan. concentrica, Goldfuss, 1826, Germ. Petref.,



FIG. 123.-Stromatocerium rugosum.

p. 22, and Pal. N. Y., vol. 2, p. 136, Niagara Gr.

constellata, see Cœnostroma constellatum. erratica, Hall, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 226, Up. Held. Gr.



92, Cornif- FIG. 124-Stromatopora himuil. erous Gr.

hindii, Nicholson, 1874, Ann. and Mag. Nat. Hist., 4th ser., vol. 13, and Pal. Prov. of Ont., p. 13, Niagara Gr.

12

166

- Mag. Nat. Hist., 4th ser., vol. 12, p. 92, Corniferous Gr.
- monticulifera, see Cœnostroma monticuliferum.
- nodulata, Nicholson, 1875, Ohio Pal., vol. 2, p. 249, Corniferous Gr.
- nulliporoides, Nicholson, 1875, Pal. Prov. Ont., p. 78, Ham. Gr. nux, Winchell, 1866, Rep. Low. Penin. Mich., p. 91, Ham. Gr.
- ostiolata, Nicholson, 1873, Ann. and Mag. Nat. Hist., 4th ser., vol. 12, p. 90, Guelph Gr.
- perforata, Nicholson, 1874, Ann. and Mag. Nat. Hist., 4th ser., vol. 13, and Pal. Prov. of Ont., p. 15, Corniferous Gr.

ponderosa, Nicholson, 1875, Ohio Pal., vol. 2, p. 246, Corniferous Gr. pustulifera, see Cœnostroma pustuliferum. pustulosa, Safford. Not defined.

solidula, see Cœnostroma solidulum.

- subcylindrica, James, 1885, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 20, Hud. Riv. Gr. Poorly defined. Not a Stromatopora. None have been found in Lower Silurian rocks.
- substriatella, Nicholson, 1875, Ohio Pal., vol. 2, p. 248, Corniferous Gr. tuberculata, Nicholson, 1873, Ann. and
- Mag. Nat. Hist., 4th ser., vol. 12, p. 90, Corniferous Gr.
- verrucosa, Troost, 1840, 5th Geo. Rep. Tenn., p. 66, Devonian? Not recognized. STROTOSPONGIA, Ulrich & Everett, (in
- press,) Geo. Sur. Ill., vol. 8, p. 276. Ety. strotos, twisted; spongia, sponge.] Funnel-shaped, composed of thin, intricately intertwined vertical leaves, arranged radiately around oscula; cloacal depressions, having apertures of vertical tubes in them; sponge-wall traversed by intertwined canals, having perforated thin walls; spicules minute,
- perforated time wans; spectres minute, three-rayed. Type S. maculosa. maculosa, Ulrich & Everett, (in press.) Geo. Sur. Ill., vol. 8, p. 277, Trenton Gr. Syringophyllum, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, p. 250. The name was preoccupied by Edwards & Haime.



FIG. 125.-Syringostroms columnare.

SYRINGOSTROMA, Nicholson, 1875, Ohio Pal., vol. 2, p. 251. [Ety. syrinx, pipe.; stroma, layer.] Massive, composed of concentric laminæ, and vertical pillars firmly amalgamated. It is intimately related to Stromatopora. Type S. columnare.

STR.-UPH.

- columnare, Nicholson, 1875, Ohio Pal-vol. 2, p. 253, Corniferous Gr. densum, Nicholson, 1875, Ohio Pal., vol.
- 2, p. 251, Corniferous Gr.
- Textularia palæotrochus, see Valvulina palæotrochus.
- THAMNODICTYA, Hall, 1884, 35th Rep. N. Y St. Mus. Nat. Hist. p 466. [Ety. thamnos, shrub; dictuon, net.] Fronds tubular below, rapidly expanding and cyathiform or infundibuliform above, with twelve strong, longitudinal ridges di-viding the surface into twelve areas. Substance reticulate. Type T. newberryi.

newbérryi, Hall, 1863, (Dictyophyton newber-ryi,) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 87, Wa-verly Gr. TRACHYUM, Billings, 1865, Pal. Foss., vol. 1, p.211. [Ety.

trachus, rough, rugged.] Turbi-nate or cylindrical, with a cup on the upper sur- FIG. 126.-Thamnodicface. It has a

close texture, without large canals. Type T. cyathiforme.



Fig. 127.—Trachyum cyathiforme.

cyathiforme, Billings, 1865, Pal. Foss., vol. 1, p. 211, Quebec Gr. rugosum, Billings, 1865, Pal. Foss., vol. 1,

- p. 212, Quebec Gr.
- TRICHOSPONGIA, Billings, 1865, Pal. Foss., vol. 1, p. 357. [Ety. trichias, to show hairs; spongia, sponge.] Large, rudely hemi-spheric, minutely fibrous, and full of elongate cylindrical or accrate spicules. just visible to the naked eye. There are also numerous irregular branching canals. Type T. sericea.
 - sericea, Billings, 1865, Pal. Foss, vol. 1. p. 257, Calciferous Gr.
- UPHANTÆRIA, Vanuxem, 1842, Geo. Rep. 3d Dist. N. Y., p. 183. [Ety. uphantos, woven; tainia, ribbon.] Composed of ligulate radiating and concentric bands, the reticulations being produced by the substance of the frond, and not by superficial striæ. For many years it was supposed to represent a marine plant. Type U. chemungensis.

chemungensis, Van 3d Dist. N. Y., p dawsmi, see Physo VALVULINA, D'Orbigi d. l. Classe d. valva, door; in blance.] Free or choid, turbinoid, cylindrical, cham sometimes termin series. Aperture on the inferior s

valvular tongue. bulloides, Brady, 18 Perm. Foraminif erous.

decurrens, Brady, Scotland, pp. 63-6 palæotrochus, Ehre ria palæotrochus, boniferous.

plicata, Brady, 1873. land, pp. 66-95, C

SUBKI

THE Coelenterat Classes : viz., Anthor the palæozoic fossils animal) are more g They are all aquatic locomotive organs, an mouth, which is dest gastric cavity. Ther ding, dividing, and b

The skeleton wh secretions take place disk or stomach. Ea tions or septa of the an expression of the sentially a skeleton of of the polyp animal. made by the meeting of addition of a point or vesicular mass; or it fill up the pores, or be ward, solid horizontal

Wherever a tabul the tissues below the

[STR.-UPH.

ertical pillars is intimately Type S. co-

5, Ohio Pal Gr.)hio Pal., vol

lvulina palaco-

th Rep. N. Y 1. [Ety. tham-Fronds tubular g and cyathiabove, with nal ridges ditwelve areas. vpe T. new-

-Thamnodic-

newberryi large canals.



hiforme

Pal. Foss., vol.

1. Foss., vol. 1,

, Pal. Foss., vol. to show hairs; , rudely hemias, and full of cerate spicules, ed eye. There ular branching

Foss, vol. 1. p.

2, Geo. Rep. 3d Ety. uphantos, Composed of

ncentric bands, roduced by the and not by suny years it was I marine plant.

CŒLENTERATA.

chemungensis, Vanuxem, 1842, Geo. Rep. 3d Dist. N. Y., p. 183, Chemung Gr. dawsoni, see Physospongia dawsoni.

VAL.-ZIT.]

VALVULINA, D'Orbigny, 1826, Tabl. Method. d. l. Classe d. Cephalopodes. [Ety. valva, door; inus, implying resem-blance.] Free or adherent, spirally trochoid, turbinoid, planoconvex or subcylindrical, chambers spirally arranged, sometimes terminating in a rectilinear series. Aperture in the umbilical angle, on the inferior surface, protected by a valvular tongue. Type V. triangularis. bulloides, Brady, 1876, Monog. Carb. and Perm. Foraminifera, p. 89, Carbonif-

erous. decurrens, Brady, 1873, Mem. Geo. Sur. Scotland, pp. 63-95, Carboniferous.

palæotrochus, Ehrenberg, 1854, (Textularia palæotrochus,) Mikrogeologie, Carboniferous.

plicata, Brady, 1873, Mem. GeoßSur., Scotland, pp. 66-95, Carboniferous.

rudis, Brady, 1876, Monog.Carb. and Perm. Foraminifera, p. 90. Carboniferous.

ZITTELELLA, Ulrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 267. [Ety. proper name.] Pedunculate, attached, variable in shape; upper surface with a shallow, central depression, with thin walled, vertical tubes extending to the base; radiating, inosculating canals, separated by spicular tissue, giving the appearance of vertical fissures. Type Z. typicalis. Ulrich & Everett refer Palæospongia trentonensis to this genus, so probably this genus is a synonym for

Palæospongia. inosculata, Ulrich & Everett, (in press,)

Inosculata, Ofrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 271, Trenton Gr.
lobata, Ulrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 270, Trenton Gr.
typicalis, Ulrich & Everett, (in press,) Geo. Sur. Ill., vol. 8, p. 268, Trenton Gr.
They have also made the varieties pictil. They have also made the varieties pistilliformis, subrotunda, and turbinata.

SUBKINGDOM CŒLENTERATA.

THE Coelenterata (koilos, hollow; entera, intestines) are divided into three Classes: viz., Anthozoa, Hydrozoa, and Ctenophora; the first two of which include the palaeozoic fossils of this Subkingdom. The Anthozoa (anthos, flower; zoon, animal) are more generally known by the name Polypi (polys, many; pous, foot). They are all aquatic, usually cylindrical, organized for sedentary life, have no locomotive organs, and are provided with a circle of retractile tentaculæ around the mouth, which is destitute of any masticating apparatus, and they have a central gastric cavity. There are no special organs of sense, and they increase by budding, dividing, and by means of ova.

The skeleton which the polyps secrete is technically called the corallum. The secretions take place at the sides and lower part of the polyp, but not in the disk or stomach. Each septum is secreted between a pair of radiating, fleshy partitions or septa of the polyp, and hence the radiate structure of ordinary corals is an expression of the internal radiate structure of the polyp. The corallum is essentially a skeleton of carbonate of lime, the open spaces in which show the structure of the polyp animal. The bottom of the calyx, or calycle, in the corallum may be made by the meeting of the septa, or by the twisting of them together, with the addition of a point or columella at the center; or the bottom may be a porous or vesicular mass; or it may be solid, because the coral secretions of the polyp may fill up the pores, or because there are formed periodically, as the polyp grows upward, solid horizontal plates across the bottom, called tabulæ.

Wherever a tabula cuts off the connection of the polyp with the coral below. the tissues below the tabula dry and wither, and we have dead coral below the

CŒLENTERATA.

tabula, and the living polyp above. In this way massive corals are formed; the secretions take place at the top, and the animal cuts itself off from the coral skeleton below. Prof. Dana says:

"It is not more surprising, nor a matter of more difficult comprehension, that a polyp should form structures of stone (carbonate of lime) called coral, than that the quadruped should form its bones, or the mollusk its shell. The processes are similar, and so the result. In each case it is a simple animal secretion; a secretion of stony matter from the aliment which the animal receives, produced by the parts of the animal fitted for this secreting process; and in each, carbonate of lime is a constituent or one of the constituents of the secretion."

Ordinary corals of the present seas have a hardness a little greater than common marble, or about equal to aragonite, and give a ringing sound when struck with a hammer.

The Anthozoa are divided into three Subclasses, two of which, Zoantharia (zoon, animal; anthos, flower) and Alcyonaria (alkuoneion, a zoophyte, like the kingfisher's nest), occur in palæozoic rocks. The Zoantharia are divided into seven orders, four of which are said to be palæozoic: viz., Perforata, Tabulata, Rugosa, and Tubulosa. To the Perforata the genera Protarea and Pleurodictyum have been very doubtfully referred, and the Auloporidæ have been classed with the Tubulosa. All other palæozoic corals are referred to the Tabulata and Rugosa. The family Favositidæ is typical of the Tabulata, and the family Cyathophyllidæ of the Rugosa. Authors are not in accord respecting the ordinal relations of all the families, and hence we will simply arrange them alphabetically.

CLASS ANTHOZOA.

SUBCLASS ZOANTHARIA.

FAMILY AULOPORIDÆ.—Aulopora, Romingeria.

FAMILY CHETETIDÆ.—Chetetes, Dania, Ptychonema.

FAMILY COLUMNARIIDÆ.—Calapœcia, Columnaria, Favistella.

FAMILY CYATHOPHYLLIDÆ.—Acervularia, Acrophyllum, Amplexus, Anisophyllum, Arachnophyllum, Astræophyllum, Aulacophyllum, Aulophyllum, Axophyllum, Baryphyllum, Blothrophyllum, Bucanophyllum, Campophyllum, Chonophyllum, Clisiophyllum, Coleophyllum, Craspedophyllum, Crepidophyllum, Cyathophyllum, Diphyphyllum, Duncanella, Elasmophyllum, Eridophyllum, Hadrophyllum, Hallia, Heliophyllum, Heterophrentis, Lithostrotion, Lophophyllum, Omphyma, Pachyphyllum, Palæophyllum, Phillipsastrea, Ptychophyllum, Pycnostylus, Streptelasma, Strombodes, Stylastrea, Trochophyllum, Zaphrentis.

FAMILY CYCLOLITIDE.—Combophyllum, Discophyllum, Microcylus, Palaocyclus.

FAMILY CYSTIPHYLLIDÆ.—Cystiphorolites, Cystiphyllum, Cystostylus.

FAMILY FAVOSITIDÆ.—Alveolites, Chonostegites, Cladopora, Cœnites, Dendropora, Emmonsia, Favosites, Leptopora, Lunatipora, Michelinia, Pleurodictyum, Pachypora, Sphærolites, Striatopora, Syringolites, Trachypora, Vermipora.

FAMILY HALYSITIDE.—Halysites. FAMILY PORITIDE.—Protarea. FAMILY SYRIN FAMILY TETR FAMILY THEC

FAMILY BOLB FAMILY HELIC FAMILY MONT Monotrype FAMILY STELL

This class is re called Graptolites. slaty layers, and ger pressed. Specimens cinnati and vicinity, covered with a thin, by longitudinal part of which is only about edges on flattened fi projecting cells may When the interior su of being pressed into cells, which furnishes imperfect, and frequ was the first Order first to become extin

> FAMILY CALLA Dendrograp FAMILY DICTYO FAMILY GRAPTO CRADOGRAPTU FAMILY GLOSSOO FAMILY GLOSSOO FAMILY NEMAGI FAMILY NEMAGI FAMILY NOCAU FAMILY MEGALO FAMILY OLDHAM FAMILY PHYLLO FAMILY PHYLLO FAMILY PHYLLO FAMILY RASTRIT FAMILY RETIOLY

CŒLENTERATA.

FAMILY SYRINGOPORIDE.—Cannapora, Syringopora, Thecostegites. FAMILY TETRADIDE.—Tetradium.

FAMILY THECIDÆ.—Thecia.

SUBCLASS ALCYONARIA.

FAMILY BOLBOPORITIDÆ.—Bolboporites.

FAMILY HELIOPORIDÆ.—Heliolites, Lyellia, Plasmopora.

FAMILY MONTICULIPORIDÆ.—Dekayella, Dekayia, Diplotrypa, Monotrypa, Monotrypella, Monticulipora, Nebulipora, Nyctopora, Prasopora.

FAMILY STELLIPORIDÆ.-Stellipora.

CLASS HYDROZOA.

This class is represented in palaeozoic rocks by carbonaceous horny skeletons, called Graptolites. They are usually flattened, forming a thin film between shaly or slaty layers, and generally, in whatever rocks they occur, they are more or less compressed. Specimens are found in clay nodules and in calcareous clay beds, at Cincinnati and vicinity, which are cylindrical branching bodies, or have subquadrate stipes, covered with a thin, carbonaceous coating. The interior of one species is divided by longitudinal partitions of thin, carbonaceous films, into three departments, one of which is only about half the capacity of either of the other two. The denticulated edges on flattened films become projecting cells on more perfect specimens. The projecting cells may be subcircular or angular, and lead directly to the interior. When the interior substance is absent, and the cells are pressed together, instead of being pressed into the stipe, there is presented a diagrammatic side view of the cells, which furnishes the usual saw or denticulated aspect, but which gives a very imperfect, and frequently a very erroneous, idea of the form of the animal. This was the first Order of organisms to reach a high state of development, and the first to become extinct.

ORDER GRAPTOLIDA.

FAMILY CALLOGRAPTIDÆ.—Acanthograptus, Callograptus, Cyclograptus, Dendrograptus.

FAMILY DICTYONEMIDÆ.—Calyptograptus, Dictyonema, Rhizograptus.

FAMILY GRAPTOLITIDÆ.—Cladograptus, Climacograptus, Clonograptus, Dicranograptus, Didymograptus, Diplograptus, Graptolithus.

FAMILY GLOSSOGRAPTIDÆ. -Glossograptus, Retiograptus.

FAMILY NEMAGRAPTIDÆ. - Nemagraptus.

FAMILY MONOGRAPTIDÆ. - Monograptus.

FAMILY INOCAULIDÆ.—Inocaulus.

FAMILY MEGALOGRAPTIDÆ.—Megalograptus.

FAMILY OLDHAMIIDÆ. -Oldhamia.

FAMILY PHYLLOGRAPTIDE. — Phyllograptus.

FAMILY PTILOGRAPTIDE. -Ptilograptus.

FAMILY RASTRITIDE. -Rastrites.

FAMILY RETIOLITIDE. - RETIOLITES.

e formed; the ne coral skele-

nension, that a ral, than that processes are n; a secretion 1 by the parts ze of lime is a

ter than comwhen struck

h, Zoantharia nyte, like the ded into seven nlata, Rugosa, um have been ith the Tubu-Rugosa. The hophyllidæ of ions of all the

blexus, Anisoyhun, Auloicanophyllum, lum, Craspedi, Duncanella, Heliophyllum, Pachyphyllum, Streptelasma,

ocylus, Pala-

ostylus. Cœnites, Denielinia, Pleuros, Trachypora,

AMP.]

cryptodens, Billing

distans, Nicholson vol. 1, p. 54, Up

dubia, see Favosite explanatus, Hall, 13, fig. 16, and F

Low. Held. Gr.

FIG. 132.—Alveoli goldfussi.

Not defined so a

to be recognized.

hemisphericus, D'Or Paléont., t. 1, p.

irregularis, Whitfi Geo. Sur. Wis.,

vol. 4, p. 251, Hu labechi, Edwards Foss. d. Terr. Pa

4, p. 115, Up. H

FAMILY STAUROGRAPTIDÆ.—Staurograptus.

FAMILY THAMNOGROPTIDE. - Bythograptus, Thamnograptus. FAMILY UNCERTAIN.—Dawsonia.

ACANTHOGRAPTUS, Spencer, 1878, Can. Nat.,



FIG. 128.

vol. 8, p.462. [Ety. akantha, spine; grapho, I write.] Shrub-like; one side spinous. Stronger and more bushy than Dendrograptus. Type A. granti. granti, Spen-1878,

pulcher. cer. Can. Nat., vol. 8, p. 463, and Bull. No. 1, Mus. Univ., St. Mo., p. 31, Niagara Gr.

-Acanthograptus

pulcher, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 32, Niagara Gr.

ACERVULARIA, Schweigger, 1820, Handb. der Naturg., p. 418. [Ety. acervus, a heap; considered as a body.] Compound, massive, cells presenting two separated walls, as in Aulophyllum; septa well developed between the walls, but much less in the central area; no columella; tabulæ little de-

veloped; increasing by gemmation. Type A. baltica.

a djunctiva, White, 1880, Proc. U. S. Nat. Mus., vol. 2, p. 255, and Cont. to Pal. No. 6, p. 120, Carbonif-

erous.



FIG. 12 -Acervularia clintonensis

clintonensis, Nicholson, 1875, Ohio Pal., vol. 2, p. 227, Niagara Gr



FIG. 130.-Acervularia davidsoni. davidsoni, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 418, Up. Held. and Ham. Gr.

inequalis, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 233, Chemung Gr.

- pentagona, Goldfuss, 1826, (Cyathophyl-lum pentagonum,) Petref. Germ., p. 60, Devonian.
- profunda, Hall, 1858, Geo. Sur. Iowa, p.,
- 477, Ham. Gr. ACROPHYLLUM, Thomson & Nicholson, 1876, Ann. and Mag. Nat. Hist. 4th ser., vol. 17, p. 455. [Ety. akros, summit; phyllon, leaf.] Corallum simple, tur-binate, or sub-cylindrical, straight, or curved; septa numerous, well-developed, coalescing, and curving as they reach the tabulæ,

forming promitortuous nent, ridges on the central, elevated portion, and becoming complicated with the tabulæ to form the conspicuous, central prominence, which often forms a central axis; fossette reaches from the base of the elevation to the margin of the calyx; exterior usually constricted. Type A. oneidaense.

oneidaense, Billings, 1859, (Clisiophyllum oneidaense, Can. Jour., p. 128, Up. Held. Gr.

agaricia, Lamarck, 1801, Syst. des

FIG. 181.-Acrophyl-Anim. sans Vert. lum oneidaense Not Palæozoic.

swinderniana, see Thecia swinderniana. ALVEOLITES, Lamarck, 1801, Syst. des Anim. sans Vert., p. 375. [Ety. alveus, cavity; lithos, stone.) Dendroid, massive, or incrusting; corallites short, prismatic, or cylindrical; walls united; tabulæ complete; mural pores large, usually near the angles of the tubes, few in number; calices oblique, lower lip most prominent; septa absent, or forming tooth-like projections. Type A. escharoides.

arctica, Woodward, 1879, Lond. Geo. Mag. n. s., vol 5, Devonian.

billingsi, Nicholson, 1874, Geo. Mag. n. s.,

vol. 1, p. 55, Up. Held. Gr. confertus, Nicholson, 1874, Geo. Mag. n. s., vol. 1, p. 54, Up. Held. Gr.





ramulosus, Nichols s., vol. 1, p. 55, U repens, Fought, 174 Amaen. Acad., vo reticulata, see Favos

rockfordensis, Hall Rep. N. Y. St. M Chemung Gr.

51. roemeri, Billings, 18 p. 255, Ham. Gr. selwyni, Nicholson,

vol 1, p. 15, Up. squamosus, Billings 5, p. 257, Up. Hel strigillatus, Winch Peningula Mich

Peninsula Mich., subramosus, Romin

als, p. 43, Ham. (undosus, S. A. Miller 2d ed., p. 262, Niag the species descri 1876, in Foss. Con preoccupied name ACA. - ALV

AMP.]

, 1873, 23d Rep. ., p. 233, Che

(Cyathophylf. Germ., p. 60,

Sur. Iowa, p.,

& Nicholson. Hist. 4th ser., akros, summit; n simple, tural, straight, or 18, well-develirving as they



81.-Acrophyloneidaense

vinderniana. lyst. des Anim. . alveus, cavity; massive, or int, prismatic, or ; tabulæ come, usually near ew in number; p most promiforming toothe A. escharo-

ond. Geo. Mag.

Geo. Mag. n. s., 3r. 4. Geo. Mag. eld. Gr.

CŒLENTERATA.

exsul, see Cal-

sul.

fischeri,

lopora ex-

Pachypora

Pachypora

frondosa.

lings, 1860,

Can. Jour.,

vol. 5, p.

255, Ham.

Foss., p. 2.

Gr. granulosus, James, 1875, Ca-tal. Cin.

goldfussi, Bil-

fischeri. frondosus, see

see

cryptodens, Billings, 1859, Can. Jour., vol. 4, p. 115, Up. Held. Gr. distans, Nicholson, 1874. Geo. Mag. n. s., vol. 1, p. 54, Up. Held. Gr. dubia, see Favosites dubius.

explanatus, Hall, 1883, Rep. St. Geol., pl. 13, fig. 16, and Pal. N. Y., vol. 6, p. 11,

Low. Held. Gr.

FIG. 132.

-Alveolites goldfussi

Not defined so as to be recognized. hemisphericus, D'Orbigny, 1850, Prodr. d. Paléont., t. 1, p. 49. Not defined so as

to be recognized. irregularis, Whitfield, 1878, Ann. Rep.

Geo. Sur. Wis., p. 72, and Geo. Wis., vol. 4, p. 251, Hud. Riv. Gr. labechi, Edwards & Haime, 1851, Pol.

iabechi, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 257, Anticosti Gr.
fd. labiosus, Billings, 1859, Can. Jour., vol. 4, p. 114, Up. Held. Gr. megastoma, Winchell, 1866, Rep. Low. Penin. Mich., p. 89, Ham. Gr. multilamella, Meck, 1877, U. S. Geo. Sur. 40th Parallel, vol. 4, p. 25, Devonian. niagarensis, Nicholson & Hinde, 1874, Can. Low. vol. 14, p. 150 Niagare Gr.

Can. Jour., vol. 14, p. 150, Niagara Gr. niagarensis, Rominger, see A. undosus. ramulosus, Nicholson, 1874, Geo. Mag. n.

s., vol. 1, p. 55, Up. Held. Gr. repens, Fought, 1749, (Millepora repens,)

rockfordensis, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 229,

selwyni, Nicholson, 1874, Geo. Mag. n. s.,

5, p. 257, Up. Held. Gr. strigillatus, Winchell, 1866, Rep. Low. Peninsula Mich., p. 89, Ham. Gr.

subramosus, Rominger, 1876, Foss. Cor-als, p. 43, Ham. Gr.

undosus, S. A. Miller, 1883, Am. Pal. Foss., 2d ed., p. 262, Niagara Gr. Proposed for

the species described by Rominger in

1876, in Foss. Corals, p. 40, under the preoccupied name of A. niagarensis.

reticulata, see Favosites reticulatus.

roemeri, Billings, 1860, Can. Jour., vol. 5, p. 255, Ham. Gr.

vol. 1, p. 15, Up. Held. Gr. *2. squamosus, Billings, 1860, Can. Jour., vol.

Chemung Gr.

Amaen. Acad., vol. 1, p. 99, Niagara Gr.

vallorum, Meek, 1868, Trans. Chi. Acad. Sci., p. 86, Devonian.

- AMPLEXUS, Sowerby, 1814, Mineral Conch-ology, vol. 1, p. 165. [Ety. amplexus, encircling.] Resembles Zaphrentis, except the septa do not extend to the center, they leave the upper surface of the tabulæ exposed in that part; septal fossula highly developed in the upper portion of the corallum; tabulæ well developed; surface usually constricted. Type A. coralloides.
 - annulatus, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 80, and Geo. Wis., vol. 4, p. 314, Niagara Gr.
- cingulatus, Billings, 1862, Pal. Foss., vol. 1, p. 106, Mid. Sil.
- coralloides, Sowerby, 1814, Min. Conch.,
- vol. 1, p. 165, Warsaw Gr. exilis, Billings, 1875, Can. Nat. and Geol., vol. 7, p. 232, Up. Held. Gr.
- fieldeni, Etheridge, 1878, Quar. Jour. Geo.
- Beldeni, Etneridge, 1878, Quar. Jour. Geo. Soc., vol. 34, p. 589, Niagara Gr. fenestratus, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 80, and Geo. Wis., vol. 4, p. 278, Niagara Gr. fragilis, White & St. John, 1868, Trans. Chi Acad Sci. p. 116 Kackuk Gr.
- Chi. Acad. Sci., p. 116, Keokuk Gr. hamiltoniæ, Hall, 1876, Illust. Dev. Foss., pl. 19, Ham. Gr.
- intermittens, Hall, 1876, Illust. Dev. Foss., pl. 32, Ham. Gr. junctus, Hall, 1882, Foss. Corals Niagara
- and Up. Held. Groups, p. 11, and 35th

Rep. N. Y. St. Mus. Nat. Hist., p. 415, Niagara Gr. laxatus, Billings,

(?) Can. Nat.

56.

55.

53.

54.

Heru. mirabilis, Bulings, 1875, Can. Nat. and Geol., vol. 7, p. 232, Coal 1852,

and Geol., vol. (?) p. (?) Up. Held. Gr.

Meas. phragmoceras, Salter, (Calophyll um phragmoceras)

FIG. 133.—Amplexus yandelli

Sutherland's Jour., vol. 2, p. ccxxx, Niagara Gr. shumardi, Edwards & Haime, 1851, (Cya-

thophyllum shumardi,) Pol. Foss. Terr. Pal., p. 370, Niagara Gr.

- uniformis, Hall, 1882, Foss. Corals Niagara & Up. Held. Grs., p. 11, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 415, Niagara Gr.
- yandelli, Edwards & Haime, 1851, Pol. Foss. d. Terr, Pal., p. 344. Up. Held. Gr. zaphrentiformis, White, 1876, Geo. of
 - Uinta Mountains, p. 107, and Cont. to Pal. No. 6, p. 120, Low. Aubrey Gr.
- ANISOPHYLLUM, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 351. [Ety. anisos, unequal; phyllon, leaf.] Distinguished from Zaphrentis by the great development of three primary septa, one of which faces the septal fossula; this fossula extends to the center of the visceral chamber, and there ceases to be distinct from the bottom of the calycle. Type A. agassizi.

agassizi, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 351, Low. Held. Gr.

- bilamellatum, Hall, 1882, Foss. Oorals Niagara and Up. Held. Grs., p. 9, and 35th Rep. N. Y. St. Mus. Nat. Hist., p.
- 413, Niagara Gr. trifurcatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 9, and 12th Rep. Ind. Geol. & Nat. Hist., p. 273, Niagara Gr.

unilargum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 8, and 12th Rep. Ind. Geol. & Nat. Hist., p. 272, Niagara Gr.

Anthophyllum, Schweigger, 1820, Handb. der. Naturg., p. 417, Not a Palæozoic genus.

FIG. 184.-Aniso-phyllum unilargum.

denticulatum, Goldfuss, 1826, Petref. Germ., p. 46, Niagara Gr. Not determined.

expansum, Owen, 1840, Rep. on Mineral Lands, p. 69. Not defined so as to be recognized.

- ARACHNOPHYLLUM, Dana, 1848, Zoophytes U. S. Expl. Exped., vol. 8, p. 360. TEty. encrusting, having obtusely defined polygonal scars, with a depressed, flattened center, in which the septa meet; septa thin, perforated; buds marginal, structure vesicular, arranged in transverse undulations, corresponding to the form of the cells; no defining walls to the center or between the stars; center marked by a few vertical striæ, resulting from the twisted edges of the septa. Type A. baltica. (Acervularia baltica of authors.)
- richardsoni, Salter, 1852, Sutherland's Jour., vol. 2., p. cexxxii, Up. Sil. Astræa, Lamarck, 1816, Hist. Nat. d. Anim.
 - sans Vert., vol. 2, p. 257. Not a Palæozoic genus. gigas, see Phillipsastrea gigas. hennahi, see Smithia hennahi.

helianthoides, see Heliophyllum halli.

mammillaris, see Strombodes mammillaris.

mammillaris, see Lithostrotion mammillare. rugosa, see Cyathophyllum rugosum. tessellata, Troost. Not defined.

ASTRÆOPHYLLUM, Nicholson & Hinde, 1874. Can., Jour., vol. 14, p. 152. [Ety. aster, star; phyllon, leaf.] Corallum aggregate; corallites cylindrical and united by numerous mural expansions, which form complete floors; septa meeting in the center, forming a columella; costal radii prolonged over the successive exothecal floors; tabulæ rudimentary or absent (?). Type A. gracile.



16. 135.—Astræophyllum gracile, greatly en-larged, showing calices, confluent mural ex-pansions, and costal radii. FIG.

- gracile, Nicholson & Hinde, 1874, Can. Jour., vol. 14, p. 153 and Pal. Ontario, p. 57, Niagara Gr.
- Astrocerium, Hall, 1852, Pal. N. Y., vol. 2, p. 120. [Ety. aster, star; kerion, honey-It was supposed to be distincomb.] guished from Favosites by the presence of twelve or more slender spiniform rays, but it is a synonym. Type A. venustum.

constrictum, see Favosites constrictus. parasiticum, see Favosites parasiticus. pyriforme, see Favosites pyriformis. venustum, see Favosites venustus.

- AULACOPHYLLUM, Edwards & Haime, 1850, Brit. Foss. Corals, p. lxvii. [Ety. aulos, furrow; phyllon, leaf.] Resembles Hallia, though the septal fossula is not replaced by a primary septum, but forms a narrow groove at the bottom where the adjoining septa meet. Type A. sulcatum.
- bilaterale, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 25, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 429, Up. Held. Gr.
- Up. Held. Gr. convergens, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 22, and 12th Rep. Ind. Geo., p. 281, Up. Held. Gr. cruciforme, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 24, and 12th Rep. Ind. Geo., p. 283, Up. Held. Gr. pinnatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 23, and 12th Rep. Ind. Geo., p. 284, Up. Held. Gr. poculum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 25 and 12th Rep.
- and Up. Held. Grs., p. 25 and 12th Rep. Ind. Geo., p. 283, Up. Held. Gr.

AUL.-AXO.]

præciptum, Hall, agara and Up. 12th Rep. Ind. Ge prateriforme, Hall, agara and Up. 12th Rep. Ind. Ge



FIG. 136.-Aulacop

- princeps, Hall, 1882 and Up. Held Grs Ind. Geo., p. 281, reflexum, Hall, 1882 and Up. Held. Gn Ind. Geo., p. 284, sulcatum, D'Orbign cata,) Prodr. d. Pa Rep. Ind. Geo., p. tripinnatum, Hall, agara and Up. H 12th Rep. Ind. Geo trisculcatum, Hall, 1 agara and Up. H
- 12th Rep. Ind. Ge Gr. AULOPHYLLUM, Edwar
- Brit. Foss. Corals pipe; phyllon, leaf septa well-develop ments double, the visceral chamber central and column nal and annular; 1 not well developed.

richardsoni, Meek, 18 Sci., p. 81, Devonia

AULOPORA, Goldfuss, 18 82. [Ety. aulos, Creeping, increasi gemmation; coralli pet-shaped, the car nicating with the springs; no pores; dimentary. Type

ANI.-AUL

n mammillare. rugosum. led.

k Hinde, 1874. 2. [Ety. aster, lum aggregate ; united by nus, which form eeting in the mella; costal successive exidimentary or ile.



ile, greatly en-aent mural ex-

le, 1874, Can. Pal. Ontario,

N. Y., vol. 2, kerion, honeyto be distin-7 the presence der spiniform ym. Type A.

nstrictus. arasiticus. riformis. ustus.

Haime, 1850, . [Ety. aulos, esembles Halsula is not ream, but forms bottom where et. Type A.

Corals Niagara 25, and 35th Hist., p. 429,

ss. Corals Nip. 22, and 12th Jp. Held. Gr. ss. Corals Nip. 24, and 12th p. Held. Gr. s. Corals Nis., p. 23, and Up. Held. Gr. Jorals Niagara and 12th Rep. d. Gr.

AUL.-AXO.]

præciptum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 24, and 12th Rep. Ind. Geo., p. 280, Up. Held. Gr. prateriforme, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 23, and 20th Dec. Let View, 629, Held. Held. 12th Rep. Ind. Geo., p. 282, Up. Held. Gr.



FIG. 136.-Aulacophyllum princeps.

- princeps, Hall, 1882, Foss. Corals Niagara and Up. Held Grs., p. 23, and 12th Rep. Ind. Geo., p. 281, Up. Held. Gr. reflexum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 24, and 12th Rep. Ind. Geo., p. 284, Up. Held. Gr. sulcatum, D'Orbigny, 1850, (Caninia sul-
- cata), Prodr. d. Pal. t. 1, p. 105, and 12th Rep. Ind. Geo., p. 279, Up. Held. Gr. tripinnatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 25, and 12th Rep. Ind. Geo., p. 285, Up. Held. Gr. trisculcatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 25, and 12th Rep. Ind. Geo., p. 279, Up. Held. Gr.
- AULOPHYLLUM, Edwards & Haime, 1850, Brit. Foss. Corals, p. lxx. [Ety. aulos, pipe; phyllon, leaf.] Corallum simple; septa well-developed; mural investments double, the interior dividing the visceral chamber into two parts-one central and columnar, the other external and annular; no columella; tabulæ not well developed. Type A. proliferum. richardsoni, Meek, 1868, Trans. Chi. Acad. Sci., p. 81, Devonian.
- AULOPORA, Goldfuss, 1826, Petref. Germ., p. 82. [Ety. aulos, pipe; poros, pore.] Creeping, increasing by latero-basal gemmation; corallites pyriform, trumpet-shaped, the cavity of each communicating with the one from which it springs; no pores; septa absent or ru-dimentary. Type A. serpens.

- annectans, Clarke, 1885, Bull, 16. U. S. Geo. Sur., p. 63, Genesee shales.
- aperta, Winchell, 1866, Rep. Low. Penin. Mich., p. 91, Ham. Gr.
- arachnoidea, Hall, 1847, Pal. N. Y., vol. 1, p. 76, Trenton and Hud. Riv. Gr.
- canadensis, see Hederella canadensis.
- conferta, Winchell, 1866, Rep. Low. Penin. Mich., p. 91, and Rominger's Foss. Corals, p. 88, Ham. Gr.
- cornulites, Hall, 1883, Rep. St. Geo., pl. 2, figs. 21 and 22, Low. Held. Gr.
- cornuta, see Romingeria cornuta.
- cyclopora, Winchell, 1866. Rep. Low. Penin. Mich., p. 92, Ham. Gr.
- elongata, Hall, 1887, Pal. N. Y., vol. 6., p. 5, Low. Held. Gr.
- erecta; Rominger, 1876, Foss. Corals, p. 88, Ham. Gr.
- filiformis, see Hederella filiformis. iowensis, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 235, Chemung Gr.
- precius, Hall, 1876, 28th Rep. N. Y., St.
- Mus. Nat. Hist., p. 107, Niagara Gr. repens, Walch, et Knorr, 1775, (Millepo-rites repens,) Sammlung von Merkw., vol. 3, p. 179, and Sil. Fauna W. Tenn., p. 28, Niagara Gr.
- saxivada, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 235, Chemung Gr.
- schoharie, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 110, Low. Held. Gr.

serpens, Goldfuss, 1826, Germ. Petref., p. 82, and Rominger's Foss. Corals, p. 87, Ham. Gr. serpuloides, Win-

chell, 1866, Rep. Penin. Low. Mich., p. o., Ham. Gr. Hall,



FIG. 137.—Aulopora serpens.

- subtenuis, 1883, Rep. St. Geo., pl. 2, fig. 9-20, Low. Held. Gr.
- tubiformis, Goldfuss, 1826, Germ. Petref., p. 82, and Murch. Sil. Syst., Up. Held. and Ham. Gr.
- tubula, Hall, 1883, Rep. St. Geo., pl. 2, fig. 7-8, Low. Held. Gr.
- umbellifera, see Romingeria umbellifera. vanclevii, Hall, 1883, 12th Rep. Ind. Geo.,
- p. 255, Niagara Gr.
- Castlenau, syn. for Lithostro-Axinura, tion.
 - canadense, see Lithostrotion canadense. AXOPHYLLUM, Ed-



rude.

-Axophyllum

FIG. 188.

wards & Haime, 1850, Brit. Foss. Corals, p. lxxii. [Ety. axon, axis; phyllon, leaf.] Corallum simple, trochoid,

and in structure resembling Lithostrotion. Type A. expansum.

infundibulum, Worthen, 1875, Geo. Sur. BOLBOPORITES, Pander, 1830, Ill., vol. 6, p. 525, Coal Meas.

rude, White & St. John, 1868, Trans. Chi. Acad. Sci., p. 115, Coal Meas.

- BARYPHYLLUM, Edwards & Haime, 1850, Brit. Foss. Corals, p. lxvi. [Ety. barys, heavy; phyllon, leaf.] Corallum short; calice superficial; slight septal fossula corresponding to one of the branches of a cross, the other three of which are primary septa; younger septa inclined toward the primary ones. Type B. verneuilanum.
 - arenarium, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 409, Onondaga Gr.
 - fungulus, White, 1878, Proc. Acad. Nat. Sci. Phil., p. 29, Niagara Gr.
 - verneuilanum, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 352, Niagara Gr.
- BLOTHROPHYLLUM, Billings, 1859, Can. Jour., vol. 4, p. 130. [Ety. blothros, tall-growing; phyllon, leaf.] Corallum simple, turbinate, or cylindrical, having the central region occupied by flat, transverse diaphragms; an intermediate area, with strong radiating septa, and an outer area, in which there are imperfect diaphragms, projecting upward, and having on their upper surface rudimentary septa; a thin, complete epitheca, and a septal fossette. Type B. decorticatum.

approximatum, Nicholson, 1873, Can. Nat. and Geo., vol. 7, p. 140, Up. Held. Gr.

Rominger, cæspitosum, 1876, Foss. Corals, p. 114, Niagara Gr.

decorticatum, Billings, 1859, Can. Jour., vol. 4, p. 130, Up. Held. Gr.

multicalicatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 44, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 448, Up. Held. Gr. papulosum, Hall, 1882, Foss. Corals Niagara

Foes. Corals Niagara and Up. Held. Grs., p. 44, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 448, Up. Held. Gr. promissum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 45, and 12th Rep. Ind.

Geo., p. 304, Up. Held. Gr.

sinuosum, Hall, 1882, Foss. Corals Niagara

and Up. Held. Grs., p. 45, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 449, Up. Held. Gr.

Beitr. Geognosie Russlands, p. 106. [Etv bolbos, bulb ; poros, pore.] Small, globular, showing basal attachment; structure dense. The type of the genus is said to be neither a coral nor bryozoan, but to belong to the Echinodermata. The form which Billings referred to the genus is

- probably a coral. americanus, Billings, 1859, Nat and Geo., FIG. 140.-Bolbo porites ameri-Can. Nat. and Geo., vol. 4, p. 429, Chazy canus. a, view of base; b, c, d, side views Gr.
- BUCANOPHYLLUM, Ulrich, 1886, Cont. to Am. Pal., p. 31. [Ety. bukane, trumpet; phyl-lon, leaf.] Corallum trumpet-shaped. consisting of a long, slender, cylindrical stem, with the upper end abruptly dilated into a cup, which becomes oblique in older specimens; interior of cup with numerous septal striæ, which become obsolete at the bottom. Type B. gracile.
 - gracile, Ulrich, 1886, Cont. to Am. Pal., p. 31, Up. Held. Gr.
- BYTHOGRAPTUS, Hall, 1861, Geo. Rep. Wis., p. 18. [Ety. buthos, in the deep; grapho, I write.] Frond consisting of a central stipe, with closely arranged lateral branches, flexuous or recurved; cellu-liferous on one side; substance corne-ous brown or black. Type B. laxus.
 - laxus, Hall, 1861, Geo. Rep. Wis., p. 19, Trenton Gr.

Calamopora, Goldfuss, syn. for Favosites. basaltica, see Favosites basalticus.

cellulata, Castelnau, 1843. Not recognized. cristata, see Favosites cristatus.

cumberlandica, see Favosites cumberlandicus.

favosa, see Favosites favosus.

fibrosa, see Monticulipora fibrosa.

fibrosa, Roemer, see Hindia fibrosa.

forbesi var. discoidea, see Favosites forbesi var. discoideus.

goldfussi, see Favosites goldfussi.

gothlandica, see Favosites gothlandicus. heliolitiformis, see Favosites heliolitiformis. hemispherica, see Favosites hemisphericus.

infundibuliformis, Goldfuss, identified by D'Archiac and Verneuil. Not an American species.

mackrothi, see Chetetes mackrothi.

maxima, see Favosites maximus.

minuta, Castelnau. Not recognized. minutissima, Castelna. Not recognized.

radians, Castelnau. Not recognized.

tumida, see Chetetes tumidus.

verneuili, Castelnau, syn. for Monticulipora fibrosa.

winchelli, see Favosites winchelli.

CALAPGECIA, Billings, 1865, Can. Nat. and Geo., 2d ser., vol. 2, p. 425. [Ety. kalos,

beautiful; poikil hemispherical of slender, tubular sites, outside str veloped costæ; thin; when cors the space is fill Type C. canader

59. anticostiensis, Bil Foss. Antic., p. anadensis, Billing 60. Geo., 2d ser., vol



Fig. 141.-Calapœcía cribriformis

CALCEOLA, Lamarck, sans Vert., p. slipper.] Coralli subtriangular, p septa narrow; st sandalina.

americana, Safford, sis.

attenuata, Lyon, Sci. Phil., p. 45, 1 referred this spe phyllum.

corniculum, Lyon, Sci. Phil., p. 43, C. tennesseensis

coxi, Lyon, 1879,

Proc. Acad. Nat. Sci. Phil.,

p. 44, Niagara Gr. Syn. (?) for C. tennes-

seensis.

plicata, Conrad,

1840, Ann. Rep. N. Y., p. 207, Low. F

Held. Gr.

pusilla, Hall, 1885 and Up. Held. G

N. Y. St. Mus. agara Gr.

F10. 143.---Calceola san lina, operculum.

Lindstrom refer genus Rhizophy CALLOGRAPTUS, Hall Decade 2, p. 133. grapho, I write.]

57.



FIG. 139. - Bloth-

missum.

rophyllum pro-

174

CAL.]

BAR. CAL

Zur

BAR. CAL.

CAL.]

59.

60.

Beitr. Ю. ZUT 106.[Etv

FIG. 140. - Bollio porites americanus. a. view of base; b, c. d, side views.

6, Cont. to Am. trumpet; phylrumpet-shaped. ider, cylindrical nd abruptly diecomes oblique rior of cup with which become Type B. gra-

to Am. Pal., p.

Geo. Rep. Wis., e deep; grapho, ing of a central ranged lateral ecurved; celluibstance cornepe B. laxus. ep. Wis., p. 19,

or Favosites alticus. Not recog-3.

atus. es cumberland-

us. fibrosa. a fibrosa. avosites forbesi

lfussi. tothlandicus. heliolitiformis. es hemispheri-

identified by Not an Amer-

ckrothi. kimus. ecognized. ot recognized. ecognized. dus.

r Monticulipora nchelli. Can. Nat. and

125. [Ety. kalos,

CŒLENTERATA.

Billings.

1865, Can. Nat. and

Geo., 2d ser., vol. 2,

beautiful; poikilos, spotted.] Composite, hemispherical or subspherical, corallites slender, tubular, perforated as in Favosites, outside striated by imperfectly developed costæ; septa about 24; tabulæ thin; when corallites are not in contact the space is filled with vesicular tissue. Type C. canadensis.

anticostiensis, Billings, 1866, Catal. Sil.

Foss. Antic., p. 32, Hud. Riv. Gr. canadensis, Billings, 1865, Can. Nat. and Geo., 2d ser., vol. 2, p. 426, Black Riv. Gr.

cribriformis, Nichol-son, 1874, (Columnopora cribriformis,) Geo. Mag., vol. 1, p. 253, and Pal. Ohio, vol. 2, p. 186, Hud. Riv. Gr. huronensis.

Fig. 141.-Calapcecia cribriformis.

p. 426, Hud. Riv. Gr. CALCEOLA, Lamarck, 1801, Syst. des Anim. sans Vert., p. 139. [Ety. calceola, a slipper.] Corallum simple, operculated, subtriangular, pyramidal; calice deep; septa narrow; structure dense. Type C. sandalina.

americana, Safford, syn. for C. tennesseensis.

attenuata, Lyon, 1879, Proc. Acad. Nat. Sci. Phil., p. 45, Niagara Gr. Lindstrom referred this species to his genus Rhizophyllum.

corniculum, Lyon, 1879, Proc. Acad. Nat. Sci. Phil., p. 43, Niagara Gr. Syn. (?) for C. tennesseensis.

coxi, Lyon, 1879, Proc. Acad. Nat. Sci. Phil., p. 44, Niagara Gr. Syn. (?) for C. tennes-

seensis.

plicata, Conrad,

1840, Ann. Rep. N. Y., p. Fig. 142. – Calceola sanda-207, Low. lina, showing deep calicie.

pusilla, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 15, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 419, Ni agara Gr.



F10. 143.--Calceola sandalina, operculum.

Lindstrom referred this species to his genus Rhizophyllum.

Decade 2, p. 133. [Ety. kallos, beautiful; grapho, I write.] Flabellate fronds, with

sandalina, La-marck. Not American. tennesseensis, Roemer, 1852, Lethæ Geognost., p. 385, and Sil. Fauna

W. Tenn., p. 73,

Niagara Gr.

CALLOGRAPTUS, Hall, 1865, Can. Org. Rem.

FIG. 145. - Calyptograptus cyathiformis

cyathiformis, Spencer, 1878, Can. Nat., vol. 8, p. 459, Niagara Gr.

subretiformis, Spencer, 1878, Can. Nat. vol. 8, p. 460, Niagara Gr.

numerous slender, bifurcating branches proceeding from a strong stem ; branches and divisions celluliferous on one side, striate on the other; sometimes distantly and (irregularly united by transverse dissepiments. Type C elegans.

elegans, Hall, 1865, Can. Org. Rem. Decade 2, p. 134, Quebec Gr. or Up. Taconic.

granti, Spencer, 1884, Buil. No. 1, Mus. Univ. St. Mo., p. 21, Niagara Gr.

minutus, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 22, Niagara Gr. multicaulis, Spencer, 1884, Bull. No. I.

Mus. Univ. St. Mo. p. 22. Niagara Gr.



F16. 144.---Callograptus niagarensis

niagarensis, Spencer, 1878, Can. Nat., vol. 8, and Bull. No. 1, Mus. Univ. St. Mo., p. 21, Niagara Gr.

salteri, Hall, 1865, Can. Org. Rem. Decade

2, p. 135, Quebec Gr., or Up. Taconic. Calophyllum, Dana, 1846, Am. Jour. Sci., p. 183, syn. for Amplexus.

phragmoceras, see Amplexus phragmoceras.

CALLYFTOGRAPTUS, Spencer, 1878, Can. Nat., vol. 8, p. 459. [Ety. kalyptos, covered; grapho, Fwrite.] Cyathiform, bifurcating branches, not connecting laterally; resembles Dig'yonema. Type C. cyathiformis.



bend; *phyllon*, leaf.] Sim-ple, tall, protected by an epitheca; septa well developed; tabulæ very large and smooth toward the center; interseptal area vesicular. Type C. flexuosum

nanum, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 232, Chemung Gr. Fig. 146.-Cam

texanum, Shumard, 7859, Trans. St. Louis Acad. Sci., vol. 1, p. 388, Permian.

torquium, Owen, 1852, (Cyathophyllum torquium,)

Vertical sec-tion ½ diam. s h o w i n g smooth central tabulæ.

Meas. Za-

phrentis. bilateralis, see Zaphrentis bilat-

punctata, D'Orbigny, 1850, Prodr. d. Paleont., t. 1, p. 105. Not defined so as to be recognized.

FIG. 147.-Campophyllum torquium.

sulcata, D'Orbigny, 1850, Prodr. d. Paléont., t. 1, p. 105. Not defined so as to be t. 1, p. 105. recognized.



FIG. 148.—Campophyllum torquium. Trausverse section.

CANNAPORA, Hall, 1852, Pal. N. Y., vol. 2, p. 43. [Ety. kanna, reed; poros, pore.] Massive, tubular, united externally by .80

- tabulæ; distinguished from Syringopora, by the regular transverse external tabulæ and by the internal structure of the corallites. Type C. junciformis.
- annulata, Nicholson & Hinde, 1874, Can. Jour., p. 154, and Pal. Prov. of Ontario, p. 58, Niagara Gr.
- junciformis, Hall, 1852, Pal. N. Y., vol. 2. p. 43, Clinton Gr.
- Caryophyllia, Lamarck, 1816. Not Palæozoic. cornicula, see Zaphrentis cornicula. gigantea, see Zaphrentis gigantea. pulmonea, see Zaphrentis pulmonea.

- Catenipora, Lamarck, 1816, syn. for Halysites. michelini, Castlenau, syn for Halysites catenulatus.
- CHETETES, Fischer, 1837, Oryct. du Gouv. Moscou, p. 159. [Ety. chaite, hair.] Corallum conglomerate; corallites very long, basaltiform; calyces polygonal; tabulæ not connected or on the same plane in different corallites; walls amalgamated, imperforate; growth fissiparous. Type C. radians.
- abruptus, see Monotrypella abrupta. aequidistans, Hall, 1881, Bryozoans Up. Held Gr., p. 4, Up. Held. Gr. approximatus, Nicholson, syn. for Mon-
- ticulipora dalii.

arbusculus, see Monotrypella arbuscula. arcticus, Haughton, 1857, Jour. Roy. Dub.

Soc., vol. 1, Silurian. attritus, Nicholson, syn. for Dekayia aspera. barrandii, see Monticulipora barrandii.

briareus, see Monotrypella briareus.

calicula, see Aspidopora caliculus.

carbonarius, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 526, Coal Meas.

cincinnatiensis, see Monticulipora cincinnatiensis.

clathratulus, James & Nicholson, syn. for Monticulipora pavonia.

clavacoideus, see Leptopora clavacoidea. colliculatus, Hall, 1883, Rep. St. Geo., pl. 8, fig. 1-4, and Pal. N. Y., vol. 6, p. 11,

Low. Held. Gr.

columnaris, see Tetradium columnare.

compressus, see Peronopora compressa.

consimilis, see Monotrypella consimilis. corticans, Nicholson, syn. for Spatiopora tuberculata.

corticosa, see Trematopora corticosa.

crassus, Lonsdale, 1845, (Stenopora crassa, Russ. and Ural Mts., vol. 1, p. 631, Coal Meas.

crebrirama, Hall, 1881, Bryozoans Up. Held. Gr., p. 4, Up. Held. Gr.

dalei, see Monticulipora dalii.

decipiens, see Monticulipora decipiens. delicatulus, see Monticulipora delicatula.

discoideus, see Amplexopora discoidea. egenus, Hall, 1881, Bryozoans Up. Held. Gr., p. 4, Up. Held. Gr.

- elegans, see Discotrypa elegans. exilis, Dawson, 1868, Acad. Geo., p. 287, (Stenopora exilis,) Subcarb.
- expansus, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 20. Not properly defined.

[CAM.-CHE.

fibrosus see Montici fliasa, see Monticu fletcheri, Edwards in Ohio Pal., vol

lipora ulrichi.

frondosus, see Mont fruticosus, Hall, 18 Ham. Gr.

fruticosus, Hall, 18 arbuscula.

furcatus, Hall, 1876 pl. 37, Ham. Gr. fusiformis, Whitfi Geo. Sur. Wis.,

vol. 4, p. 248, 1 Chetetes; probal gracilis, see Batosto

granuliferus, see lifera.

hamiltonensis, Wir Penin. Mich., p.

helderbergiæ, see P giæ.

humilis, Hall, 1876 pl. 37, Up. Held. internascens, Hall Held. Gr., p. 4, 1

irregularis, see Mont jamesi, see Batoston lycoperdon, see M don.

mackrothi, Geinit mackrothi,) Gru American (?) 866

mammulatus, ulata. microscopica, Wind

Penin. Mich., p. milleporaceus, Ed Mon. d. Pol. Fos

Coal Meas. moniliformis, see 1 formis.

monticulatus, Hall. 8, fig. 5-7, and Pa Low. Held. Gr.

muscatinensis, Wh Nat. Sci. Phil., p newberryi, see Praso nodulosus, see Callo onealli, see Callopoi ortoni, see Atactopo pavonia, see Ptilodi petechialis, see Petig

petropolitanus, Pand p. 105. Not an A pulchellus, Edwards

fied in Ohio Pal., ticulipora andrew

quadrangularis, see gularis.

quadratus, see Mono ramosus, see Montic rhombicus, Nicholso pella quadrata.

rugosus, see Montici rugosus, Edwards &

Monticulipora ra sigillarioides, see Cal



[CAM.-CHE.

from Syringosverse external al structure of unciformis. ide, 1874, Can. ov. of Ontario.

I. N. Y., vol. 2,

Not Palæozoic. rnicula. antea. ilmonea. . for Halysites.

for Halysites

yct. du Gouv. chaite, hair.] corallites very es polygonal; on the same allites; walls e; growth fis-

18. abrupta. Bryozoans Up. Gr.

yn. for Monarbuscula.

our. Roy. Dub.

ekayia aspera. 1 barrandii. riareus. culus. Geo. Sur. Ill.,

lipora cincinlson, syn. for

lavacoidea. p. St. Geo., pl. , vol. 6, p. 11,

olumnare. ompressa.

consimilis. or Spatiopora

prticosa. iopora crassa,) 1, p. 631, Coal

ryozoans Up. Gr.

decipiens. a delicatula. discoidea. ns Up. Held.

ns. Geo., p. 287, b.

Bull. Buf. Soc. t properly defibrosus see Monticulipora fibrosa. fliasa, see Monticulipora filiasa.

fletcheri, Edwards & Haime, as identified in Ohio Pal., vol. 2, p. 197, is Monticulipora ulrichi.

frondosus, see Monticulipora frondosa. fruticosus, Hall, 1876, Illust. Foss., pl. 38, Ham. Gr.

- fruticosus, Hall, 1883, see Monotrypella arbuscula
- furcatus, Hall, 1876, Illust. Devon. Foss., pl. 37, Ham. Gr.
- fusiformis, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 70, and Geo. Wis., vol. 4, p. 248, Hud. Riv. Gr. Not a Chetetes; probably a Bryozoan. gracilis, see Batostomella gracilis.
- granuliferus, see Homotrypella granulifera.
- hamiltonensis, Winchell, 1866, Rep. Low. Penin. Mich., p. 89, Ham. Gr. helderbergiæ, see Ptychonema helderber-
- giæ.
- humilis, Hall, 1876, Illust. Devon. Foss., pl. 37, Up. Held. Gr.
- internascens, Hall, 1881, Bryozoans Up. Held. Gr., p. 4, Up. Held. Gr.
- irregularis, see Monticulipora irregularis.
- jamesi, see Batostoma jamesi. lycoperdon, see Monticulipora lycoper-
- don. mackrothi, Geinitz, 1846, (Calamopora
- mackrothi,) Grund, p. 586, Permian, American (?)
- mammulatus, see Monticulipora mamulata.
- microscopica, Winchell, 1866, Rep. Low. Penin. Mich., p. 90, Ham. Gr. illeporaceus, Edwards & Haime, 1851,
- milleporaceus, Mon. d. Pol. Foss. d. Terr. Pal., p. 272, Coal Meas.
- moniliformis, see Monticulipora moniliformis.
- monticulatus, Hall, 1883, Rep. St. Geo., pl. 8, fig. 5, 7, and Pal. N. Y., vol. 6, p. 12, Low. Held. Gr.
- muscatinensis, White, 1876, Proc. Acad. Nat. Sci. Phil., p. 27, Devonian.
- newberryi, see Prasopora newberryi. nodulosus, see Callopora nodulosa.
- onealli, see Callopora onealli. ortoni, see Atactoporella ortoni.
- pavonia, see Ptilodictya pavonia.
- petechialis, see Petigopora petechialis. petropolitanus, Pander, 1830, Russ. reiche, p. 105. Not an American species.
- pulchellus, Edwards & Haime, as identi-fied in Ohio Pal., vol. 2, p. 195, is Monticulipora andrewsi.
- quadrangularis, see Paleschara quadrangularis.
- quadratus, see Monotrypella quadrata. ramosus, see Monticulipora ramosa.
- rhombicus, Nicholson, syn. for Monotrypella quadrata.
- rugosus, see Monticulipora rugosa. rugosus, Edwards & Haime, is a variety of
- Monticulipora ramosa. sigillarioides, see Callopora sigillarioides.

sphæricus, see Favosites sphæricus.

spinigerus, Lonsdale, 1845, (Stenopora spinigera,) Geö. Russ. and Ural Mts., vol. 1, p. 631, Coal Meas.

subglobosus, see Monticulipora subglobosa. subpulchellus, see Monticulipora subpulchella.

tabulatus, see Ptvchonema tabulatum. tuberculatus, see Spatiopora tuberculata.

tumidus, Phillips, 1836, (Calamopora tumida,)Geo Yorkshire, p. 200, Subcarb. undulatus, see Monticulipora undulata.

venustus, see Mon ticulipora venusta.



Edwards & Haime, 1850, Brit. Foss. corals, p. lxix. [Ety. chonos, funnel; phyllon, leaf.] Corallum simple, constituted, principally, by a series of infundibuliform tabulæ, superposed and invaginated, upon the surface of which, equally de-veloped septal radii extend from center to circumference; no walls or colu-

- mella. Type C. perfoliatum. belli, Billings, 1865, Can. Nat. and Geo. vol. 2, p. 431 Clinton Gr.
- capax, Hall, 1882, Foss. Corals Niagara & Up. Held. Grs., p. 6, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 410, Niagara Gr.
- ellipticum, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 233, Chemung Gr.

magnificum, Billings, 1860, Can. Jour., vol. 5, p. 264, Up. Held. Gr.

niagarense, Ha (Conophyllum Hall, 1852, niagarense,) Pal. N. Y., vol. 2, p. 114, Niagara Gr. ponderosum, Rominger, 1876, Foss. Corals, p. 117,

Ham. Gr. sedaliense, White, 1880, 12th Rep. U. S. Geo. Sur. Terr., p. 157, Choteau limestone. vadum, Hall, 1884, 35th Rep. N. Y. St. Mus. Nat.

FIG, 150.-Chonophyllum niagarense

Hist., p. 410, Niagara Gr. validum, Hall, 1882, Foss. Corals Niagara and Up.

Held. Grs., p. 6, and 12th Rep. Geo. Ind., p. 272, Niagara Gr.

CHONOSTEGITES, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 299. [Ety. konos, cone; stege, covering.] Subhemis-pheric; corallites cylindrical, annulated, connected at the expansions, imperforate at the constrictions; mural pores where the [corallites] are contiguous; tabulæ





62.

CHQ.]

numerous; septa consisting of short spines; growth by generation. Type C. clappi.

clappi, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 299, Up. Held. Gr. ordinatus, Billings, 1859, (Haimeophyllum ordinatum,) Can. Jour.,

-Chonostegites vol. 4, p. 139, Up. Held. Gr.

ordinatus.

151 F16

- CLADOGRAPTUS, Geinitz, 1852, (Cladograpsus,) Verst. Grauw. Sachs. and Emmons, Am. Geo., p. 107. [Ety. klados, twig; grapho, I write.] Serrations, or cells, arranged on the outer sides of branching stipes; no axis.
 - dissimilaris, Emmons, 1856, Am. Geo., p. 107, Upper Taconic.
 - inæqualis, Emmons, 1856, Am. Geo., p. 107, Upper Taconic.
- CLADOPORA, Hali, 1852, Pal. N. Y., vol. 2, p. 137. [Ety. klados, twig; poros, pore.] Ramose or reticulate; branches cylindrical or compressed; terminations terete; corallites radiating from the axis, and opening upon the surface in rounded or subangular expanded mouths; tabulæ and septal crests usually obsolete, sometimes present; corallites connected by mural pores. Type C. seriata.
 - alpenensis, Rominger, 1876, Foss. Corals, p. 51, Ham. Gr.
 - aspera, Rominger, 1876, Foss. Corals, p. 56, Up. Held. Gr.
 - cæspitosa, Hail, 1852, Pal. N. Y., vol. 2, p. 138, Niagara Gr.

canadensis, Rominger, 1876, Foss. Corals,

- p. 49, syn. for Pachypora frondosa. cervicornis, Hall, 1852, Pal. N. Y., vol. 2, p. 139, Niagara Gr.
- dichotoma, Hall, 1858, Geo. Sur. Iowa, p. 478, Ham. Gr.
- expatiata, Rominger, 1876, Foss. Corals,
- p. 57, Up. Held. Gr. fibrosa, Hall, 1852, Pal. N. Y., vol. 2, p. 139, Niagara Gr.
- imbricata, Rominger, 1876, Foss. Corals, p. 56, Up. Held. Gr. 64. labiosa, Billings, 1859, Can. Jour., vol. 4,
- p. 138, Up. Held. Gr.
 - laqueata, Rominger, 1876, Foss. Corals, p. 46, Niagara Gr, lichenoides, Winchell & Marcy, 1865,
 - Bost. Soc. Nat. Hist., vol. 1, p. 84, Niagara Gr.
 - lichenoides, Rominger, 1876, see C. winchellana.
 - macrophora, Hall, 1852, Pal. N. Y., vol. 2, p. 140, Niagara Gr.



magna, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 230, Up. Held. Gr.

- multipora, Hall, 1852, Pal. N. Y., vol. 2, p. 140, Niagara Gr. palmata, Hall, 1873, 23d Rep. N. Y. St.
- Mus. Nat. Hist., p.

231, Up. Held. Gr. pinguis, Rominger, 1876, Foss. Corals, p. 53, Up. Held. Gr. prolifica, Hall & Whit-

- field, 1873, 23d Rep. N. Y. St. Mus. Nat. p. 230, Up. Hist. Held. Gr.
- Rominger, pulchra, 1876, Foss. Corals, p. 54, Up. Held. Gr.
- reticulata, Hall, 1852, FIG. 152.-Clado-Pal. N. Y., vol. 2, p. pora reticulata. 141, Niagara Gr.
- rimosa, Rominger, 1876, Foss. Corals, p. 53, Up. Held, Gr.
- robusta, Rominger, 1876, Foss. Corals, p. 55, Up. Held. and Ham. Gr.
- sarmentosa, Hall, 1876, Desc. New Spec. Foss., p. 3, and 11th Geo. Sur. Ind., p. 230, Niagara Gr.
- seriata, Hall, 1852, Pal. N. Y., vol. 2, p. 137, Niagara Gr.
- turgida, Rominger, 1876, Foss. Corals, p. 49, Up. Held. Gr.
- verticillata, Winchell & Marcy, 1865, Bost. Soc. Nat. Hist., vol. 1, p. 84, Niagara Gr.
- winchellana, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss., p. 265, Up. Held. Gr. Proposed for the species described by Rominger under the preoccupied name of C. lichenoides, in Foss. Corals, p. 47.

CLIMACOGRAPTUS, Hall, 1865, Can. Org. Rem. Decade 2, p. 111. [Ety. klimax, ladder; grapho, I write.] Simple stipes, with subparallel margins, having a range of cells on each side; axis subquadrate; apertures transversely oval or subquadrate; denticles on the upper side of the aper-tures. Type C. bicornis. antennarius, Hall, 1863, (Graptolithus antennarius,) Geo. of Can., p. 955, and Can. Org. Rem. Decade 2, p. 112, Quebec Gr. bicornis, Hall, 1847, (Graptolithus bicornis,) Pal.

N. Y., vol. 1, p. 268, Hud. Riv. Gr.

emmonsi, Walcott, 1886, Bull. U. S. Geo. Sur. No. 30, p. 93, Upper Taconic.

parvus, Hall, 1865, Can. Org. Rem. Decade 2, p. 57, Hud. Riv. Gr. Not defined.

F10. 153.-Cli-

macog r a p-tus bicornis.

typicalis, Hall, 1865, Can. Org. Rem. Decade 2, p. 57, Hud. Riv. Gr.

CI.I.-COL.]

CLISIOPHYLLUM, Dana vol. 8, p. 361. [Et leaf.] Simple, b



Fig. 154.—Clisiophyllum gerum.

Pol. Foss. d. Ter Held. Gr. gabbi, Meek, 1864, 1, p. 8, Carbonife

oneidaense, see Acro pluridiale, Nicholse Ont., p. 21, Up. H Unit, p. 21, 6 p. 2 tumulus, Salter, 1 Arctic Voyage, vo CLONOGRAPTUS, Hall,

- Nat. Hist., 4th ser twig; grapho, I numerous slende cylindrical stipes small denticulatio C. rigidus.
- flexilis, Hall, 1858, (Geo. Sur. Can., p Rem. Decade 2, p rigidus, Hall, 1857 idus,) Geo. Sur. Can. Org. Rem.
- Quebec Gr. CENITES, Eichwald, 18 vol. 1, p. 186. [E gether.] Corallum or ramose; coralli



CLA.-CLI

1873, 23d Rep. st., p. 230, Up. N. Y., vol. 2,

Rep. N. Y. St.



152 -(lado. ora reticulata.

oss. Corals, p

oss. Corals, p. Gr. sc. New Spec. . Sur. Ind., p.

Y., vol. 2, p.

oss. Corals, p.

cy, 1865, Bost. 34, Niagara Gr. 1883, 2d Ed. Up. Held. Gr. described by ccupied name Foss. Corals,

Hall, 1865, em. Decade 2 y. klimax, lado, I write.] es, with subgins, having a s on each side : drate; aperersely oval or denticles on le of the aper-C. bicornis. Hall, 1863,

antennaf Can., p. 955, rg. Rem. De-2, Quebec Gr. 1847, (Grapcornis,) Pal. , p. 268, Hud.

ott, 1886, Bull. p. 93, Upper

Rem. Decade Not defined.)rg. Rem. De-Jr.

CLI.-COL.] CLISIOPHYLLUM, Dana, 1848, Explor. Exped.,

vol. 8, p. 361. [Ety. klision, tent ; phyllon, leaf.] Simple, branched or aggregate,

with vertical radiating lamellæ or septa; central area vesicular and forming a conical boss or columella, exterior to which the vesicular plates incline outward and upward; calycle deep. Type C. danianum. austini, Salter, 1852, (Strephodes austini,) Sutherland's Jour., vol. 2, p. ccxxx, Devonian. conigerum, Rominger, 1876, (Zaphrentis conigera.) Foss.Corals, p. 40, Up. Held. Gr. danianum. Fig. 154.-Clisiophyllum coni-Edwards & Haime, 1854,

Pol. Foss. d. Terr. Pal., p. 412, Low. Held. Gr.

gerum.

gabbi, Meek, 1864, Pal. California, vol. 1, p. 8, Carboniferous

oneidaense, see Acrophyllum oneidaense. pluridiale, Nicholson, 1874, Pal. Prov. Ont., p. 21, Up. Held. Gr.

tumulus, Salter, 1855, Belcher's Last Arctic Voyage, vol. 2, p. 383, Carb. CLONOGRAPTUS, Hall, 1873, Ann. and Mag.

- Nat. Hist., 4th ser., vol, 13. [Ety. klon, twig; grapho, I write.] Composed of numerous slender, regular branching, cylindrical stipes; cells small, forming small denticulations on one side. Type C. rigidus.
- flexilis, Hall, 1858, (Graptolithus flexilis,) Geo. Sur. Can., p. 119, and Can. Org.
- Rem. Decade 2, p. 103, Quebec Gr. rigidus, Hall, 1857, (Graptolithus rig-idus,) Geo. Sur. Can., p. 121, and Can. Org. Rem. Decade 2, p. 105, Quebec Gr.

CONTESS, Eichwald, 1829, Zoologia specialis, vol. 1, p. 186. [Ety. koinos, living to-gether.] Corallum incrusting, massive, or ramose; corallites vertical or oblique to the surface, remote, imbedded in a cœnenchyma; calices irregular, prominent, triangular, quincuncially arranged; lower margin most prominent; interstices increasing by age, and reducing the cavity of the cell-tubes; no septa; taubulæ distinct; mural pores large and few. Type C. clathrata.

crassus, Rominger, 1876, (Limaria crassa,) Foss. Corals, p. 45, Niagara Gr.

- falcatus, Prout, 1859, (Limaria falcata,) Trans. St. Louis Acad. Sci., vol. 1, p. 445, Up. Held. Gr.
- fruticosus, Steininger, 1834, (Limaria fruticosa,) Bull. Soc. Geo. France, vol. 1, p. 339, and Pal. N. Y., vol. 2, p. 143, Niagara Gr.

laminatus, Hall, 1852, (Limaria lami-nata,) Pal. N. Y., vol. 2, p. 143, Niagara Gr.

lunatus, Nicholson & Hinde, 1874, Can. Jour., p. 149, and Pal. Prov. Ont., p. 55, Niagara Gr.

ramulosus, Hall, 1852, (Limaria ramulosa,) Pal. N. Y., vol. 2, p. 142, Niagara Gr.

Coenites Coleophyllum, Hall, 1883, 12th Rep. Geo. Sur. Ind., p. 317. koleos, sheath; phyllon, leaf.] Etv. Corallum simple; substance composed of closely arranged, invaginated tabulæ, more or less oblique to the axis;

rays obscure; calices oblique. Type C. romingeri. pyriforme, Hall,

FIG. 155.-

1883, 12th Rep. Geo. Sur. Ind., p.318, Up. Held. Gr.

romingeri, Hall, 1883, 12th Rep. Geo. Sur. Ind., 317, Up. Held. Gr.

COLUMNARIA, Goldfuss, 1826, Germ. Petref., p. 72. [Ety. columnarius. formed of columns.] Aggregate, corallites polygonal, longitudinally sulcated, but readily separable; no mural pores; tabulæ numerous; mentary; in-

crease by fis-sion. Type C. alveolata.

alveolata, Goldfuss, 1826, Germ. Petref., p. 72, and Pal. N. Y., vol. I, p. 47, Black Riv. Gr.



romingeri.

septa rudi- Fig. 156.—Coleophyilum

65.

blainvilli, Billings, 1858, Can. Nat. and Geo., vol. 3, and Rep. of Progr. Geo. Sur. Can., p. 166, Hud. Riv. Gr.



FIG. 157.—Columnaria alveolata.

carterenis, Safford, 1869, Geo. of Tenn., p. 285, Trenton Gr.

- divergens, Troost, 1840, 5th Geo. Rep. Tenn., p. 72, Devonian. erratica, Billings, 1858, Can. Nat. and Geo.,
- 66
- erratica, Billings, 1559, Cau. Nat. and Geo., vol. 3, and Rep. of Progr. Geo. Sur. Can., p. 167, Trenton Gr. goldfussi, Billings, 1858, Can. Nat, and Geo., vol. 3, and Rep. of Progr. Geo. Sur. Can., p. 166, Hud. Riv. Gr. halli, Nicholson, 1879, Tabulate corals, syn. 67.
 - for C. alveolata.

herzeri, Rominger, 1876, syn. for Favistella stellata.

- incerta, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 128, Chazy Gr. inæqualis, Hall, 1852, Pal. N. Y., vol. 2, p. 68.
 - 223, Coralline limestone.
 - intermedia, Eaton, 1832, Geo. Text-book, p. 41. Not recognized.

mammillaris, Castelnau. Not recognized. multiradiata, Castelnau, 1843, Syst. Sil., p. 44. Not recognized. Probably same as Favistella stellata.

- 69. parva, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 428, Chazy Gr.
- 70. rigida, Billings, 1858, Can. Nat. and Geo., vol. 3, and Rep. of Progr. Geo. Sur. Can., p. 167, Hud. Riv. Gr.
 - sutherlandi, Salter, 1852, Sutherland's Jour., vol. 2, p. ccxxxii, Devonian. troosti, Castelnau, 1843, Syst. Sil., p. 44,
 - syn. for Lonsdaleia papillata.
 - Columnopora, Nicholson, 1874, London Geo. Mag. N. S., vol. 1, p. 253, and Ohio Pal., vol. 2, p. 186, syn. for Calapœcia. cribriformis, see Calapœcia cribriformis.
 - COMBOPHYLLUM, Edwards & Haime, 1850, Brit. Foss. Corals, p. lxvii. [Ety. kombos, strip of cloth; phyllon, leaf.] Coral-lum, in form like Cyclolites; single septal fossula; septa exsert and regu-larly radiate. Type C. osismorum. multiradiatum, Meek, 1868, Trans. Chi.
 - Acad. Sci., p. 84, Devonian. Conophyllum, Hall, 1852, Pal. N. Y., vol. 2,
 - syn. for Chonophyllum.

niagarense, see Chonophyllum niagarense. Constellaria, Dana, 1848, syn. for Stellipora.

constellata, syn. for Stellipora antheloidea. fischeri, see Stellipora fischeri. florida, see Stellipora florida.

polystomella, see Stellipora polystomella.

- CRASPEDOPHYLLUM, Dybowski, 1873, Be-schreibung neuen aus Nordamerika, Stammenden, Devonischen art der Zoantharia rugosa, p. 153. [Etv. kraspedos, an edge; phyllon leaf.] Prob-ably a syn. for Heliophyllum. Type (americanum.
 - americanum, Dybowski, 1873, Beschr. n. a. Nord. Stamm. Dev. a. d. Zoanth.
- rugosa, p. 153, Up. Held. Gr. CREPIDOPHYLLUM, Nicholson & Thomp-son, 1877, Proc. Roy. Soc. Edinburgh. vol. 9, p. 149. [Ety. krepis, horseshee: phyllon, leaf.] Distinguished from Heliophyllum, by the central part of the tabulate area being shut off from the rest of the visceral chamber by a secondary investment, in the form of

a central pipe, which is crossed, by tabulæ; this pipe is sometimes open or horseshoe-shaped. Type C. archiací.

- archiaci, Billings, 1860, (Diphyphyllum archiaci,) Can. Jour., vol. 5, p. 260, Ham. Gr.
- subcæspitosum, Nicholson, 1874, (Heli-ophyllum subcæspitosum,) Lond. Geo. Mag. n. ser., vol. 1, p. 58, Ham. Gr.
- CYATHAXONIA, Michelin, 1846, Icon. Zooph., p. 258. [Ety. kuathos, cup; axones, a tablet made to turn on its axis.] Simple; calice deep; columella styliform,

strong and promi-nent; septa extend-Crepidophyllum subcæspitosum ing to the columella;

the place of one of them occupied, by a deep depression or septal fossula. Type C. cornu.

- columellata, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Gr., and 35th Rep. N. Y. Mus. Nat. Hist., p. 415, Niagara Gr.
- cynodon, Rafinesque & Clifford, 1820, (Turbinolia cynodon,) Monog. d. Tur-binolides in Ann. d. Phys. d. Brux., t. 5, p. 234, Waverly Gr.
- distorta, Worthen, 1875, Geo. Sur. Ill.,
- vol. 6, p. 526, Coal Meas. herzeri, Hall, 1882, Foss. Corals Niagara and Up. Held. Gr., p. 11, and 12th Rep. Ind. Geo., p. 275, Niagara Gr. profunda, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 323, Carbon-iforome
- iferous.



prolifera, see Lop wisconsinensis,



FIG. 159. Cyathaxonia herzeri.

being filled with exterior wall prov Type C. cæspitos agglomeratum, Cast ognized.

ammonis, Castlenau nized. 72. anticostiense, Billi

vol. 1, p. 109, An arborescens, Castelna 48. Not recogniz

- arcticum, Meek, 18 Sci., p. 79, Devon articulatum, Wahl articulatus,) Nov
 - p. 97, Up. Sil. arctifossa, Hall, 18 agara, and Up. H 12th Rep. Ind.
- Held Gr. atlas, Castelnau, 18 Not recognized.
- billingsi, Dawson, 287. Subcarbonife
- bullatum, Hall, 1882, and Up. Held. Grs N. Y. St. Mus. N Held. Gr.
- bullulatum, Hall,
- Niagara and Up. H 35th Rep. N. Y. St 412, Niagara Gr.
- cæspitosum, Goldfuss p. 60, Up. Held. G
- calyculare, Owen, 18 Lands, p. 69, Devor
- canaliculatum, Hall, Niagara and Up. H

35th Rep. N. Y. Mu Up. Held. Gr. ceratites, Goldfuss. N

coalitum, Rominger, p. 108, Up. Held. G cohærens, Hall, 1882


COL-CYA

CYA.]

ra antheloidea. ieri. la

polystomella. ki, 1873, Be Nordamerika. chen art der 153. [Ety. m leaf.] Prob-llum. Type C.

873, Beschr. n. a. d. Zoanth. Gr. Thompn & e. Edinburgh. pis, horseshoe:

guished from central part of shut off from chamber by a in the form of



idophyllum sub-

occupied, by a I fossula. Type

DES. Corals Ni-, and 35th Rep. p. 415, Niag-

Clifford, 1820, fonog. d. Turvs. d. Brux., t.

Geo. Sur. Ill.,

Corals Niagara . 11, and 12th iagara Gr. ime, 1851, Pol. 323, CarbonCŒLENTERATA.

prolifera, see Lophophyllum proliferum. wisconsinensis, Whitfield, 1878, Ann.

Geo. Sur. Wis., p. 79, and Geo. Sur. Wis., vol. 4, p. 277, Niagara Gr. ATHOPHYLLUM, Goldfuss, 1826, Petref. Germ., p. 54. [Etv. kuathos, cup; phyllon, leaf.] Simple or composite; no costæ; septa extending to the center and twisting together. giving the appearance of a columella; tabulæ only in the center of the vis-

ceral chamber,

FIG. 159. Cyathaxonia herzeri.

the outer area being filled with vesicular dissepiments: exterior wall provided with an epitheca. Type C. cæspitosum.

- agglomeratum, Castelnau, 1843. Not recognized.
- ammonis, Castlenau, 1843. Not recognized.
- anticostiense, Billings, 1862, Pal. Foss., 71. vol. 1, p. 109, Anticosti Gr., Div. 4.
 - arborescens, Castelnau, 1843, Syst. Sil., p. 48. Not recognized.
 - arcticum, Meek, 1868, Trans. Chi. Acad. Sci., p. 79, Devonian.
 - articulatum, Wahlenberg, (Madreporites articulatus,) Nov. Act. Upsal., vol. 8, p. 97, Up. Sil.
 - arctifossa, Hall, 1882, Foss. Corals Niagara, and Up. Held. Gr., p. 40, and 12th Rep. Ind. Geo., p. 297, Up. Held Gr.
 - atlas, Castelnau, 1843, Syst. Sil., p. 47. Not recognized.
 - billingsi, Dawson, 1868, Acad. Geol., p. 287. Subcarboniferous.
 - bullatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 41, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 445, Up. Held. Gr.
 - bullulatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 12, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 412, Niagara Gr.
 - cæspitosum, Goldfuss, 1826, Petref. Germ., p. 60, Up. Held. Gr.
 - calyculare, Owen, 1840, Rep. on Mineral Lands, p. 69, Devonian.
 - canaliculatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 39, and 35th Rep. N. Y. Mus. Nat. Hist., p. 443, Up. Held. Gr.
 - ceratites, Goldfuss. Not American.
 - coalitum, Rominger, 1876, Foss. Corals, p. 108, Up. Held. Gr.
 - cohærens, Hall, 1882, Foss. Corals Ni-

agara and Up. Held Grs., p. 41, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 445, Up. Held. Gr.

conatum, Hall, 1876, Illust. Dev. Foss., pl. 31, Ham. Gr. concentricum, Hall, 1882, Foss. Corals Niagara and Up. Held. Gr., p. 42, and 12th Rep. Geo. Sur. Ind., p.316, Up. Held. Gr.

conicum, Castel-nau, 1843, Syst. Sil., p. 48. Not recognized.

corinthium,

- Owen, 1840, FIG. 160.—Cyathophyllum Rep. on Minn. cæspitosum. b. trans-Rep. on Minn. cæspitosum. o. traus-verse section. c. vertical Lands, p. 69, section. Devonian.
- cristatum, Rominger, 1876, Foss. Corals, p. 108, Ham. Gr.
- depressum, Hall, 1882, Foss. Corals Niagara and Up. Held. Gr., p. 40, and 12th Rep. Ind. Geol., p. 298. Up. Held. Gr.
- dianthus, Goldfuss, 1826, Germ. Petref., p. 54, Onondaga Gr. dilatatum, Castelnau, 1843, Syst. Sil., p.
- 48. Not recognized.
- distinctum, Castelnau, 1843, Syst. Sil., p. 49. Not recognized.
- d'orbignyi, Castelnau, 1843, Syst. Sil., p. 49. Not recognized.
- eriphyle, Billings, 1862, Pal. Foss., vol. 1, 73. p. 111, Anticosti Gr., Div. 4. euryone, Billings, 1862, Pal. Foss., vol. 1,
- 74. p. 110, Anticosti Gr., Div. 4. excentricum, Goldfuss. Not American.
- exfoliatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 39, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 443, Up. Held. Gr.
- flexuosum, Owen, syn. for Campophyllum torquium.
- galerum, Hall, 1876, Illust. Dev. Foss., pl. 32, Ham. Gr.
- geniculatum, Rominger, 1876, Foss. Corals, p. 103, Ham. Gr.
- gigas, Yandell & Shumard, syn. for Zaphrentis gigantea.
 - goldfussi, Castelnau, 1843, Syst. Sil., p. 47. Not recognized.
 - goliath, Castelnau, 1843, Syst. Sil., p. 47. Not recognized.
 - gracile, Troost, 5th Rep. Tenn., Subcarb. Not recognized.
 - gradatum, Hall, 1876, Illust. Dev. Foss., pl. 31, Ham. Gr.
 - helianthoides, Goldfuss, see Heliophyllum halli.
 - houghtoni, Rominger, 1876, Foss. Corals, p. 104, Ham. Gr.
 - impositum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 40, and

13



Held Gr. interruptum, Billings, 1862, Pal. Foss., 75. vol. 1, p. 109, Mid. Sil.

- vol. 1, p. 105, mai. on. intertrium, Hall, 1884, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 416, Niagara Gr. intervesicula, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 38, and 35th Rep. N. Y. St. Mus. Nat. Hist., p.
- 442, Up. Held. Gr. juvene, Rominger, 1876, Foss. Corals, p.
- 101, Up. Held. Gr.
- leseuri, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 371, Onondaga Gr.
- michelini, Castelnau, 1843, Syst. Sil., p. 48. Not recognized.
- nanum, Hall, 1876, Illust. Dev. Foss., pl. 22, Ham. Gr. nepos, Hall, 1876, Illust. Dev. Foss, pl.
- 22, Ham. Gr.

nevadense, Meek, 1877, U. S. Geo. Sur. 40th Parallel, vol. 4, p. 60, Carboniferous. nymphale, Billings, 1862, Pal. Foss., vol. 1, p. 111, Mid. Sil.

- palmeri, Meek, 1877, U.S. Geo. Sur. 40th Parallel, vol. 4, p. 33, Devonian. palum, Hall, 1876, Illust. Dev. Foss., pl.
- 31, Ham. Gr. panicum, Winchell, 1866, Rep. Low Penin.
- Mich., p. 90, Ham. Gr. partitum, Winchell, 1866, Rep. Low. Penin. Mich., p. 90, Ham. Gr.
- pasithea, Billings, 1862, Pal. Foss., vol. 1, p. 112, Mid. Sil. 77.
- pelagicum, Billings, 1862, Pal. Foss., vol. 78. 1, p. 108, Anticosti Gr., Div. 2. pennanti, Billings, 1862, Pal. Foss., vol. 1,
- 79. p. 107, Mid. Sil.
 - perfossulatum, Hall, 1882, Foss. Corals, Niagara and Up. Held. Gr., p. 42 and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 446, Up. Held. Gr.
 - perlamellosum, Hall, 1876, Illust. Devon. Foss., pl. 39, Up. Held. Gr. perplicatum, Hall, 1882, Foss. Corals Ni-
 - agara and Up. Held Grs., p. 42, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 447, Up. Held. Gr.

picthorni, Salter, 1852, (Strephodes picthorni,) Sutherland's Jour., vol. 2, p. ccxxx, Devonian,

- plicatulum, Castelnau, 1843, Syst. Sil., p. 48. Not recognized.
- plicatum, Goldfuss, 1826, Germ. Petref. Not American.
- profundum, see Streptelasma profundum. pustulatum, Conrad, 1848. Not properly defined.
- quadrigeminum, Goldfuss. Not American. radicula, Rominger, 1876, Foss. Corals, p. 109, Niagara Gr.
- robustum, Hall, 1876, Illust. Devon. Foss., pl. 22, Ham. Gr.
- robustum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 43, Up. Held.

Gr. The name was preoccupied. rollini, Castelnau, 1843, Syst. Sil., p. 49. Not recognized.

rugosum, Hall, 1843, (Astrea rugosa,) Geo. Sur. 4th Dist. N. Y., p. 159, Up. Held. Gr. scalenum, Hall,

1882, Foss. Cor-als Niagara and Up. Held. Grs., p. 42, and 35th Rep. N. Y. St.

Mus. Nat. Hist., p. 446, Up. Held. Ġr. scyphus, Romin-

- ger, 1876, Foss. Corals, p. 103, Ham. Gr. septatum, Hall,
- 1882. Foss. Corals Niagara and
 - p. 41, and 35th rugosum Rep. N. Y. St.
- Mus. Nat. Hist., p. 445, Up. Held. Gr. shumardi, see Amplexus shumardi.
- solitarium, Billings, 1866, Catal. Sil. Foss. 80
- Antic., p. 93, Clinton and Niagara Grs. striatulum, Castelnau, Syst. Sil., p. 48. Not recognized.
- subcæspitosum, Meek, 1872, 6th Rep. Hayden's Geo. Sur. Terr., p. 470, and U. S. Geo. 40 Parallel, vol. 4, p. 60, Subcarboniferous.
- torquium, see Campophyllum torquium.
- turbinatum, Goldfuss. Not American.
- undulatum et multiplicatum, Owen, 1840,
- Rep. on Min. Lands. Not binomial.
- validum, Hall, 1876, Illust. Devon. Foss.. pl. 39, Up. Held. Gr. vanuxemi, Hall, 1859, figured without specific name in 1843, Geo. Rep. 4th Dist. N. Y., Tab. 49, fig. 3, 3a, Ham. Gr. vermiculare, Owen, syn. for Campophyl-
- lum torquium.
- vesiculatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 41, and 12th Geo. Sur. Ind., p. 297, Up. Held. Gr. vesiculosum, see Cystiphyllum vesiculosum.
- vicinum, Castelnau, 1843, Syst. Sil., p. 48. Not recognized.
- wahlenbergi, Billings, 1862, Pal. Foss., vol. 1, p. 108, Anticosti Gr., Div. 3.
- zenkeri, Billings, 1860, Can. Jour., vol. 5, p. 262, Up. Held. Gr.
- Cyathopora iowensis, Owen, see Striatopora There is no genus Cyathoiowensis. pora, and if Dr. Owen did not intend to refer his species to Cyathophora, then he failed to establish a genus, by neglecting to define it.

Cyclograptus. Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 42. [Ety. kuklos, disk; grapho, I write.] A circular disk, with stipes radiating from the radicle to the margin and in a free manner be-

yond. Type C. rotadentatus. rotadentatus, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 42, Niagara (ir.

WY IL

FIG 162. -Cyclo-

graptus rota-dentatus.

Cyclolites, Lamarck, Vert., p. 369. rotuloides, see Pala

CYSTIPHOROLITES. but the referen a small cavity; stone.] Corallu superimposed s vertical sections equal, vesiculose tiphyllum; laye cells broad, ex Type C. major. Vesicularia, Roi occupied.

major, Rominger, jor,) Foss. Coral minor, Rominge minor,) Foss. Co variolosus, Roming

riolosa,) Foss. Co CYSTIPHYLLUM, LONS Syst., p. 691. [E lon, leaf.] Simp

drical, rarely again with vesicular ti ary or absent. T aggregatum, Billin P3.

vol. 3, p. 136, Ha americanum, Edwar Foss. d. Terr. Pal americanum var. a

Trans. Chi. Acad. bifurcatum, Hall, 1

- agara and Up. H 35th Rep. N. Y. S 459, Up. Held. Gr bipartitum, Hall, 18
- agara and Up. H 35th Rep. N. Y. S 459, Up. Held. Gr conifollis, Hall, 187 pl. 30, Ham. Gr.

corrugatum, Hall,

Foss., pl. 29, Ham crateriforme, Hall, 1 agara and Up. H 35th Rep. N. Y. St 461, Up. Held. Gr.

cylindricum, Lonsdale

fruticosum, Nicholso vol. 2, N. S., p. 32, grande, Billings, 1856 p. 138, Corniferous granilineatum, Hall, Niagara and Up. H

12th Rep. Ind. Geo. huronense, Billings, 1

Antic., p. 92, Clinton Andre, p. 92, Onnon infundibulum, Hall. Niagara and Up. He 35th Rep. N. Y. St. 402, Up. Held. Gr. latiradius, Hall, 1882

agara and Up. Hel 12th Rep. Geo. Sur

Held. Gr. maritimum, Billings, 1 1, p. 112, Mid. Sil.



CYA.-CYC

182

76.

Suman

[CYA.-CYC

a rugosa,) Geo. , Up. Held. Gr





-Cyathophyllum agosum.

Up. Held. Gr. umardi. Catal. Sil. Foss. 80 Niagara Grs. Sil., p. 48. Not

872, 6th Rep. rr., p. 470, and d. 4, p. 60, Sub-

m torquium.

- American. i, Owen, 1840,
- t binomial.

Devon. Foss.

gured without Geo. Rep. 4th 3, 3a, Ham. Gr. or Campophyl-

loss. Corals Nirs., p. 41, and , Up. Held. Gr. m vesiculosum. 3yst. Sil., p. 48.

Pal. Foss., vol. Div. 3. 1. Jour., vol. 5,

see Striatopora genus Cyathodid not intend Cyathophora, ish a genus, by to define it.

Spencer, 1. No. 1, Mus. Mo., p. 42. [Ety. sk; grapho, circular disk. s radiating from

e to the margin ree manner betatus. 14, Bull. No. 1,

42. Niagara (ir.

CŒLENTERATA.

Cyclolites, Lamarck, 1801, Syst. Anim. sans Vert., p. 369. Not a Palæozoic genus. rotuloides, see Palæocyclus rotuloides.

CVC.—CVS.]

- CYSTIPHOROLITES. Recently proposed genus but the reference mislaid. [Ety. kustis, a small cavity; phoros, bearing; lithos, stone.] Corallum compound, formed of superimposed series of cups, which in vertical sections appear as layers of unequal, vesiculose plates, resembling Cystiphyllum; layers radiated, margins of cells broad, expanded, and confluent. Type C. major. Proposed instead of Vesicularia, Rominger, which was preoccupied.
- major, Rominger, 1876, (Vesicularia major,) Foss. Corals, p. 135, Niagara Gr. minor, Rominger, 1876, (Vesicularia minor,) Foss. Corals, p. 136, Niagara Gr. variolosus, Rominger, 1876, (Vesicularia variolosa,) Foss. Corals, p. 136, Niagara Gr. CYSTIPHYLLUM, Lonsdale, 1839, Murch. Sil.
- Syst., p. 691. [Ety. kustis, cavity ; phyllon, leaf.] Simple, turbinate, or cylindrical, rarely aggregate; interior filled with vesicular tissue; septa rudimentary or absent. Type C. siluriense.
- aggregatum, Billings, 1859, Can. Jour., vol. 3, p. 136, Ham. Gr.
 - americanum, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 464, Ham. Gr. americanum var. arcticum, Meek, 1868,
 - Trans. Chi. Acad. Sci., p. 80, Ham. Gr. bifurcatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 55, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 450, Up. Held. Grs.
 - 459, Up. Held. Gr. bipartitum, Hall, 1882, Foss. Corals Ni-
 - agara and Up. Held. Grs., p. 55, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 459, Up. Held. Gr. conifollis, Hall, 1876, Illust. Dev. Foss.,
 - pl. 30, Ham. Gr.
 - corrugatum, Hall, 1876, Illust. Devon. Foss., pl. 29, Ham. Gr.
 - crateriforme, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 57, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 461, Up. Held. Gr.
 - cylindricum, Lonsdale. Not American. fruticosum, Nicholson, 1875, Geo, Mag., vol. 2, N. S., p. 32, Corniferous Gr. grande, Billings, 1859, Can. Jour., vol. 4,
- p. 138, Corniferous Gr.
- grinilineatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 14, and 12th Rep. Ind. Geo. p. 274, Niagara Gr.
- huronense, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 92, Clinton and Niagara Grs. infundibulum, Hall. 1882, Foss. Corals Niagara and Up. Held. Grs., p. 58, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 462, Up. Held. Gr.
- latiradius, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 57, and 12th Rep. Geo. Sur. Ind., p. 304, Up. Held. Gr.
- maritimum, Billings, 1862, Pal. Foss., vol. 1, p. 112, Mid. Sil.

- mundulum, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist, p. 234, Chemung Gr.
- muricatum, Hall, 1882 Foss. Corals, Niagara and Up. Held. Grs., p. 56, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 460, Up. Held. Gr. nanum, Hall, 1882, Foss. Corals Niagara
- and Up. Held. Grs., p. 56, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 460, Up. Held. Gr.
- obliquum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 58, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 462, Up. Held. Gr.



ohioense, Nicholson, 1875, Ohio Pal., vol. 2, p. 234, Corniferous Gr.

183

pustulatum, Hall, 1882, Foss. Cor-als, Niagara and Up. Held. Grs.,

. — Cystiphyllum ohioense. F1G. 168.

- p. 58, and 12th Rep. Geo. Sur. Ind., p. 262, Up. Held. Gr. quadrangulare, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 56, and 35th Rep. N. Y. St. Mus. Nat. Hist., p.
- 460, Up. Held. Gr. scalatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 59, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 463, Up. Held. Gr.

senecaense, Billings, 1859, Can. Jour., vol. 87. 4, p. 137,



Cornifer-Fig. 164.-Cystiphyllum vesicuous Gr. losum superbum,

Nicholson, 1875, Geo. Mag. vol. 2, N. S., p. 33, Ham. Gr.

supraplanum, Hall, 1882, Foss. Corals Ni-

88.

agara and Up. Held. Grs., p. 57, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 461, Up. Held. Gr.

- tenuiradius, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 56, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 460, Up. Held. Gr.
- varians, Hall, 1876, Illust. Devon. Foss., pl. 29, Ham. Gr.
- vesiculosum, Goldfuss, 1826, (Cyathophyllum vesiculosum,) Germ. Petref., p. 58, Devonian.
- Cystostylus, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis. and Geo. Wis., vol. 4, p. 273. [Ety. kustis, cavity; stylos, stalk.] Aggregate, cylindrical, corallites in contact or united by transverse filaments; increase by bifurcation, structure cystose as in Cystiphyllum; formed by imperfect transverse plates arranged in circular, funnel-formed order; septa and tabulæ obsolete. Type C. typicus.
 - infundibulum, Whitfield, 1878, (Syringopora infundibulum,) Ann. Rep. Geo. Sur. Wis., p. 79, and Geo. Wis., vol. 4,
 - p. 274, Niagara Gr. typicus, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis. and Geo. Wis., vol. 4, p. 274, Niagara Gr.
- DANIA, Edwards & Haime, 1849, Comp. Rend., t. 29, p. 261. [Ety. proper name.] Corallum having most of the characters of Chetetes, but with the tabulæ connected through the corallites so as to divide the mass into parallel strata. Type D. huronica.
 - huronica, Edwards & Haime, 1849, Comp.
- Rend., t. 29, p. 261, Up. Sil. Dawsonia, Nicholson, 1873, Ann. Mag. Nat. Hist., 4th ser., vol. 12. [Ety. proper name.] Supposed to be the ovarian vesicles of Graptolites. Type D. campanulata.
 - acuminata, Nicholson, 1873, Ann. Mag. Nat. Hist., 4th ser., vol. 12, Quebec Gr. campanulata, Nicholson, 1873, Ann. Mag.
 - Nat. Hist., vol. 12, Quebec Gr. rotunda, Nicholson, 1873, Ann. Mag. Nat.
- Hist., vol. 12, Quebec Gr.
- tenuistriata, Nicholson, 1873, Ann. Mag. Nat. Hist., vol. 12, Quebec Gr.
- DEKAYELLA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 155. [Ety diminu-tive of Dekayia.] Ramose, interstitial cells; spiniform tubuli of two kinds, larger ones arranged as in Dekayia, others more numerous; diaphragms in both sets of tubes. Type D. obscura. obscura, Ulrich, 1883, Jour. Cin. Soc. Nat.
 - Hist., vol. 6, p. 89, Hud. Riv. Gr. robusta, Foord, 1884, Ann. and Mag. Nat. Hist., 5th ser., vol. 14, p. 341, Hud.
 - Riv. Gr.
- DEKAYIA, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal., p. 277. [Ety. proper name.] Distinguished from Monticulipora by having little protuberances on the surface between the angles of the corallites. Type D. aspera.

appressa, Ulrich, 1883, Jour. Cin. Soc. Nat Hist., vol. 6, p. 152, Hud. Riv. Gr.

aspera, Ed-





CVS.-DEN

- multispi-FIG. 165.—Dekayia aspera, nat nosa, Ul- ural size, and magnified. rich, 1883, Jour. Cin. Soc. Nat. Hist.,
- vol. 6, p. 154, Hud. Riv. Gr. paupera, Ulrich, 1883, Jour. Cin. Soc. Nat
- Hist., vol. 6, p. 153, Hud. Riv. Gr.
- pelliculata, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 150, Hud. Riv. Gr.
- trentonensis, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 151, Trenton Gr. DENDROGRAPTUS, Hall, 1865, Can. Org. Rem., Decade 2, p. 126. [Ety. dendron, tree, grapho, I write.] Simple or aggregate; foot-stalk strong, sometimes with a rootlike bulb; ramified above into slightly divergent branches, celluliferous on one side. Type D. hallanus.
 - compactus, Walcott, 1879, Utica Slate and related formations, p. 21, Utica Slate.
 - dawsoni, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 18, Niagara Gr. diffusus, Hall, 1865, Can. Org. Rem., De-

 - cade 2, p. 132, Quebec Gr. divergens, Hall, 1865, Can. Org. Rem., Decade 2, p. 129, Quebec Gr.
 - dubius, n. sp. Proposed instead of D. simplex, Spencer, in Bull. No. 1, Mus. Univ. St. Mo., p. 17, which was preoccupied. Niagara Gr.
 - erectus, Hall, 1865, Can. Org." Rem., De-
 - cade 2, p. 130, Quebec Gr. flexuosus, Hall, 1865, Can. Org. Rem., Decade 2, p. 127, Quebec Gr. frondosus, Spencer, 1884, Bull. No. 1,

Mus. Univ. St. Mo., p. 18, Niagara Gr.

fruticosus, Hall, 1865, Can. Org. Rem., Decade 2, p. 131, Quebec Gr.

gracilis, Hall, 1865, Can. Org. Rem., Decade 2, p. 132, Quebec Gr.

gracillimus, Lesquereux, 1877, Proc. Am. Phil. Soc. p. 164, (Psilophygracillimum, ton Hud. Riv. Gr.

lanus,) Am. Jour. Sci. 2d ser., vol. 11, p. 187,



Potsdam sandstone. novellus, Hall, 1879, Desc. New Spec. Foss., p. 2, and 11th Rep. Geo. Sur. Ind., p. 225, Niagara Gr.

FIG. 166. - Dendro-

graptus hallanus.



prægracilis, Spe Mus. Univ. St. primordialis, Ma Soc. Can., p. 3

ramosus, Spencer Univ. St. Mo.,

simplex, Walcot related formati

simplex, Spencer, Univ. St. Mo., preoccupied.

spinosus, Spencer

Univ. St. Mo., striatus, Hall, 18

cade 2, p. 129, (and related fo

Slate. DENDROPORA, Miche p. 187. [Ety.

p. 187. [Ety. pore.] Corallui delicate, smooth tant, and surrou tuse margin; se

Type D. explici alternans, Roming p. 64, Ham. Gr.

neglecta, Rominge 63, Up. Held. G ornata, see Trachy

proboscidialis, Ron als, p. 65, Ham. reticulata, Roming

p. 65, Ham. Gr. Dichograptus, syn. for

DICRANOGRAPTUS, H Rem., Decade 2, two pointed; g lower part of th cells on each side

bifurcates, and h outer side of each ramosus.

divaricatus, Hall, divaricatus,) Pal. Hud. Riv. Gr.

furcatus, Hall, 184 catus,) Pal. N. Y Slate.



FIG. 167.—Dicranograptu ramosus.

net; nema, thread. of flabelliform or f sions, composed o branches, which

[CYS.-DEN

r. Cin. Soc. Nat 1. Riv. Gr.



avia aspera, nat nd magnified. Soc. Nat. Hist.,

. Gr. Ir. Cin. Soc. Nat d. Riv. Gr. Jour. Cin. Soc), Hud. Riv. Gr. , Jour. Cin. Soc. Trenton Gr. Can. Org. Rem., . dendron, tree le or aggregate ; mes with a rootwe into slightly uliferous on one

Utica Slate and 1, Utica Slate. Jull. No. 1, Mus. agara Gr.

Örg. Rem., De-Gr.

an. Org. Rem., e Gr.

I instead of D. ull. No. 1, Mus. hich was preoc-

Org." Rem., De-Gr.

an. Org. Rem., ec Gr.

4. Bull. No. 1, 18, Niagara Gr. sus, Hall, 1865. Org. Rem., De-2, p. 131, Quebec

, Hall, 1865, Can. Rem., Decade 2, 2. Quebec Gr. mus, Lesquereux, Proc. Am. Phil. p. 164, (Psilophygracillimum, Riv. Gr.

ns, Prout, 1851, ptolithus hals,) Am. Jour. Sci. r., vol. 11, p. 187, dam sandstone. esc. New Spec. Rep. Geo. Sur. r.

DEN.-DID.]

- prægracilis, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 19, Niagara Gr. primordialis, Matthew, 1885, Trans. Roy.
- Soc. Can., p. 31, St. John Gr. ramosus, Spencer, 1884, Bull. No. 1, Mus.
- Univ. St. Mo., p. 17, Niagara Gr. simplex, Walcott, 1879, Utica Slate and related formations, p. 20, Utica Slate.
- simplex, Spencer, 1984, Bull. No. 1, Mus. Univ. St. Mo., p. 17. The name was preoccupied. See D. dubius.
- spinosus, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 19, Niagara Gr. striatus, Hall, 1865, Can. Org. Rem., De-
- cade 2, p. 129, Quebec Gr. tenuiramosus, Walcott, 1879, Utica Slate and related formations, p. 21, Utica Slate.
- DENDROPORA, Michelin, 1846, Icon. Zooph., p. 187. [Ety. dendron, tree; poros, pore.] Corallum arborescent, with very delicate, smooth branches; calices distant, and surrounded by a narrow, obtuse margin; septa small, but distinct. Type D. explicita.
 - alternans, Rominger, 1876, Foss. Corals, p. 64, Ham. Gr.
 - neglecta, Rominger, 1876, Foss. Corals, p. 63, Up. Held. Gr.
 - ornata, see Trachypora ornata.
 - proboscidialis, Rominger, 1876, Foss. Corals, p. 65, Ham. Gr. reticulata, Rominger, 1876, Foss. Corals,
 - p. 65, Ham. Gr.
- Dichograptus, syn. for Graptolithus.
- Dicranographia, syn. 10 Graphonicus. Dicranographia, syn. 10 Graphonicus. Rem., Decade 2, p. 46. [Ety. dikranos, two pointed; grapho, I write.] The lower part of the stipe has a row of cells on each side, but above, the stipe bifurcates, and has cells only on the outer side of each bifurcation. Type D. ramosus.
 - divaricatus, Hall, 1859, (Graptolithus divaricatus,) Pal. N. Y., vol. 3, p. 513, Hud. Riv. Gr.
 - furcatus, Hall, 1847, (Graptolithus fur-catus,) Pal. N. Y., vol. 1, p. 273, Utica Slate.

ramosus, Hall, 1847, (Grapto-lithus ramosus,) Pal. N. Y vol. 1, p. 270, Utica Slate. sextans, H a l l, 1847, (Graptolithus sextans,) Pal. N. Y., vol. 1, p. 273, Utica Slate.

DICTYONEMA, Hall, 1852, Pal. N. Y., vol. 2, p. 174. [Etv. dictuon. FIG. 167.-Dicranograptus

dictyon, [Ety. net; nema, thread.] Fronds consisting of flabelliform or funnel-shaped expansions, composed of slender, radiating branches, which frequently bifurcate

ramosus

as they recede from the base; branches united laterally by transverse dissepiments; exterior striated; interior surface celluliferous or serrate. Type D. retiforme.

- expansum, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 25, Niagara Gr.
- fenestratum, Hall, 1851, in Foster and
- Whitney's Rep. on Lake Superior Land Dist., p. 223, Up. Held. Gr. gracile, Hall, 1852, Pal. N. Y., vol. 2, p. 175, Niagara Gr.
- 175, Niagara Gr. grande, Nicholson, 1873, Ann. Mag. Nat. Hist., 4th ser., vol. 12, Quebec Gr. irregulare, Hall, 1865, Can. Org. Rem., Decade 2, p. 136, Quebec Gr. murrayi, Hall, 1865, Can. Org. Rem., De-
- cade 2, p. 138, Quebec Gr.
- neenah, Hall, 1861, Geo. Rep. Wis., p. 17, Trenton Gr.
- pergracile, Hall & Whitfield, 1872, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 181, and Acad. Geo., p. 563, Niagara Gr. quadrangulare, Hall, 1865, Can. Org. Rem.,

Decade 2, p. 138, Quebec Gr.



FIG. 168.-Dictyonema retiforme.

retiforme, Hall, 1843, (Gorgonia reti-formis,) Geo. Rep. 4th Dist. N. Y., p. 115, and Pal. N. Y., vol. 2, p. 174, Niagara Gr.

- robustum, Hall, 1865, Can. Org. Rem., Decade 2, p. 137, Quebec Gr. splendens, Billings, 1874, Pal. Foss., vol.
- 2, p. 12, Gaspe limestone No. 1, Up. Sil.
- tenellum, Spencer, 1878, Can. Nat., vol. 8, and Bull. No. 1, Mus. Univ. St. Mo.,
- p. 26, Niagara Gr. websteri, Dawson, 1860, Can. Nat. and Geo., vol. 5, and Acad. Geo., p. 563, Niagara Gr.
- DIDYMOGRAPTUS, McCoy, 1851, Brit. Pal. Foss., p. 3-9. [Ety. didymos, double; grapho, I write.] Consisting of forked stipes, straight or curved; one celluliferous side. Type D. murchisoni.

caduceus, Salter, 1853, (Graptolithus caduceus,) Quar. Jour. Geo. Soc., vol. 9, p. 87, Quebec Gr.

ودورد در در در در در در در در در Cumulant

FIG. 169.—Didymograptus geminus.

- geminus, Hisinger, 1840, (Prionotus geminus,) Leth Suecia, Supp. 2, p. 5, pl. 38, Quebec Gr.
- DIPHYPHYLLUM, Lonsdale, 1845, Russ. and Ural Mts., vol. 1, p. 624. [Ety. diphyia, division; phyllon, leaf.] Corallum simple, composite, increasing by lateral gemmation; corallites tall, cylindrical, connected by epitheeal or radiciform expansions, with each other; central area occupied by tabulæ; circumscribed by an inner wall; exterior vesicular zone occupied by septa, which are confined between the outer and inner mural investment; no columella. Type D. conicum.
- adnatum, Hall, 1882, Foss. Corals Niagara and Up. Held Grs., p. 54, and 12th Rep. Geo. Sur. Ind., p. 303, Up. Held. Gr.
- apertum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 54, and 12th Rep. Geo. Sur. Ind., p. 303, Up. Held. Gr.

archiaci, see Crepidophyllum archiaci.

- arundinaceum, Billings, 1859, Can. Jour., vol. 4, p. 134, Corniferous limestone.
- breve, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 55, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 459, Up. Held. Gr.
- cæspitosum, Hall, 1852, (Diplophyllum cæspitosum,) Pal. N. Y., vol. 2, p. 116, Niagara Gr.
- coralliferum, Hall, 1852, (Diplophyllum coralliferum,) Pal. N. Y., vol. 2, p. 322, Coralline limestone.
- cylindraceum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 54, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 458, Up. Held. Gr.
- fasciculum, Meek, 1877, U. S. Geo. Sur. 40th Parallel, vol. 4, p. 29, Devonian.
- gigas, Rominger, 1876, Foss. Corals, p. 125, Niagara Gr.
- gracile, McCoy, 1854, Brit. Pal. Foss., p. 88, Up. Held Gr.
- huronicum, Rominger, 1876, Foss. Corals, p. 121, Niagara Gr.
- rectiseptatum, Rominger, 1876, Foss. Corals, p. 124, Ham. Gr.
- rugosum, Edwards & Haime, 1851, (Eridophyllum rugosum,) Pol. Foss. des Terr. Pal., p. 424, Niagara Gr.
- Terr. Pal., p. 424, Niagara Gr. simcoense, Billings, 1859, (Eridophyllum simcoense,) Can. Jour.. vol. 4, p. 131, Up. Held. Gr.

stramineum, Billings, 1859, Can. Jour., vol. 4, p. 135, Corniferous Gr.

strictum, Edwards & Haime, 1851, (Eri-

dophyllum strictum,) Poll. Foss. des Terr. Pal., p. 424, Up. Held. Gr. tumidulum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 55, and 12th Rep. Geo. Sur. Ind., p. 303, Up. Held. Gr.

[DIP.



FIG. 170.-Diphyphyllum stramineum.

- vennori, Billings, 1865, (Eridophyllum vennori,) Can. Nat. and Geo., 2d ser., vol. 2, p. 431, Clinton Gr.
- verneuilanum, Edwards & Haime, 1850, (Eridophyllum verneuilanum,) Brit. Foss. Corals, p. lxxi, and Pol. Foss. des Terr. Pal., p. 424. Up. Held Gr.
- Terr. Pal., p. 424, Up. Held Gr. DIPLOGRAPTUS, McCoy, 1854, (Diplograpsus,) Brit. Pal. Rocks, p. 3. [Ety. diplos, duplex; grapho, L write.) Stipes simple, flattened, or quadrangular; cellules, in single series, on the two sides of a double central axis; cellules oblique, opening toward, the apex; cell denticles prominent, often mucronate. Type D. foliaceus.
 - amplexicaulis, Hall, 1847, (Graptolithus amplexicaulis,) Pal. N. Y., vol. 1, p. 79, Trenton Gr.
 - angustifolius, Hall, 1859, (Graptolithus angustifolius,) Pal. N. Y., vol. 3, p. 515, Hud. Riv. Gr.
 - ciliatus, Emmons, 1856, Am. Geo., p. 105, Up. Taconic.
 - dissimilaris, Emmons, 1856, Am. Geo., p. 105, Up. Taconic.
 - foliaceous, (?) Murch, 1839, (Graptolites foliaceus,) Murch. Sil. Syst., p. 695, Hud. Riv. Gr.

DIP.-FAV.] foliosus, Emmon Up. Taconic. folium, H folium, Hud. F hudsonic Proc. 0 hypnifori FIG. 171. tolithus Diplograptus folium. vert. Fe W. 100 Trento inutilis, Hall, 18 cade 2, p. 111, laciniatus, Emm 236, Up. Tacon marcidus, Hall, cidus,) Pal. N. Riv. Gr. mucronatus, Ha mucronatus,) I Hud. Riv. Gr. obliquus, Emmo 106, Up. Tacon peosta, Hall, 186 Geo. Rep. Wis. pristiniformis, H pristiniformis,) and Can. Org. Quebec Gr. pristis, (?) Hisin pristis,) Leth S Y., vol. 1, p. 26 putillus, Hall, 18 cade 2, p. 44, H rugosus, Emmons Up. Taconic. rectangularis, M Rocks, p. 3, Lo secalinus, Hall, 18 Pal. N. Y., vol simplex. simplex, Emmon plex,) Taconic N. Y., vol. 1, p. spinulosus, Hall spinulosus,) Pa Hud. Riv. Gr. whitfieldi, Hall, 1 fieldi,) Pal. N. Riv. Gr. Diplophyllum, Hall, p. 115, syn. for cæspitosum, see Dip coralliferum, see liferum. DIPLOTRYPA, Nicho Corals, p. 292. trypa, hole.] C the larger th tabulæ remote; clusters, (mont lites angular, th pletely isolating numerous. Typ infida, Ulrich, 188 Minn., p. 88, Tr milleri, Ulrich, 18 Hist., vol. 5, p. :

[DIP.

DIP.-FAV.]

oll. Foss. des eld. Gr. oss. Corals Nirs., p. 55, and d., p. 303, Up.



ramineum.

(Eridophyllum Geo., 2d ser.,

k Haime, 1850, lanum,) Brit. l Pol. Foss. des eld Gr. (Diplograpsus,)

[Ety. diploos, Stipes vrite.) quadrangular; s, on the two l axis; cellules , the apex; cell en mucronate.

(Graptolithus Y., vol. 1, p. (Graptalithus Y., vol. 3, p.

m. Geo., p. 105,

6, Am. Geo., p.

39, (Graptolites Syst., p. 695,

CŒLENTERATA.

foliosus, Emmons, 1856, Am. Geo., p. 105, Up. Taconic.

folium, Hisinger, 1837, (Prionotus folium.) Leth. Suec., p. 113, Hud. Riv. Gr.

hudsonicus, Nicholson, 1875, Pal. Proc. Ont., p. 38, Hud. Riv. Gr. hypniformis, White, 1874, (Grap-

FIG. 171. tolithus hypniformis,) Rep. In-Diplovert. Foss., p. 12, and Geo. Sur. W. 100th Mer., vol. 4, p. 63, graptus folium.

Trenton Gr. inutilis, Hall, 1865, Can. Org. Rep., Decade 2, p. 111, Quebec Gr.

laciniatus, Emmons, 1856, Am. Geo., p. 236, Up. Taconic.

marcidus, Hall, 1859; (Graptolithus marcidus,) Pal. N. Y., vol. 3, p. 514, Hud. Riv. Gr.

- mucronatus, Hall, 1847, (Graptolithus mucronatus,) Pal. N. Y., vol. 1, p. 263, Hud. Riv. Gr.
- obliquus, Emmons, 1856, Am, Geo., p. 106, Up. Taconic.
- peosta, Hall, 1861, (Graptolithus peosta,) Geo. Rep. Wis., p. 17, Trenton Gr. pristiniformis, Hall, 1858, (Graptolithus
- pristiniformis,) Geo. Sur. Can., p. 133, and Can. Org. Rem., Decade 2, p. 110, Quebec Gr.
- pristis, (?) Hisinger, 1837, (Prionotus pristis,) Leth Suec., p. 114, and Pal. N. ., vol. 1, p. 265, Hud. Riv. Gr.
- putillus, Hall, 1865, Can. Org. Rem., Decade 2, p. 44, Hud. Riv. Gr.
- rugosus, Emmons, 1856, Am. Geo., p. 105, Up. Taconic.
- rectangularis, McCoy, 1851, Brit. Pal. Rocks, p. 3, Low Sil.
- secalinus, Hall, 1847, (Fucoides secalinus,) Pal. N. Y., vol. 1, p. 267, syn. for D. simplex.
- simplex, Emmons, 1844, (Fucoides simplex.) Taconic system, p. 27, and Pal.
- N. Y., vol. 1, p. 267, Up. Taconic. spinulosus, Hall, 1859, (Graptolithus spinulosus,) Pal. N. Y., vol. 3, p. 517, Hud. Riv. Gr.
- whitfieldi, Hall, 1859 (Graptolithus whitfieldi,) Pal. N. Y., vol. 3, p. 516, Hud. Riv. Gr.
- Diplophyllum, Hall, 1852, Pal. N. Y., vol. 2, p. 115, syn. for Diphyphyllum. cæspitosum, see Diphyphyllum cæspitosum. coralliferum, see Diphyphyllum coralliferum.
- DIPLOTRYPA, Nicholson, 1879, Pal. Tab. Corals, p. 292. [Ety. diploos, double; trypa, hole.] Corallites of two kinds, the larger thin walled, polygonal, tabulæ remote; often aggregated in clusters, (monticules); smaller corallites angular, thin walled, never completely isolating the larger ones; tabulæ numerous. Type D. petropolitana.
- infida, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 88, Trenton Gr. milleri, Ulrich, 1882, Jour. Cin. Soc. Nat.
- Hist., vol. 5, p. 245, Niagara Gr.

regularis, Foord, 1883, Micropalæontology, p. 13, Trenton Gr.

- DISCOPHYLLUM, Hall, 1847, Pal. N. Y., vol. 1, p. 277. [Ety. diskos, disk; phyllon,
 - leaf.] Discoid flattened, rays numerous, proceeding from the center and terminating in a thickened border. Type D. peltatum.
 - peltatum, Hall, 1847, Pal. N. Y., vol. 1, p. 277, Up. Taconic.
- DUNCANELLA, Nicholson, 1874, Ann. Mag. - Nat. Hist., 4th ser., vol. 13, p. 333. [Ety.

proper name.] Corallum IIIIII simple, obconical; calycle deep, circular; rays strong, exsert; epitheca striated vertically; closely allied to Type D. Streptelasma. borealis.

- borealis, Nicholson, 1874, Ann. Mag. Nat. Hist., 4th ser., vol. 13, p. 333, Niagara Gr.
- ELASMOPHYLLUM, Hall, 1882, Foss. Corals Niagara and Up. Held Grs., p. 38. [Ety. elasma, lamellæ; phyllon, FIG. 172. leaf.] Simple, turbinate, buncanella borealis lamellæ extending to the magnified. center, twisted or not; in
 - terlamellar cysts continuing to the cen-

ter; no tabulæ. Type Lattenuatum. attenuatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 38, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 442, Up. Held. Gr.

- EMMONSIA, Edwards & Haime, 1851, Monographie des Polyp., Foss. des Terr. Palæoz., p. 246. [Ety. proper name.] Distinguished from Favosites by the compound character of the diaphragms, but generally regarded as a synonym. Type E. hemispherica.
- hemispherica, Troost, 1840, (Calamopora hemispherica,) 5th Rep. Geo. Tenn., p. 72, Up. Held. Gr.
- hemispherica, Yandell & Shumard, 1847, (Favosites hemisphericus,) Contrib. to Geo. of Ky., p. 7. Same species described by Troost.
- Eridophyllum, Edwards & Haime, 1850, Brit. Foss Corals, p. lxxi, syn. for Diphyphyllum.
 - rugosum, see Diphyphyllum rugosum.

simcoense, see Diphyphyllum simcoense. strictum, see Diphyphyllum strictum.

vennori, see Diphyphyllum vennori. verneuilanum, see Diphyphyllum, verneuilanum.

- Favastrea, DeBlainville, 1830, Man. d. Actinol, p. 374. Not an American palæozoic. genus.
- striata, D'Orbigny, 1850, Prodr. d. Palé-ont., t. 1, p. 48. Not defined so as to be recognized.
- Faviphyllum, as used by Hall, 1852, Stans. Exped. to Great Salt Lake, p. 407. Not defined, and founded upon a silicified, indeterminate fragment.

- FAVISTELLA, Hall, 1847, Pal. N. Y., vol. 1, p. 275. [Ety. favus, honey-comb; stella, star.] Massive, hemispherical, coral-lites polygonal, increasing by lateral development; walls not separable as in
 - Favosites, nor perforated by pores; tabulæ close; septa of alternately larger and smaller size, the larger reaching the center; twelve or more in each coral-lite. Type F. sfellata.
 - calicina, Nicholson, 1874, Rep. Brit. Ass'n. and Pal. Tab. Corals, p. 197, Hud. Riv. Gr.
 - favosidea, Hall, 1852, Pal. N. Y., vol. 2, p. 41, Clinton Gr.
 - franklini, Salter, 1852, Sutherland's Jour., vol. 2, p. ccxxxi, Up. Sil. reticulata, Salter, 1852, Sutherland's Jour.,
 - vol. 2, p. cexxix, Up. Sil.



FIG. 173.-Favistella stellata

stellata, Hall, 1847, Pal. N. Y., vol. 1, p. 275, Hud. Riv. Gr.

FAVOSITES, Lamarck, 1812, Cours. de Zool. du Mus. d'Hist. Nat. and Hist. des An. sans Vert., vol. 2, p. 204. [Ety. favus, Massive or branched, honey-comb.] composed of numerous more or less polygonal corallites; tabulæ present; septa absent or rudimentary; walls perforated by one or more rows of mural pores, connecting the corallites. Type F. alveolatus.

alpenensis, Winchell, 1866, Rep. Low. Penin. Mich., p. 88, Ham. Gr.

alveolaris, DeBlainville. Not American. arbuscula, Hall, 1876, Illust. Devon. Foss., pl. 36, Ham. Gr.

argus, Hall, 1876, Illust, Dev. Foss., pl. 13, Ham. Gr.

asper, D'Orbigny, 1849, Prodr. de Paléont., t. 1, p. 49, Clinton Gr.

basalticus, Goldfuss, 1826, Germ. Petref., p. 78, (Calamopora basaltica,) Devonian. billingsi, Rominger, 1876, Foss. Corals, p. 29, Ham. Gr.

canadensis,

Billings, 1858, (Fis-

tulipora

canaden-

sis,) Can. Nat. and

Geol., vol.



FIG. 174.-Favosites canadensis. .

- 4, p. 98, Up. Held. Gr. capax, Billings, 1866, Catal. Sil. Foss. Antic., p. 6, Hud. Riv. Gr. cervicornis, DeBlainville, 1830, (Alveolo-litation of the second second second second
- lites cervicornis,) Dict., vol. 60, p. 369, Devonian.

chapmani, Nicholson, 1874, Pal. Prov. Ont., p. 52, Up. Held. Gr.

- clausus, Rominger, 1876, Foss. Corals, p. 37, Up.Held. and Ham. Gr.
- conicus, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 112, and Pal. N. Y. vol. 6, p. 9, Low. Held. Gr.
- constrictus, Hall, 1852, (Astrocerium constrictum,) Pal. N. Y., vol. 2, p. 123, Niagara Gr.
- cristatus, Edwards & Haime, 1851, Pol. Foss. Terr. Palæoz., p. 242, Niagara Gr.
- cumberlandicus, Troost, 1840, (Calamo-pora cumberlandica,) 5th Geo. Rep. Tenn., p. 70, Kaskaskia Gr.
- digitatus, Rominger, 1876, Foss. Corals, p.
- 39, Ham. Gr. divergens, Winchell, 1862, Proc. Acad. Nat. Sci., p. 112, and Geo. Sur. W. 100th Merid., vol. 4, p. 79, Subcarb. dubius, DeBlainville, 1830, (Alveolites du-
- bius.) Dict., vol. 60, p. 370, Corniferous Gr.
- dumosus, Winchell, 1866, Rep. Low. Penin, Mich., p. 89, Ham. Gr.
- emmonsi, Rominger, 1876, Foss. Corals, p. 27, Up. Held. Gr., Syn. (?) for F. heli-
- emmonsi, Hall, 1876, Illust. Dev. Foss., pl. 9. The name was preoccupied.

epidermatus, Rominger, 1862, Am. Jour-Sci. and Arts, vol. 34, p. 396, Corniferous Gr.

- epidermatus var. biloculi, Hall, 1876. Illust. Dev. Foss., pl. 7, 'Up. Held. (ir. epidermatus var. corticosus/ Hall, 1876, Illust. Dev. Foss., pl. 10, Up. Held. (ir. excretus, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist. sym. for Forsibile
- Mus. Nat. Hist., syn. for F. spinigerus. cplanatus, Hall,



flabelliformis, Troost, 1843. Not satis- FIG. 175.-Favosites for-factorily defined. besi var. occidentalis. forbesi, Edwards &

Haime, 1854, Brit. Foss. Corals, p. 258, Niagara Gr.

forbesi var. discoideus, Roemer, 1860, (Calamopora forbesi var. discoidea,) Sil. Fauna W. Tenn., p. 19, Niagara Gr. forbesi var. occident-

Hall, 1876, alis. 28th Rep. N. Y. St. Mus. Nat. Hist., p. 109, Niagara Gr.



forbesi var. waldronensis, Nicholson, 1879, syn. for F. forbesi var. occidentalis.



goldfussi, Caste

goldfussi, D'Orbis

goldfussi,) Sys

hemispherica. hemisphericus v Illust. Dev. Fo

hemisphericus Illust. Dev. Fo hisingeri, Edwar Foss. des Ter agara Gr.

hispidus, Roming 23, Niagara Gr. infundibuliformis,

iac & Verneuil. intertextus, Rom

p. 38, Ham. Gr invaginatus, Nicl vol. 2, p. 232, C

limitaris, Roming 36, Corniferous

lycoperdon, see M mammillaris, Cast nized.

mancus, Winchel Sci., p. 112, Kir maximus, Troost, ima,) 5th Rep.

vonian. minimus, Hall, 1 Mus. Nat. Hist. niagarensis, Hall.

p. 125, Niagara niagarensis var spir nitellus, Winchel Mich., p. 89. H

obliquus, Roming 24, Niagara Gr. occidens. Whitfiel

Sur. Wis., p. 78 p. 313, Niagara

parasiticus, Hall, 1 siticum,) Pal. N agara Gr. This by Phillips in h

FAV.-GLO.]

FAV.

FAV.

Foss. Corals, p. Gr. Rep. N. Y. St.

and Pal. N. Y. Gr. trocerium con-1. 2, p. 123, Ni-

ime, 1851, Pol. 42, Niagara Gr. 1840, (Calamoith Geo. Rep. Gr. Foss. Corals, p.

robbi cortaio, pi

2, Proc. Acad. o. Sur. W. 100th bcarb. (Alveolites du-70, Corniferous

6, Rep. Low. n. Gr. i, Foss. Corals,

1. (?) for F. heli-

st. Dev. Foss., reoccupied. 862, Am. Jour-

. 396, Cornifer-

i, Hall, 1876, 'Up. Held. Gr. us. Hall, 1876, , Up. Held. Gr. Rep. N. Y. St.

r F. spinigerus.



75.—Favosites for-7ar. occidentalis.

. Corals, p. 258,

esi var. disleus, Roemer,), (Calamopora sesi var. dislea,) Sil. Fauna Tenn., p. 19, gara Gr. ii var. occident-

Hall, 1876, 1 Rep. N. Y. St. 3. Nat. Hist., p. Niagara Gr. var. waldronrn. for F. forbesi FAV.—GLO.]

177.-Favo

sites gothlandicus.

FIG.

goldfussi, Castelnau, 1843, (Calamopora goldfussi,) Syst. Sil., p. 47, Up. Sil. goldfussi, D'Orbiguy, 1850, Prodr. de Paléont., p. 107, Devonian. The name was preoccupied.

gothlandicus, Lamarck, 1816, Hist. An. sans Vert., vol. 2, p. 206, Up. Held. and Ham. Grs.

hamiltonensis, Rominger, 1876, Foss. Corals, syn. for F. dumosus. hamiltoniæ, Hall, 1876,

Illust. Dev. Foss., pl. 34, Ham. Gr.

helderbergiæ, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 111, and Pal. N. Y., vol. 6, p. 8, Low. Held. Gr.

- heliolitiformis, Rominger, 1862, (Calamopora heliolitiformis,) Am. Jour. Sci., vol. 34, 2d series, p. 397, Devonian.
- p. 397, Devonian. hemisphericus, Troost, 1840, (Calamopora hemispherica,) 5th Geo. Rep. Tenn., p. 72, Up. Held. Gr. Same as Emmonsia hemispherica.
- hemisphericus var. distortus, Hall, 1876, Illust. Dev. Foss., pl. 5, Up. Held. Gr. hemisphericus var. rectus Hall 1876
- hemisphericus var. rèctus, Hall, 1876, Illust. Dev. Foss., pl. 2C, Up. Held. Gr. hisingeri, Edwards & Haime, 1851, Pol. Foss. des Terr. Palæoz., p. 240, Ni-
- agara Gr. hispidus, Rominger, 1876, Foss. Corals, p. 23, Niagara Gr.
- infundibuliformis, as identified by D'Arch-
- iac & Verneuil. Not American. intertextus, Rominger, 1876, Foss. Corals, p. 38, Ham. Gr.
- invaginatus, Nicholson, 1875, Ohio Pal.; vol. 2, p. 232, Corniferous Gr.
- limitaris, Rominger, 1876, Foss. Corals, p. 36, Corniferous Gr.

lycoperdon, see Monticulipora lycoperdon. mammillaris, Castelnau, 1843. Not recognized.

- mancus, Winchell, 1865, Proc. Acad. Nat. Sci., p. 112, Kinderhook Gr.
- maximus, Troost, 1840, (Calamopora maxima,) 5th Rep. Geo. Tenn., p. 73, Devonian.
- minimus, Hall, 1874, 26th Rep. N. Y. St.
 Mus. Nat. Hist., p. 113; Low. Held. Gr.
 niagarensis, Hall, 1852, Pal. N. Y., vol. 2,
- p. 125, Niagara Gr. niagarensis var spinigerus, see F. spinigerus.
- nitellus, Winchell, 1866, Rep. Low. Pen. Mich., p. 89. Ham. Gr.
- obliquus, Rominger, 1876, Foss. Corals, p. 24, Niagara Gr. occidens, Whitfield, 1878, Ann. Rep. Geo.
- ccidens. Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 78, and Geo. Wis., vol. 4, p. 313, Niagara Gr.
- parasiticus, Hall, 1852, (Astrocerium parasiticum,) Pal. N. Y., vol. 2, p. 122, Niagara Gr. This name was preoccupied by Phillips in his Geol. of Yorkshire.

placenta, Rominger, 1876, Foss. Corals, p. 34, Ham. Gr.

- pleurodictyoides, Nicholson, 1875, Ohio Pal., vol. 2, p. 231, Corniferous Gr.
- polymorphus, Goldfuss, 1826, Germ. Petref., p. 79, Corniferous Gr.
- pr lificus, Billings, 1865, Can. Nat. and Geol., 2d ser., vol. 2, p. 429, Hud. Riv. Gr.
- proximus, Hall, 1883, Rep. St. Geol., pl. 7, fig. 13-15, and Pal. N. Y., vol. 6, p. 10, Low. Held. Gr.
- pyriformis, Hall, 1852, (Astrocerium pyriforme,) Pal. N. Y., vol. 2, p. 123, Niagara Gr.
- radiatus, Rominger, 1876, Foss. Corals, p. 33, Ham. Gr.
- radiciformis, Rominger, 1876, Foss. Corals, p. 34, Devonian.
- reticulatus, DeBlainville, 1840, (Alveolites reticulatus,) Dict., vol. 60, p. 369, Niagara Gr.
- sphericus, Hall, 1874, (Chetetes sphericus,) 26th Rep. N. Y. St. Mus. Nat. Hist., p. 111, and Pal. N. Y., vol. 6, p. 9, Low. Held. Gr.
- spinigerus, Hall, 1876, (F. niagarensis var. spinigerus,) 28th Rep. N. Y. St. Mus. Nat. Hist., p. 108, Niagara Gr.
- spongilla, Rominger, 1876, Foss. Corals, p. 24, syn. for F. spinigerus.
- 24, syn. for F. spinigerus. strutus, Say, 1818, Am. Jour. Sci., vol. 1, p. 384, Niagara Gr.
- roosti, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal, p. 238, Devonian.
- tuberosus, Rominger, 1876, Foss. Corals, p. 31, Corniferous Gr.
- turbinatus, Billings, 1859, Can. Jour., vol. 4, p. 109, Up. Held. & Ham. Gr. venustus, Hall, 1852, [Astrocerium ven-
- venustus, Hall, 1852, [Astrocerium venustum,) Pal. N. Y.; vol. 2, p. 120, Niagara Gr.
- verneuili, Castelnau, 1843, syn. for Monticulipora fibrosa.
- whitfieldi, White, 1874, Rep. Invert. Foss., syn. for F. divergens.
- winchelli, Rominger, 1862, (Calamopora winchelli,) Am. Jour. Sci., vol. 34, 2d ser., p. 397, Devonian.
- Favosilopora, Kent, 1870, Ann. and Mag. Nat. Hist., 3d ser., vol. 6, p. 384.
- palæozoica, Kent, 1870, Ann. and Mag. Nat. Hist., 3d ser., vol. 6, p. 384. Not recognized.
- Filicites gracilis, see Plumalina gracilis.
- Geoporites americanus, D'Orbigny, 1850. Not defined so as to be recognized.
- GLOSSOGRAPTUS, Emmons, (Glossograpsus,) 1856, Am. Geo., p. 108. [Ety. glosse, tongue; grapho, I write.] Stipe free; thin, membranaceous, ligulate, extremities rounded, axis distinct. Type G. ciliatus.
 - ciliatus, Emmons, 1856, Am. Geo., pt. 2, p. 108, Up. Taconic.
- setaceus, Emmons, 1856, Am. Geo., pt. 2, p. 236, Up. Taconic.

- GRAPTOLITHUS, Linnæus, 1736, Syst. Nat., 1st Ed., but it was not until 1767, in the 12th Ed., that any species were defined. [Ety. grapho, I write; lithos, stone.] Stipes elongated, slender, flattened, or quadrangular; they may be simple or bifur-cating; the cells enter the central canal and open their mouths upward, so as to form denticles on the margins when
 - compressed. Type G. scalaris. abnormis, Hall, 1858, Geo. Sur. Can., p.
 - 117, and Can. Org. Rem., Decade 2, p. 106, Quebec Gr.
 - alatus, Hall, 1858, Geo. Sur. Can., p. 127, and Can. Org. Rem., Decade 2, p. 93, Quebec Gr.
 - amplexicaulis, see Diplograptus amplexicaulis
 - angustifolius, see Diplograptus angustifolius.
 - annectans, Walcott, 1879, Utica Slate and related formations, p. 20, Utica Slate.
- antennarius, see Climacograptus antennarius.
- approximatus, Nicholson, 1873, (Tetragraptus approximatus,) Ann, and Mag. Nat. Hist., 4th ser., vol. 12, Quebec Gr.
 - arcuatus, Hall, 1865, Can. Org. Rem., Decade 2, p. 79, Quebec Gr. bicornis, see Climacograptus bicornis.

 - bifidus, Hall, 1858, Can. Nat. and Geo., vol. 3, p. 73, Quebec Gr. bigsbyi, Hall, 1865, Can. Org. Rem., De-

 - cade 2, p. 86, Quebec Gr. bryonoides, Hall, 1858, Geo. Sur. Can., p. 126, and Can. Org. Rem., Decade 2, p. 84, Quebec Gr.

caduceus, see Didymograptus caduceus.

- clintonensis, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 74, and Pal. N. Y., vol. 2, p. 39, Clinton Gr.
- constrictus, Hall, 1865, Can. Org. Rem., Decade 2, p. 76, Quebec Gr.
- crucifer, Hall, 1858, Geo. Sur. Can., p. 125, and Can. Org. Rem., Decade 2, p. 92, Quebec Gr.
- dentatus, Emmons, 1842, Geo. Rep. N. Y., p. 279, Utica Slate.
- denticulatus, Hall, 1858, Geo. Sur. Can., p. 132, and Can. Org. Rem., Decade 2, p. 88, Quebec Gr.
- divaricatus, Hall, 1859, Pal. N. Y., vol. 3, p. 513, Hud. Riv. Gr. See Dicranograptus divaricatus.
- divergens, Hall, 1859, Pal. N. Y., vol. 3, p. 509, Hud. Riv. Gr.

- ensiformis, see Retiolites ensiformis. extensus, Hall, 1858, Geo. Sur. Can., p. 132, and Can. Org. Rem., Decade 2, p. 80, Quebec Gr.
- extenuatus, Hall, 1865, Can. Org. Rem., Decade 2, p. 75, Quebec Gr.
- flaccidus, Hall, 1865, Can. Org. Rem., Decade 2, p. 143, Utica Slate.
- flexilis, see Clonograptus flexilis.
- foliaceus, see Diplograptus foliaceus.

folium, see Diplograptus folium.

- fruticosus, Hall, 1858, Geo. Sur. Can., p. 128 and Can. Org. Rem., Decade 2, p. 90, Quebec Gr
- furcatus, see Dicranograptus furcatus.
- gracilis, Hall, 1847, Pal. N. Y., vol. 1, p. 274, Utica Slate.
- hallanus, see Dendrograptus hallanus.
- headi, Hall, 1858, Geo. Sur. Can., p. 127, and Can. Org. Rem., Decade 2, p. 94, Quebec Gr.

hypniformis, see Diplograptus hypniformis.

- indentus, Hall, 1858, Geo. Sur. Can., p. 128, and Can. Org. Rem. Decade 2, p. 74, Quebec Gr.
- lævis, Hall, 1847, Pal. N. Y., vol. 1, p. 274, Utica Slate.

logani, 1858, Geo.Sur.Can.

p. 115, and Can. Org. Rem., Decade 2, p. 100, Quebec Gr.

marcidus, see Diplograptus marcidus. milesi, Hall, 1861, Geo.



- mucronatus, see Diplograptus mucronatus. multifasciatus, Hall, 1859, Pal. N. Y., vol.
- 3, p. 508, and Can. Org. Rem., Decade 2, p. 10, Hud, Riv. Gr.
- nitidus, Hall, 1858, Geo. Sur. Can., p. 129, and Can. Org. Rem., Decade 2, p. 69, Quebec Gr.
- octobrachiatus, Hall, 1858, Geo. Sur. Can., p. 122, and Can. Org. Rem., Decade 2, p. 96, Quebec Gr
- octonarius, Hall 1858, Geo. Sur. Can., p. 124, and Can³⁰Org. Rem., Decade 2, p. 95, Quebec Gr.
- patulus, Hall, 1858, Geo. Sur. Can., p. 131, and Can. Org. Rem., Decade 2, p. 71, Quebec Gr.
- pennatulus, Hall, 1865, Can. Org. Rem.,
- Decade 2, p. 82, Quebec Gr. peosta, see Diplograptus peosta.
- pristis, see Diplograptus pristis.
- putillus, see Diplograptus putillus.
- pristiniformis, see Diplograptus pristiniformis.
- quadribrachiatus, Hall, 1858, Geo. Sur. Can., p. 125, and Can. Org. Rem., Decade 2, p. 91, Quebec Gr.
- quadrimucronatus, Hall, 1865, Can. Org. Rem., Decade 2, p. 144, Utica Slate.
- ramosus, see Dicranograptus ramosus.
- ramulus, Hall, 1865, Can. Org. Rem., Decade 2, p. 108, Quebec Gr. ramulus, White. The name was preoc-
- cupied. See G. whitianus. richardsoni, Hall, 1865, Can. Org. Rem.,
- Decade 2, p. 107, Quebec Gr. rigidus, see Clonograptus rigidus.

scalaris, Linnæus, as identified by Hall in Pal. N. Y., vol. 1, p. 271, Utica Slate.

GRA.

p. 274, Utica S

sagittarius, Linn identified by

1, p. 272, Utica sextans, see Dicra similis, Hall, 186 ade 2, p. 78, Q spinulosus, see D

subtenuis, Hall, 244, Hud. Riv. tentaculatus, see

latus. tenuis, Hall, 184 272. The nam

Portlock in 184 venosus, see Retio

whitfieldi, see Dip whitianus, S. A. Foss., p. 269, I

instead of G. which was p Sur. W. 100th

HADROPHYLLUM, E Brit. Foss. Co hadros, mighty

lun ficia foss one radi

sept



ites. ordinatum, see Cl HALLIA, Edwards d. Pol. Foss.

[Ety. proper 1 turbinate ; sept ter; one large place of the s neighboring sep

as to assume a no columella. " divergens, Hall,

agara and Up. 35th Rep. N. Y

412, Niagara Gr divisa, Hall, 1882 and Up. Held. (

N. Y. St. Mus. agara Gr. insignis, Edwards

d. Pol. Foss. d. Held. Gr.

pluma, Hall, 1882 and Up. Held. G N. Y. St. Mus. agara Gr.

secalinus, see Dip serratulus, Hall,

HAD.-HEL.]

o. Sur. Can., p. Decade 2, p. 90,

GRA.

us furcatus. N. Y., vol. 1, p.

us hallanus.

ar. Can., p. 127, Decade 2, p. 94, us hypniformis. o. Sur. Can., p.

n. Decade 2, p.

. Y., vol. 1, p.



-Graptolithus logani.

tus mucronatus. Pal. N. Y., vol. : Rem., Decade

Sur. Can., p. 129, Decade 2, p. 69,

Geo. Sur. Can., Rem., Decade 2,

o. Sur. Can., p. n., Decade 2, p.

ur. Can., p. 131, Decade 2, p. 71,

an. Org. Rem., : Gr. eosta. ristis. putillus. raptus pristini-

1858, Geo. Sur. Org. Rem., De-

1865, Can. Org. Utica Slate. us ramosus. an. Org. Rem., ec Gr. ime was preocus. Can. Org. Rem., e Gr. rigidus. ntified by Hall 271, Utica Slate.

- secalinus, see Diplograptus secalinus. serratulus, Hall, 1847, Pal. N. Y., vol. 1, p. 274, Utica Slate. /
- sagittarius, Linnæus, 1767, Syst. Nat., as identified by Hall in Pal. N. Y., vol. 1, p. 272, Utica Slate.
- sextans, see Dicranograptus sextans. similis, Hall, 1865, Can. Org. Rem., Dec-
- ade 2, p. 78, Quebec Gr. spinulosus, see Diplograptus spinulosus.
- subtenuis, Hall, 1877, Am. Pal. Foss., p. 244, Hud. Riv. Gr.
- tentaculatus, see Retiograptus tentaculatus.
- tenuis, Hall, 1847, Pal. N. Y., vol. 1, p. 272.The name was preoccupied by Portlock in 1843. See G. subtenuis. venosus, see Retiolites venosus.

whitfieldi, see Diplograptus whitfieldi.

whitianus, S. A. Miller, 1883, Am. Pal. Foss., p. 269, Hud. Riv. Gr. Proposed instead of G. ramulus, White, 1874, which was preoccupied. See Geo. Sur. W. 100th Mer., vol. 4, p. 62. HADROPHYLLUM, Edwards & Haime, 1850,

Brit. Foss. Corals, p. lxvii. [Ety. hadros, mighty; phyllon, leaf.] Coral-lum short; calicle super-

ficial, one very large septal fossula and three small ones representing a cross; radiate arrangement of the septa somewhat irregular. Type H. orbignyi.

glans, White, 1862, (Zaphren-F1G. 179. Hadrophyl-lum glans. tis glans,) Proc. Bost. Soc. Nat. Hist., vol. 9, p. 32, and Cont. to Pal., No. 8, p. 156, Burlington Gr.

- orbignyi, Edwards & Haime, 1850, Brit. Foss. Corals, p. lxvii, Up. Held Gr.
- Haimeophyllum, Billings, 1859, Can. Jour., vol. 4, p. 139, syn. for Chonostegites.

ordinatum, see Chonostegites ordinatus.

- HALLIA, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal., p. 353. [Ety. proper name.] Corallum tall, turbinate; septa extending to the center; one large septum occupying the place of the septal fossula, and the neighboring septa directed toward it, so as to assume a pinnate arrangement; no columella. Type H. insignis. divergens, Hall, 1882, Foss. Corals Ni
 - agara and Up. Held. Grs., p. 8, and 35th Rep. N. Y. Mus. Nat. Hist., p. 412, Niagara Gr.
 - divisa, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 8, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 412, Niagara Gr.
 - insignis, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal., p./353, Up. Held. Gr.
 - pluma, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 8, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 412, Niagara Gr.

scitula, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 7, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 411, Niagara Gr.

191

- HALYSITES, Fischer, 1813, Zoognosia, vol. 1, p. 387. [Ety. halyson, a small chain.] Corallites long, arranged in single series, united laterally in the form of elliptical expansions, presenting a chain-like arrangement: epitheca thick; septa usually absent or rudimentary, but, in perfect specimens, extending to the center of the visceral chamber; tabulæ horizontal. Type H. catenulatus.
 - agglomeratus, Hall, 1843, (Catenipora agglomerata,) Geo. Rep. 4th Dist. N. Y., Tab. Foss. No. 22, fig. 2, and Pal. N. Y., vol. 2, p. 129, Niagara Gr.

catenulatus, Linnæus, 1767, (Tubipora catenulata,) Syst. Nat, 12th Ed., p. 1270, Niagara Gr.

fieldeni, Eth-eridge, 1878, Quar. Jour. Geo. Soc., vol. 34, p. 582, Up. Sil. catenulatus var. harti, Etheridge, 1878, Quar. Jour. Geo. Soc., vol.

34, p. 583, Up. Sil. FIG. 180.-Halysites catenulatus.

- Whitfield, 1882, Geo. Wis., vol. 4, p. 272, Niagara, Gr.
- compactus, Rominger, 1876, Foss. Corals, syn. for H. agglomeratus.
- escharoides, Lamarck, 1816, (Catenipora escharoides,) Hist. des Anim. sans Vert., vol. 2, p. 207, Niagara Gr. gracilis, Hall, 1851, (Catenipora gracilis,)
- Geo. Lake Sup. Land Dist., vol. 2, p. 212, Hud. Riv. Gr.
- labyrinthicus, Goldfuss, 1826, (Catenipora labyrinthica,) Petref. Germ., p. 71, Niagara Gr.
- meandrina, Troost, 1840, (Catenipora meandrina,) 5th Geo. Rep. Tenn., Niagara Gr. The definition is too meagre for identification.
- parryi, König, 1824, (Catenipora parryi,) Supp. to App. of Capt. Parry's Voyage for the Discovery of a North-west Passage, Up. Sil.
- sexto-attenuatus, Owen, 1862, Geo. Sur. Ind., p. 362, Niagara Gr.
- Harmodites rugosus, D'Orbigny, 1850.Prodr. de Paléont., t. 1, p. 50. Not defined so as to be recognized.
- HELIOLITES, Guettard, 1770, Mem. 3, p. 454. Ety. helios, sun; lithos, stone.] Corallum spheroidal, hemispherical or ramose; corallites of larger and smaller size, the



catenulatus var. microporus,

catenulatus var.



larger ones cylindrical, with twelve infoldings of the wall or septa, not reaching the center, the smaller ones polygonal, investing the larger ones; walls amalgamated; tabulæ numer-ous; no columella. Type H. interstinctus.

affinis, Billings, 1865, Can. Nat. and Geo., 2d ser., vol. 2, p. 427, Hud. Riv. and Mid. Sil.

elegans, Hall, 1852, Pal. N. Y., vol. 2, p. 130, Niagara Gr.

exiguus, Billings, 1865, Can. Nat. and Geo., 2d ser., vol. 2, p. 428, Mid. Sil.

Linnæus, 1767, (Madrepora interstincta,) Syst. Nat.,12th Ed., p. 1276, Nimacrostylus, Hall, 1852, Pal. N. Y., vol. 2, p. 135, Niagara Gr.

CELENTERATA.

megastoma, McCoy, 1846, Sil Foss. of Ireland, p. 62, Niagara Gr.

FIG. 181.— Heliolites inter-stinctus.

- pyriformis, Guettard, 1770, Mem. 3, p. 454, and Pal. N. Y., vol. 2, p. 133, Niagara Gr.
- sparsus, Billings, 1865, Can. Nat. and Geo.,

²d ser., vol. 2, p. 428, Mid. Sil. speciosus, Billings, 1865, Can. Nat. and Geo., 2d ser., vol. 2, p. 426, Mid. Sil. spiniporus, Hall, 1852, Pal. N. Y., vol. 2,

p. 131, Niagara Gr.

subtubulatus, McCoy, as identified by - Rominger, 1876, Foss. Corals, p. 13, Niagara Gr.

tenuis, Billings, 1865, Can. Nat. and Geo., mittelsilor.

Helilien, V. 2d ser., vol. 2, p. 428, Mid. Sil. HELIOPHYLLUM, Hall, 1848, in Dana. Zooph., Helilien, V. p. 356. [Ety. helios, sun; phyllon, leaf.] Constrance, Corallum simple; septa well developed Videnskaba and producing lateral lamellar pro-longations, which extend from the wall Selfskelet toward the center of the visceral chamber, so as to represent ascending arches JKriften 1 and to constitute irregular central tabulæ, *M.M.* math and which are united toward the cir-cumference by means of vertical dis-*Kensel* sepiments. Type H. halli. acuminatum, Hall, 1882, Foss. Corals

- Niagara and Up. Held. Grs., p. 46, and 12th Rep. Ind. Geo., p. 310, Up. Held. Gr.
- acquale, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 47, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 451, Up. Held. Gr.
- aquum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 51, and 12th Rep. Ind. Geo., p. 314, Up. Held. Gr. alternatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 45, and 12th Rep. Ind. Geo., p. 305, Up. Held. Gr.

- annulatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 48, and 12th Rep. Ind. Geo., p. 307, Up. Held. Gr.
- arachne, Hall, 1876, Illust. Dev. Foss., pl. 24, Ham. Gr.
- campaniforme, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 53, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 457, Up. Held. Gr.
- canadense, Billings, 1859, Can. Jour., vol.,
 4, p. 125, Up. Held. Gr.,
 cancellatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 53, and
 35th Rep. N. Y. St. Mus. Nat. Hist., p. 457, Up. Held. Gr.
- cayugaense, Billings, 1859, Can. Jour., vol. 4, p. 124, Up. Held. Gr.
- colbornense, Nicholson, 1875, Can. Nat. and Geo., vol. 7, p. 143, Up. Held. Gr.
- colligatum, Billings, 1859, Can. Jour., vol. 4, p. 126, Up. Held. Gr. compactum, Hall, 1882, Foss. Corals Ni-
- agara and Up. Held. Grs., p. 48, and 12th
- Rep. Ind. Geo., p. 308, Up. Held. Gr. confluens, Hall, 1876, Illust. Dev. Foss., pl. 26 and 27, Ham. Gr.
- degener, Hall, 1876, Illust. Dev. Foss., pl. 25, Ham. Gr.
- dentatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 48, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 452, Up. Held. Gr.
- denticulatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 52, and 12th Rep. Ind. Geo., p. 313, Up. Held. Gr.
- dentilineatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 13, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 417, Niagara Gr.
- distans, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 50, and 12th Rep. Ind. Geo., p. 308, Up. Heldt Gr.
- eriense, Billings, 1859, Can. Jour., vol. 4, p. 124, Corniferous Gr.
- exiguum, Billings, 1860, Can. Jour., vol. 5, p. 261, Corniferous Gr.
- fasciculatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held, Grs., p. 48, and 35th Rep. N. Y. St. Mus. Nat. Hist., p.
- 452, Up. Held. Gr. fecundum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 49, and 12th Rep. Geo. Ind., p. 309, Up. Held Gr.
- fissuratum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 53, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 457, Up. Held. Gr.
- gemmatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 49, and 12th Rep. Geo. Ind., p. 310, Up. Held Gr.
- gemmiferum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 13, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 417, Niagara Gr.

HET.-INO.]

halli, Edwards Corals, p. 235



FIG. 182. Helioph halli.

Mus. Nat. Hi incrassatum, Ha agara and Up

- 12th Rep. Geo. infundibulum, H
- Ind., p. 305, 1 invaginatum, Ha
- agara and Up 12th Rep. Geo.

irregulare, Hall, pl. 24, Ham. (latericrescens, 1

Niagara and U 12th Rep. Geo.

- lineolatum, Hal
- agara and Up 35th Rep. N. Y 454, Up. Held.
- mitella, Ĥall, 188
- Up. Held. Grs., St. Mus. Nat.
- nettlerothi, Hall
 - agara and Up. Rep. Geo. Ind.
- pocillatum, Hall
- agara and Up. 35th Rep. N. Y
- 454, Up. Held.
- pravum, Hall, 18 and Up. Held.
- Geo. Ind., p. 2 proliferum, Nich
- Ont. Can., p. 2 proliferum, Hall,
- pl. 26, is proba
- liferum, Nichol puteatum, Hall, 1
- and Up. Held. Rep. N. Y. St. Niagara Gr.
- scyphulus, Hall, agara and Up.
- 12th Rep. Geo. I sordidum, Hall, 13 and Up. Held. (
- Geo. Ind., p. 31 subcæspitosum, see cæspitosum.
 - tenuimurale, Hall agara and Up. 12th Rep. Geo. In

[HEL.

interstinctus, agara Gr.



Unchora

(iner)

Rev. der

1903.

10.10.

HET.-INO.]

'oss. Corals Ni-Grs., p. 48, and p. 307, Up.

[HEL.

. Dev. Foss., pl.

2. Foss. Corals Grs., p. 53, and s. Nat. Hist., p.

Can. Jour., vol.

Foss. Corals Ni-Grs., p. 53, and 18. Nat. Hist., p.

Can. Jour., vol.

1875, Can. Nat. 143, Up. Held.

Can. Jour., vol.

Foss. Corals Ni-., p. 48, and 12th Up. Held. Gr. ust. Dev. Foss.,

. Dev. Foss., pl.

. Corals Niagara 8, and 35th Rep. ist., p. 452, Up.

Foss. Corals Ni-Grs., p. 52, and ., p. 313, Up.

2, Foss. Corals Grs., p. 13, and s. Nat. Hist., p.

Corals Niagara). 50, and 12th Up, Heldt Gr. an. Jour., vol. 4,

Can. Jour., vol. r. Foss. Corals Ni-

Grs., p. 48, and s. Nat. Hist., p.

'oss. Corals Ni-Grs., p. 49, and , p. 309, Up.

loss. Corals Ni-Grs., p. 53, and 18. Nat. Hist., p.

Foss. Corals Ni-Grs., p. 49, and ., p. 310, Up.

Foss. Corals Ni-3., p. 13, and 35th at. Hist., p. 417,



halli var. obconicum, Hall, 1876, Illust.

Dev. Foss., pl. 25, Ham. Gr. halli var. reflexum, Hall, 1876, Illust. Dev. Foss., pl. 23, Ham. Gr. imbricatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs.

FIG. 182 Heliophyllum p. 46, and 35th halli

Rep. N. Y. St. Kep. N. Y. St. Mus. Nat. Hist., p. 450, Up. Held. Gr. incrassatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 46, and 12th Rep. Geo. Ind., p. 309, Up. Held Gr. infundibulum, Hall, 1883, 12th Rep. Geo. Ind., p. 305, Up. Held. Gr. invaginatum Hall, 1892, Foss. Corals Ni

- invaginatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 47, and 12th Rep. Geo. Ind., p. 306, Up. Held. Gr. irregulare, Hall, 1876, Illust. Dev. Foss., pl. 24, Ham. Gr.
- latericrescens, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 49, and 12th Rep. Geo. Ind., p. 314, Up. Held Gr. lineolatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 50, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 454, Up. Held. Gr.
- mitella, Hall, 1882, Foss. Corals Niagara and
- Up. Held. Grs., p. 14, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 418, Niagara Gr. nettlerothi, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs. p. 51, and 12th
- Rep. Geo. Ind., p. 312, Up. Held. Gr. pocillatum, Hall, 1884, Foss. Corals Ni-agara and Up. Held. Grs., p. 50, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 454, Up. Held. Gr.
- pravum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 13, and 12th Rep.
- Geo. Ind., p. 274, Niagara Gr. proliferum, Nicholson, 1874, Rep. Pal. Ont. Can., p. 27, Up. Held. Gr. proliferum, Hall, 1876, Illust. Dev. Foss.,
- pl. 26, is probably a syn. for H. proliferum, Nicholson.
- puteatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 14, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 418, Niagara Gr.
- scyphulus, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 51, and 12th Rep. Geo. Ind., p. 306, Up. Held. Gr.
- sordidum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 52, and 12th Rep. Geo. Ind., p. 311, Up. Held. Gr. subcæspitosum, see Crepidophyllum sub-
- cæspitosum.
- tenuimurale, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 51, and 12th Rep. Geo. Ind., p. 307, Up. Held. Gr.

tenuiseptatum, Billings, 1859, Can. Jour., vol. 4, p. 126, Ham. Gr.

- venatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 46, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 450, Up. Held. Gr.
- verticale, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 47, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 451, Up. Held. Gr.
- HETEROPHRENTIS, Billings, 1875, Can. Nat. and Geo., vol. 7, p. 235. [Ety. heteros, irregular; phren, midriff or lamella.] Corallum simple, turbinate, calice large, septal fossette well²defined, bottom smooth or with a pseudo-columella, septa, below the calice, sharp edged; often with their inner edges twisted together, usually rounded on approaching the margin; apparently only a single transverse diaphragm, which forms
- the floor of the cup. Type H. spatiosa. compta, Billings, 1875, Can. Nat. and Geo., vol. 7, p. 236, Corniferous Gr.
- excellens, Billings, 1875, Can. Nat. and Geo., vol. 7, p. 236, Corniferous Gr.
- prolifica, Billings, 1875, Can. Nat. and Geo., vol. 7, p. 236, Corniferous Gr.
- spatiosa, Billings, 1858, (Zaphrentis spatiosa,) Can. Nat. and Geo., vol. 3, p. 430, Onondaga and Corniferous Gr.
- Heterotrypa, Nicholson, 1879, Pal. Tab. Cor., p. 291. Proposed as a subgenus of Monticulipora, making M. mammulata the type which is the type of Mon-ticulipora. This is a violation of the elementary principles of nomenclature. Houghtonia, syn. for Calapcecia.
- huronica, see Calapœcia huronica.
- INOCAULIS, Hall, 1852, Pal. N. Y., vol. 2, p.
 - 176. [Ety. inos, small sprouts; kaulos, stem.] Expanded, bifurcating, fenestrate, and usually indicated by simple black rays connected by small cross bars. Type I. plumulosus.



FIG. 183.-Inocaulis plumulosus.

anastomica, Ringueberg, 1888, Proc. Acad. Nat. Sci. Phil., p. 131, Niagara Gr.

arbuscula, Ulrich, 1879, Jour. Cin. Soc. | Nat. Hist., vol. 2, p. 28, Hud. Riv. Gr. bellus, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 122, Niagara Gr.

194

- cervicornis, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 37, Niagara Gr. diffusus, Spencer, 1884, Bull. No. 1, Mus.
- Univ. St. Mo., p. 36, Niagara Gr. divaricatus, Hall, 1879, Desc. New sp. Foss., p. 2, and 11th Rep. Geo. Ind., p. 225, Niagara Gr.
- phycoides, Spencer, 1884, Bull. No. 1. Mus. Univ. St. Mo., p. 38, Niagara Gr. plumulosus, Hall, 1851, Pal. N.Y., vol. 2, p. 176, Niagara Gr.
- problematicus, Spencer, 1878, Can. Nat., vol. 8, and Bull. No. 1, Mus. Univ. St. Mo., p. 36, Niagara Gr.
- ramulosus, Spencer, 1884, Bull, No. 1. Mus. Univ. St. Mo., p. 38, Niagara Gr. walkeri, Spencer, 1884, Bull No. 1, Mus.
- Univ. St. Mo., p. 35, Niagara Gr. Lamellopora, Owen, 1840, Rep. on Minn. Lands, p. 70. Verly poorly defined, but a syn. for Stromatapora.
- infundibularia, Owen, 1840, Bep. on Minn. Lands, p. 70. A species of Stromatapora, poorly defined.
- LEPTOPORA, Winchell, 1863, Proc. Acad. Nat. Sci. Phil., p. 2. [Ety. leptos, shallow; poros, cell.] Discoidal, cells shallow; walls vertically striated; interior vesicporos, cell.] ular; cups elevated in the center, and displaying radial septa. Type H. typus. typus, Winchell, 1863, Proc. Acad. Nat.
- Sci. Phil., p. 3, Marshall Gr. winchelli, White, 1879, Bull. U. S. Sur., vol. 5, p. 211, and Cont. to Pal. No. 6, p. 121, Carboniferous.
- Dimaria, Steininger, 1834, Bull. Soc. Geo. France, vol. 1, p. 339. The name was preoccupied by Link in 1807, and by Rafinesque in 1815. See Cœnites.

crassa, see Coenites crassus.

falcata, see Coenites falcatus.

fruticosa, see Cœnites fruticosus. laminata, see Cœnites laminatus.



FIG. 184. - Lithostrotion basaltiforme.

(This is dousdaleia pictoene Beelings).

ramulosa, see Cornites ramulosus. LINDSTROMIA, Nicholson & Thompson, 1877, Proc. Roy. Soc Edinb., vol. 9, p. 149. [Ety. proper name.]

Type L. columnaris. columnaris, Nicholson & Thompson, 1877, Proc. Roy. Soc Edinb., vol. 9, p. 149, Devonian.

Linipora rotunda, Troost, not defined.

LITHOSTROTION, Lhwydy 1869, Lithophyl. Britann. Ichnographia,

Epistola5, tab. xxiii. [Ety. lithos, stone; strotion, little rafter.] Corallum composite, astreiform; corallites loosely approximated, and circu-

lar/or intimately united, and polygonal; septa numerous; calices unequal; structure as in Clisiophyllum. Type 1. basaltiforme.

californiense, Meek, 1864, Pal. California, vol. 1, p. 6. Carb.

canadense, Castelnau, 1843, (Axinura canadensis,) Syst. Sil., p. 49, St. Louis Gr. harmodites, Ed-wards & Haime, 1851, Mon. d. Pol. Foss. d.Terr.

Pal., p. 440, Carboniferous. junceum. Fleming, 1828, (Caryophyllæa juncea,)



Lithostrotion mammillare, Castelcanadense nau, 1843, (As-

- trea mammillaris,) Syst. Sil., p. 50, syn. for L. canadense.
- microstylum, White, 1880, 12th Rep. U.S. Geo. Sur. Terr., p. 158, Kinderhook or Waverly Gr
- () pictoense, Billings, 1868, Acad. Geo., p. 285, Carb.
 - proliferum, Hall, 1858, Geo. Rep. Iowa, p. 668, St. Louis Gr.
- 0 stokesi, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr., Pal., p. 440, Carboniferous.
 - whitneyi, Meek, 1875, Wheeler's Sur. W. 100 Mer., vol. 4, p. 103 Coal Meas.
- LONSDALIA, McCoy, 1849, Ann. & Mag. Nat. Hist. 2d ser., vol. 3, p. 10. [Ety. proper name.] Corallum aggregate; corallites circular, not laterally united; septa and tabulæ numerous; visceral chamber separated into two zones, the outer one

composed of

curved vesic-

ular plates

extending

upward and

outward;

walls ru-

gose and

striated; re-

production

by circular

germs aris-

ing from the

outer zone.

Type L. du-

plicata.



FIG. 186.-Lonsdalia floriforpapillata, mis, typical of the genus. Fischer, (Cyathophyllum 1837, papillatum,) erous. American. (?)

Brit. Foss. Corals, p. lxvi. [Ety. lophos,

Oryct. de Moscou., p. 155, Carbonif-LOPHOPHYLLUM, Edwards & Haime, 1850,

ridge; *phyllon*, leaf.] Corallum resembling Zaphrentis, excepting that a cres-() This is a Diphyphyller from the Salena Trenta of the Lake Uning Legion & is prototy the Same as Sarcinula [?], otsaleta, Hall. J.F.M.

centiform co occupies the of the calie is in continu one of its en a small 86 placed in the of the septal and by the otl with the o primary se Type L. konir calceola, see Zap calceola.

LEN.-MEG.]

W expansum, 1876, Proc. Aca Sci. Phil., p. Cont. to. Pal., p. 157, Keokul

proli Me ne (Cy oni lif Ne Fos 75, Coa

-Lo- LUNA FIG Rep phophyllum proliferum. p. cent-formed; p with corallites long, curving o ary axis; walls

no mural pores. michiganensis, W Penin. Mich., p

LYELLIA, Edwards Pol. Foss. Terr. name.] Corallu cylindrical; wa free toward th united by vesicu 12; tabulæ irregi



FIG. 188.-Lye

americana, Edward Pol. Foss. Terr. Pa decipiens, Roming p. 17, Niagara Gr glabra, Owen, 184 Rep. on Minn. La

[LAM.-LOP.

LAM.-LOP.

I, and polygonal; s unequal; strucllum. Type L.

, Pal. California.



Lithostrotion canadense

. Sil., p. 50, syn.

, 12th Rep. U.S. Kinderhook or

Acad. Geo., p.

eo. Rep. Iowa, p.

e, 1851, Mon. d. l., p. 440, Car-

neeler's Sur. W. Coal Meas. nn. & Mag. Nat.). [Ety. proper egate; corallites nited; septa and ral chamber septhe outer one composed of curved vesic ular plates extending upward and outward; walls ru. gose and striated; reproduction by circular germs arising from the outer zone. Type L. duplicata. papillata, Fischer, Ş papillatum,) 155, Carbonif-

t Haime, 1850, i. [Ety. lophos, orallum resemting that a cres- . to Lake Uw Ca, Hall. J.F.M.

LPN.-MEG.]

centiform columella occupies the center of the calice, and is in continuity by one of its ends with a small septum placed in the middle of the septal fossula, and by the other end with the opposite primary septum. Type L. konincki. calceola, see Zaphrentis calceola.

expansum, White, 1876, Proc. Acad. Nat. Sci. Phil., p. 27, and Cont. to. Pal., No. 6. p. 157, Keokuk Gr.

proliferum, McChesney, 1860, (Cvathaxonia prolifera,) New Pal. Foss., p. 75, and Pal. E. Neb., p. 144, Coal Meas.

187.-Lo- LUNATIPORA, Winchell, 1866, FIG. phophyllum Rep. Low. Penin. Mich. proliferum. p. 89. [Ety. lunatus, crescent-formed; poros, pore.] Massive or with corallites consolidated; corallites long, curving outward from an imaginary axis; walls double; tabulæ present; no mural pores. Type L. michiganensis. michiganensis, Winchell, 1866, Rep. Low. Penin. Mich., p. 89, Ham. Gr.

Lyellia, Edwards & Haime, 1851, Mon. Pol. Foss. Terr. Pal., p. 226 [Ety. proper name.] Corallum massive; corallites cylindrical; walls thick, costulated, free toward their terminations, and united by vesicular coenenchyma; septa 12; tabulæ irregular. Type L. americana.



FIG. 188.-Lyellia americana.

americana, Edwards & Haime, 1851, Mon. Pol. Foss. Terr. Pal., p. 226, Up. Held. Gr. decipiens, Rominger, 1876, Foss. Corals, p. 17, Niagara Gr. glabra, Owen, 1840, (Sarcinula glabra,)

Rep. on Minn. Lands, p. 70, Niagara Gr.



CŒLENTERATA.

FIG. 189 - Megalograptus welchi. Cylindrical part of the body depressed, showing cells.

papillata, Rominger, 1876, Foss. Corals, p. 16, Niagara Gr. parvituba,

Rominger, 1876, Pal. Foss. Corals, p. 17, Niagara Gr. Madrepora repêns, Troost. Not satisfactorily defined. MEGALOGRAP-TUS, S. A. Miller, 1874, Cin. Quar.Jour.

Sci., vol. 1, p. 343. Ety. megale, large; grapho, 1 write. Very large cylindrical, bearing fronds with spinous processes, and covered with cellu-

lar open-ings. Type FIG. 190.-Megalograptus welchi.

M. welchi. Frond, showing cells and spinous processes welchi, S.

A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 343, Hud. Riv. Gr.

CŒLENTERATA.

MICHELINIA, DeKoninck, 1842, Descrides Anim. Foss. Belg., p. 29. [Ety. proper name.] Corallum composite, forming hemispherical, depressed, or pyriform masses of prismatic or subcylindrical corallites; mural pores; tabulæ; tubes having striæ or ridges; epitheca concentrically wrinkled, with root-like prolongations. Type M. fawosa.

196



FIG. 191.-Megalograptus welchi. Frond, showcells and spinous processes.

convexa, D'Orbigny, 1850, Prodr. de Paléont., t. 1, p. 107, Onondaga and Corniferous Grs.

dividua, Hall, 1876, Illust. Dev. Foss., pl. 18, Ham. Gr.

eugeneæ, White, 1884, 13th, Rep. Geo. Ind., p. 119, Coal Meas.

expansa, White, 1880, 12th Rep. U. S. Geo. Sur. Terr., p. 158, Waverly Gr. favositoidea, Billings, 1858,

Rep. of Progr. Can. Geo. Sur., p. 175, Up. Held. Gr.

FIG.

men,

larger lites.

Michelinia

eugeneæ. Another speci-

with

coral-

insignis, Rominger, 1876, Foss. Corals, p. 75, Up. Held. and p. 75. U Ham. Gr.

intermittens, Billings, 1859, Can. Nat. and Geo. Sur., vol. 4, p. 113, Cornifer-

FIG. 192.

eugeneæ.

Michelinia

ous Gr. Penticularis, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist, p. 113, Low. Held. Gr.

placenta, White, 1880, 12th Rep. U. S. Geo. Sur. Terr., p. 157, Waverly Gr.

stylopora, Eaton, 1832, (Astrea stylopora,) Geo. Text book, p. 40, and Illust. Dev. Foss., pl. 18, Ham. Gr.

trochiscus, Rominger, 1876, Pal. Foss., p. 76, syn. for Pleurodictyum americanum.

MICROCYCLUS, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 420. [Ety. mikros, small; kuklos, circle.] Corallum free or with a minute central point of attachment, discoidal; no columella; calice shallow, with a single fossula; septa short, radiating regularly, or those nearest the fossette converging a little toward its sides; epitheca well developed. Type M. discus.

discus, Meek & Worthen, 1868, Geo. Sur. Ill., vol.

3, p. 420, Ham. Gr. Millepora repens, see Alveo-

lites repens. MONOGRAPTUS, Emmons.

1856, (Monograpsus,) Am. Geo., p. 106. [Ety. Fig. 194.-Micro-Am. Geo., p. 106. [Fry, 136. 167. and ben monos, one; grapho, I cyclus discus write.] Serrations confined to one edge of the stipe; axis none. Type M. elegans.

- convolutus var. coppingeri, Etheridge, 1878, Quar. Jour. Geo. Soc., vol. 34, p. 577, Silurian.
- elegans, Emmons, 1856, Am. Geo., p. 106, Up. Taconic.
- rectus, Emmons, 1856, Am. Geo., p. 107, Up. Taconic.
- MONOTRYPA, Nicholson, 1879, Pal. Tab. Cor-als, p. 320. [Ety. monos, one; trupa, hole.] Corallites of two kinds; the larger aggregated into clusters (monticules); the smaller occupying the space between the monticules; both larger and smaller thin-walled, polygonal tabulæ remöte. Type M. undulata. This was proposed as a subgenus for Monticulipora; upon microscopial examination and upon such a state of facts. I prefer, at present, to leave the species under the genus Monticulipora.
 - (?) spinulosa, Hall, 1887, Pal. N. Y., vol. 1, p. 67, Low. Held. Gr.
- MONOTRYPELLA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 153. [Ety. mono-trypa; and illus, diminutive.] Ramose, smooth or tuberculated, cells of one kind only; walls thin, in the axial region, and thicker toward the periphery; diaphragms straight; no spiniform
 - abrupta, Hall, 1879, (Chetetes abruptus,) 32d Rep. N. Y. St. Mus. Nat. Hist., p. 148, Low. Held. Gr.

æqualis, Ulrich, 1882, Jour. Cin. Soc. Nat.

Hist., vol. 5, p. 247, Hud. Riv. Gr. arbuscula, Hall, 1887, Pal. N. Y., vol. 6, p. 12, Low. Held. Gr.

briareus, Nicholson, 1875, (Chetetes briareus,) Ohio



FIG. 195.--Monotrypella quad-rata, natural size and magnified.

atopora densa,) 26th Rep. N. Y. St. Mus. Nat. Hist., p. 105, Low. Held. Gr.



quadrata, Rom ratus,) Proc. 3, and Ohio the name of Riv. Gr.

subquadrata, I Nat. Hist., v MONTICULIPORA,

Paléont., t. hillock; poro form and sh two kinds, or ous; walls se the mouths often aggrega numerous m mural pores: Lindstrom, U genus with t son, Edwards it with the belong. Typ

adherens, Billi herens,) Can. 427, Chazy G

andrewsi, Nich Affin. of Mon Ulrich refers

barrandi, Nicho randi,) Quar. J Pal. of Ontari

bulbosa, Billing bosa,) Can. N 2, p. 429, Mid

calceolus, Miller Soc. Nat. Hi Riv. Gr.

cincinnatiensis, cincinnatiensi p. 2, and Nich Montic., p. 226 compressa, Ulric

pressa) Jour.

5, p. 244, Hud consimilis, Ulric Nat. Hist., vo Gr.

dalii, Edwards d dalii,) Pol. Fo Hud. Riv. Gr.

lopora. dawsoni, Nicho Affin. Montic., decipiens, Romin cipiens,) Proc. 3, Hud. Riv. G



FIG. 196.—Monticulipo delicatula. dychei, James, 18

Hist., vol. 6, p.



Pal., vol. 2.

p. 202, Utica Slate.

[MIC.-MON,

MIC.-MON.

itheca well de-

cus.

FIG. 194.-Micro cyclus discus ined to one edge e. Type M. ele-

geri, Etheridge, Soc., vol. 34, p.

Am. Geo., p. 106,

.m. Geo., p. 107,

19, Pal. Tab. Cornos. one; trupa, two kinds; the clusters (montiupying the space es; both larger 1, polygonal tabundulata. This genus for Monticopial examinastate of facts. I eave the species culipora. Pal. N. Y., vol. 1,

2, Jour. Cin. Soc. 53. [Ety. monoutive.] Ramose, ed, cells of one in the axial red the periphery; no spiniform lis. etetes abruptus,) s. Nat. Hist., p.

Ir. Cin. Soc. Nat. id. Riv. Gr. I. N. Y., vol. 6, p.

i, (Chetetes briareus,) Ohio Pal., vol. 2. p. 202, Utica Slate. consimilis, Hall, 1876, (Chetetes consimilis, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 110, Niagara Gr. densa, Hall, 1874, (Trem-Rep. N. Y. St.

, Low. Held. Gr.

MON.]

CŒLENTERATA.

quadrata, Rominger, 1866, (Chetetes quadratus,) Proc. Acad. Nat. Sci. Phil., p. 3, and Ohio Pal., vol. 2, p. 201, under the name of Chetetes rhombicus, Hud. Riv. Gr. subquadrata, Ulrich, 1882, Jour. Cin. Soc.

Nat. Hist., vol. 5, p. 249, Hud Riv. Gr.

- Matt Hack, Vol. P. 216, Hugenviller, Matt Matt, William Monticulipona, D'Orbigny, 1850 Prodr. de Paléont., t. 1, p. 25. [Ety. monticulus, hillock; poros, pore.] Corallum of every form and shape; corallites usually of two kinds, one minute ; tabulæ numerous; walls separable, thickened toward the mouths of the tubes; corallites often aggregated, upon the surface, in numerous monticules; no septa; no mural pores; increase by germation. Lindstrom, Ulrich, and others, class this genus with the Bryozoa, while Nicholson, Edwards & Haime, and others, class it with the Polypi, where it seems to Type M. mammulata. belong.
- adherens, Billings, 1859, (Stenopora adherens,) Can. Nat. and Geo., vol. 4, p. 427, Chazy Gr.
- andrewsi, Nicholson, 1881, Struct. and Affin. of Montic., p. 128, Hud. Riv. Gr. Ulrich refers it to Callopora.
- barrandi, Nicholson, 1874, (Chetetes bar-randi,) Quar. Jour. Geo. Soc., vol. 30, and Pal. of Ontario, p. 60, Ham. Gr.
- bulbosa, Billings, 1865, (Stenopora bul-bosa,) Can. Nat. and Geo., 2d ser., vol. 2, p. 429, Mid. Sil.
- calceolus, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 26, Hud. Riv. Gr.
- cincinnatiensis, James, 1875, (Chetetes cincinnatiensis, Jint. Catal. Cin. Foss., p. 2, and Nicholson, Struct. and Affin. Montic., p. 226, Hud. Riv. Gr. compressa, Ulrich, 1882, (Peronopora com-
- pressa) Jour. Cin. Soc. Nat. Hist., vol. 5, p. 244, Hud. Riv. Gr.
- consimilis, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 238, Hud. Riv. Gr.

dalii, Edwards & Haime, 1851, (Chetetes dalii,) Pol, Foss. d. Terr. Pal., p. 266, Hud. Riv. Gr. Ulrich refers it to Callopora.

dawsoni, Nicholson, 1881, Struct. and Affin. Montic., p. 141, Hud. Riv. Gr. decipiens, Rominger, 1866, (Chetetes decipiens,) Proc. Acad. Nat. Sci. Phil., p.

3, Hud. Riv. Gr. delicatula, Nicholson, 1874, (Chetetes delicatulus) Quar. Jour. Geo. Soc., vol. 30, and Ohio Pal., vol. 2,

p. 199, Hud. Riv. Gr. Probably a Bryozoum and not a Monticuli-

pora.

FIG. 196.—Monticulipora delicatula.

dychei, James, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 235, Hud. Riv. Gr. 🖌 14

- fibrosa, Goldfuss, 1826, (Calamapora fibrosa,) Germ. Petref., p. 82, Hud. Riv. and Clinton Grs.
- filiasa, D'Orbigny, 1850, Prodr. d. Pal., t. 1, p. 25, and Edwards & Haime, Pol. Foss. d. Terr. Pal., p. 266, Hud. River Gr.
- frondosa, D'Orbigny, 1850, Prodr. d. Pal., t. 1, p. 25, and Ohio Pal., vol. 2, p. 208.

Hud. Riv. Gr. gracilis, see Batostomella gracilis.

- grandis, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 78, Trenton Gr.
- implicata, see Batostoma implicata.
- irregularis, Ulrich, 1879, (Chetetes irregularis,) Jour. Cin. Soc. Nat. Hist., vol. 2, p. 129, Hud. Riv. Gr.
- lævis, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol.

5, p. 236, Hud. Riv. Gr.



Say, 1847, (Favosites lycoper-Fig. 197.-Monticulipora lyco-perdon perdon don,) Hall,

Pal. N. Y., vol. 1, p. 64, Trenton Gr. mammulata, D'Orbigny, 1850, Prodr. de Paléont., t. 1, p. 25, and Ohio Pal., vol. 2, p. 207, Hud. Riv. Gr. molesta, Nicholson, 1881, Struct. and

Affin. of Montic., p. 224, Hud. Riv. Gr. moniliformis, Nicholson, 1874, (Chetetes

moniliformis,) Geo. Mag., vol. 1, p. 57,

moniliformis,) Geo. Mag., vol. 1, p. 57, and Pal. of Ont., p. 60, Ham. Gr. monticula, White, 1876, Proc. Acad. Nat. Sci. Phil., p. 27, Devonian. multituberculata, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 71, and Geo. Wis., vol. 4, p. 250, Hud. Riv. Gr. parasitica, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 238, Hud. Riv. Gr. patulus, Billings, 1859, (Stenopora patula,) Can. Nat. and Geo., vol. 4, p. 427.

Can. Nat. and Geo., vol. 4, p. 427, Chazy Gr.

pavonia, see Ptilodictya pavonia.

petasiformis, Nicholson, 1881, Struct. and Affin. of Montic., p. 190, Hud. Riv. Gr. punctata, Whitfield, 1878, Anp. Rep. Geo. Sur. Wis., p. 71, and Geo, Wis., vol. 4, p. 249, Hud. Riv. Gr.



FIG. 198.—Monticulipora ramosa, natural size and magnified.

ramosa, D'Orbigny, 1850, Prodr. d. Pal., t. 1, p. 25, and Edwards & Haime, Pol. Foss. de Terr. Pal., p. 266, and Ohio Pal.,

vol. 2, under the name of Chetetes dalii, Hud. Riv. Gr. Ulrich refers it to Callopora.

- rectangularis, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 70, and Geo. Wis., vol. 4, p. 249, Hud. Riv. Gr. rugosa, Hall, 1847, (Chetetes rugosus,) Pal. N. Y., vol. 1, p. 67, Trenton Gr. rugosa, Edwards & Haime, 1851, Pol. Foss.
- de Terr. Pal., is merely a variety or form of M. ramosa, and associated with it in the Hud. Riv. Gr.
- selwyni, see Prasopora selwyni.
- selwyni var. hospitalis, see Prasopora selwyni var. hospitalis.
- solitaria, Ulrich, 1883, (Heterotrypa soli-taria,) Jour. Cin. Soc. Nat. Hist., vol. 6, p. 88, Hud. Riv. Gr.
- subglobosa, Ulrich, 1879, (Chetetes sub-globosus,) Jour. Cin. Soc. Nat. Hist.,
- vol. 2, p. 129, Hud. Riv. Gr. subpulchella, Nicholson, 1875, (Chetetes subpulchellus,) Ohio Pal., vol. 2, p. 196, Hud. Riv. Gr.
- trentonensis, Nicholson, 1881, Struct. and Affin. Montic., p. 149, Trenton Gr.
- tuberculata, see Spatiopora tuberculata. ulrichi, Nicholson, 1881, Struct. and Affin.
- Montic., p. 131, Hud. Riv. Gr. undulata, Nicholson, 1875, (Chetetes undulatus,) Pal. of Ont., p. 10, and Struct. and Affin. Montic., p. 170, Trenton and Hud, Riv. Gr.
- uniformis, Ulrich, 1882, (Peronopora uniformis,) Jour. Cin. Soc. Nat. Hist., vol. 5, p. 244, Hud. Riv. Gr. vaupeli, Ulrich, 1883, (Heterotrypa vau-
- peli,) Jour. Cin. Soc. Nat. Hist., vol. 6, p. 85, Hud. Riv. Gr.
- venusta, Ulrich, 1878, (Chetetes venustus,) Jour. Cin. Soc. Nat. Hist., vol. 1, p. 93, Utica Slate.
- westoni, Foord, 1883, Cont. to Micro-Pal., p. 7, Trenton Gr.
- wetherbyi, Ulrich, 1882, Jour. Cin. Soc.
- Nat. History, vol. 5, p. 239, Trenton Gr. whiteavesi, Nicholson, 1879, Pal. Tab. Corals, p. 316, and Struct. and Affin. of
- Montic., p. 160, Trenton Gr. NEBULIPORA, McCoy, 1850, Ann. and Mag. Nat. Hist., 2d ser., vol. 6, p. 284. [Ety. nebula, thick mist; poros, pore.] In-crusting or forming lenticular masses, with a concentrically wrinkled epitheca below, composed of small prismatic corallites perpendicular to the upper surface, with clusters of rather larger size, all in contact ; tabulæ at regular distances; no septa. Type N. explanata. papillata, McCoy, 1850, Ann. and Mag. Nat. Hist., vol. 6, p. 284, Hudson
- Riv. Gr. NEMAGRAPTUS, Emmons, (Nemagrapsus,) 1856, Am. Geo., pt. 2, p. 109. The termination graptus is preferred be
 - cause grapsus is used in the nomenclature of crustacea. [Ety. nema, thread; grapho, I write.] Axis elongated and thread-like, simple or com-

pound branches, round at the base, and flattened at the extremities; cells arranged on the flattened part of the axis instead of the margin. Type N. elegans.

NEB.-PAC.

capillaris, Emmons, 1856, Am. Geo., pt. 2, p. 109, Up. Taconic.

- elegans, Emmons, 1856, Am. Geo., pt. 2,
- p. 109, Up. Taconic. Nycropora, Nicholson, 1879, Pal. Tab. Corals, p. 182. [Ety. nuktos, night; poros, pore.] Corallum composite, massive; corallites polygonal, in contact; walls thin, amalgamated; mural pores numerous, small; septa, in the form of marginal vertical ridges; 10 to 15 in each corallite; tabulæ numerous, complete, horizontal. Type N. billingsi. billingsi, Nicholson, 1879, Pal. Tab.
- Corals, p. 184, Trenton Gr.
- OLDHAMIA, Forbes, 1850, Dub. Geo. Jour. [Ety. proper name.] Strong stems, Strong stems, with branches arranged in whorls; substance corneous; cellules undetermined. Type O. antiqua.
 - antiqua, Forbes, 1850, Dublin Geo. Jour., Pots-
 - dam Gr. fruticosa, Hall, 1865, Can. Org. Rem. Decade 2, p. 50, Trenton Gr.
- OMPHYMA, Rafinesque, 1820, Ann. des Sci. Phys. d Bruxelles, vol. 5, p. 234. [Ety. omphax, precious stone.] Simple, turstone.] Simple, tur-binate, wall with rudi Fig. 199. -- Old-

mentary epitheca, prohamia antiqua. ducing radiciform ap-

pendages; septa numerous, equally developed and divided into four groups by an equal number of shallow fostabulæ smooth toward the sulæ: Type O. turbinata. center.

congregata, Billings, 1866, Catal. Sil. Foss. Antic., p. 93, Clinton and Ni-

agara Gr. drummondi, Billings, 1866, Catal. Sil. Foss. Antic., p. 93, Clinton and Niagara Grs.

stokesi, Edwards & Haime, 1851, (Ptychophyllum stokesi,) Polyp. Foss. Pal., p. 407, and Geo. Wis., vol. 4, p. 279, Niagara Gr.

verrucosa, Rafinesque & Clifford, 1820, Monog. d. Turbinolides in Ann. d. Phys. d. Brux., t. 5, p. 235, Niagara Gr.

PACHYPHYLLUM, Edwards & Haime, 1850, Brit. Foss. Corals, p. lxviii. [Ety. pachys, thick; phyllon, leaf.] Corallum, composite, increasing by lateral gemmation: corallites united by the development of the costæ and exotheca; tabulæ abundant. Type P. bouchardi.

FIG. 200. - Om-

phyma tur-binata.



circular; septa cemented toge kirbyi, Meek, 1 85, Devonian. rotuloides, Hall, (Cyclolites loides,) Pal. N vol. 2, p. 42, ton Gr.

PALEOPHYLLUM, lings, 1858, Re Prog. Geo. St palaios, ancient







P. lamellicori

Can. Jour. r

fischeri, Billings

Held. Gr.

solitarium, Ha Rep. N. Y. S Chemung Gi

NEB.-PAC.

t the base, and ities ; cells arpart of the axis ype N. elegans. Am. Geo., pt.

m. Geo., pt. 2,

79, Pal. Tab. nuktos, night; m composite, gonal, in conmated; mural septa, in the il ridges; 10 to ulæ numerous. pe N. billingsi. '9, Pal. Tab. łr.

ıb. Geo. Jour. Strong stems, n whorls; subundetermined.



FIG. 199. -- Oldhamia antiqua.

us, equally deto four groups f shallow fostoward the nata.

Billings, 1866, Foss. Antic., inton and Ni-

, Billings, 1866, Foss. Antic., nton and Ni-

rards & Haime, tychophyllum Polyp. Foss. 107, and Geo. 4, p. 279, Ni-

Rafinesque & 820, Monog. d. des in Ann. d. Brux., t. 5, p. ıra Gr.

Haime, 1850, a xviii. [Ety. lxviii. .f.] Corallum, y lateral gemd by the deand exotheca; P. bouchardi.

PAC.-PHI.]

solitarium, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 232, Chemung Gr.



FIG. 201 -- Pachyphyllum woodmani.

woodmani, White, 1870, (Smithia woodmani,) Geo. Sur. Iowa, vol. 1, p. 188, Chemung Gr.

PACHYPORA, Lindstrom, 1873, Ofversight af K. Vetensk Akad. Forhandl., p. 14. [Ety. pachys, thick; poros, pore.] Dendroid or frondescent; corallites polygonal or subcylindrical, walls thickened toward their mouths, by concentric layers of sclerenchyma; calices annular, oblique, or semilunar; septa obsolete or mere spiniform projections : tabulæ complete, remote; mural pores few, irregular, and often large. Type P. lamellicornis.

fischeri, Billings, 1860, (Alveolites fischeri,) Can. Jour. n. s., vol. 5, p. 256, Up. Held. Gr.

frondosa, Nicholson, 1874, (Alveolites frondosus,) Geo. Mag., vol. 1, p. 15, and Rep. Pal. Ontario, p. 57, Ham. Gr. ornata, Rominger, 1876, (Dendropora ornata,) Pal. Foss. Corals, p. 62, Ham. Gr.

PALEOCYCLUS, Edwards & Haime, 1849, Comptus rendus, t. 29, p. 71. [Ety. palaios, ancient; kuklos, circle.] Corallum circular; fos-

81410

sula deep, broad, circular; septa thick, not numerous or cemented together. Type P. porpita. kirbyi, Meek, 1868, Trans. Chi. Sci., p.

85, Devonian. rotuloides, Hall, 1852, (Cyclolites rotu-loides,) Pal. N. Y., vol. 2, p. 42, Clin-

FIG. 202.-Pachypora

frondosa.

PALEOPHYLLUM, Bil- FIG. 203.--Paleocyclus Victoria lings, 1858, Rep. of

Prog. Geo. Sur. Can., p. 168. [Ety. palaios, ancient; phyllon, leaf.] Fascicu-

CŒLENTERATA.

late or aggregate; corallites surrounded by a thick wall; septa extending the whole length; tabulæ absent or rudimentary; increase by lateral budding. Distinguished from Streptelasma by forming aggregate masses. Type P. rugosum.



FIG. 204.-Palceophyllum divaricans.

divaricans, Nicholson, 1875, Pal. Ohio,

- divaricans, Nicholson, 1875, Fai. Onio, vol. 2, p. 220, Hud. Riv. Gr. rugosum, Billings, 1858, Rep. of Progr. Can. Geo. Sur., p. 168, Trenton Gr. Palæotrochis, Emmons, 1856, Geo. Rep. Midland counties of North Carolina. Two species were mentioned, P. major and P. minor, both of which are supposed to be concretions, and therefore inorganic.

Peronopora, Nicholson, syn. for Monticulipora.

PETRAIA, Munster, 1839, Beitrage zur Petrefaktenkunde, vol. 1, p. 42. [Ety. petraios, that grows among rocks.] Simple, turbinate; septa of one or two sizes, the larger extending from the walls to the center, where they are more or less twisted; no tabulæ or connecting vesicular plates. Type P. decussata. Streptelasma is by some regarded as a synonym, by others as a subgenus, and by others as quite distinct. The forms in this country which have been referred to Petraia are all. probably, Streptelasma, and for that reason I have so referred 'them.

angulata, see Streptelasma angulatum. aperta, see Streptelasma apertum.

fanningana, see Streptelasma fanninganum.

forresteri, Honeyman, 1868, Acadian Geology, p. 594. A catalogue name.

latuscula, see Streptelasma latuscula. logani, see Streptelasma logani.

minganensis, see Archæocyathus minganensis.

ottawensis, see Streptelasma ottawense. pulchella, see Streptelasma pulchellum. pygmæa, see Streptelasma pygmæum. rustica, see Streptelasma rusticum. selecta, see Streptelasma selectum. waynensis, see Streptelasma wayneuse.

PHILLIPSASTREA, D'Orbign y, 1849, Note Sur. des Polypiers Fossiles, • p. 12. [Ety. proper name; aster, star.] Composite, resembling Strombodes, but differing in

the septa of neighboring corallites

CŒLENTERATA.

- being confluent, and consequently the calices are not definitely circumscribed; no exterior walls; interior mural investment well characterized ; center of tabulæ presenting a columellar tubercle. Type P. hennahi.
- affinis, Billings, 1874, Pal. Foss., vol. 2, p. 11, Gaspe limestone No. 8, Devonian.
- gigas, Owen, 1840, (Astræa gigas,) Rep. on Mineral lands, p. 70, Devonian. hennahi, Lonsdale, 1840, (Astræa hen-nahi,) Geo. Trans., vol. 5, p. 697, Devonian.
- johanni, Hall & Whitfield, 1873, (Smithia johanni,) 23d, Rep. N. Y. St. Mus. Nat. Hist., p. 234, Chemung Gr.

mammillaris, see Strombodes mammillaris. multiradiata, Hall & Whitfield, 1873, Smithia multiradiata,) 23d Rep. N. Y.

St. Mus. Nat. Hist., p. 234, Chemung Gr.



FIG. 205.—Phillipsastrea verneuli.

verneuli, Edwards & Haime, 1851, Polypiers Foss. des Terr. Pal., p. 447, Ham. Gr.

verrilli, Meek, 1868, (Smithia verrilli,) Trans. Chi. Acad. Sci., p. 83, Devonian. yandelli, Rominger, 1876, Foss. Corals, p. 130, Up. Held. Gr. Not well defined.

PHYLLOGRAPTUS, Hall, 1858, Rep. of Progr. Can. Geo. Sur. p. 135. [Ety. phyllon, leaf; grapho, I write.]

Frond consisting of simple or compound foliiform stipes, which are celluliferous on the two opposite sides, the margins having a mucronate extension from each cellule; supported on a slender radicle, or combined in groups. Type P. typus. angustifolius, Hall, 1858, Rep. of Progr. Can. Geo. Sur., p. 139, and Dec. 2. Org. Rem., p. 125, Quebec Gr. anna, Hall, 1865, Can. Org. Rem., Decade 2, p. 124, Quebec Gr. dubius, Spencer, 1884, Bull. No. 1, Mus. Univ. St.

FIG. 206.—Phyllograptus typus.

Mo., p. 15, Niagara Gr. illicifolius, Hall, 1858, Rep. of Progr. Can. Geo. Sur., p. 139, and Dec. 2, Org. Rem., p. 121, Quebec Gr.

- loringi, White, 1874, Rep. Invertebrate Foss., p. 9, and Geo. Sur. W. 100th
- Mer., vol. 4, p. 51, Quebec Gr. similis, Hall, 1858. Can. Nat. and Geo., vol., 4, syn. for Graptolithus bigs-
- bvi. typus, Hall, 1858, Rep. of Progr. Can. Geo. Sur., p. 137, and Dec. 2, Org. Rem., p. 118, Quebec Gr.
- PLASMOPORA, Edwards & Haime, 1849, Comptes rend., t. 29, p. 262. [Ety. plasma, cast; poros, pore.] Free, subhemispheric; basal epitheca, con

centrically folded; calices immersed; septa rudimentary; tabulæ horizontal; walls thin; cœnench y ma composed of vertical radiate laminæ united b v smaller horizontal plates. Type P. petaliformis. follis, Ed-

wards & Haime, Fig. 207. – Plasmopora follis. Natural size, and magnified. Natural size, and magnified. 1851, Mon. Pol. Foss. de Terr. Pal., p. 220, Ni-

- agara Gr.
- PLEURODICTYUM, Goldfuss, 1826, Petref. Germ., vol. 1, p. 209. [Ety pleura, side; dictyon, net. Corallum discoidal, upper surface convex; corallites diverging from the center of the base, polygonal or subcylindrical; walls thick; mural pores irregular; tabulæ not numerous, but sometimes inosculating; septa rudimentary, in the form of marginal ridges. There is usually a vermiform body at the central part of the base. Type P. problematicum.

americanum, Roemer, 1876, Lethæ Palæozoica, pl. 33, figs. 2a and 2b. Ham. Gr. problem a ti cum,

Porites, Lamarck, 1816, Hist. des Anim. sans

Vert., t. 2, p. 267. Not an American

Goldfuss, 1826, Petref. Germ., vol. 1, p. 113,

Onondaga Gr.

Zaphrentis.

binata.

Zaphrentis tur-



Polydilasma, Hall, 1852, Pal. N. Y., vol. 2, syn. for FIG. 208.—Pleurodictyum problematicum. Under turbinatum, see side, showing serpula like body.

Palæozoic genus.

PHY.-POR.

and crossed h plete, horizon affinis, Foord, tology, p. 12

conoidea, Ulr Sur. Minn., contigua, Ulri Sur. Minn., newberryi, N

newberryi,) Hud. Riv. G nodosa, Ulrich Hist., vol. 5,

oculata, Foor palæontology selwyni, Nicho

selwyni,) Sti p. 206, Trent selwyni var. h (Monticulipo Struct. and Hud. Riv. G

simulatrix, Ulı Sur. Minn,,] Prionotus, Nilsson folium, see Dipl pristis, see Dipl PROTAREA, Edwa Foss. des T



FIG. 209 .-- Protare

protos, first; (crusting; ca



astræiformis, C

eral lands. I

same specie

Pachyphylli

pyriformis, as Verneuil, no

vetustus, see Pr

Ann. and M

20, p. 388 []

pore.] Cora convex or h

ating from a

larger and s

gled through

cules; coral

vesicular tal

central tube

an occasions

ranged in a z

large ones

PRASOPORA, Nic

PHY.-POR.

Invertebrate 1r. W. 100th Gr. it. and Geo., olithus bigs

Progr. Can. Dec. 2, Org.

laime, 1849, 262. [Ety Free, subitheca, con



smopora follis. nd magnified.

., p. 220, Ni-

1826, Petref. y pleura, side; scoidal, upper tes diverging use, polygonal thick; mural ot numerous. g; septa rudiarginal ridges. rm body at the Type P. prob-

Lethæ Palæ-2b. Ham. Gr. lematicum, ldfuss, 1826, tref. Germ., l. 1, p. 113, ondaga Gr. dilasma, Hall, 52, Pal. N. Y., 1. 2, syn. for phrentis. inatum, see phrentis turlata. les Anim. sans an American

PRA.-PTY.]

- astraiformis, Owen, 1840, Rep. on Min-eral lands, Devonian. This may be the same species subsequently described as Pachyphyllum woodmani.
- pyriformis, as identified by d'Archiac & Verneuil, not American.
- vetustus, see Protarea vetusta.
- PRASOPORA, Nicholson & Etheridge, 1877. Ann. and Mag. Nat. Hist., 4th ser., vol. 20, p. 388 [Ety. prason, sea-plant; poros, pore.] Corallum compound, concavoconvex or hemispheric; corallites radi-ating from a wrinkled basal epitheca; larger and smaller corallites intermingled throughout the colony; no monticules; corallites thin-walled, prismatic; large ones with an exterior zone of vesicular tabulæ surrounding a vacant central tube, which may be crossed by an occasional tabula; smaller ones arranged in a zone around the larger ones, and crossed by numerous, close-set, complete, horizontal tabulæ. Type P. gravæ. affinis, Foord, 1883, Cont. to Micropalæon-tology, p. 12, Trenton Gr.
 - conoidea, Ulrich, 1886, 14th Rep. Geo.
- Sur. Minn., p. 87, Trenton Gr. contigua, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 87, Trenton Gr.
- newberryi, Nicholson, 1875, (Chetetes newberryi,) Ohio Pal., vol. 2, p. 212, Hud. Riv. Gr.
- nodosa, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 245, Hud. Riv. Gr,
- oculata, Foord, 1883, Cont. to Micro-palæontology, p. 11, Trenton Gr. selwyni, Nicholson, 1881, (Monticulipora
- selwyni,) Struct. and Affin. of Montic., p. 206, Trenton Gr.
- selwyni var. hospitalis, Nicholson, 1881, (Monticulipora selwyni var. hospitalis,) Struct. and Affin. of Montic., p. 206, Hud. Riv. Gr.
- simulatrix, Ulrich, 1886, 14th Rep. Geo. Sur. Minn,, p. 85, Trenton Gr.
- Prionotus, Nilsson, 1835, Leth. Suec.
- folium, see Diplograptus folium. pristis, see Diplograptus pristis.
- PROTAREA, Edwards & Haime, 1851, Pol. Foss. des Terr. Pal., p. 208. [Ety.
- FIG. 209 .-- Protarea vetusta, on Strophomena alternata.

protos, first; araios, porous.] Thin, incrusting; calices equal, hexagonal,

- shallow; septa 12, extending but slightly into the visceral chamber; walls thick. Type P. vetusta.
- vetusta, Hall, 1847, (Porites vetustus,) Pal. N. Y., vol. 1, p. 77, Trenton & Hud. Riv. Grs.
- verneuili, Edwards & Haime, 1851, Pol. Foss. des Terr. Pal., p. 209, Silurian. (?)
- PROTOGRAPTUS, Matthew, 1885, Trans. Roy. Soc. Can., p. 31. [Ety. protos, first; grapho, I write.] Stipes thin, flat, elongate, dichotomously branched ; having a central axis, and being alate on each side; pores arranged along the axis of the stipe; axis and margin of the stipe connected by delicate nerv
 - ules. Type P. alatus. alatus, Matthew, 1885, Trans. Roy. Soc. Can., p. 32, St. John Gr.
- PTILOGRAPTUS, Hall, 1865, Can. Org. Rem., Decade 2, p. 139. (Ety. *ptilon*, feather; grapho, I write.] Plant-like, rooted, simple or branching ; branches plumose, pinnules alternate on opposite sides; celluliferous on one face only; branches cylindrical or flattened. Type P. plumosus.

foliaceus, Spencer, 1878, Can. Nat., vol. 8, and Bull. No. 1, Mus. Univ. St. Mo., p. 41, Niagara Gr.



- geinitzanus, Hall, 1865,
- Can. Org. Rem., De- FIG. 210 .-- Ptilograpcade 2, p. 140, Quebec tus foliaceus. Gr.
- plumosus, Hall, 1865, Can. Org. Rem., Decade 2, p. 140, Quebec Gr.
- PTYCHONEMA, Hall, 1887, Pal. N. Y., vol. 6, p. xiv. [Ety. *ptyche*, wrinkle; *nema*, thread.] Massive or ramose, composed of thin-walled, strongly corrugated cells, which are apparently without diaphragms. Type P. tabulatum.
 - belderbergiæ, Hall, 1874, (Chetetes helder-bergiæ,) 26th Rep. N. Y. St. Mus. Nat. Hist., p. 110, Low. Held, Gr.
- tabulatum, Hall, 1876, (Chetetes tabulatum,) Illus. Dev. Foss., pl. 37, and figs. 16-19, and Pal. N. Y., vol. 6, p. 14, Up. Held. Gr.
- PTYCHOPHYLLUM, Lonsdale, 1839, Sil. Syst., p. 691, and E. & H. Brit. Foss. Corals, p. lxix. [Ety. ptyche, ridge, phyllon, leaf.] Corallum simple, having infundibuliform tabulæ superposed and invaginated; septastrongly twisted toward the center of the tabulæ so as to constitute a spurious columella. Type P. stokesi.
 - canadense, Billings, 1862, Pal. Foss., vol. 1, p. 107, Mid. Sil. Anticosti Gr., Division 4.
 - floriforme, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 5, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 409, Niagara Gr.

- fulcratum, Hall, 1882, Foss. Corals Niagara | RASTRITES, Barrande, 1850, Graptolites de and Up. Held. Grs., p. 6, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 410, Niagara Gr.
- infundibilum, Meek, 1877, U.S. Geo. Sur. 40th Parallel, vol. 4, p. 28, Devonian.



FIG. 211.-Ptychophyllum knappi.

knappi, Hall, 1883, 12th Rep. Geo. Ind.,

- p. 278, Up. Held. Gr. okesi, Edwards & Haime, 1851, Brit. stokesi,
- Foss. Corals, p. lxix, Niagara Gr. striatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 22, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 426, Up. Held. Gr.

versiforme, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 22, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 426, Up. Held. Gr.

PYCNOSTYLUS, Whiteaves, 1884, Pal. Foss., vol. 3, p. 2. [Ety. puknos, dense; stylos, column.] Corallum aggregate; corallites slender, divided by calicular gemmation, at distant intervals, into sets of three or more ascending flexuous branches; structure similar to Amplexus, but tabulæ horizontal and not embracing. · Type P. guelphensis. Whiteaves, 1884, Pal. Foss., elegans, vol. 3, p. 4,



FIG. 212. — Pycnostylus guelphensis; two branches are broken off at C, C.

proposed Romingeria.

niagarensis, see Romingeria niagarensis.

Boheme, p. 64. [Sig. a rake.] Small, almost linear, very long,

PYC.-RHI

stipe slightly curved; interior canal connecting the cellules, which are on the convex

side and iso-lated from FIG. 213. – Rastrites grinus. each other. Type R. peregrinus.

barrandi, Hall, 1859, Pal. N. Y., vol. 3, p.

- 521, Hud. Riv. Gr. RETIOGRAPTUS, Hall, 1865, Dec. 2, Org. Rem. p. 115. [Ety. rete, net; grapho, I write.] Frond simple or compound; stipes numerous arranged bilaterally on an axis, elongate, oval or lanceolate with longitudinal axis and reticulate structure; margins with mucronate points. Type R. tentaculatus.
 - barrandi, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 61, Hud. Riv. Gr.
 - eucharis, Hall, 1865, Can. Org. Rem., Decade 2, p. 146, Utica Slate.
 - geinitzanus, Hall, 1859, Pal. N. Y., vol. 3, p. 518, Hud. Riv. Gr.

tentaculatus, Hall, 1858, (Graptolithus tentaculatus,) Rep. of Prog. Can. Geo. Sur., p. 134, and Dec. 2, Org. Rem., p. 116, Quebec Gr.

RETIOLITES, Barrande, 1850, Graptolites de Boheme, p. 68. [Ety. rete, net; lithos, stone.] Stipes thin, flat, elongate, triangular, composed of two series of cellules symmetrically arranged, in regard to the axis; orifices on the sides of the triangle. Type R. geinitzanus.

ensiformis, Hall, 1858, (Graptolithus ensiformis,) Rep. of FIG. 214.-Re-Prog. Can. Geo. Sur., p. 133, tiolites veand Decade 2, Org. Rem., p. 114, Quebec Gr.

venosus, Hall, 1852, (Graptolithus veno-sus,) Pal. N. Y., vol. 2, p. 40, Clinton Gr.

RHIZOG RAPTUS, Spencer, 1878, Can. Nat., vol. 8, p. 460. [Ety. rhiza, root; grapho, I write.] Cyathiform, bifurcating branches with dichotomous terminations and reticulate;

nosus.

Whiteaves,

p. 3, Guelph

Nicholson

Ro-

Gr.





more or less FIG. 215.-Rhizograptus bulbosus

stem terminating in a bulb. Type R. bulbosus.

ROM.-STE.]

bulbosus, Spend p. 460, and B

Mo., p. 30, N Romingeria, Nic p. 114. [Ety lum lax, sp drical, annu lateral gemm ducing new t or verticils, a the walls an visceral chan by mural po mote; septa rows of spin pora, but is c

is therefore fr part of its of lifera. cornuta, Billin nuta,) Can. J

Held. and Ha niagarensis, Ron niagarensis,)

agara Gr. umbellifera, E umbellifera,) Up. Held. Gr.

Sarcinula, Lamarc sans Vert., t.

can Palaeozoi glabra, Owen,

Lands. See I (?)obsoleta, Hall,

Dist., vol. 2, I nized. ramosa, Eaton, 41. Not prop

Smithia, Edwards des Terr. Pal. cupied for a g syn. for Philli

johanni, see Phil multiradiata, se

tiradiata. woodmani, see P verrilli, see Phill SPHÆROLITES, Hin

Lond., vol. 31 spheroidal for nicholsoni, Hin

Lond., vol. 3 Gr.

STAUROGRAPTUS, E



Fig. 216. – Staurog dichotomus. dichotomus, En p. 109, Up. Ta PYC.-RHI

iraptolites de rake.] Small,



lastrites pere nus

Y., vol. 3, p.

2, Org. Rem. apho, I write.] ound; stipes erally on an nceolate with iculate struconate points.

ep. N. Y. St. d. Riv. Gr. rg. Rem., Dec-

N. Y., vol. 3,

(Graptolithus og. Can. Geo. Org. Rem., p.

raptolites de 3. [Ety. rete, one.] Stipes gate, trianguof two series ymmetrically egard to the n the sides of Type R. gei-

1858, (Graprmis,) Rep. of). Sur., p. 133, Org. Rem., p.

olithus veno-0, Clinton Gr.



zograptus bulilb. Type R. CŒLENTERATA.

bulbosus, Spencer, 1878, Can. Nat., vol. 8, p. 460, and Bull. No. 1, Mus. Univ. St. Mo., p. 30, Niagara Gr.

ROM.-STE.]

- ROMINGERIA, Nicholson, 1879, Tab. Corals, p. 114. [Ety. proper name.] Corallum lax, spreading; corallites cylindrical, annulated, multiplying by lateral gemmation, and typically producing new tubes, in umbellate whorls or verticils, at short intervals; where the walls are in contact with the visceral chambers they are connected by mural pores; tabulæ complete, remote; septa represented by vertical rows of spinules. It resembles Aulopora, but is only attached basally, and is therefore free throughout the greater part of its extent. Type R. umbellifera.
 - cornuta, Billings, 1859, (Aulopora cornuta,) Can. Jour., vol. 4, p. 119, Up. Held. and Ham. Grs.
- niagarensis, Rominger, 1876, (Quenstedtia niagarensis,) Foss. Corals, p. 72, Niagara Gr.
- umbellifera, Billings, 1859, (Aulopora umbellifera,) Can. Jour., vol. 4, p. 119, Up. Held. Gr.
- Sarcinula, Lamarck, 1816, Hist. des Anim. sans Vert., t. 2, p. 222. Not an American Palaeozoic genus.
- glabra, Owen, 1840, Rep. on Mineral Lands. See Lyellia glabra.
- (?)obsoleta, Hall, 1857, Geo. Lake Sup. Land Dist., vol. 2, Hud. Riv. Gr. Not recognized.
- ramosa, Eaton, 1832, Geo. Text Book, p. 41. Not properly defined.
- Smithia, Edwards & Haime, 1851, Pol. Foss. des Terr. Pal. The name was preoccupied for a genus in botany, and is a syn. for Phillipsastrea.
 - johanni, see Phillipsastrea johanni. multiradiata, see Phillipsastrea mul-

tiradiata. woodmani, see Pachyphyllum woodmani.

verrilli, see Phillipsastrea verrilli. SPHÆROLITES, Hinde, 1875, Proc. Geo. Soc.

Lond., vol. 31, p. 514. [Ety. from the spheroidal form.] Type S. nicholsoni. nicholsoni, Hinde, 1875, Proc. Geo. Soc. Lond., vol. 31, p. 544, Low. Held. Gr.

STAUROGRAPTUS, Emmons, 1856, (Staurograp-



omus.

stauros,

F1G. 216. — Staurograptus dichotomus.

dichotomus, Emmons, 1856, Am. Geo., p. 109, Up. Taconic.

- STELLIPORA, Hall, 1847, Pal. N. Y., vol. 1, p. 79. [Ety. stella, star; poros, pore.] Corallum dendroid or incrusting; corallites dimorphic; apertures subcircular; no septa; tabulæ abundant; surface covered with conspicuous star-shaped elevations and depressions. Type S.
 - antheloidea. antheloidea, Hall, 1847, Pal. N. Y., vol. 1, p. 79, Trenton and Hud. Riv. Grs.
 - fischeri, Ulrich, 1883, (Constellaria fischeri,) Jour. Cin. Soc. Nat. Hist., vol. 6, p. 270, Hud. Riv. Gr.
 - florida, Ulrich, 1882, (Constellaria florida,) Jour. Cin. Soc. Nat. Hist., vol. 2, p. 257, Hud. Riv. Gr.
 - limitaris, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 126, Hud. Riv. Gr. Syn. (?) for S. polystomella.



FIG. 217.—Stellipora polystomella, natural size and magnified star.

polystomella, Nicholson, 1873, (Constellaria polystomella,) Ohio Pal., vol. 2, p. 215, Hud. Riv. Gr.

STENOPORA, Lonsdale, 1844, App. to Dar-win's Volcanic Islands, p. 161, and Geo. Russ. and Ural Mts., vol. 1, p. 631. [Ety. stenos, narrow; poros, pore.] Corallum very similiar to Chetetes, but having small styliform processes at the angles of the calices, as understood by Edwards & Haime. Nicholson defines the genus, and restricts it to specimens from Australia and Van Diemen's Land, which, as in the type, have constricted corallites and minute mural pores. Type S. ovata.

bulbosa, see Monticulipora bulbosa. adherens, see Monticulipora adherens. crassa, see Chetetes crassus.

fibrosa, see Monticulipora fibrosa



ous. huronensis, see Tetradium hu-

ronense. libana, Safford, 1869, Geo. of Tenn. Not de-

fined. FIG. 218.-Stenopora exilis. patula, see Mon-

ticulipora patula. spinigera, see Chetetes spinigerus.



Strephodes, McCoy, 1849, syn. for Cyathophylfum.

austini, see Clisiophyllum austini.

pickthorni, see Cyathophyllum pickthorni.

- STREPTELASMA, Hall, 1847, Pal., N. Y., vol. 1, p. 17. [Ety. streptos, twisted; elasma, lamella.] Turbinate, gradually or abruptly expanding; cup deep; lamellæ or septa longitudinal, spirally twisted toward the center; no tabulæ or fossette. Type S. expansum.
 - acquidistans, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 20, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 424, Up. Held. Gr.
 - ampliatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 19, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 423, Up. Held. Gr.
 - angulatum, Billings, 1862, (Petraia angulata,) Pal. Foss., vol. 1, p. 103, Hud. Riv. Gr.
 - apertum, Billings, 1862, (Petraia aperta,) Pal. Foss., vol. 1, p. 102, Black Riv. Gr.
 - calyculus, Hall, 1852, Pal. N. Y., vol. 2, p. 111, Niagara Gr.
 - coarctatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs; p. 21, and 12th Rep. Geo. Sur. Ind., p. 275, Up. Held. Gr.
 - conspicuum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 19, and 35th Rep. N. Y. St. Mus. Nat. Hist., p.
 - 423, Up. Held. Gr. conulus, Rominger, 1876, Foss. Corals, p. 144, Niagara Gr.
 - corniculum, Hall, 1847, Pal. N. Y., vol. 1, p. 69, Trenton and Hud. Riv. Grs.
 - crassum, Hall, 1847, Pal. N. Y., vol. 1, p. 70, Trenton Gr.
 - crateriforme, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 20, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 424, Up. Held. Gr.
 - dissimile, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 17, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 421, Up. Held. Gr.



FIG. 219.-Streptelasma inflatum, transverse section

expansum, Hall, 1847, Pal. N. Y., vol. 1, p. 17, Chazy Gr.

- extans, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 5, and 35th, Rep. N. Y. St. Mus. Nat. Hist., p. 409, Niagara Gr.
- fanningana, Safford, 1869, (Petraia fanningana,) Geo. Tenn., p. 320, Low. Held. Gr.
- fossula, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 19, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 423, Up. Held. Gr.
- inflatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 18, and 12th Rep.
- Geo. Ind., p. 276, Up. Held. Gr. involutum, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 20, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 424, Up. Held. Gr.
- lamellatum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 17, and 35th Rep. N. Y. St. Mus. Nat. Hist, p. 421, Up. Held. Gr.
- laterarium, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 18, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 422, Corniferous limestone.
- latuscula, Billings, 1862, (Petraia latus-cula,) Pal., Foss., vol. 1, p. 104, Mid. Sil. Anticosti, Div. 4.
- limitare, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 5, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 409, Niagara Gr.
- logani, Nicholson, 1875, (Petraia logani,) Can. Nat., vol. 7, p. 143, Up. Held. Gr.
- mammiferum, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 21, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 425, Up. Held. Gr.
- minimum, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 106, syn. for Duncanella borealis.
- multilamellosum, Hall, 1847, Pal. N. Y.,
- vol. 1, p. 70, Trenton Gr. ottawensis, Billings, 1865, (Petraia otta-wensis,) Can. Nat. and Geo., 2d ser., vol. 2, Trenton Gr.
- papillatum, Hall, 1882, Foss. Corals Ni-agara and Up. Held, Grs., p. 21, and 12th Rep. Geo. and., p. 276, Up. Held. Gr.
- parvulum, Hall, 1847, Pal. N. Y., vol. 1, p. 71, Trenton Gr.
- patulum, Rominger, 1876, Foss. Corals, p. 143, Niagara Gr.
- profundum, Conrad, 1843, Proc. Acad. Nat. Sci. Phil., p. 335, (Cyathophyllum profundum,) and Hall, 1847, Pal. N. Y., vol. 1, p. 49, Birdseye, Black Riv. and Trenton Grs.
- pulchellum, Billings, 1865, (Petraia pulchella,) Can. Nat. and Geo., 2d ser., vol. 2, p. 424, Mid. Sil. pygmæum, Billings, 1862, (Petraia pyg-
- mæa,) Pal. Foss., vol. 1, p. 103, Mid. Sil. Anticosti, Div. 4.
- radicans, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 106, Niagara Gr.



rectum, Hall, 18 Geo. Rep. 4th



FIG. 220. Streptelasma rectum.

1876, Foss. Co strictum, Hall, 1 Mus. Nat. His

- tenue, Hall, 18 and Up. Hel
- Rep. Geo. Ind ungula, Hall, 18 19, Ham. Gr.

waynensis, Saffe nensis,) Geo. Held. Gr.

- STRIATOPORA, Hall p. 156. [Ety. pore.] Ramos angular, conie the surface in like depressio nally striated. bands may be mural pores co
- carbonaria, Whi Nat. Hist., vol

cavernosa, Rom p. 60, Cornifer flexuosa, Hall, 1

156, Niagara (formosa, Billing p. 254, Up. He

huronensis, Ron p. 58, Niagara

iowensis, Owen, sis,) Rep. on

p. 69, Ham. G issa, Hall, 1874,

- Nat. Hist., p.
- limbata, Eaton, 1 Geo. Text Boo
 - Illust. Dev. H
- Ham. Gr. linnæana, Billing Jour., vol. 5, 1

Gr. missouriensis,

Worthen, 186

Ill., vol. 3, p Held. Gr.

rugosa, Hall, 18

Iowa, p. 479, iowensis.

STROMBODES, Schw Naturg., p. 418

204

STR.

STR.

STR.-SYR.]

Corals Niagara , and 35th, Rep. ist., p. 409, Ni-

, (Petraia fanp. 320, Low.

Corals Niagara , and 35th Rep. s, p. 423, Up.

Corals Niagara , and 12th Rep. eld. Gr. oss. Corals Niirs., p. 20, and . Nat. Hist., p.

oss. Corals Nirs., p. 17, and s. Nat. Hist, p.

oss. Corals Nip. 18, and 35th Hist., p. 422,

(Petraia latus-1, p. 104, Mid.

Corals Niagara , and 35th Rep. st., p. 409, Ni-

Petraia logani.) 1**43, Up. H**eld.

, Foss. Corals irs., p. 21, and . Nat. Hist., p.

Rep. N. Y. St. syn. for Dun-

47, Pal. N. Y.,

(Petraia otta-Geo., 2d ser.,

oss. Corals Ni-Frs., p. 21, and p. 276, Up.

N. Y., vol. 1, p.

Foss. Corals, p.

3, Proc. Acad. **Cyatho**phyllum 847, Pal. N. Y Black Riv. and

, (Petraia puleo., 2d ser., vol.

(Petraia pygp. 103, Mid. Sil.

Rep. N. Y. St. liagara Gr.

CŒLENTERATA.

rectum, Hall, 1843, (Strombodes rectus,) Geo. Rep. 4th Dist. N. Y., p. 200, and Illust. Dev. Foss., pl. 19, Ham. Gr. rusticum, Billings, 1858, (Petraia rustica,) Rep. of Progr. Geo. Sur. Can., p. 168, Hud. Riv. Gr. selectum, Billings, 1865, (Petraia selecta,) Can. Nat. and Geo., 2d ser., vol. 2, p. 429, Mid. Sil. simplex, Hall, 1882, Foss.

Corals Niagara and Up. Held. Grs., p. 18, and 12th Rep. Geo. Ind.,

p. 277, Up. Held. Gr. FIG. 220. Streptelasma rectum. spongiaxis,

Rominger. 1876, Foss. Corals, p. 144, Niagara Gr. strictum, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 114, Low. Held. Gr. tenue, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 17. and 12th Rep. Geo. Ind., p. 278, Up. Held. Gr. ungula, Hall, 1876, Illust. Dev. Foss., pl. 19, Ham. Gr.

- waynensis, Safford, 1869, (Petraia way-nensis,) Geo. of Tenn., p. 314, Low. Held, Gr.
- STRIATOPORA, Hall, 1852, Pal. N. Y., vol. 2, p. 156. [Ety. striatus, striated; poros, pore.] Ramose; corallites thick-walled, angular, conical; cells opening upon the surface in expanded, angular, cuplike depressions, which are longitudinally striated, and between the striæ the bands may bear spinules; tabulæ and mural pores common. Type S. flexuosa. carbonaria, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, Burlington Gr.
 - cavernosa, Rominger, 1876, Foss. Corals, p. 60, Corniferus Gr.
 - flexuosa, Hall, 1852, Pal. N. Y., vol. 2, p. 156, Niagara Gr.
 - formosa, Billings, 1860, Can. Jour., vol. 5, p. 254, Up. Held. Gr.

huronensis, Rominger, 1876, Foss. Corals, p. 58, Niagara Gr.

iowensis, Owen, 1840, (Cyathopora iowensis,) Rep. on Min. Lands of Iowa, etc., p. 69, Ham. Gr.

issa, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 114, Low. Held. Gr.

- limbata, Eaton, 1832, (Madrepora limbata,) Geo. Text Book, p. 30, and
- Illust. Dev. Foss., pl. 33, Ham. Gr.
- linnæana, Billings, 1860. Can. Jour., vol. 5, p. 253, Ham. Gr.

missouriensis, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 369, Low.

Held. Gr. Held. Gr. Fie. 221.-Stri-rugosa, Hall, 1858, Geo. of atopora lin-Iowa, p. 479, syn. for S. næana. lowensis.

STROMBODES, Schweigger, 1820, Handb. der Naturg., p. 418. [Ety. strombos, twisting.]

Composite, increasing by calicular gemmation; corallites constituted principally by a series of superposed, in-vaginated, infundibuliform tabulæ, united by ascending trabiculæ, so as to form a columnar mass; calices pentagonal, well circumscribed, and completely covered with the septal radii; outer walls not well developed, and inner mural investment rudimentary. Type S. pentagonus.

- alpenensis, Rominger, 1876, Foss. Corals, p. 133, Ham. Gr. Is this a syn. for S. mammillaris?
- diffluens, Edwards & Haime, 1851, Pol. Fos. des Terr. Pal., p. 431, Auticosti Gr.
- distortus, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 209, Ham. Gr. Too imper-N. Y., p. 209, Ham. Gr. Too imper-fectly described for recognition. Probably a Heliophyllum.

eximius, Billings, 1866, Catal, Sil. Foss. Antic., p. 93, Clinton and Niagara Grs. gracilis, Billings, 1862, Pal. Foss., vol. 1,

p. 113, Mid. Sil. helianthoides, (?) Heliophyllum halli.

mammillaris, Ówen, 1840, (Astrea mam-millaris,) Rep. on Min. Lands, p. 70, and Rominger, in Pal. Foss., p. 133, Niagara Gr.



FIG. 222-Strombodes pentagonus.

pentagonus, Goldfuss, 1826, Germ. Petref. p. 62, Niagara Gr.

pygmæus, Rominger, 1876, Foss. Corals, p. 132, Niagara Gr. (?) rectus, see Streptelasma rectum.

separatus, Ulrich, 1886, Cont. to Am. Pal., p. 32, Niagara Gr.

simplex, see Zaphrentis simplex.

- striatus, D'Orbigny, 1850, Prodr. de Paléont., p. 48 Niagara Gr. STYLASTREA, Lonsdale, 1845, Geo. and Pal.
- of Russia, and Ural Mts., p. 621. [Ety. sty'os, pillar; aster, star.] Composite, large; corallites prismatic; easily separable; walls thick, striated longitudinally, and wrinkled transversely; within the walls there is a narrow, vesicular, perithecal zone, and within it a lamelliferous area; septa numerous, not reaching the center; tabulæ abundant. Type S. inconferta.
- anna, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 199, Up. Held. Gr.
- SYRINGOLITES, Hinde, 1879, Geo. Mag., vol. 6, p. 244. [Ety. syrinx, pipe; lithos, stone.] Composite, large with basal epitheca; corallites polygonal, thin-

206

huronensis, Hinde, 1879, Geo. Mag., vol. 6, p. 246, Niagara Gr.

- SYRINGOFORA, Goldfuss, 1826, Germ. Petref., p. 75. [Ety. syrinx, pipe; poros, pore.] Corallum aggregating, at first creeping after the manner of Aulopora, then sending up numerous vertical, cylindrical corrallites, usually flexuous, subparallel, and connected laterally by more or less transverse processes; septa rudimentary; tabulæ close set, infundibuliform; epitheca well de-veloped. Type S. reticulata. alectiformis, Winchell, 1866, Rep. Low. Penin. Mich., p. 90, Ham. Gr.

 - annulata, Rominger, 1876, Foss. Corals, p. 81, Niagara Gr.
 - aulopora, Salter, 1855, Belcher's Last of the Arctic Yoyages, vol. 2, p. 385, Carboniferous.
 - cleviana, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 295, Corniferous Gr.
 - compacta, Billings, 1858, Can. Nat. and Geo., vol. 3, p. 422, Up. Sil.
 - crassata, Winchell, 1866, Rep. Low. Penin. Mich., p. 90, Ham, Gr. dalmani, Billings, 1858, Can. Nat. and

 - dalmani, Billings, 1858, Can. Nat. and Geo., vol. 3, p. 423, Up. Sil. *e*debilis, Billings, 1858, Can. Nat. and Geo., vol. 3, p. 423, Up. Sil.
 elegans, Billings, 1858, Can. Nat. and Geo., vol. 3, p. 425, Corniferous Gr.
 fenestrata, Winchell, 1866. Rep. Low. Penin Mich., p. 90, Ham. Gr.
 fibrata, Rominger, 1876, Foss. Corals, p. 82. Niagara Gr.

 - 82, Niagara Gr.
 - harveyi, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 32, Waverly or Kinderhook Gr.
 - hisingeri, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 116, Corniferous Gr.
 - infundibulum, see Cystostylus infundibulum.
 - intermedia, Nicholson, 1874, Rep. Pal. Prov. Ont. Can., p. 126, Ham. Gr. laxata, Billings, 1859, Can. Jour., vol. 4,
 - p. 118, Corniferous Gr. maclurii, Billings, 1860, Can.



FIG 228-Syringopora macluril.

Jour., vol. 5, p. 258, Corniferous Gr. multattenuata, McChesney,

1860, New Pal. Foss., p. 75, and Pal. E. Neb., p. 144, Coal Meas.

multicaulis, Hall, 1852, Pal. N. Y., vol. 2, p. 119, Niagara Gr.

nobilis, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 118, Up. Held. Gr.

- vol. 4, p. 116, Up. Held. Gr.
 parallela, Etheridge, 1878, Quar. Jour.
 Geo. Soc., vol. 34, p. 583, Up. Sil.
 perelegans, Billings, 1859, Can. Jour., vol.
 4, p. 117, Up. Held. Gr.
 retiformis, Billings, 1858, Can. Nat. and
 Geo., vol. 3, p. 424, Up. Sil.

- tabulata, Edwards & Haime, 1851, Pol. Foss. des Terr. Pal., p. 288, Up. Held. Gr. tenella, Rominger, 1876, Foss. Corals, p.
- 81, Niagara Gr. tubiporoides, Yandell & Shumard, 1847.
- Cont. to Geo. of Ky., p. 8, Corniferous Gr. tubiporoides, Billings, see S. maclurii. verneuli, Edwards & Haime,
- 1851. Polyp. Foss. de Terr. Pal., p. 289, Corniferous Gr.
- verticillata, Goldfuss, 1826, Petref. Germ., p. 76, Niagara Gr.
- TETRADIUM, Dana, 1848, Wilkes. Expl. Exped. Zooph., vol. 8, p. 701. [Ety. tetra, four.] Aggregate, massive, sub-hemispheric; corallites long, prismatic, in close contact; septa few, not reaching the center of the visceral chamber (typically four); tabulæ numerous, complete; calices generally petaloid; no mural pores; increase by fission. Type. T. fibratum.



FIG. 224.-Tetradium fibratum.

columnare, Hall, 1847, (Chetetes colum-naris,) Pal. N. Y., vol. 1, p. 68, Trenton Gr.

fibratum, Safford, 1856, Am. Jour. Sci., vol. 22, p. 237, Hud. Riv. Gr.

fibratum var. aper-tum, Safford, 1856, Am. Jour. Sci., vol. 22, p. 237, Hud. Riv. Gr.

- fibratum var. mi-nus, Safford, 1856, Am. Jour. Sci., vol. 22, p. 238, Hud. Riv. Gr.
- huronense, Billings, 1865, (Stenopora huronensis,) Pal.

Foss., vol. 1, p. 185, Hud. Riv. Gr.

 Foss., vol. 1, p. 185, Hud. Riv. Gr.
 peachi var. canadense, Foord, 1883, Cont.
 to Micro. Pal., p. 24, Trenton Gr.
 Tetragraptus, Salter, 1863, Quar. Jour. Geo.
 Soc., vol. 19. [Ety. tetra, four; grapho,
 I write.] This genus is not regarded with much favor. Graptolithus bryonoides is made the typical species. G. quadribrachiatus is also placed in it.



68, Niagara Gr. ramosa, Rominger 69, Up. Held. G swindernana, Gol

swindernana,) 1 Niagara Gr. THECOSTEGITES, Edw

major, Rominger, 67, Niagara Gr.

minor, Rominger,

Comptes rend., theke, sheath; s lites cylindrical, short mural en

FIG. 227.-1



THA.-VER.]

SYR.-TET.

matus. THAMNOGRAPTUS, H:

3, p. 519. [Ety Fron I write.] or flexuous sti widely divergin long, simple, or manner as the

and branches a longitudinal, de the axis. Type anna, Hall, 1865, ade 2, p. 141, Q bartonensis, Spen

8, and Bull. No p. 39, Niagara (capillaris, Hall, 1



FIG. 226. - Thamnogr typus

THECIA, Edwards & rend., t. 29, p. 26 Corallum massi compact, spurid duced by the se together laterall developed ; tab shallow, with Type T. swinder

SYR.-TET.

3, Petref. Germ.,

aime, 1851, Pol. 288, Up. Held. Gr. Foss. Corals, p.

Shumard, 1847. 8, Corniferous Gr. S. maclurii. Haime, 1851.

Pal., p. 289, Cor-6, Petref. Germ.,

Wilkes. Expl.

, p. 701. [Etv. massive, sube. long, prismatic, few, not reaching isceral chamber ulæ numerous, erally petaloid; ease by fission.



Chetetes colum-

1, p. 68, Tren-



225.-Tedradium e rock.

d. Riv. Gr. ord, 1883, Cont. enton Gr. uar. Jour. Geo.

a, four; grapho, is not regarded uptolithus bryocal species. G. placed in it.

THA.-VER.]

approximatus, see Graptolithus approximatus.

- THAMNOGRAPTUS, Hall, 1859, Pal. N. Y., vol. 3, p. 519. [Ety. thamnus, shrub; grapho, I write.] Fronds consisting of straight or flexuous stipes, with alternating or widely diverging branches; branches long, simple, or ramose, in the same manner as the stipe; the main stipe and branches are marked by a central longitudinal, depressed line, indicating the axis. Type T. typus. anna, Hall, 1865, Can. Org. Rem., Dec-
- ade 2, p. 141, Quebec Gr.

bartonensis, Spencer, 1878, Can. Nat., vol. 8, and Bull. No. 1, Mus. St. Univ. Mo., p. 39, Niagara Gr.

capillaris, Hall, 1859, Pal. N. Y., vol. 3, p. 520, Hud. Riv. Gr.

multiformis, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 40, Niagara Gr. typus, Hall 1859, Pal. N. Y., vol. 3, p. 519, Hud.

Riv. Gr.

FIG. 226. - Thamnograptus typus

THECIA, Edwards & Haime, 1849, Comptes rend., t. 29, p. 263. [Ety. theke, sheath] Corallum massive, with an abundant, compact, spurious cœnenchyma, produced by the septa becoming cemented together laterally; septal system highly developed : tabulæ numerous; calices shallow, with a small deep fossula. Type T. swindernana.



FIG. 227.-Thecia major.

major, Rominger, 1876, Foss. Corals, p. 67, Niagara Gr.

- minor, Rominger, 1876, Foss. Corals, p. 68, Niagara Gr.
- ramosa, Rominger, 1876, Foss. Corals, p. 69, Up. Held. Gr.
- swindernana, Goldfuss, 1829, (Agaricia swindernana,) Petref. Germ., p. 109, Niagara Gr.
- THECOSTEGITES, Edwards & Haime, 1849, Comptes rend., t. 29, p. 261. Etv. theke, sheath; stege, covering.] Corallites cylindrical, short and united by short mural expansions situated at

various heights: tabulæ horizontal. Type T. bouchardi.

bouchardi, Michelin, 1845, (Harmodites bouchardi,) Icon. Zooph., p. 185. This species was described from France, and is probably not American.



FIG. 228.--Thecostegites hemisphericus, natural size and magnified

hemisphericus, Roemer, 1860, Sil. Fauna

- W. Tenn., p. 25, Niagara Gr. TRACHYPORA, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 305. [Ety. trachys, rough ; poros, pore.] Dendroid ; calices slightly salient; no septa; cœnenchyma abundant, solid, and surface marked by strong, irregular, vermicular, subechinulated striæ. Type T. davidsoni.
- austini, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 81, Coal Meas. elegantula, Billings, 1860, Can. Jour., vol.
- 5, p. 254, Ham. Gr.
- ornata, Rominger, 1876, (Dendropora ornata,) Foss. Corals, p. 62, Ham. Gr.



F1G. 229. -Trachypora elegantula. Portion of two corallites a longitudinal section and a corallite enlarged.

- TROCHOPHYLLUM, Edwards & Haime, 1851, Mon. d. Pol. Foss. de Terr. Pal., p. 356. [Ety. trochos, wheel; phyllon, leaf.] Simple, trochoid; calice shallow; septa thick, not denticulate; extending almost to the center of the visceral chamber, where a small tabula is visible; fossula rudimentary and occupied by a small septum. Type T. verneuilanum.
- verneuilanum, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal., p. 357, Subcarboniferous.
- Tubipora, Linnæus, 1758, Syst. Nat., 10th Ed., p. 789. Not American Palæozoic. lamellosa, Owen, 1840, Rep. on Min. Lands, p. 78. Not defined. Probably a Syringopora.
- VERMIPORA, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 109. [Ety. vermis, worm; poros, pore.] Ramose; corallites cylindrical, close, increasing by lateral gemmation, and projecting at the surface; tabulæ remote; no mural pores connecting corallites. Type V. serpuloides.

- fasciculata, Rominger, 1876, Foss. Corals, p. 70, Ham. Gr.
- niagarensis, Rominger, 1876, Foss. Corals, p. 70, Niagara Gr.
- robusta, Hall, 1883, Rep. St. Geo., pl. 2, figs. 32, 33, Low. Held. Gr. serpuloides, Hall, 1874, 26th Rep. N. Y.
- St. Mus. Nat. Hist., p. 110, Low. Held. Gr.
- tortuosa, Hall, 1883, Rep. St. Geo., pl. 2, fig. 23, Low. Held. Gr.
- Vesicularia, Rominger, 1876, Foss. Corals, This name was preoccupied the Bryozoa. See Cystip. 135. among phorolites.

major, see Cystiphorolites major.

minor, see Cystiphorolites minor.

- variolosa, see Cystiphorolites variolosus.
- Ann. des ZAPHRENTIS, Rafinesque, 1820, Sci. Phys. Brux., vol. 5, p. 234. [Ety. za, very; phrentis, diaphragm.] Simple, turbinate; lamellæ simple, alternate, extending from the epitheca to the center of the visceral chamber; tabulæ well developed, extending from wall to wall, and deflected downward around the periphery; no columella; calice deep, with a single strongly developed fossula occupying the place of one of the lamellæ. Type Z. phrygia. acuta, White & Whitfield, 1862, Proc.
 - Bost. Soc. Nat. Hist., vol. 8, p. 306, Waverly or Choteau Gr.
 - affinis, Billings, 1865, Can. Nat. and Geo., 2d ser., vol. 2, p. 430, Hud. Riv. Gr. ampla, Hall, 1876, Illust. Dev. Foss., pl.
 - 21, Ham. Gr.
 - annulata, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 33, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 437, Up. Held. Gr.
 - bellistriata, Billings, 1865, Can. Nat. and Geo., 2d ser., vol. 2, p. 430, Hud. Riv. Gr.
 - bigsbyi, Billings, 1866, Catal. Sil. Foss. Antic., p. 92, Clinton and Niagara Grs.
 - bilateralis, Hall, 1852, (Caninia bilateralis,) Pal. N. Y., vol. 2, p. 41, Clinton and Niagara Grs.
 - calcariformis, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 33, and 12th Geo. Ind., p. 293, Up. Held. Gr. calceola, White & Whitfield, 1862, (Lo-
 - phophyllum calceola.) Proc. Bost. Soc. Nat. Hist., vol. 8, p. 305, and 1880, Cont. to Pal. No. 6, p. 156, Waverly or Choteau Gr.
 - canadensis, Billings, 1862, Pal. Foss., vol. 1, p. 105, Hud. Riv. Gr.
 - cannonensis, Winchell, 1869, Geo. of Tenn., p. 442, Waverly or Kinderhook Gr.
 - carniatas, Worthen, (in press.) Geo. Sur. Ill., vol. 8, p. 75, Keokuk Gr. cassedayi, M. Edwards, 1860, Hist. d
- Corallaires, t. 3, Warsaw Gr. celator, Hall, 1876, 28th Rep. N. Y. St.
- Mus. Nat. Hist., p. 107, Niagara Gr.

- centralis, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal., p. 328, Up. Held. Gr.
- chesterensis, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 73, Kaskaskia Gr.
- cinctosa, Billings, 1866, Catal. Sil. Foss. Antic., p. 92, Clinton and Niagara Grs.
- cingulosa, Billings, 1874, Pal. Foss., vol. 2, p. 10, Gaspe limestone No. 8, Devonian.
- clappi, syn. for Z. gigantea.
- cliffordana, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal., p. 329, Subcarboniferous.
- colletti, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 28, and 12th Rep. Geo. Ind., p. 315, Up. Held. Gr.
- omplanata, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 26, and Soth Rep. N. Y. St. Mus. Nat. Hist., p. 430, Up. Held. Gr.
- compressa, M. Edwards, 1860, Hist. d. Corallaires, t. 3, Warsaw Gr.
- compressa, see Z. davisana.
- concava, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 35, and 12th Rep. Geo. Ind., p. 291, Up. Held. Gr. conigera, see Clisiophyllum conigerum.
- constricta, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 33, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 437, Up. Held. Gr.
- contorta, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 37, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 441, Up. Held. Gr.
- convoluta, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 37, and 12th Rep. Geo. Ind. p. 294, Up. Held. Gr.
- cornicula, Lesueur, 1820, (Caryophyllia cornicula,) Mem. du Mus., vol. 6, p. 297, Up. Held. Gr.
- corrugata, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 27, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 431, Schoharie Gr.
- corticata, Billings, 1874, Pal. Foss., vol. 2, p. 9, Low. Devonian.
- cristulata, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 10, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 414, Niagara Gr.
- cruciformis, Hall, 1883, 12th Rep. Geo. Ind., p. 315, Up. Held. Gr. curvata, Hall, 1882, Foss. Corals Niagara
- and Up. Held. Grs., p. 35, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 439, Up. Held Gr.
- cyathiformis, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 27, and 12th Rep. Geo. Ind., p. 290, Up. Held. Gr.
- cylindraceas, Worthen, (in press.) Geo. Sur. Ill., vol. 8, p. 78, Kaskaskia Gr. cystica, Winchell, 1866, Rep. Low. Penin.
- Mich., p. 90, Ham. Gr.
- dalei, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal., p. 329, Warsaw Gr

[VES.-ZAP.

davisana, n. sp. U instead of Z.

1876, Foss. Cor was preoccupie

deformis, Hall, 18 p. 290, Up. Hel

denticulata, Eichw American.

- desori, Edwards Pol. Foss. d. 7
- Held. Gr. duplicata, Hall, 18

and Up. Held Rep. Geo. Ind. edwardsi, Nichols

2, p. 235, Up. H egeria, Billings, 1

vol. 7, p. 234, 1 elegans, Hall, 188

and Up. Held. Rep. Geo. Ind.,

elliptica, White, Nat. Hist., vol.

to Pal., No. 6, p eriphyle, Billings Geo. vol. 7, p. 2

excentrica, Meek, U. S. Geo. Sur. Sur. W. 100th 1

Meas. fastigata, Hall, 18

and Up. Held. (N. Y. St. Mus. Held. Gr.

fenestrata, Nichol Geo., vol. 7, p. foliata, Hall, 188

and Up. Held. Rep. Geo. Ind., frequentata, Hall

agara and Up. 35th Rep. N. Y 435, Up. Held.

fusiformis, Hall, 1 and Up. Held.

Rep. Geo. Ind., genitiva, Billings Geo., vol. 7, p. gibsoni, White, 1

p. 117, Coal Me

gigantea, Lesueur vol. 6, Up. Hel

glans, see Hadrop gravis, Hall, 1882 Up. Held. Grs N. Y. St. Mus.

Held. Gr.

gregaria, Rominge

149, Niagara G halli, Edwards &

Pol. Foss. d. Te haysi, Meek, 186

Arts, 2d ser., Held. Gr.

hecuba, Billings, 1 vol. 7, p. 234, U herzeri, Hall, 188 and Up. Held

Rep. Geo. Ind.,

VES.-ZAP.

laime, 1851, Mon. Pal., p. 328, Up.

in press,) Geo. Sdr. kaskia Gr.

, Catal. Sil. Foss. and Niagara Grs. 4. Pal. Foss., vol. imestone No. 8.

tea.

Haime, 1851, Mon. Pal., p. 329, Sub-

ss. Corals Niagara **p. 28, and** 12th 5, Up. Held. Gr. 5 Foss. Corals Ni-. Grs., p. 26, and Ius. Nat. Hist., p.

ls, 1860, Hist. d. saw Gr. 1a.

ss. Corals Niagara , p. 35, and 12th I, Up. Held. Gr. um conigerum. Foss. Corals Ni-Grs., p. 33, and Ius. Nat. Hist., p.

ss. Corals Niagara p. 37, and 35th Nat. Hist., p. 441,

Foss. Corals Ni-. Grs, p. 37, and nd. p. 294, Up.

20. (Caryophyllia Mus., vol. 6, p.

Foss. Corals Ni-Grs., p. 27, and fus. Nat. Hist., p.

Pal. Foss., vol. 2,

Foss. Corals Ni-. Grs., p. 10, and Ius. Nat. Hist., p.

12th Rep. Geo. d. Gr. ss. Corals Niagara p. 35, and 35th

Nat. Hist., p. 439, 382, Foss. Corals

d. Grs., p. 27, and id., p. 290, Up.

(in press,) Geo. Kaskaskia Gr. Rep. Low. Penin. ir.

2, 1851, Mon. d. Pol. . 329, Warsaw Gr ZAP.]

CŒLENTERATA.

- davisana, n. sp. Up. Held. Gr. Proposed instead of Z. compressa of Rominger, 1876, Foss. Corals, p. 151, pl. 53, which was preoccupied.
- deformis, Hall, 1883, 12th Rep. Geo. Ind., p. 290, Up. Held. Gr.
- denticulata, Eichwald, 1857. Probably not American.
- desori, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal., p. 333, Low. Held. Gr
- duplicata, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 32, and 12th Rep. Geo. Ind., p. 293, Up. Held. Gr.
- edwardsi, Nicholson, 1875, Ohio Pal., vol. 2, p. 235, Up. Held. Gr.
- egeria, Billings, 1875, Can. Nat. and Geo.,
- egeria, Billings, 1875, Can. Nat. and Geo., vol. 7, p. 234, Up. Held. Gr. elegans, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 37, and 12th Rep. Geo. Ind., p. 287, Up. Held. Gr. elliptica, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 31, and 1880, Cont. to Pal., No. 6, p. 155, Burlington Gr. erjphyle. Billings, 1875, Can. Nat. and
- eriphyle, Billings, 1875, Can. Nat. and Geo. vol. 7, p. 233, Up. Held. Gr.
- excentrica, Meek, 1873, Haydens, 6th Rep. U. S. Geo. Sur. Terr., p. 495, and Geo. Sur. W. 100th Mer., vol. 4, p. 101, Coal Meas.
- fastigata, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 30, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 434, Up. Held. Gr.
- fenestrata, Nicholson, 1875, Can. Nat. and
- Ienestrata, NICHOISON, 18/5, Can. Nat. and Geo., vol. 7, p. 138, Up. Held. Gr.
 foliata, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 34, and 12th Rep. Geo. Ind., p. 286, Up. Held. Gr.
 frequentata, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 31, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 435. Up. Held. Gr. 435, Up. Held. Gr.
- fusiformis, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 29, and 12th Rep. Geo. Ind., p. 296, Up. Held. Gr. genitiva, Billings, 1875, Can. Nat. and Geo., vol. 7, p. 235, Up. Held. Gr. gibsoni, White, 1884, 13th Rep. Geo. Ind., p. 117, Coal Meas.

- gigantea, Lesueur, 1820, Mem. du. Mus., vol. 6, Up. Held. Gr. glans, see Hadrophyllum glans.
- gravis, Hall, 1882, Foss. Corals Nigara and Up. Held. Grs., p. 36, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 440, Up. Held. Gr.
- gregaria. Rominger, 1876, Foss. Corals, p. 149, Niagara Gr.
- halli, Edwards & Haime, 1851, Mon. d.
- Pol. Foss. d. Terr. Pal., p. 341, Ham. Gr. haysi, Meek, 1865, Am. Jour. Sci. and Arts, 2d ser., vol. 40, p. 32, Low.
- Held. Gr. hecuba, Billings, 1875, Can. Nat. and Geo.,
- vol. 7, p. 234, Up. Held. Gr. herzeri, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 35, and 12th Rep. Geo. Ind., p. 292, Up. Held. Gr.

- ida, Winchell. 1865, Proc. Acad. Nat. Sci. Phil., p. 117, Waverly or Kinderhook Gr.
- illinoisensis, Worthen, (in press,) Geo. Sur. Ill. vol. 8, p. 77, Keokuk Gr. *inæqualis*, Hall, 1882, Foss. Corals Niagara
- and Up. Held. Grs., syn. for Palæophyllum divaricans.
- inclinata, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 34, syn. for Cyathophyllum angustatum.
- incondita, Billings, 1874, Pal. Foss., vol. 2, p. 7, Devonian.
- invenusta, Billings, 1875, Can. Nat. vol. 7, p. 233, Up. Held. Gr.
- irregularis, Hall, 1882, Foss. Corafs, Ni-agara and Up. Held. Grs., p. 34, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 438, Up. Held. Gr.
- knappi, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 34, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 438, Up. Held. Gr.
- lanceolata, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 76, Warsaw Gr. latisinus, Hall, 1882, Foss. Corals Niagara
- and Up. Held. Grs., p. 10, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 414, Niagara Gr.
- macfarlani, Meek, 1868, Trans. Chi. Acad. Sci., p. 83, Devonian.
- marcoui, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal., p. 337, Niagra Gr.
- minas, Dawson, 1868, Acad. Geo., p. 286, Subcarboniferous.
- multilamella, Hall, 1852, Stans. Ex. to Gt. Salt Lake, p. 408, Coal Meas.
- multilamellata, Nicholson, 1875, Ohio Pal., vol. 2, p. 236. The name was preoc-cupied, and the definition is very imperfect.
- nitida, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 31, and 12th Rep. Geo. Ind., p. 288, Up. Held Gr
- nodulosa, Rominger, 1876, Foss. Corals, p. 148, Corniferous Gr.
- offleyensis, Etheridge, 1878, Quar. Jour. Geo. Soc., vol. 34, p. 588, Up. Sil.
- ovalis, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 29, and 12th Rep. Geo. Ind., p. 294, Up. Held. Gr.
- ovibus, Salter, 1855, Belcher's Last of the Arctic Voyages, vol. 2, p. 382, Carboniferous.
- parasitica, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 79, Kinderhook Gr.
- patens, Billings, 1865, Can. Nat. and Geo. 2d. ser., vol. 2, p. 430, Mid. Sil.
- pellaensis, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 74, St. Louis Gr. planima, Hall, 1882, Foss. Corals Niagara
- and Up. Held. Grs., p. 29, and 12th Rep. Geo. Ind., p. 292, Up. Held. Gr.
- ponderosa, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 27, and 12th Rep. Geo. Ind., p. 288, Up. Held. Gr.

pressula, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 10, and 35th Rep. N. Y. St. Mus. Nat., Hist., p. 414, Niagara Gr.

210

- profunda, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs. p. 81, and 12th Rep. Geo. Ind., p. 287, Up. Held. Gr. prolifica, Billings, 1858, Can. Jour. N. S., vol. 4, p. 121, Up. Held. and Ham. Grs. prona, M. Edwards, 1860, Hist. d. Coral-
- laires t. 3, Warsaw Gr. pulmonea, Lesueur, 1820, (Caryophyllia pulmonea,) Mem. du. Mus., vol. B, Carboniferous.
- racinensis, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis. and Geo. Wis., vol. 4, p. 277, Niagara Gr.
- rafinesquii, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal., p. 329, Up. Held. Gr.
- recta, Meek, 1868, Trans. Chi. Acad. Sci., p. 82, Devonian.
- reversa, Worthen, (in press,) Geo. Sur.
- rigida, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 9, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 413, Niagara Gr.
- roemeri, Edwards & Haime, 1851, Mon. d. Pol. Foss. d. Terr. Pal., p. 341, Delthyris Shale, Low. Held. Gr.
- rugatula, Billings, 1874, Pal. Foss., vol. 2, p. 8, Gaspe limestone No. 1, Up. Sil.
- and Up. Held. Grs., p. 32, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 436, Up. Held. Gr.
- simplex, Hall, 1843, (Strombodes simplex,) Geo, Rep. 4th Dist. N. Y., p. 200, and Illust. Dev. Foss., pl. 21, Ham. Gr. solida, Hall & Whitfield, 1873, 23d Rep.
- N. Y. St. Mus. Nat. Hist., p. 231, Chemung Gr.
- spatiosa, see Heterophrentis spatiosa.
- spergenensis, Worthen, (in press.) Geo. Sur. Ill., vol. 8, p. 77, Warsaw Gr. spinulifera, Hall, 1858, Geo. Sur. Iowa, p.
- 650, Warsaw Gr.
- spinulosa, Edwards & Haime, 1851, Pol. Foss. d. Terr. Pal., p. 334, Kaskaskia Gr.
- spissa, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 30, and 12th Rep. Geo. Ind., p. 289, Corniferous limestone. stansburyi, Hall, 1852, Stans. Ex. to Gt.
- Salt Lake, p. 408, Coal Meas.
- Stokesi, Edwards & Haime, 1851, Pol.
 Foss. d. Terr. Pal., p. 330, Niagara Gr.
 subcompressa, Hall, 1882, Foss. Corals
 Niagara and Up. Held. Grs., p. 28, and
 12th Rep. Geo. Ind., p. 286, Up. Held. Gr.

subrecta, Billings, 1875, Can. Nat. and Geo., vol. 7, p. 235, Up. Held. Gr. subvada, Hall, 1882, Foss. Corals Ni-

ZAP.

- agara and Up. Held. Grs., p. 11, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 415, Niagara Gr.
- Subvesicularis, Hall, 1882, Foss. Corals Niagara and Up. Held. Grs., p. 10, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 414, Niagara Gr. tabulata, Hall, 1882, Foss. Corals Niagara
- and Up. Held. Grs., p. 27, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 431, Up. Held. Gr.
- terebrata, Hall, 1883, 12th Rep. Geo. Ind., p. 316, Up. Held. Gr. torta, Hall, 1882, Foss. Corals Niagara and
- Up. Held. Grs., p. 30, and 12th Rep. Geo. Ind., p. 285, Up. Held. Gr. transversa, Hall, 1882, Foss. Corals Ni-agara and Up. Held. Grs., p. 36, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 440, Up. Held. Gr.
- transversensis, Winchell, 1866, Rep. Low. Penin. Mich., p. 90, Ham. Gr. trisutura, Hall, 1882, Foss. Corals Niagara
- and Up. Held. Grs., p. 30, and 12th Rep. Geo. Ind., p. 289, Up. Held. Gr. turbinata, Hall, 1852, (Polydilasma turbi-natum.) Pal. N. Y., vol. 2, p. 112, Ni-
- agara Gr. ulrichi, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 76, Warsaw Gr. umbonata, Rominger, 1876, Foss. Corals,
- p. 146, Ham. Gr.
- undata, Hall, 1883, 12th Rep. Geo. Ind.,
- p. 291, Up. Held. Gr. ungula, Rominger, 1876, Foss. Corals, p. 151, Up. Held. Gr.
- varsoviensis, Worthen, (in press.) Geo. Sur. Ill., vol. 8, p. 78, Keokuk Gr. venusta, Hall, 1882, Foss. Corals Niagara
- and Up. Held. Grs., p. 38, and 35th Rep. N. Y. St. Mus. Nat. Hist., p. 442, Up. Held. Gr.



FIG. 230.--Zaphrentis wortheni.

wortheni, Nicholson, 1875, Ohio Pal., vol. 2. p. 235, Corniferus Gr.

C

SUBKI

THIS Subkin Crinoidea, Stelleri

The word " lished a book ent family name, but Palæozoic Orders, Cystoidea, Lichen The Stellerida are Echinida by the O

The fossils con composed of pecul are the calyx or bo and Lichenocrinoi Cyclocystoidea wei loidea were free of were sessile, others roots for attachme of them attached b but some did not Blastoidea, Palæoc

Prof. Wachsn characters for the tinguished three pl

1. The summ squamous integum

2. The summ posteriorly, on the probably, lateral.

3. The summi ing a dome arching the dome or at the

Without unde can not always be Heterocrinidæ, th Heterocrinus, Iocr Ohiocrinus has a la beyond the ends of

We believe th upon the construct ably no family sh

, Can. Nat. and b. Held. Gr. Foss. Corals Ni-Grs., p. 11, and us. Nat. Hist., p.

ZAP.

82, Foss. Corals. . Grs., p. 10, and us. Nat. Hist., p.

s. Corals Niagara p. 27, and 35th Vat. Hist., p. 431,

h Rep. Geo. Ind.,

orals Niagara and , and 12th Rep. Held. Gr. Foss. Corals Ni-Grs., p. 36, and us. Nat. Hist., p.

, 1866, Rep. Low. am. Gr. s. Corals Niagara p. 30, and 12th Up. Held. Gr. olydilasma turbiol. 2, p. 112, Ni-

ss,) Geo. Sur. Ill., ir. 56, Foss. Corals,

Rep. Geo. Ind.,

Foss. Corals, p.

(in press,) Geo. Keokuk Gr. Korals Niagara p. 38, and 35th at. Hist., p. 442,



wortheni. 5, Ohio Pal., vol.

6

SUBKINGDOM ECHINODERMATA.

THIS Subkingdom is represented, in the Palæozoic rocks, by the Classes Crinoidea, Stellerida, and Echinida.

The word "Crinoidea" was first used in 1821, by J. S. Miller, who published a book entitled "A Natural History of the Crinoidea." He used it as a family name, but later investigations raised it to the rank of a Class. The Palæozoic Orders, into which the Class is divided, are Palæocrinoidea, Blastoidea, Cystoidea, Lichenocrinoidea, Agelacrinoidea, Cyclocystoidea and Myelodactyloidea. The Stellerida are represented by the Orders Asteroidea and Ophiuroidea, and the Echinida by the Order Perischoechinida.

The fossils consist of plates, variously arranged and connected, all of which are composed of peculiar crystalline lime. The principal parts of the Palæocrinoidea are the calyx or body, arms, pinnules, column, and base or root. The Agelacrinoidea and Lichenocrinoidea were attached, by one side, to some foreign substance. The Cyclocystoidea were free or attached in like manner. Whether the Myelodactyloidea were free or attached to other bodies is unknown. Some of the Cystoidea were sessile, others possessed columns tapering to a point, and others had bases or roots for attachment. The Blastoidea possessed columns, but whether or not any of them attached by bases or roots is unknown. All Palæocrinoidea had columns, but some did not have bases or roots. The Orders bearing pinnules are the Blastoidea, Palæocrinoidea, and part of the Cystoidea.

Prof. Wachsmuth has claimed the construction of the vault affords good characters for the separation of the Palæocrinoidea into families, and has distinguished three plans upon which the summit is constructed, viz.:

1. The summit composed of a more or less pliable, sometimes perhaps squamous integument, yielding to motion, in the body and arms.

2. The summit composed of solid plates, with a porous ventral sac, located posteriorly, on the disk, and closed at the top. Anal opening rarely observed, but, probably, lateral.

3. The summit composed of heavy immovable plates, closely joining and forming a dome arching the entire oral side. Anal opening directly through the wall of the dome or at the extremity of a tube, the so-called proboscis.

Without underestimating his work, a single illustration will show that families can not always be distinguished by the construction of the vault; for in the family Heterocrinidæ, there is no resemblance between the vaults of Ectenocrinus, Heterocrinus, Iocrinus, and Ohiocrinus. Ectenocrinus has no tube or proboscis, Ohiocrinus has a large spiral tube, and Iocrinus has a long cylindrical one, extending beyond the ends of the arms and flowing pinnules.

We believe the separation of the Palæocrinoidea into families must be based upon the construction of the calyx and vault, but chiefly upon the former. Probably no family should be made to include genera, some of which have subradials

and others do not. It is therefore of the first importance to ascertain whether the crinoid has one or two circles of plates below the radials. Those having only one circle have been called monocyclic, and those having two circles dicyclic. The circle at the base is composed of what we call the "basal plates," and the second circle, whenever it has an existence, is composed of "subradial plates." In this we follow Billings, Meek, Agassiz, and most other standard authors. Carpenter and "Wachsmuth call the "subradials" the "basals" in all cases where they occur, and the lower plates "underbasals;" but where there are no "subradials," they follow the well-established nomenclature in calling the first circle of plates "basals."

The presence or absence of regular internadials, it seems, should always be regarded as of family importance.

The number of basal plates should also be regarded as of family importance. If not in all cases, then in connection with the general structure of the calyx and vault the families will be sufficiently well-defined. Those characters upon which genera are founded, when combined, in certain associations will form families; and under this head several important families have been created.

Generic characters, as a matter of course, are to a certain extent included in the family characters; but the form and construction of the column is of generic importance. The general form of the calyx and vault, and the number of primary radials, and the construction of the azygous area, are always of generic importance. Beside, certain combinations and associations of what are usually regarded as specific characters have been made the basis for establishing genera.

Wachsmuth, speaking from experience, says in young crinoids the basals are the most perfectly developed parts; they attain nearly their full size in young individuals, greater in proportion than the subradials and radials, which are comparatively early developed, and at a time when the interradial and anal plates have scarcely made their appearance. The latter develop the slowest, and in some genera increase continually, both in size and number, during the growth of the individual. Abnormal growths, or sudden modifications of specific characters, almost always take place in the interradial and azygous areas, the azygous rays and dome. His experience is corroborated by others, and the author never saw a small specimen that did not have its basals or first circle of plates as distinctly marked as they occur in large specimens of the same species.

The columns of crinoids very frequently show injuries received by the animal in its life-time. The column is sometimes much swollen on one side and depressed on the other; sometimes a parasite that attached to the column is found imbedded or enveloped in the crinoid column. The animal could also repair its arms andother parts of its body by secretions of lime in the same way.

Some of the Cystoidea may be arranged into families, upon characters similar to those upon which families are founded in the Palaeocrinoidea; but, generally, this is not the case. Some of the Cystoidea possessed an ambulacral opening and two other orifices, the purposes of which may not be fully understood; in others, the two openings referred to are absent. In addition to these, many bear openings called "pectinated rhombs," and all have pores passing through the plates. These pores passed to organs called "hydrospires," which were largely developed within the calyx of the Cystoidea and Blastoidea. The communication, through the test, with the outside water is supposed to show the hydrospires belonged to the respiratory system. The rhombs constitute orifices at the surfissures at the surhave five pairs surspires situated be some have regard In the nome:

or forked plates, radials is the basi or interradial ridg and the two pron occupied by the a wise by the food-g marked by pinnu ambulacra there a ings of these tub hydrospire slits; the gap between hydrospire cleft, y externally by spin anal interradius n The plates covering down the ambula

The Cyclocys connect with a ci and radiate system also had a compose Lichenocrinoidea a Internally there a supported the very been connected we have maintained i evidence has been and effluent openin sponges, have thus of this order in We three orders—Cyclin in rocks later than

The Class Ste pentagonal body at face of the disk; is along the lower su is a more or less dis æozoic orders, Aste seas. In the comm plates from which

213

ain whether the aving only one elic. The circle is second circle, n this we follow ter and Wachsoccur, and the they follow the isals."

d always be re-

ily importance. f the calyx and ers upon which m families; and

ent included in nn is of generic iber of primary eric importance. ly regarded as

the basals are ize in young inwhich are comunal plates have , and in some growth of the ific characters, zygous rays and ever saw a small netly marked as

by the animal e and depressed ound imbedded ir its arms and.

aracters similar hut, generally, al opening and tood; in others, y bear openings plates. These eveloped within hrough the test, l to the respiratory system. The number and position of the larger orifices and the pectinated rhombs constitute the principal basis for family classification. The Blastoidea have orifices at the summit of the calyx which are important in classification. Some have fissures at the summit, others have slits along each side of the ambulacra, and others have five pairs surrounding an oral center. These openings connect with hydrospires situated beneath the ambulacra. These orifices are of family importance, and some have regarded the number of hydrospires as of generic importance.

In the nomenclature of the Blastoidea the calvx consists of the basals, radials or forked plates, and orals or deltoid plates. The suture between the basals and radials is the basi-radial suture. The ridge at the median line of an oral is an oral or interradial ridge. In the forked plates the lower part is the body of the radial, and the two prongs are the limbs. Between the limbs is the radial sinus, which is occupied by the ambulacrum, consisting of a lancet-piece, which is excavated lengthwise by the food-groove or ambulacrum, and against it rest side plates or pore pieces. marked by pinnule pits or sockets, and there are also side plates. Beneath the ambulacra there are interradial systems of lamellar tubes or hydrospires. The openings of these tubes on the ventral surface of the calvx, as in Codaster, are called hydrospire slits; if they are concentrated beneath the ambulacra, as in Codonites. the gap between the edge of the lancet-plate and the sides of the radial sinus is the hydrospire cleft, which leads downward into the hydrospire canal. The canals open externally by spiracles, sometimes called ovarian openings. The spiracles of the anal interradius may be confluent with the anal opening to form the anal spiracle. The plates covering the mouth and peristome, and which are sometimes continued down the ambulacra covering the food-grooves, are the summit plates or the vault.

The Cyclocystoidea have tubes radiating from the center of the disk, which connect with a circular tube in the rim. It is evident there was both a circular and radiate system of circulation in this order of animals. The Myelodactyloidea also had a compound internal system of both circular and radiate circulation. The Lichenocrinoidea attached by a base that appears to have been a single solid plate. Internally there are numerous thin, upright septa radiating from the center, which supported the very small external plates, and the sarcode between which must have been connected with the tube in the column to have given support to it, and to have maintained it in an upright position. The column tapered to a point, and no evidence has been found of any external opening of these animals. The affluent and effluent openings that abound in all other Echinoderms, and even among the sponges, have thus far never been discovered in the Lichenocrinoidea. The notice of this order in Wachsmuth's Palæocrinoidea seems to be wholly erroneous. The three orders—Cyclocystoidea, Myelodactyloidea and Lichenocrinoidea—are unknown in rocks later than the Upper Silurian.

The Class Stellerida is composed of animals with a flattened and more or less pentagonal body and central disk. The mouth opens in the center of the lower surface of the disk; the skin is coriaceous, the whole body more or less flexible, and along the lower surface of each arm or prolonged ray from the central disk, there is a more or less distinct furrow from which the ambulacra are protruded. The Palzozoic orders, Asteroidea and Ophiuroidea, are exceedingly abundant in all existing seas. In the common starfish the arms are mere prolongations of the disk, and the plates from which the ambulacra are in deep furrows along the lower

surface of the arms. The mouth is in the center of the disk, and the ramifications of the stomach extend a greater or less distance into the arm-furrows. In the Ophiuroidea [Ophis, snake; oura, tail] there are usually five simple curving or flowing arms with undefined furrows and furnished with cirri, which give them a ragged and tangled exterior.

The class Echinida is composed of animals having a complete exterior calcareous shell of closely-fitting plates, which prevents all flexion of the body. The animal has no arms, but the holes, through which the sucking feet are protruded, are arranged upon five rows of plates running from the center of the top of the shell to the angles of the mouth at the bottom; or, when they are confined to the dorsal surface, they form a distinct five-rayed star surrounding the apex of the shell. A striking character in this class is the manner in which spines are articulated upon tubercles on the surface of the shell; the base of the spines being hollowed for the reception of the convex surface of the tubercle, and, being sustained in place by a ligament, the spines are movable, and serve economical purposes. The Palæozoic order Perischoechineda is extinct, but some of them had an internal masticatory apparatus that will compare with any that exists in the living representatives.

CLASS CRINOIDEA.

ORDER PALÆOCRINOIDEA.

FAMILY ACROCRINIDÆ.—Acrocrinus.

FAMILY ACTINOCRINIDÆ.—Actinocrinus, Agaricocrinus, Alloprosallocrinus, Amphoracrinus, Batocrinus, Dorycrinus, Eretmocrinus, Gennæocrinus, Megistocrinus, Melocrinus, Physetocrinus, Saccocrinus, Siphonocrinus, (?) Steganocrinus, Stereocrinus, Strotocrinus, Teleiocrinus.

FAMILY AGASSIZOCRINIDÆ. - Agassizocrinus.

FAMILY ALLAGECRINIDÆ.—Allagecrinus.

FAMILY ANCYROCRINIDÆ.—Ancyrocrinus.

FAMILY ARTHRACANTHIDÆ.—Arthracantha.

FAMILY BELEMNOCRINIDÆ.—Belemnocrinus.

FAMILY CALCEOCRINIDÆ.—Calceocrinus, Deltacrinus.

FAMILY CAMAROCRINIDÆ.—Camarocrinus.

FAMILY CATILLOCRINIDÆ.—Catillocrinus.

FAMILY CUPRESSOCRINIDÆ.—Aspidocrinus.

- FAMILY CYATHOCRINIDÆ—Ampheristocrinus, Arachnocrinus, Atelestocrinus, Barycrinus, Carabocrinus, Cyathocrinus, Erisocrinus, Eupachycrinus, Euspirocrinus, Menocrinus, Palæocrinus, Vasocrinus.
- FAMILY DICHOCRINIDÆ.—Cotyledonocrinus, Dichocrinus, Pterotocrinus, Talarocrinus.

FAMILY DIMEROCRINIDÆ.—Coronocrinus, Cytocrinus.

FAMILY EDRIOCRINIDÆ. --- Edriocrihus.

FAMILY EUCALYPTOCRINIDÆ. — Eucalyptocrinus.

FAMILY GASTEROCOMIDÆ.—Myrtillocrinus.

FAMILY GAUROCRINIDÆ.—Gaurocrinus, Retiocrinus, Rhaphanocrinus, Thysanocrinus.

FAMILY GLYPTASTERIDÆ.—Glyptaster, Lampterocrinus.

· crinus, S FAMILY HAP FAMILY HET FAMILY HYB FAMILY ICHT crinus, N FAMILY MELO crinus, T FAMILY PISO FAMILY PLAT crinus. FAMILY POTE crinus, H iocrinus, FAMILY RHO Rhodocrin FAMILY SYNB FAMILY TAXO FAMILY XENC FAMILY AFFIN

FAMILY GLY

FAMILY AMYO FAMILY ANOM FAMILY CARYO FAMILY COMA FAMILY COMA FAMILY ECCY FAMILY ECCY FAMILY ECCY FAMILY HOLO FAMILY HOLO FAMILY LEPAN crinus, Ple FAMILY PLAT FAMILY UNCER

FAMILY BLAST FAMILY CODAS FAMILY CODON FAMILY ELEUT FAMILY GRANA FAMILY NUCLE FAMILY PENTR FAMILY STEPH FAMILY TROOST

ECHINODERMAT	4
--------------	---

the ramifications
urrows. In the
curving or flow-
e them a ragged
00
exterior calcare-
ly. The animal

ly protruded, are p of the shell to o the dorsal surf the shell. A articulated upon hollowed for the d in place by a The Palæozoic rnal masticatory sentatives.

loprosallocrinus, nnæocrinus, Meohonocrinus, (?)

Atelestocrinus, Eupachycrinus,

protocrinus, Tal-

nocrinus, Thysa-

FAMILY GLYPTOCRINIDÆ.—Archæoerinus, Compsocrinus, Glyptoerinus, Pycno-
🐃 crinus, Schizocrinus.
FAMILY HAPLOCRINIDÆ.—Coccocrinus, Haplocrinus.
FAMILY HETEROCRINIDÆ.—Ectenocrinus, Heterocrinus, Iocrinus, Ohiocrinus.
FAMILY HYBOCRINIDE.—Anomalocrinus, Hybocrinus.
FAMILY ICHTHYOCRINIDE.—Cleiocrinus, Ichthyocrinus, Lecanocrinus, Mespilo-
crinus, Nipterocrinus, Onychocrinus, Taxocrinus.
FAMILY MELOCRINIDÆAllocrinus, Dolatocrinus, Macrostylocrinus, Maria-
crinus, Technocrinus.
FAMILY PISOCRINID.E Pisocrinus.
FAMILY PLATYCRINIDÆ -Cordylocrinus, Eucladocrinus, Marsupiocrinus, Platy-
crinus.
FAMILY POTERIOCRINIDEBursacrinus, Cœliocrinus, Dendrocrinus, Graphio-
crinus, Homocrinus, Hydreionocrinus, Merocrinus, Ottawacrinus, Poter-
iocrinus, Stemmatocrinus, Zeacrinus.
FAMILY RHODOCRINIDÆGoniasteroidocrinus, Hadrocrinus, Lyriocrinus,
Rhodocrinus.
FAMILY SYNBATHOCRINIDÆ.—Synbathocrinus.
FAMILY TAXOCRINIDÆ.—Cupulocrinus, Forbesiocrinus, Taxocrinus.
FAMILY XENOCRINIDÆ.—Xenocrinus.
FAMILY AFFINITY UNCERTAIN — Brachiocrinus, Closterocrinus, Cystocrinus.
ORDER CYSTOIDEA.
FAMILY AMYGDALOCYSTIDE. — Amygdalocystites, Palæocystites,
FAMILY ANOMALOCYSTIDE. — Anomalocystites.
FAMILY CARVOCRINIDE. — Carvocrinus.
FAMILY COMABOCYSTIDE —Comarocystites.
FAMILY ECHINOCYSTIDE.—Echinocystites.
FAMILY EOCYSTIDE.—Eocystites.
FAMILY EOCYSTIDE.—Eocystites. FAMILY GOMPHOCYSTIDE.—Gomphocystites. Hemicosmites.
FAMILY EOCYSTIDE.—Eocystites. FAMILY GOMPHOCYSTIDE.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDE.—Allocystites. Crinocystites. Holocystites.
FAMILY EOCYSTIDE.—Eocystites. FAMILY GOMPHOCYSTIDE.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDE.—Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDE.—Hybocystites.
FAMILY EOCYSTIDE.—Eocystites. FAMILY GOMPHOCYSTIDE.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDE.—Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDE.—Hybocystites. FAMILY LEPADOCRINIDE.—Aniocystites. Callocystites, Glyptocystites, Lepado-
 FAMILY EOCYSTIDE.—Eocystites. FAMILY GOMPHOCYSTIDE.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDE.—Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDE.—Hybocystites. FAMILY LEPADOCRINIDE.—Apiocystites, Callocystites, Glyptocystites, Lepadocrinus. Pleurocystites. Sphaerocystites. Strobilocystites.
 FAMILY EOCYSTIDE. — Eocystites. FAMILY GOMPHOCYSTIDE. — Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDE. — Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDE. — Hybocystites. FAMILY LEPADOCRINIDE. — Apiocystites, Callocystites, Glyptocystites, Lepadocrinus, Pleurocystites, Sphaerocystites, Strobilocystites. FAMILY PLATYCYSTIDE. — Platycystites.
 FAMILY EOCYSTIDE. — Eocystites. FAMILY GOMPHOCYSTIDE. — Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDE. — Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDE. — Hybocystites. FAMILY LEPADOCRINIDE. — Apiocystites, Callocystites, Glyptocystites, Lepadocrinus, Pleurocystites, Sphaerocystites, Strobilocystites. FAMILY PLATYCYSTIDE. — Platycystites. FAMILY UNCERTAIN. — Heterocystites. Lysocystites. Malocystites. Porocrinus.
 FAMILY EOCYSTIDÆ.—Eocystites. FAMILY GOMPHOCYSTIDÆ.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDÆ.—Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDÆ.—Hybocystites. FAMILY LEPADOCRINIDÆ.—Apiocystites, Callocystites, Glyptocystites, Lepadocrinus, Pleurocystites, Sphaerocystites, Strobilocystites. FAMILY PLATYCYSTIDÆ.—Platycystites. FAMILY UNCERTAIN.—Heterocystites, Lysocystites, Malocystites, Porocrinus.
 FAMILY EOCYSTIDÆ.—Eocystites. FAMILY GOMPHOCYSTIDÆ.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDÆ.—Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDÆ.—Hybocystites. FAMILY LEPADOCRINIDÆ.—Apiocystites, Callocystites, Glyptocystites, Lepadocrinus, Pleurocystites, Sphaerocystites, Strobilocystites. FAMILY PLATYCYSTIDÆ.—Platycystites. FAMILY UNCERTAIN.—Heterocystites, Lysocystites, Malocystites, Porocrinus.
 FAMILY EOCYSTIDE. —Eocystites. FAMILY GOMPHOCYSTIDE. —Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDE. —Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDE. —Hybocystites. FAMILY LEPADOCRINIDE. —Apiocystites, Callocystites, Glyptocystites, Lepadocrinus, Pleurocystites, Sphaerocystites, Strobilocystites. FAMILY PLATYCYSTIDE. —Platycystites. FAMILY UNCERTAIN. —Heterocystites, Lysocystites, Malocystites, Porocrinus. ORDER BLASTOIDEA.
 FAMILY EOCYSTIDÆ.—Eocystites. FAMILY GOMPHOCYSTIDÆ.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDÆ.—Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDÆ.—Hybocystites. FAMILY LEPADOCRINIDÆ.—Apiocystites, Callocystites, Glyptocystites, Lepadocrinus, Pleurocystites, Sphaerocystites, Strobilocystites. FAMILY PLATYCYSTIDÆ.—Platycystites. FAMILY UNCERTAIN.—Heterocystites, Lysocystites, Malocystites, Porocrinus. ORDER BLASTOIDEA. FAMILY BLASTOIDOCRINIDÆ.—Blastoidocrinus. FAMILY CODASTERIDÆ.—Codaster, Heteroschisma.
 FAMILY EOCYSTIDÆ.—Eocystites. FAMILY GOMPHOCYSTIDÆ.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDÆ.—Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDÆ.—Hybocystites. FAMILY LEPADOCRINIDÆ.—Apiocystites, Callocystites, Glyptocystites, Lepadocrinus, Pleurocystites, Sphaerocystites, Strobilocystites. FAMILY PLATYCYSTIDÆ.—Platycystites. FAMILY UNCERTAIN.—Heterocystites, Lysocystites, Malocystites, Porocrinus. ORDER BLASTOIDEA. FAMILY BLASTOIDOCRINIDÆ.—Blastoidocrinus. FAMILY CODASTERIDÆ.—Codaster, Heteroschisma. FAMILY CODONITIDÆ.—Codonites.
 FAMILY EOCYSTIDÆ.—Eocystites. FAMILY GOMPHOCYSTIDÆ.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDÆ.—Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDÆ.—Hybocystites. FAMILY LEPADOCRINIDÆ.—Apiocystites, Callocystites, Glyptocystites, Lepadocrinus, Pleurocystites, Sphaerocystites, Strobilocystites. FAMILY PLATYCYSTIDÆ.—Platycystites. FAMILY UNCERTAIN.—Heterocystites, Lysocystites, Malocystites, Porocrinus. ORDER BLASTOIDEA. FAMILY BLASTOIDOCRINIDÆ.—Blastoidocrinus. FAMILY CODASTERIDÆ.—Codaster, Heteroschisma. FAMILY CODONITIDÆ.—Codonites. FAMILY ELEUTHEROCRINIDÆ.—Eleutherocrinus.
 FAMILY EOCYSTIDÆ.—Eocystites. FAMILY GOMPHOCYSTIDÆ.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDÆ.—Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDÆ.—Hybocystites. FAMILY LEPADOCRINIDÆ.—Apiocystites, Callocystites, Glyptocystites, Lepadocrinus, Pleurocystites, Sphaerocystites, Strobilocystites. FAMILY PLATYCYSTIDÆ.—Platycystites. FAMILY PLATYCYSTIDÆ.—Platycystites. FAMILY UNCERTAIN.—Heterocystites, Lysocystites, Malocystites, Porocrinus. ORDER BLASTOIDEA. FAMILY BLASTOIDOCRINIDÆ.—Blastoidocrinus. FAMILY CODASTERIDÆ.—Codaster, Heteroschisma. FAMILY CODONITIDÆ.—Codonites. FAMILY ELEUTHEROCRINIDÆ.—Eleutherocrinus, Schizoblastus.
 FAMILY EOCYSTIDÆ.—Eocystites. FAMILY GOMPHOCYSTIDÆ.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDÆ.—Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDÆ.—Hybocystites. FAMILY LEPADOCRINIDÆ.—Apiocystites, Callocystites, Glyptocystites, Lepadocrinus, Pleurocystites, Sphaerocystites, Strobilocystites. FAMILY PLATYCYSTIDÆ.—Platycystites. FAMILY PLATYCYSTIDÆ.—Platycystites. FAMILY UNCERTAIN.—Heterocystites, Lysocystites, Malocystites, Porocrinus. ORDER BLASTOIDEA. FAMILY BLASTOIDOCRINIDÆ.—Blastoidocrinus. FAMILY CODASTERIDÆ.—Codaster, Heteroschisma. FAMILY CODONITIDÆ.—Codonites. FAMILY ELEUTHEROCRINIDÆ.—Eleutherocrinus. FAMILY GRANATOCRINIDÆ.—Granatocrinus, Schizoblastus. FAMILY NUCLEOCRINIDÆ.—Nucleocrinus.
 FAMILY EOCYSTIDÆ.—Eocystites. FAMILY GOMPHOCYSTIDÆ.—Gomphocystites, Hemicosmites. FAMILY HOLOCYSTIDÆ.—Allocystites, Crinocystites, Holocystites. FAMILY HYBOCYSTIDÆ.—Hybocystites. FAMILY LEPADOCRINIDÆ.—Apiocystites, Callocystites, Glyptocystites, Lepadocrinus, Pleurocystites, Sphaerocystites, Strobilocystites. FAMILY PLATYCYSTIDÆ.—Platycystites. FAMILY PLATYCYSTIDÆ.—Platycystites, Lysocystites, Malocystites, Porocrinus. ORDER BLASTOIDEA. FAMILY BLASTOIDOCRINIDÆ.—Blastoidocrinus. FAMILY CODASTERIDÆ.—Codaster, Heteroschisma. FAMILY CODONITIDÆ.—Codonites. FAMILY ELEUTHEROCRINIDÆ.—Eleutherocrinus. FAMILY GRANATOCRINIDÆ.—Granatocrinus, Schizoblastus. FAMILY NUCLEOCRINIDÆ.—Nucleocrinus. FAMILY PENTREMITIDÆ.—Pentremites, Pentremitidea.

FAMILY TROOSTOCRINIDÆ. - Troostocrinus, Tricelocrinus.

¢

ACR.-ACT.

ORDER AGELACRINOIDEA.

FAMILY AGELACRINIDÆ.—Agelacrinus, Echinodiscus, Edrioaster, Lepidodiscus. FAMILY HEMICYSTIDÆ.—Hemicystites.

ORDER MYELODACTYLOIDEA.

FAMILY MYELODACTYLIDÆ.—Myelodactylus.

ORDER CYCLOCYSTOIDEA.

FAMILY CYCLOCYSTOIDIDÆ.—Cyclocystoides.

ORDER LICHENOCRINOIDEA.

FAMILY LICHENOCRINIDÆ.—Lichenocrinus.

CLASS STELLERIDA.

ORDER ASTEROIDEA.

FAMILY ONYCHASTERIDE.—Onychaster. FAMILY PALEASTERIDE.—Cholaster, Compsaster, Palæaster, Palæasterina, Petraster, Schoenaster, Stenaster, Tremataster.

ORDER OPHIUROIDEA.

FAMILY PROTASTERIDE.—Eugaster, Palæocoma, Protaster, Tæniaster.

CLASS ECHINIDA.

Order Perischoechinida.

FAMILY ARCHÆOCIDARIDÆ.—Archæocidaris, Eocidaris, Lepidocidaris, Perischodomus, Pholidocidaris.

FAMILY LEPIDECHINIDÆ.—Hybochinus, Lepidechinus.

FAMILY PALÆCHINIDÆ, -- Lepidesthes, Melonites, Oligoporus, Palæchinus.

- ACROCRINUS, Yandell, 1855, Am. Jour. Sci. and Arts, 2d ser., vol. 20, p. 135. [Ety. akros, extreme, from the great number of plates covering the body; krinon, lily.] Body goblet or un-shaped, consisting of many series of plates; two basals, the suture from the anterior to the posterior side, followed by a series of small plates, and these again by another and another, so that the plates reach the 5th to 10th series before the arms become free; the size of the plates increase as they approach the arms; arms 20, long, composed of two series of plates bearing pinnules; column round. Type A. shumardi.
 - round. Type A. sbumardi. shumardi, Yandell, 1855, Am. Jour. Sci. and Arts, 2d ser., vol. 20, p. 135, Kaskaskia Gr.
 - urniformis, Hall, 1858, Geo. Rep. Iowa, p. 690, Kaskaskia Gr.

wortheni, Wachsmuth, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 4, and Geo. Sur. Ill., vol. 7, p. 343, Coal Meas.

ACTINOCRIVES, Miller, 1821, Nat. Hist. Crinoidea, p. 95. [Ety. aktin, ray; krinon, lily.] Body turbinate, plates sculptured; basals 3; primary radials 3x5; secondary 1x10, axillary; succeeding radials having a single series to each division, one axillary, the other simple; arms 20 to 50 or more; pinnules; regular interradials, one in the first series, two in the second, and one or two in the third; azygous interradials, one in line with the first primary radials, and ot the same size, two in the second series, and one, two, or three in succeeding series; vault variable, plates nodose; tube or proboscis large, subcentral; column long. Type A. triacontadactylus. abnormis, see Meg xgilops, see Teleio %qualis, see Batocu xquibrachiatus, see iatus.

ACT.]

iatus. *aquibrachiatus var.* crinus æquibrac

agassizi, Troost, 18 althea, see Teleioc amplus, see Saccoc andrewsianus, see B araneolus. see Steg arnoldi, Wachsm press.) Geo. Su

Kinderhook Gr. asterias, McChes ney, 1860, Desc New. Pal. Foss Syn. for Batc crinus verrucc sus.

asteriscus, see Bato crinus asteriscus biturbinatus, se

Batocrinus bi turbinatus. brevicornis, see Me

gistocrinus brevi cornis. brevis, see Agarico

crinus brevis. brontes, Hall, 1860 Sup. to Geo. Sur Iowa, p. 47, and Geo. Sur. Ill. vol. 5, p. 341 Warsaw Gr.

Warsaw Gr. cælatus, Hall, 1858 Geo. Sur. Iowa p. 585, and Geo

Sur. Ill., vol. 5 p. 341, Burling ton Gr. calyculoides, see

Eretmocrinus calyculoides.

calyculus, see Batocrinus calyculus. calypso, see Gennæocrinus calypso.

cassedayi, see Genn carica, see Eretmoo caroli, see Batocrin cauliculus, see Genn chloris, Hall, 1861,

syn. for A. tenuis christyi, Shumard, christyi.

christyi, Hall, see S clarus, Hall, 1861, p. 2, and Geo. Su

Burlington Gr. clavigerus, see Batoc clio, see Eretmocrin clivosus, see Teleiocu cladia, see Eretmocu clupfatus, see Batocu concavus, see Doryc
ACT.]

Palæasterina,

eniaster.

locidaris, Peris-

Palæchinus.

1882, Bull. No. 1, p. 4, and Geo. Coal Meas. 821, Nat. Hist. Ety. aktin, ray; turbinate, plates primary radials 10, axillary; sucg a single series xillary, the other 50 or more; pindials, one in the second, and one ; azygous interwith the first of the same size, es, and one, two, ng series; vault se; tube or proal; column long. ylus.

abnormis, see Megistocrinus abnormis. *agilops*, see Teleiocrinus ægilops. *agualis*, see Batocrinus ægualis.

aquibrachiatus, see Batocrinus æquibrachiatus.

- *aquibrachiatus var. alatus*, syn. for Batocrinus æquibrachiatus.
- agassizi, Troost, 1850, Catal. Not defined. althea, see Teleiocrinus althea. amplus, see Saccocrinus amplus. andrewsianus, see Batocrinus andrewsanus. araneolus. see Steganocrinus araneolus.
- arnoldi, Wachsmuth & Springer, (in press,) Geo. Sur. Ill., vol. 8, p. 168,

Kinderhook Gr. asterias, McChesney, 1860, Desc. New. Pal. Foss. Syn. for Batocrinus verruco-

sus. asteriscus, see Batocrinus asteriscus. biturbinatus, see Batocrinus biturbinatus.

brevicornis, see Megistocrinus brevicornis. brevis, see Agaricocrinus brevis. brontes, Hall, 1860, Sup. to Geo. Sur. Iowa, p. 47, and Geo. Sur. Ill., vol. 5, p. 341, Warsaw Gr. Cælatus, Hall, 1858, Geo. Sur. Iowa, p. 585, and Geo.

- Sur. Ill., vol. 5, p. 341, Burlington Gr. calyculoides, see Eretmocrinus calyculoides.
- calyculus, see Batocrinus calyculus. calypso, see Gen-
- næocrinus ca-« lypso.
- casedayi, see Gennæocrinus cassedayi. carica, see Eretmocrinus carica. caroli, see Batocrinus caroli. cauliculus, see Gennæocrinus cauliculus. chloris, Hall, 1861, Desc. New Crinoidea, syn. for A. tenuisculptus. christyi, Shumard, 1855, see Batocrinus christyi.
- christyi, Hall, see Saccocrinus christyi. clarus, Hall, 1861, Desc. New Crinoidea,
- p. 2, and Geo. Sur. Ill., vol. 5, p. 341, Burlington Gr. clavigerus, see Batocrinus clavigerus.

clio, see Eretmocrinus clio. clivosus, see Teleiocrinus clivosus. clucia, see Eretmocrinus clielia. clyptatus, see Batocrinus clypeatus. concavus, see Dorycrinus concavus. concinnus, see Steganocrinus concinnus. copei, see Physetocrinus copei.

- corbulis, see Eretmocrinus corbulis.
- coreyi, Lyon & Casseday, 1859, Am. Jour. Sci. and Arts, 2d ser., vol. 29, p. 76, Keokuk Gr.
- corniculum, Hall, 1858, Geo. Rep. Iowa, p. 566, Burlington Gr. Wachsmuth says it is a syn. for Agaricocrinus brevis.
- cornigerus, Hall, see Dorycrinus cornigerus.
- cornigerus, Lyon & Casseday, see Gennæocrinus cornigerus.
- cornutus, Troost, 1850, Catal. Not defined.

FIG. 231.-Acrocrinus wortheni; diagram.

- coronatus, see Eretmocrinus coronatus. dalyanus, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 309, Burlington Gr.
- daphne, Hall, 1864, 17th Rep. N. Y. St. Mus. Nat. Hist., p. 52, and Ohio Pal., vol. 2, p. 162, Waverly Gr.
- decornis, see Dorycrinus decornis.
- delicatus, Meek & Worthen ; the young of Teleiocrinus umbrosus.
- desideratus, Hall, syn. for Dorycrinus missouriensis.
- discoideus, see Batocrinus discoideus. divaricatus, Hall, syn for Dorycrinus cor-
- nigerus. divergens, see Amphoracrinus divergens.
- dodecadactylus, see Batocrinus dodecadactylus.

matuta var. attenu attenuatus.

ACT.]

meeki, see Macros minor, Hall, 185 573, Burlington mississippiensis, se

piensis. mississippiensis var

mississippiensis missouriensis, see I moniliformis, Mille American.

mortoni, Troost, 1 multibrachiatus, Iowa, p. 580, Bu

multibrachiatus v Desc. New Crin multicornis, see C mundulus, see Bat multiradiatus, Sh

Louis Acad. Sc Iowa, p. 579, Bi nashvillæ, see Bat nashvillæ var. sul nashvillæ var.

novobrachiatus, (in press,) Geo.

Kinderhook Gr nyssa, see Gennæd oblatus, see Batoci obpyramidalis, se amidalis.

olla, McCoy, 1849. olliculus, syn. for



Actinocrinus orna tissimus

papillatus, see Bat parvus, see Doryc pendens, see Dory penicillus, Meek

Acad. Nat. Sci. Sur. Ill., vol. 5, pentagonus, see Ste

pentaspinus, see Ce pernodosus, Hall, p. 608, Keokuk perumbrosus, see St

pistilliformis, see B pistillus, see Batoc planobasalis, see basalis.

planodiscus, see Ba plumosus, Hall, 18

N. Y., p. 72, an 180, Clinton Gr. and the fragme mination.

pocillum, see Genn

Foss., p. 19, and Trans. Chi. Acad. Sci., p. 14, Burlington Gr. formosus, see Batocri-FIG. 282-Adtinocrinus nus formosus. arnoldi. gemmiformis, see Eretmocrinus gemmiformis. gibbosus, Troost, 1850. Not defined. glans, Hall, 1860, Sup. to Geo. Sur. Iowa, p. 16, Burlington Gr. glyptus, see Strotocrinus glyptus.

noidea, p. 3, and Geo. Sur. Ill., vol. 5, p. 341, Burling-

fibula, Troost, 1850,

fiscellus, see Agarico-

fosteri, McChesney, 1860, Desc. New Pal.

crinus fiscellus.

Catal. Not defined.

ton Gr.

gouldi, see Dorycrinus gouldi. hageri, see Batocrinus hageri. helice, see Agaricocrinus helice. helice var. eris, see Agaricocrinus eris. humboldti, Troost. Not defined. hurdanus, McChesney, 1860. New Pal.

inornatus, see Batocrinus inornatus. insculptus, see Teleiocrinus insculptus. irregularis, see Batocrinus irregularis. jugosūs, Hall, 1860, Supp. Geo. Sur. Iowa, p. 49, Keokuk Gr. kentuckiensis, Shumard,

syn. for Gennæocrinus cornigerus. konincki, see Eretmocrinus konincki. lagena, Hall, 1861, Desc. New Crino-idea, p. 13, Burlington Gr.

lagunculus, see Batocrinus lagunculus. laura, see Batocrinus laura. lepidus, see Batocrinus lepidus. leucosia, see Eretmocrinus leucosia.

- limabrachiatus, Hall, 1861, Desc. New Crinoidea, p. 2, and Bost. Jour. Nat. Hist., p. 268, Burlington Gr. liratus, see Teleiocrinus liratus.
- lobatus, Hall, 1860, Supp. Geo. Sur. Iowa, p. 51, Keokuk Gr. locellus, Hall, 1861, Desc. New Crinoidea, p. 15, Burlington Gr.
- longirostris, see Batocrinus longirostris.
- longus, Meek & Worthen, Proc. Acad. Nat. Sci. Phil., p. 156, and Geo. Sur. Ill., vol. 5, p. 345, Burlington Gr.
- lowii, Hall, 1858, Geo. Sur. Iowa, p. 611, Keokuk Gr.
- lucina, Hall, 1861, Desc. New Crinoidea, p. 11, Burlington Gr.
- matuta, see Eretmocrinus matuta.

218

doris, see Batocrinus doris. erodus, see Teleiocrinus erodus. eryx, Hall, 1861, Desc. New Crinoidea, p. 12, Burlington Gr.

eucharis, see Gennæocrinus eucharis. evansi, see Megistocrinus evansi. excerptus, Hall, 1861, Desc. New Cri-

Foss., p. 24, and Trans. Chi. Acad. Sci., p. 17, Burlington Gr.

icosidactylus, see Batocrinus icosidactylus.

infrequens, Hall, 1861, Desc. New Cri-

indianensis, see Batocrinus indianensis.

inflatus, see Amphoracrinus inflatus.

noidea, p. 14, Burlington Gr.

ACT.

ACT.]

Chi. Acad. Sci.,

us icosidactylus. s indianensis. us inflatus. Desc. New Crion Gr.



tus, see Batocriinornatus. tus, see Teleious insculptus. aris, see Batocriirregularis. 1860. Hall, is, p. Geo. Sur. Iowa,). Keokuk Gr. tiensis, Shumard, ius cornigerus. inus konincki. lesc. New Crinoon Gr. inus lagunculus. laura lepidus. inus leucosia. 1861, Desc. New Bost. Jour. Nat. gton Gr. is liratus. Supp. Geo. Sur. Gr. New Crinoidea,

s longirostris. en, Proc. Acad. and Geo. Sur. ington Gr.

ur. Iowa, p. 611,

New Crinoidea,

matuta.

matuta var. attenuatus, see Eretmocrinus attenuatus.

meeki, see Macrostylocrinus meeki. minor, Hall, 1858, Geo. Rep. Iowa, p. 573, Burlington Gr.

mississippiensis, see Dorycrinus misissippiensis.

mississippiensis var. spiniger, see Dorycrinus mississippiensis var. spiniger.

missouriensis, see Dorycrinus missouriensis. moniliformis, Miller, cited by Troost. Not American.

mortoni, Troost, 1850. Not defined. multibrachiatus, Hall, 1858, Geo. Rep. Iowa, p. 580, Burlington Gr.

multibrachiatus var. echinatus, Hall, 1861. Desc. New Crinoidea, p. 10, Warsaw Gr. multicornis, see Centrocrinus multicornis.

mundulus, see Batocrinus mundulus. multiradiatus, Shumard, 1857, Trans. St.

Louis Acad. Sci., p. 75, and Geo. Rep. Iowa, p. 579, Burlington Gr.

nashvillæ, see Batocrinus nashvillæ. nashvillæ var. subtractus, see Batocrinus

nashvillæ var. subtractus. novobrachiatus, Wachsmuth & Springer, (in press,) Geo. Sur. Ill., vol. 8, p. 165, Kinderhook Gr.

nyssa, see Gennæocrinus nyssa.

oblatus, see Batocrinus oblatus. obpyramidalis, see Melocrinus obpyramidalis.

olla, McCoy, 1849. Not American. olliculus, syn. for Megistocrinus whitii.

opusculum, Hall, 1861,

ornatissimus, Wachs-muth & Springer, (in press), Geo. Sur. Ill.,

ornatus, see Physetocrinus

ovatus, Hall, 1861, Desc.

vol. 8, p. 163, Kinder-hook Gr.

Bost. Jour. Nat. Hist., p. 264, Burlington Gr.



FIG 233. - Actinocrinus ornatissimus

New Crinoidea, p. 19, Burlington Gr. papillatus, see Batocrinus papillatus.

ornatus.

parvus, see Dorycrinus parvus. pendens, see Dorycrinus pendens.

penicillus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 155, and Geo. Sur. Ill., vol. 5, p. 342, Burlington Gr.

pentagonus, see Steganocrinus pentagonus. pentaspinus, see Centrocrinus pentaspinus. pernodosus, Hall, 1858, Geo. Rep. Iowa, p. 608, Keokuk Gr.

perumbrosus, see Strotocrinus perumbrosus. pistilliformis, see Batocrinus pistilliformis. pistillus, see Batocrinus pistillus.

planobasalis, see Amphoracrinus planobasalis.

planodiscus, see Batocrinus planodiscus.

plumosus, Hall, 1843, Geo Rep. 4th Dist. N. Y., p. 72, and Pal. N. Y., vol. 2, p. 180, Clinton Gr. Not an Actinocrinus, and the fragments too poor for determination.

pocillum, see Gennæocrinus pocillum.

polydactylus, see Mariacrinus polydactylus. præcursor, see Dorycrinus præcursor. proboscidialis, Hall, 1858,

Geo. Rep. lowa, p. 584,

Burlington Gr.

pyriformis, see Batocrinus pyriformis.

pyriformis, var. rudis, Meek & Worthen, see Bato-

crinus pistilliformis. pyramidatus, see Agarico-

crinus pyramidatus. quadrispinus, see Ampho-

racrinus quadrispinus.

quaternarius, Hall, 1860, FIG.234. Supp. Geo. Rep. Iowa, crinus p. 22, Burlington Gr. cidial -Actinocrinus probos-cidialis.

quaternarius var. spiniferus, Hall, 1861, Desc. New Crinoidea, p. 11, Burlington Gr.

quinquelobus, see Dorycrinus quinquelobus.

ramulosus, see Eretmocrinus ramulosus.

regalis, see Strotocrinus regalis. remibrachiatus, see Eretmocrinus remibra-

chiatus.

reticulatus, see Physetocrinus reticulatus. rotundus, see Batocrinus rotundus. rudis, see Teleiocrinus rudis.

rusticus, Hall, 1861, Desc. New Crinoidea,

p. 2, syn. for A. scitulus.



FIG. 235 - Actinocrinus scitulus. Diagram x 2.

scitulus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 386, and Geo. Sur. Ill., vol. 2, p. 202, Burlington Gr.

sculptus, see Steganocrinus sculptus.

securis, Hall, 1861, Desc. New Crinoidea, p. 14, Burlington Gr.

semiradiatus, see Saccocrinus semiradiatus. senarius, see Physetocrinus senarius.

sexarmatus, Hall, 1860, Supp. Geo. Rep. Iowa, p. 21, Burlington Gr. sillimani, Meek & Worthen, syn. for A.

scitulus.

similis, see Batocrinus similis.

sinuosus, see Batocrinus sinuosus.

speciosus, Meek & Worthen, syn. for Strotocrinus regalis.

spinobrachiatus, see Amphoracrinus spinobrachiatus.



Rep. Iowa, p. 86, Burlington Gr. spinulosus, see Dorycrinus spinulosus.

steropes, see Batocrinus steropes.

subaculeatus, see Dorycrinus subaculeatus, subæqualis, see Batocrinus subæqualis.

- subturbinatus, see Dorycrinus subturbinatus. subumbrosus, Hall, syn. for Teleiocrinus
- liratus.
- subventricosus, see Physetocrinus subventricosus.

superlatus, see Megistocrinus superlatus. symmetricus, see Dorvcrinus symmetricus.

tenuidiscus, Hall, 1861, Desc. New Crinoidea, p. 14, Burlington Gr.

- tenuiradiatus, Hall, 1847, see Palæocystites tenuiradiatus.
- tenuiradiatus, Hall, 1861, see Teleiocrinus tenuiradiatus.
- tenuisculptus, McChesney, 1860, Desc.

New Pal. Foss., p. 15, and Trans. Chi. Acad. Sci., pl. 5, fig. 11, Burlington Gr. thalia, Hall, 1861, Desc. New Crinoidea, p. 13, Burlington Gr.

themis, Hall, 1861, Desc. New Crinoidea, p. 11, Burlington Gr.

- thetis, Hall, 1861, Desc. New Crinoidea, p. 11, Burlington Gr.
- thoas, Hall, syn. for A. reticulatus.
- tholus, syn. for A. glans.

tricornis, see Dorycrinus tricornis.

trinodus, see Dorycrinus trinodus.

turbinatus, see Batocrinus turbinatus.

turbinatus var. elegans, see Batocrinus turbinatus var. elegans.

umbrosus, see Teleiocrinus umbrosus. unicarinatus, Hall, 1860, Supp. to Geo.

Sur. Iowa, p. 48, Keokuk Gr. unicornis, see Dorycrinus unicornis.

unispinus, see Dorycrinus unispinus. urna, Troost, 1850. Not defined.

- urniformis, McChesney, 1860, New Pal. Foss., p. 23, syn. for Eretmocrinus konincki.
- validus, Meek & Worthen, 1860, syn. for Steganocrinus concinnus.
- ventricosus, see Physetocrinus ventricosus. ventricosus var. cancellatus, see Physetocrinus ventricosus var. cancellatus.
- ventricosus var. internodus, see Physetocrinus ventricosus var. internodus.

verneuili, see Melocrinus verneuili.

verneuilianus, see Eretmocrinus verneuilanus.

- verrucosus, Hall, 1858, Geo. Rep. Iowa, p. 578, Burlington Gr.
- viaticus, White, 1874, Rep. Invert. Foss., p. 16, and Geo. Sur. W. 100th Merid., vol. 4, p. 82, Subcarboniferous.

viminalis, see Amphoracrinus viminalis. wachsmuthi, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 17, syn. for A.

- scitulus.
- wachsmuthi, White, 1880, see Batocrinus wachsmuthi.

whitfieldi, see Saccocrinus whitfieldi. whitii, see Megistocrinus whitii. yandelli, see Batocrinus yandelli.

- spinotentaculus, Hall, 1860, Supp. Geo. | AGARICOCRINUS, Troost, 1850, Catal. in Proc. Am. Ass'n, and Hall in Geo. Sur. Iowa, p. 560. [Ety. Agaricus, mushroom; krinon, lily.] The form of the calyx is p. 560. that of an inverted basin or mushroom; plates smooth; dome composed of large
 - nodose plates and smaller convex ones. the central plate being the largest in the body; basals 3, small; primary radials 3x5; secondary radials 1 or 2×10 , which are succeeded by shorter arm-plates; regular interradials 3; azygous plates 4 to 7, or more; aperture, at the upper part, directed laterally; arms long, constructed of two rows of plates bearing pinnule; columns round. Type A. americanus.
 - americanus, Roemer, 1854, (Amphoracrinus americanus,) Bronn's Leth. Geog. vol. 2, p. 250, and Geo. Sur. Iowa, p. 617, Keokuk Gr.

bellitrema, Hall, 1861, Bost. Jour. Nat. Hist., p. 281, Burlington Gr. Wachs-muth says it is a syn. for A. ornotrema.

brevis, Hall, 1858, (Actinocrinus brevis,) Geo. Sur. Iowa, p. 567, Burlington Gr. bullatus, Hall, 1858, Geo. Sur. Iowa, p. 562, Burlington Gr. Wachsmuth says

- it is a syn. for A. americanus.
- convexus, Hall, 1860, (A. pentagonus var. convexus,) Supp. to Geo. Sur. Iowa, p. 58, Burlington Gr.



FIG. 236 .-- Agaricocrinus crassus, azygous view of calyx.

- corrugatus, Hall, 1861, Desc. New Spec. Crin., p. 4, and Bost. Jour. Nat. Hist., p. 283, Burlington Gr. Wachsmuth says it is a syn. for A. pyramidatus founded upon a mature specimen. crassus, Wetherby, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. Keokuk 178, Gr.
- elegans, Wetherby, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 179, Keokuk

Gr.

FIG. 237.—Agaricocrinus el-egans, view of the vault. eris, Hall, 1864, egans, view of the vaut (Actinocrinus helice var eris,) 17th

Rep. N. Y. St. Mus. Nat. Hist., p. 53,



and Ohio P verly Gr.



FIG. 238.—Agaricoc elegans, basal vie

New Spec. C Nat. Hist., p. geometricus, H Sur. Iowa, p. gracilis, Meek Acad. Nat. S

ton Gr. helice, Hall, 18 tinocrinus h 17th Rep. N. Mus. Nat. I 53, and Oh vol. 2, p. 16 verly Gr.

inflatus, Hall, Desc. New Cr p. 4, and Bos Nat. Hist.,

Burlington G macadamsi, W (in press,) G

Ill., vol. 8, Keokuk Gr. nodosus, 'M

Worthen, 186 Phil., p. 167, ap. 387, Burli

says it is a syn nodulosus, Wor Ill., vol. 8, p. ornotrema, Hal

oidea, p. 3, Bu pentagonus, Hal Iowa, p. 57, B

pentagonus var. c planoconvexus, Crinoidea, p.

Hist., p. 280, 1 pyramidatus, H pyramidatus,)

Burlington Gr springeri, Whit and Nat. His

kuk Gr. stellatus, Hall, J 564, Burlington

tuberosus, Troost Geo. Rep. Io americanus.

whitfieldi, Hall, p. 621, Keokuk wortheni, Hall, 619, Keokuk G



AGA.

AGA.

0, Catal. in Proc. Geo. Sur. Iowa, rus, mushroom; of the calyx is n or mushroom : omposed of large ler convex ones. g the largest in small; primary ry radials 1 or eded by shorter erradials 3; azyore; aperture, at 1 laterally; arms o rows of plates ns round. Type

4, (Amphoracrin's Leth. Geog., o. Sur. Iowa, p.

Bost. Jour. Nat. on Gr. Wachsor A. ornotrema. ocrinus brevis,) Burlington Gr.). Sur. Iowa, p. Vachsmuth says icanus.

pentagonus var. 30. Sur. Iowa, p.



is, azygous view of

Desc. New Spec. our. Nat. Hist., p. Vachsmuth says nidatus founded



Agaricocrinus eliew of the vault. var eris,) 17th iat. Hist., p. 53,

AGA.-AGE.]

ECHINODERMATA.

and Ohio Pal., vol. 2, p. 164, Wa- | AGASSIZOCRINUS, Troost, 1850 Mss., Shuverly Gr.

excavatus, Hall,

1861, (Actinocri-

nus excavatus,)

Desc. New Spec.

Crin., p. 3, and Bost. Jour. Nat.

Hist., p. 282, Bur-

lington Gr.

Wachsmuth says

it is a syn. for A.

(Actinocrinus fis-

fiscellus, Hall, 1861,

americanus.

238.—Agaricocrinus elegans, basal view.

cellus,) Desc. New Spec. Crin., p. 2, and Bost. Jour. Nat. Hist., p. 272, Burlington Gr. geometricus, Hall, 1860, Supp. to Geo. Sur. Iowa, p. 56, Burlington Gr. gracilis, Meek & Worthen, 1861, Proc.

*

Acad. Nat. Sci. Phil., p. 135, Burlington Gr.

helice, Hall, 1864, (Actinocrinus helice.) 17th Rep. N. Y. St. Mus. Nat. Hist., p. 53, and Ohio Pal., vol. 2, p. 163, Waverly Gr.

inflatus, Hall, 1861, Desc. New Criniodea, p. 4, and Bost. Jour. Nat. Hist., p. 284, Burlington Gr.

macadamsi, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 94, FIG. 239-Agarico-Keokuk Gr.

crinus helice nodosus, 'Meek & Worthen, 1869, Proc. Acad. Nat. Sci.

- Phil., p. 167, and Geo. Sur. Ill., vol. 5, p. 387, Burlington Gr. Wachsmuth says it is a syn. for A. americanus.
- nodulosus, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 94, Keokuk Gr. ornotrema, Hall, 1861, Desc. New Crin-
- oidea, p. 3, Burlington Gr.

pentagonus, Hall, 1860, Supp. Geo. Rep. Iowa, p. 57, Burlington Gr.

- pentagonus var. convexus, see A. convexus. planoconvexus, Hall, 1861, Desc. New
- Crinoidea, p. 3, and Bost. Jour. Nat. Hist., p. 280, Burlington Gr. pyramidatus, Hall, 1858, (Actinocrinus
- pyramidatus,) Geo. Rep. Iowa, p. 565, Burlington Gr. springeri, White, 1882, 11th Rep. Geo.
- and Nat. Hist. Indiana, p. 363, Keokuk Gr.
- stellatus, Hall, 1858, Geo. Rep. Iowa, p. 564, Burlington Gr.
- tuberosus, Troost, 1850, Catal. Hall, 1858, Geo. Rep. Iowa, p. 617, syn. for A. americanus.
- whitfieldi, Hall, 1858, Geo. Rep. Iowa, p. 621, Keokuk Gr.
- wortheni, Hall, 1858, Geo. Rep. Iowa, p. 619, Keokuk Gr.

mard, 1853, Marcy's Rep. Red Riv., and Hall, 1858, Geo. Rep. Iowa, p. 684. [Ety. proper name; krinon, lily.] Calyx

conical or semielliptical; not ornamental; basals 5, usually anchylosed, very small inner cavity; subradials 5, thick, usually anchylosed; radials 2x5; arms 10; azygous plates 3 or 4; column evidenced by a small cylindrical tube extending from a minute cicatrix at the center of the basals to the interior of the cup. Type A. dactyliformis. carbonarius, Worthen, 1873, Geo. Sur.

Ill., vol. 5, p. 566, Up. Coal Meas. chesterensis, Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 558, Kaskaskia Gr.

conicus, Owen & Shumard, 1851, Jour. Acad. Nat. Sci, Phil., 2d. ser., vol. 2, p. 93, and Geo. Sur. Ill., vol. 5, p. 557, Kaskaskia Gr.

constrictus, Hall, 1858, Geo. Rep. Iowa, p. 687, Kaskaskia Gr.

dacty liformis,

Troost, 1850, described by Shumard, 1853, Marcy's Rep. Red. Riv., p. 199, Kaskaskia Gr.

gibbosus, Hall, 1858, Geo. Rep. Iowa, p, 686, Kaskaskia Gr. globosus, Worthen, 1873, Geo. Sur. Ill., vol. 5,

p. 557, Kaskaskia Gr.

gracilis, Troost, 1850. Not defined.

hemisphericus, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat.

vol. 7, p. 316, FIG. 240. – Agassizocrinus Kaskaskia Gr. dactyliformis.

occidentalis, Owen & Shumard, 1852, (Poteriocrinus occidentalis,) Jour. Acad. Nat. Sci.

Phil., vol. 2, p. 92, Kaskaskia Gr. papillatus, Worthen, 1882, Bull. No. 1,

Ill. St. Mus. Nat. Hist., p. 36, and Geo. Sur. Ill., vol. 7, p. 315, Kaskaskia Gr. pentagonus, Worthen, 1873, Geo. Sur.

Ill., vol. 5, p. 556, Kaskaskia Gr. tumidus, Owen & Shumard, 1852, (Poteri-

ocrinus tumidus,) Jour. Acad. Nat. Sci.

Phil., vol. 2, p. 90, Kaskaskia Gr. AGELACRINUS, Vanuxem, 1842, (Agelacri-nites,) Geo. Rep. 3d Dist. N. Y., p. 158. [Ety. agele, herd; krinon, lily.] A thin, circular, parasitic disk ; upper face more or less convex, and composed of thin imbricating plates; ambuls cra consist-





ECHINODERMATA.

ing of a double series of alternating plates, forming convex ridges, constituting wart of the upper face, and bearing two or more rows of ambulacral pores; ovarian or anal aperture is situated within the azygous interambulacral area, surrounded by cuneiform plates. Type A. hamiltonensis.

billingsi, Chapman, 1860, Can. Jour., vol. 5, p. 358, Trenton Gr.



cincinnatiensis, Roemer, 1851, Verh. Naturh, Rhein. Westph., vol. 8, p. 372, and Ohio Pal. vol. 1, p. 55, Hud. Riv. Gr. dicksoni, Billings, 1857,

Rep. of Progr. Geo, Sur. Can., p. 294, and

Can. Org. Rem., Dec.

FIG. 241.-Agelacrinus cincinnatiensis

ade 3, p.84, Trenton Gr. hamiltonensis, Vanuxeen, 1842, Geo. Rep. 3d Dist. N. Y., p. 158, Ham. Gr. holbrooki, James, 1887, Jour. Cin. Soc. Nat. Hist., vol. 10, p. 25. Hud. Riv. Gr.

kaskaskiensis, see Echinodiscus kaskaskiensis.

- pileus, Hall, 1866, Adv. sheets, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 214, and
- Ohio Pal., vol. 1, p. 56, Hud. Riv. Gr. septembrachiatus, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 27, Hud. Riv. Gr.
- squamosus, Meek & Worthen, 1868, Proc. Acad. Nat. Sci. Phil., p. 357, and Geo. Sur. Ill., vol. 5, p. 573, Keokuk Gr.
- stellatus, see Hemicystites stellatus. vorticellatus, Hall, 1866, Adv. sheets, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 215, and Ohio Pal., vol. 1, p. 57, Hud. Riv. Gr.
- ALLAGECRINUS, Etheridge & Carpenter, 1881, Ann. and Mag. Nat. Hist., p. 281. [Ety. allage, change; krinon, lily.] Calyx minute, pyriform, without ornamentation; basals 5, anchylosed; radials 1 x 5; arms '10; interradials none; column round. Type A. austini. carpenteri, Wachsmuth, 1882, Bull. No. 1,
- Carpenteri, watchsmuth, 1852, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 40, and Geo. Sur. Ill., vol. 7, p. 341, Kaskaskia Gr.
 ALLOCRINUS, Wachsmuth and Springer, (in press,) Geo. Sur. Ill., vol. 8, p. 206. [Ety. allos, another; krinon, lily.] Calyx small; arms stout; basals 3, small; pri-mary, radials 3, 5 first large others mary radials 3x5, first large, others smaller; secondary radials 2 or 3, rounded, quadrangular; arms composed of transverse plates; interradials two or more deeply impressed; column small; canal pentangular. Type A. typus.
 - typus, Wachsmuth & Springer, (in press.) Geo. Sur. Ill., vol. 8, p. 207, Niagara Gr.
- ALLOCYSTITES, n. gen. [Ety. allos, another; kustis, bladder.] Small, irregularly subelliptical, tapering below to a small column; plates polygonal, without definite order of arrangement and of very

unequal size; all the plates poriferous; mouth near the margin of the summit: the plates which form it cover part of the body, and on approaching the orifice curve up so as to form part of the opening. The collector says when found it projected an eighth of an inch, and the plates forming the projection were accidentally broken off. The ambulacral opening is upon the extreme height of the summit, and projects above the body, where it is covered by minute plates forming a pentagonal star. Type A. hammelli.

hammelli, n. sp., Niagara Gr. In addition to the characters above ascribed to the genus, the ranges of plates, if in regular series, would form about six series; the first series are anchylosed so that two plates only can be distinguished; in the second range there are seven plates; above this the plates are extremely variable in form and size, no two of them being alike; only four plates are distinguished as forming the mouth, but there is no reasonable doubt there are five, and that one is narrow, and situated between the mouth and ambulacral orifice, as is usual in this tamily of Cystidians. The projecting mouth-plates and elevated ambulacral opening specially characterize this genus and species. The specific name is in honor of Mr. J. F. Hammell, of Madison, Indiana, who collected it in Jefferson County.



FIG. 242.—Allocystites hammelli. Side and summit view.

- ALLOPROSALLOCRINUS, Casseday & Lyon, 1860, Proc. Am. Acad. Arts and Sci., vol. 5, p. 29.] Ety. alloprosallos, inclining first to one side and then to another; krinon, lily.] Turbinate; basals 3; primary radials 3 x 5; secondary radials 2 x 10; regular interradials 1; azygous plates 3; vault elevated, bearing a central tube or proboscis; arms 11 to 13; distinguished from Agaricocrinus by general form and fewer interradials. Type A. conicus.
 - conicus, Casseday & Lyon, 1860, Proc. Am. Acad. Arts and Sci., vol. 5, p. 29, Warsaw Gr.

euconus, see Batocrinus euconus.

depressus, Casseday & Lyon, 1860, Proc. Am. Acad. Arts and Sci., vol. 5, p. 31, Warsaw Gr.

AMP.-ANO.]

ALL.

AMPHERISTOCRINU Spec. Foss., p and Nat. His ampheristos, Turbinate, h area, large; p als 5; radials trix on the m for the attac regular interr



FIG. 243.—Ampheris side vi

typus, Hall, 187 p. 11, and 11th Indiana, p. 27

AMPHORACRINUS, Geo. Soc. Lon Sur. Ill., vol. cup; krinon,] dome elevate excentric on 3; primary ra dials 1x10; a composed of a regular interr radials, 3 or smaller ones;

gilbertsoni. americanus, see bellatrema, see A divergens, Hall, vergens,) Sup and Geo. Sur.

ington Gr. excavatus, see As inflatus, see Aga jerseyensis, Wo Sur. Ill., vol.



FIG. 244.-Amp planobasalis, H planobasalis,) Burlington Gr a syn. for A. d ALL.

AMP. -ANO.]

ites poriferous; of the summit; t cover part of baching the orirm part of the or says when thth of an inch. the projection 1 off. The amon the extreme and projects t is covered by pentagonal star.

Gr. In addiove ascribed to of plates, if in orm about six are anchylosed can be distinrange there are s the plates are rm and size, no ke; only four as forming the asonable doubt one is narrow, he mouth and s usual in this The projecting ted ambulacral erize this genus ific name is in ell, of Madison, it in Jefferson



Side and sum

day & Lyon, Arts and Sci., prosallos, inclinnen to another ; te; basals 3; condary radials als 1; azygous bearing a cenarms 11 to 13; aricocrinus by er interradials.

)n, 1860, Proc. ., vol. 5, p. 29,

conus. on, 1860, Proc. i., vol. 5, p. 31,

ECHINODERMATA.

AMPHERISTOCRINUS, Hall, 1879, Desc. New Spec. Foss., p. 11, and 11th Rep. Geo. and Nat. Hist. Indiana, p. 278. [Ety. ampheristos, disputed; krinon, lily.] Turbinate, base attenuate; azygous area, large; plates 6; basals 3; subradi-als 5: radials 1 × 5 with a als 5; radials 1 x 5, with a narrow cicatrix on the middle of the top of each for the attachment of the arms; no regular interradials. Type A. typus.



FIG. 243.-Ampheristocrinus typus. Basal and side view of calyx.

- typus, Hall, 1879, Desc. New Spec. Foss., p. 11, and 11th Rep. Geo. and Nat. Hist. Indiana, p. 278, Niagara Gr.
- AMPHORACRINUS, Austin, 1848, Quar. Jour. Geo. Soc. Lond., vol. 4, p. 292, and Geo. Sur. Ill., vol. 5, p. 386. [Ety. amphora, cup; krinon, lily.] Body short, lobed, dome elevated, with tube or proboscis excentric on the surgers side, here by excentric on the azygous side; basals 3; primary radials 3x5; secondary radials 1x10; arms numerous, variable, composed of a double series of plates; regular interradials 3; azygous interradials, 3 or 4 large ones and a few smaller ones; column round. Type A gilbertsoni.

americanus, see Agaricocrinus americanus. bellatrema, see Agaricocrinus bellitrema. divergens, Hall, 1860, (Actinocrinus di-

vergens,) Supp. Geo. Rep. Iowa, p. 36, and Geo. Sur. Ill., vol. 5, p. 388, Burlington Gr.

excavatus, see Agaricocrinus excavatus. inflatus, see Agaricocrinus inflatus. jerseyensis, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 96, Kinderhook Gr.



FIG. 244.-Amphoracrinus viminalis.

planobasalis, Hall, 1858, (Actinocrinus planobasalis,) Geo. Rep. Iowa, p. 19, Burlington Gr. Wachsmuth says it is a syn. for A. divergens.

- quadrispinus, White, 1862, (Actinocrinus quadrispinus,) Proc. Bost. Soc. Nat. Hist., vol. 9, p. 15, Burlington Gr. Wachsmuth says it is a syn. for A. divergens.
- spinobrachiatus, Hall, 1860, (Actinocrinus spinobrachiatus,) Supp. Geo. Rep. Iowa, p. 6, and Geo. Sur. Ill., vol. 5, p. 389, Burlington Gr.
- viminalis, Hall, 1864, (Actinocrinus vimi-nalis,) 17th Rep. N. Y. St. Mus. Nat. Hist., p. 54, and Ohio Pal., vol. 2. p. 165, Waverly Gr.
- AMYGDALOCYSTITES, Billings, 1854, Can. Rem., Decade 3, p. 63. [Ety. amygdalos, almond; kustis, bladder.] Body flattened, ovate, covered with nonporiferous plates arranged without order; ambulacral opening at the apex, mouth near by; arms recumbent, composed of a double series of plates; column round. Type A. florealis.
 - florealis, Billings, 1854, Can. Jour., vol. 2, p. 270, and Can. Org. Rem., Decade 3, p. 63, Trenton Gr.
 - florealis var. lævis, W. R. Billings, 1883. Trans. No. 4, Ottawa Field Nat. Club, p. 52, Trenton Gr.

huntingtoni, Weth-erby, 1881, Jour. Cin. Soc. Nat.

Hist., vol. 4, p. 177, Trenton Gr. radiatus, Billings, 1854, Can. Jour., vol. 2, p. 271, and Can. Org. Rem., Docedo 2, p. 65

Decade 3, p. 65, Trenton Gr. tenuistriatus, Bil-

lings, 1854, Can. Jour., vol. 2, p. 271, and Can. Org. Rem., Decade 3, p. 64, Trenton Gr.



FIG. 245.—Amygdalo-cystites huntingtoni.

- ANCYROCRINUS, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 89. [Ety. ankura, grapnel; krinon, lily.] A bulb with lateral ascending processes and a central column. But little is known of this genus. Type A. bulbosus.
- bulbosus, Hall, 1862, 15th Rep. N. Y. St.
- Mus. Nat., 1862, 1900, Ham. Gr. spinosus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 90, Up. Held. Gr. NOMALOCRINUS, Meek & Worthen, 1868,
- Geo. of Ill., vol. 3, p. 327. [Ety. anomalos, irregular; krinon, lily.] Calyx depressed, irregularly saucer-shaped; basals 5; sometimes a 6th intercalated one; radials 1×3 and 2×2 , the last ones truncated in the central part for the free arms, and curving over on the vault on either side, thus widely separating the arms; arms irregular, frequently bifurcating, composed of a single series of plates, round on the exterior; pinnules strong; vault convex

and supposed to possess a tube or proboscis; column large and longitudinally from 5 to 20 partite. Type A. incurvus.

caponiformis, Lyon, 1869, (Ataxocrinus caponiformis,) Trans. Am. Phil. Soc., vol. 13, p. 464, and Jour. Cin. Soc. Nat. Hist., vol. 2, p. 109, Hud. Riv. Gr.



FIG. 246.-Anomalocrinus incurvus. Diagram.

- incurvus, Meek & Worthen, 1865, (Hetero-crimes incurvus,) Proc. Acad. Nat. Sci. Phil., p. 148, and Geo. Sur. Ill., vol. 3, p. 327, Hud. Riv. Gr.
- A NOMALOCYSTITES, Hall, 1859, Pal. N. Y. vol. 3, p. 132. [Ety. anomalos, irregular; kustis, bladder.] Somewhat semielliptical, sides unequal, vertical outline oval or ovoid; first series of plates 3 on the convex and 2 on the flat or concave side; second series 4 or 5 on the convex side and 2 on the concave side; third series 4 on the convex and 1 on the other; succeeding series have smaller plates and the apex is unknown; column large at the body and very rapidly tapering; no pores or pecti-nated rhombs. Type A. cornutus. Wetherby supposed this to be a Crustacean and gave it the name of Enoploura.



FIG. 247.—Anomalocystites balanoides. Convex and flattened sides.

- balanoides, Meek, 1872, Am. Jour. Sci., 3d ser., vol. 3, p. 423, and Ohio Pal., vol. 1, p. 41, Hud. Riv. Gr.
- cornutus, Hall, 1859, Pal. N. Y., vol. 3, p. 133, Low. Held. Gr.
- disparilis, Hall, 1859, Pal. N. Y., vol. 3,
- huxleyi, Billings, 1858, (Ateleocystites huxleyi, Can. Org. Rem., Decade 3, p. 72, Trenton Gr.

- ANO.-ARC
- Anomaloides, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist, vol. 1, p. 92. A word con-structed of adjectives making it meaningless, contrary to the rules of nomenclature, and the attempt to found a genus was made on a fossil fragment not understood.
 - reticulatus, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 92, Hud. Riv. Gr. A fossil fragment not understood.
- APIOCYSTITES, Forbes, 1848, Mem. Geo. Sur. Great Brit., vol. 2, p. 502. [Ety. apion. pear; kustis, bladder.] Body ovoid, or oblong oval, angular and covered by four series of plates; first series has 4 plates: second series 5; third series 5 or 6; fourth series 5 or more; arms 4, recumbent and filling shallow grooves at the angles of the body, column rapidly tapering; ovarian aperture near the summit, on the anterior side; all the plates bearing calycine pores; a pectinated rhomb upon each side in the 3d and 4th series, and one on the anterior side in the 2d series, but these may be variable. Type A. pentremitoides.
 - canadensis, Billings, 1866, Catal. Sil. Foss. Antic., p. 90, Niagara Gr. elegans, Hall, 1852, Pal. N. Y., vol. 2, p.
 - 243, Niagara Gr.
 - buronensis, Billings, 1866, Catal. Sil. Foss. Antic., p. 91, Niagara Gr. imago, Hall, 1867, 20th Rep. N. Y. St.
 - Mus. Nat. Hist., p. 358, Niagara Gr. tecumseth, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 91, Niagara Gr. Arachnofinus, Meek & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 177. [Ety. arachne, spider; krinon, lily.] Calyx small, resembling Cyathocrinus, but more depressed; basals 5; subradials 5; radials 3x5; arms long, robust, spreading, furrow deep; no pinnules;
- by the supporting a lateral tube;
 azygous plate supporting a lateral tube;
 column round. Type A. bulbosus.
 bulbosus, Hall, 1860, (Cvathocrinus bulbosus,)
 15th Rep. N. Y. St. Mus. Nat.
 Hist., p. 123, Up. Held. Gr.
 avtaneus Washermuth & Supinger 1870.
- extensus, Wachsmuth & Springer, 1879, Revis. Palæocrinoidea, p. 93, Ham. Gr. knappi, Wachsmuth & Springer, 1879,
- Revis. Palæocrinoidea, p. 93, Ham. Gr.

pisiformis, Roemer, 1860,



Lecanocrinus. ARCH MOCIDARIS, McCoy, 1844, Carb. Foss. Ireland,

p. 173. [Ety. archaios, ancient; cidaris, turban.] Spherical; ambulacra narrow, each composed of two ranges of plates, with two pores in each plate; interambulacral plates large, thin, each with a large, perforated, central tubercle, surrounded, at its base, by a smooth ring, and rounded, at the base, for the artic-

FIG. 248

Arachnocrinus

pisiformis.

ARC.-ASP.]

ulation of whole surre for the artic mouth surr cating plate suture; pri ornamented aculeata, Shu Acad. Sci.,



FIG. 249. – Archa daris agassizi, si ing spines.

No. 6, p. 13 edgarensis, W Sur. Ill.,

Meas. gracilis, Newl Ex., p. 117, illinoisensis, W Sur. Ill., vol keokuk, Hall, 699, Keokuk

longispina, Ne Ex., p. 116, megastylus, 8 Louis Acad.

mucronata, Me Acad. Nat. 8 Sur. Ill., vol newberryi, H

Meas.

Louis Acad. kaskia Gr. norwoodi, Hal

701, Kaskask ornata, Newber

p. 116, Up. (shumardana, I p. 699, Wars

spinoclavata, Geo. Sur. Ill. triplex, White Foss. New M

triserrata, Mee 151, Up. Coa trudifera, Whit

p. 17, and Ge 4, p. 104, Ca verneuiliana, S Louis Acad. occupid by aculeata.

wortheni, Hall 700, St. Louis

ANO.-ARC

lour. Cin. Soc. A word conaking it meanules of nomenpt to found a lossil fragment

our. Cin. Soc. Hud. Riv. Gr. derstood. Mem. Geo. Sur. ?. [Ety. apion. Body ovoid, or id covered by st series has 4 third series 5 more; arms 4, hallow grooves y, column rapaperture near erior side; all cine pores; a each side in nd one on the eries, but these A. pentremit-

Catal. Sil. Foss.

I. Y., vol. 2, p.

6, Catal. Sil. Ira Gr. tep. N. Y. St. Niagara Gr. latal. Sil. Foss.

Vorthen, 1866, p. 177. [Ety. lily.] Calyx hocrinus, but 5; subradials long, robust, no pinnules: a lateral tube; bulbosus. hocrinus bulb-St. Mus. Nat. ir.

Springer, 1879. . 93, Ham. Gr. pringer, 1879. . 93, Ham. Gr.



FIG. 248 Arachnocrinus pisiformis.

icient; cidaris, ulacra parrow. nges of plates, late : interamn, each with a tubercle, sura smooth ring, , for the artic-

ARC.-ASP.]

ECHINODERMATA.

ulation of a primary spine, and the whole surrounded by smaller tubercles for the articulation of secondary spines; mouth surrounded by numerous imbricating plates; jaws strong with mesial suture; primary spines large, variously ornamented. Type A. urii. aculeata, Shumard, 1858, Trans. St. Louis

Acad. Sci., vol. 1, p. 223, Permian Gr. agassizi, Hall, 1858, Geo. Rep. Iowa, p.

698, Burlington Gr.

Louis Acad. Sci.,

vol. 1, p. 224, Coal

biangulata, Shumard, 1858, Trans. St.

cratis, White, 1876, Geol. of Uinta

Mountains, p. 109, and Cont. to Pal.,

No. 6, p. 130, Lower

Aubrey Gr. dininni, White, 1880, Proc. U. S. Nat.

FIG. 249. - Archæocidaris agassizi, showing spines.

Mus., vol. 2, p. 260, and Cont. to Pal., No. 6, p. 131, Up. Coal Meas. edgarensis, Worthen & Miller, 1883, Geo. Sur. Ill., vol. 7, p. 337, Up. Coal

Meas.

- Meas.
- gracilis, Newberry, 1861, Ives Col. Ex. Ex., p. 117, Up. Carb. illinoisensis, Worthen & Miller, 1883, Geo.
- Sur. Ill., vol. 7, p. 338, St. Louis Gr. keokuk, Hall, 1858, Geo. Rep. Iowa, p.
- 699, Keokuk Gr.
- longispina, Newberry, 1861, Ives Col. Ex. Ex., p. 116, Up. Carb. megastylus, Shumard, 1858, Trans. St.
- Louis Acad. Sci., vol. 1, p. 225, Up. Coal Meas.
- mucronata, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 395, and Geo.
- Sur. Ill., vol. 2, p. 295, Kaskaskia Gr. newberryi, Hambach, 1884, Trans. St. Louis Acad. Sci., vol. 4, p. 548, Kaskaskia Gr.
- norwoodi, Hall, 1858, Geo. Rep. Iowa, p. 701. Kaskaskia Gr.
- ornata, Newberry, 1861, Ives Col. Ex. Ex., p. 116, Up. Carb.
- shumardana, Hall, 1858, Geo. Rep. Iowa, p. 699, Warsaw Gr.
- spinoclavata, Worthen & Miller, 1883,
- Geo. Sur. Ill., vol. 7, p. 337, Coal Meas. triplex, White, 1882, Rep. Carb. Invert. Foss. New Mex., p. xxii, Coal Meas. triserrata, Meek, 1872, Pal. E. Neb., p.
- 151, Up. Coal Meas. trudifera, White, 1874, Rep. Invert. Foss.,
- p. 17, and Geo. Sur. W. 100th Mer., vol. 4, p. 104, Carb.
- verneuiliana, Swallow, 1858, Trans. St. Louis Acad. Sci. This name was preoccupid by King. The species is A. aculeata.
- wortheni, Hall, 1858, Geo. Rep. Iowa, p. 700, St. Louis Gr.

2

- ARCH.EOORINUS, Wachsmuth & Springer, 1881, Proc. Acad. Nat. Sci. and Rev. Palæocrinoidea, p. 189. [Ety. archaios, ancient; krinon, lily.] Basals 5; sub-radials 5; primary radials 3 x 5; secondary radials 3 or 4 x 10; median line of radial plates keeled as in Glyptocrinus; interradial areas wide; arms composed of a double series of plates; column round. Type A. lacunosus.
- desideratus, Billings, 1885, Trans. Ottawa Field Nat. Club, p. 248, Trenton Gr.
- lacunosus, Billings, 1857, (Glyptocrinus lacunosus,) Rep. of Prog. Geo. Sur. Can., p. 261, and Org. Rem., Decade 4, p. 61, Trenton Gr.
- marginatus, Billings, 1857, (Glyptocrinus
- marginatus,) Rep. of Prog. (ieo. Sur. Can., p. 260, and Org. Rem., Decade 4, p. 59, Trenton Gr.
- microbasalis, Billings, 1857, (Rhodocrinus microbasalis,) Rep. of Progr. Geo. Sur. Can., p. 264, and Org. Rem., Decade 4, p. 63, Trenton Gr.
- pyriformis, Billings, 1857, (Rhodocrinus pyriformis,) Rep. of Prog. Geo. Sur. Can., p. 262, and Org. Rem., Decade 4, p. 61, Trenton Gr.



FIG. 250.-Archæocrinus sculptus.

- sculptus, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 83 and 117, Trenton Gr.
- ARTHRACANTHA, Williams, 1883, Proc. Am. Phil. Soc., p. 84. [Ety. arthron, joint;
 - akantha, spine.] Calyx bowl-shaped; plates of body and arms covered with spine-bearing tubercles; basals 3; primary radials 3x5, the lower one large, the others small; an azygous interradial as large as the primary radials rests upon the basals, and is followed by numerous small plates; regular interradials small; arms 10, bearing pincolumn round. Type nules: Α.
 - carpenteri, Ann. and Mag. Nat. Hist., p. 162, Ham. Gr. Probably a syn. for A. punctobrachiata.
 - ithacensis, Williams, 1883, Proc. Am. Phil. Soc., p. 83, Ham. Gr.
 - punctobrachiata, Williams, 1883, Proc. Am. Phil. Soc., p. 83, Ham. Gr.
- ASPIDOCRINUS, Hall, 1859. Pal. N. Y., vol. 3, p. 122. [Ety. aspis, shield; krinon, lily.] Calyx broadly circular. depressed, hemispheric or scutelliform; upper margin plain or plicate exteriorly; articulating edges irregular; point for attachment of column small. Type A. scutelliformis.

callosus, Hall, 1859, Pal. N. Y., vol. 3, p. 123, Low. Held. Gr.

- digitatus, Hall, 1859, Pal. N. Y., vol. 3, p. 123, Low. Held. Gr.
- scutelliformis, Hall, 1859, Pal. N. Y., vol. 3, p. 122, Low. Held. Gr.
- Asterias, Lamarck, 1815, Hist. Nat. Anim. sans Vert. Not Palæozoic. anthonyi, see Palæaster jamesi. antiqua, see Palæaster antiqua.
- antiquata, see Palæaster antiquata. matutina, see Palæaster matutina.
- Asterocrinus, Lyon, 1857, Geo. Sur. Ky., vol. 3. This name was preoccupied by Munster. See Pterotocrinus.
 - capitalis, see Pterotocrinus capitalis.
- coronarius, see Pterotocrinus coronarius. Astrios, Troost, 1850, Catalogue. Not defined.

tennesseeæ, Troost, 1850. Not defined.



FIG. 251.-Barycrinus wachsmuthi. Diagram.

- Astrocrinites, Conrad in Catalogue Ann. Geo. Rep., 1840-'41. This name was proposed, but not defined ; moreover it was preoccupied.
- pachyclactylus, see Mariacrinus pachydactylus.
- Astylocrinus, Roemer, 1854, Leth. Geo., p. 229, syn. for Agassizocrinus.
- lævis, syn. for Agassizocrinus dactyliformis.
- Ataxocrinus, Lyon, 1869, syn. for Anomalocrinus.
- caponiformis, see Anomalocrinus caponiformis.
- Ateleocystites, Billings, 1858, Can. Org. Rem., Decade 3, p. 72, syn. for Anomalocystites.

shuxleyi, see Anomalocystites huxleyi.

ATELESTOCRINUS, Wachsmuth & Springer, 1886, Rev. Pal., pt. 3, p. 221. [Ety. atelestos, incomplete; krinon, lily.] Calyx elongate, bell-shaped, sides concave, restricted along the suture between

basals and subradials; basals 5; subradials 5; long, narrow, irregular; 3 hexagonal, 2 heptagonal; **azygous** radial, non-arm bearing, the other four supporting each from 2 to 5 brachials; the eight arms give off branching armlets; azygous plate large, resting upon two subradials; column pentangular. Type A. delicatus.

- delicatus, Wachsmuth & Springer, 1886, Rev. Pal., pt. 3, p. 223, Burlington Gr. robustus, Wachsmuth & Springer, 1886,
- Rev. Pal., pt. 3, p. 223, Burlington or base of Keokuk Gr.
- Balanocrinus, Troost, 1850. This name was preoccupied. See Lampterocrinus. inflatus, see Lampterocrinus inflatus.

BARYCRINUS, Wachsmuth, 1868, Proc. Acad. Nat. Sci., p. 338. [Ety. barus, heavy; krinon, lily.] Distinguished from

Cyathocrinus by being more robust, having thicker plates, and a shallower cup; there are usually two azygous plates, while in Cyathocrinus there is never more than one; there are never more than two brachials, and these are shorter and wider than in Cvathocrinus; the arms are shorter, heavier, and have .narrower grooves; the column is stouter; subpentagonal and longitudinally five partite, with a highly organized central canal. Type B. angulatus.

angulatus, Meek &

Worthen, 1860, (Cyathocrinus angulatus,) Proc. Acad. Nat. Sci. Phil., p. 391, and Geo. Sur. Ill., vol. 2, p. 234/ Keokuk Gr.

- bullatus, Hall, 1858, (Cyathocrinus bu latus,) Geo. Sur. Iowa, p. 624, Keokuk Gr.
- cornutus, Owen & Shumard, 1850, (Cyathocrinus cornutus,) Jour. Acad. Nat. Sci., 2d ser., vol. 2. p. 63, and Geo. Sur.
- Wis., Iowa, and Minn., p. 591, Burlington Gr. crassibrachiatus, Hall, 1860, (Cyathocrinus
- crassibrachiatus,) Sup. to Geo. Sur. Iowa, p. 60, Keokuk Gr.
- geometricus, Meek & Worthen, 1873, Geo.
- Sur. Ill., vol. 5, p. 485, Keokuk Gr. herculeus, Meek & Worthen, 1868, Proc. Acad. Nat. Sci. Phil., p. 341, and Geo. Sur. Ill., vol. 5, p. 485, Keokuk Gr. hoveyi, Hall, 1861, (Cyathocrinus hoveyi,)
- Desc. New Crin., p. 5, and Geo. Sur. Ill., vol. 5, p. 486, Keokuk Gr.

kelloggi, Whi loggi,) Proc Keokuk Gr magister, H magister,) Keokuk Gr magnificus, M Acad. Nat. Sur. Ill., vo mammatus, V vol. 5, p. 48 pentagonus, Ill., vol. 5, protuberans, protuberans Keokuk Gr syn. for B. h rhombiferus, (Poteriocrin Acad. Nat. and Geo. V 595, Burling sculptilis, Ĥ sculptilis,) S Burlington (solidus, Hall, 1 Desc. New (Nat. Hist., Gr. spectabilis, Me Acad. Nat. S vol. 5, p. 530 spurius, Hall, rius,) Geo. okuk Gr. stellatus, Hall, latus,) Geo. okuk Gr. striatus, Wort vol. 6, p. 515, thomae, Hall, 1 Supp. Geo. S

tumidus, Hall, dus,) Geo. Su wachsmuthi, 1

(Cyathocrinu Nat. Sci. Ph.

Ill., vol. 3, p. ocrinus, Ca BATOCRINUS, Zeitschr, d. G. and Geo. Sur batos, prickly l biturbinate o mary radials 2 x 10; tertiar interradials 1 12 or more; t to cut off the radials with th vated; tube tral; arms 18t column round tinocrinus by radial instead number of p areas; by the

radials; and h

of plates in ea

ning. Type B

AST.-BAR

BAT.]

basals 5; subw, irregular; 3 onal; azygous , the other four to 5 brachials; branching arme, resting upon n pentangular.

Springer, 1886, Burlington Gr. Springer, 1886, Burlington or

This name was terocrinus. 18 inflatus. 368, Proc. Acad. r. barus, heavy; guished from hocrinus by bemore robust, ing thicker s, and a shalr cup; there sually two azyplates, while in hocrinus there ver more than there are never e than two ials, and these norter and wider in Cyathocrithe arms are er, heavier, and narrower

res; the column outer; subpenal and longially five partite, a highly ored central ca-Type B. an-

118. Meek & tus, locrinus angu-Sci. Phil., p. vol. 2, p. 234/

thocrinus by , p. 624, K

ard, 1850, (Cy-ur. Acad. Nat. , and Geo. Sur. o. 591, Burling-

, (Cyathocrinus to Geo. Sur. łr. hen, 1873, Geo. Leokuk Gr. en, 1868, Proc. . 341, and Geo. leokuk Gr. crinus hoveyi,) and Geo. Sur. 1k Gr.

ECHINODERMATA.

- kelloggi, White, 1862, (Cyathocrinus kelloggi,) Proc. Bost. Soc. Nat. Hist., p. 8, Keokuk Gr.
- magister, Hall, 1858, (Cyathocrinus magister,) Geo. Sur. Iowa, p. 628, Keokuk Gr.
- magnificus, Meek & Worthen, 1868, Proc. Acad. Nat. Sci. Phil., p. 340, and Geo. Sur. Ill., vol. 5, p. 483, Keokuk Gr.
- mammatus, Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 486, Keokuk Gr.
- pentagonus, Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 487, Keokuk Gr. protuberans, Hall, 1858, (Cyathocrinus
- protuberans,) Geo. Sur. Iowa, p. 626, Keokuk Gr. Wachsmuth says it is a syn. for B. bullatus.
- rhombiferus, Owen & Shumard, 1850, rhombiferus,) (roteriocrinus rhombiferus,) Jour. Acad. Nat. Sci. Phil., 2d ser., vol. 2, and Geo. Wis., Iowa, and Minn., p. 595, Burlington Gr. (Poteriocrinus Jour.
- sculptilis, Hall, 1860, (Cyathocrinus sculptilis,) Supp. Geo. Sur. Iowa, p. 59, Burlington Gr.
- solidus, Hall, 1861, (Cyathocrinus solidus,) Desc. New Crin., p. 5, and Bost. Jour. Nat. Hist., vol. 7, p. 293, Burlington Gr
- spectabilis, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil. and Geo. Sur. Ill.,
- vol. 5, p. 530, St. Louis Gr. spurius, Hall, 1858, (Cyathocrinus spu-rius,) Geo. Sur. Iowa, p. 625, Keokuk Gr.
- stellatus, Hall, 1858, (Cyathocrinus stel-latus,) Geo. Sur. Iowa, p. 623, Keokuk Gr.
- striatus, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 515, Keokuk Gr. thomae, Hall, 1860, (Cyathocrinus thomae,)
- Supp. Geo. Sur. Iowa, p. 61, Warsaw Gr. tumidus, Hall, 1858, (Cyathocrinus tumi-
- dus,) Geo. Sur. Iowa, p. 624, Keokuk Gr. wachsmuthi, Meek & Worthen, 1861, (Cyathocrinus wachsmuthi,) Proc. Acad.
- Nat. Sci. Phil., p. 136, and Geo. Sur. Ill., vol. 3, p. 482, Burlington Gr. ocrinus, Casseday, 1854, Deutsche Zeitschr, d. Geol. Gesellsch, vol. 6, p. 237, and Constantial and a p. 155 [Etti BATOCRINUS, and Geo. Sur. Ill., vol. 2, p. 150. [Ety. batos, prickly bush; krinon, lily.] Calyx biturbinate or globose; basals 3; primary radials 3×5 ; secondary radials 2×10 ; tertiary radials $2 \times 2 \times 10$; regular interradials 1 to 5; azygous plates 6 to 12 or more; tertiary radials meet so as to cut off the connection of the interradials with the dome plates; vaultelevated; tube or proboscis nearly central; arms 18 to 26 or 36 to 40; pinnules; column round, distinguished from Actinocrinus by the quadrangular second radial instead of hexagonal; by the number of plates in the interradial areas; by the number of secondary radials; and by having a double series of plates in each arm from the beginning. Type B. icosidactylus.

ća

- æqualis, Hall, 1858, (Actinocrinus æqualis.) Geo. Rep. Iowa, p. 592, Burlington Gr.
- æquibrachiatus, McChesney, 1860, (Acti-nocrinus æquibrachiatus,) New Pal. Foss., p. 25, and Trans. Chi. Acad. Sci., p. 18, Burlington Gr.
- æquibrachiatus, var. alatus, Hall, 1861, (Actinocrinus æquibrachiatus var. alatus,) Bost Jour. Nat. Hist., vol. 7, p. 263. Wachsmuth says it is a syn. for B. æquibrachiatus.
- andrewsanus, McChesney, 1859, (Actino-crinus andrewsanus,) New Pal. Foss., p. 27, and Trans. Chi. Acad. Sci., p. 20, Burlington Gr.
- asteriscus, Meek & Worthen, 1860, (Actinocrinus asteriscus,) Proc. Acad. Nat. Sci. Phil., p. 385, and Geo. Sur. Ill., vol. 2, p. 207, Burlington Gr.
- biturbinatus, Hall, 1858, (Actinocrinus biturbinatus,) Geo. Sur. Iowa, p. 616, Keokuk Gr.
- calyculus, Hall, 1860, (Actinocrinus, calyculus,) Supp. Geo. Sur. Iowa, p. 55, Warsaw Gr.
- calyculus var. hardinensis, Meek & Worthen, 1866, (Actinocrinus caylculus var. hardinensis,) Proc. Acad. Nat. Sci. Phil., p. 253, Warsaw Gr. caroli, Hall, 1860, (Actinocrinus caroli,)
- Supp. Geo. Rep. Iowa, p. 54, Warsaw Gr.
- Cassedayanus, Meek & Worthen, 1868, Proc. Acad. Nat. Sci. Phil., p. 353, and Geo._Sur. Ill., vol. 5, p. 370, Burlington Gr.
- christyi, Shumard, 1855, (Actinocrinus christyi,) Geo. Sur. Mo., p. 191, Burlington Gr.
- clavigerus, Hall, 1860, (Actinocrinus clavigerus,) Supp. Geo. Sur. Iowa, p. 44, Burlington Gr. Wachsmuth says it is a syn. for B. similis.
- clypeatus, Hall, 1860, (Actinocrinus clypeatus,) Supp. Geo. Sur. Iowa, p. 12, and Geo. Sur. Ill., vol. 2, p. 150, Burlington Gr.
- discoideus, Hall, 1858, (Actinocrinus discoideus,) Geo. Rep. Iowa, p. 594, Burlington Gr.

dodecadactylus, Meek & Worthen, 1861, (Actinocrinus dodecadactylus,) Proc. Acad. Nat. Sci. Phil., p. 13, and Geo. Sur. Ill., vol. 2, p. 205, Burlington Gr.

doris, Hall, 1861, FIG. 252. – Batocrinus (Actinocrinus dodecadactylus. Diadoris,) Desc. New gram.

Crinoidea, p. 15, Burlington Gr. Wachsmuth says it is a syn. for B. æqualis.

euconus, Meek & Worthen, 1860, (Alloprosallocrinus euconus,) Proc. Acad. Nat. Sci. Phil., p. 164, Warsaw Gr.

- formosus, Hall, 1860, (Actinocrinus formosus,) Supp. to Geo. Sur. Iowa, p. 30, Burlington Gr. Wachsmuth says it is a syn. for B. discoideus.
- hageri, McChesney, 1860, (Actinocrinus hageri,) New Pal. Foss., p. 28, and Trans. Chi. Acad. Sci., p. 21, Burlington Gr.
- icosidactylus, Casseday, 1854, (Actino-crinus icosidactylus,) Zeitsch. Deutsch. Geol. Gesellsch, vol. 6, p. 238, Warsaw Gr.
- indianensis, Casseday & Lyon, 1859, Am. Jour. Sci. and Arts, 2d ser., vol. 29, p. 75, Keokuk Gr.
- inornatus, Hall, 1860, (Actinocrinus inornatus,) Supp. to Geo. Sur. Iowa, p. 34, Burlington Gr. Wachsmuth says it is a syn. for B. clypeatus.
- irregularis, Casseday, 1854, Zeitsch. Deutsch. Geol. Gesell., vol. 6. p. 238, Warsaw Gr.
- lagunculus, Hall, 1860, (Actinocrinus lagunculus,) Supp. to Geo. Sur. Iowa, p. 41, Warsaw Gr.
- laura, Hall, 1861, (Actinocrinus laura,) Desc. New Crinoidea, p. 15, Burlington Gr.
- lepidus, Hall, 1860, (Actinocrinus lepidus,) Supp. to Geo. Sur. Iowa, p. 32, Bur-
- lington Grangirostris, Hall, 1858, (Actinocrinus longirostris,) Geo. Sur. Iowa, p. 589, longirostris, Burlington Gr.
- lovii, Wachsmuth & Springer, 1881, Proc. Acad. Nat. Sci., p. 342, Burlington Gr.



macbridii, Wachsmuth & Springer, (in press,) Geo. Sur. Ill., vol. 8, p. 172, Kinderhook Gr. montgomeryensis

Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 35, and Geo. Sur. 111.,

vol. 8, p. 83, Keokuk

Gr. mundulus, Hall, 1860, (Actinocri-

FIG. 253.-Batocrinus macbridii.

nus mundulus,) Supp. to Geo. Sur. Iowa, p. 39, Warsaw Gr.

- nashvillae, Troost, Hall, 1858, (Actinocrinus nashvillæ,) Geo. Sur. Iowa, p. 609, Keokuk Gr.
- nashvillae var. subtractus, White, 1863, (Actinocrinus nashvillæ var. subtractus,) Proc. Bost. Soc. Nat. Hist., vol. 9, p. 16, Keokuk Gr.

neglectus, see Eretmocrinus neglectus.

oblatus, Hall, 1860, (Actinocrinus oblatus,) Supp. to Geo. Sur. Iowa, p. 38, Burlington Gr. Wachsmuth says it is a syn. for B. rotundus.

- papillatus, Hall, 1860, (Actinocrinus papillatus,) Supp. to Geo. Sur. Iowa, p. 29, Burlington Gr. Wachsmuth says
- 29, Burlington Gr. Watershutter 20, it is a syn. for B. clypeatus. pistilliformis, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 153, and Geo. Sur. Ill., vol. 2, p. 151 Waverly or Kinderhook Gr.
- pistillum, Meek & Worthen, 1865, (Actisocial procession of the second secon
- planodiscus, Hall, 1860, (Actinocrinus planodiscus,) Supp. to Geo. Sur. Iowa, p. 45, Warsaw Gr.
- pyriformis, Shumard, 1855, (Actinocrinus pyriformis,) Geo. Sur. Mo., p. 192, Bur-lington Gr.
- Acad. Nat. Sci. Phil., p. 352, and Geo. Sur. Ill., vol. 5. p. 369, Burlington Gr.
- rotundus, Yandell & Shumard, 1855, (Actinocrinus rotundus,) Geo. Sur. Mo., p. 191, Burlington Gr. similis, Hall, 1860, (Actino-crinus similis,) Supp. to



BAT

Keokuk Gr. crinus rotunsinuosus, Hall, 1860, (Actidus. nocrinus sinuosus,) Supp.

to Geo. Sur. Iowa, p. 26 Burlington Gr.

- steropes, Hall, 1860, (Actinocrinus steropes,) Supp. to Geo. Sur. Iowa, p. 43, Keokuk Gr.
- subæqualis, McChesney, 1860, (Actino-crinus subæqualis,) New Pal. Foss., p. 17, and Trans. Chi. Acad. Sci., p. 13, Burlington Gr. Wachsmuth says it is a syn. for B. discoideus.
- subconicus, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p, 26, and Geo. Sur. Ill., vol. 8, p. 84, Keokuk Gr. trochiscus, Meek & Worthen, 1868, Proc.
- Acad. Nat. Sci. Phil., p. 354, and Geo. Sur. Ill., vol. 5, p. 372, Burlington Gr.
- turbinatus Hall, 1858, (Actinocrinus tur-binatus,) Geo. Rep. Iowa, p. 587, Burlington Gr.
- turbinatus var. elegans, (Actinocrinus turbinatus var elegans,) Geo. Rep. Iowa, p. 588, Burlington Gr.
- unionensis, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 84, St. Louis Gr.
- wachsmuthi, White, 1880, (Actinocrinus wachsmuthi,) 12th Rep. U. S. Geo. Sur. Terr., p. 162, and 2d Rep. Ind. Geo. Sur., p. 510 Keokuk Gr.
- whitii, Wachsmuth & Springer, 1881, Proc. Acad. Nat. Sci., Phil., p. 343, Keokuk Gr.
- yandelli, Shumard, 1857, (Actinocrinus yandelli,) Trans. St. Louis Acad. Sci., vol. 1, p. 76, and Geo. Sur. Ill., vol. 5, p. 341, Keokuk Gr.



BELEMNOCRINUS.



whitii, Meek & W Nat. Sci. Phil Ill., vol. 3, p. 4



BLASTOIDOCRINUS, BI Org. Rem., Deca blastos, a bud; ei lily.] The gene Pentremites; b upon the top of their inner edge the column pass

228

ß

BAT.

Actinocrinus pao. Sur. Iowa, p. Vachsmuth says atus.

Worthen, 1865. hil., p. 153, and 151 Waverly or

nen, 1865, (Acti-roc. Acad. Nat. Geo. Sur. Ill., on Gr. (Actinocrinus Geo. Sur. Iowa,

5, (Actinocrinus Mo., p. 192, Bur-

hen, 1869, Proc. ., p. 352, and p. 369, Burling-



0, FIG. 254.-Bato crinus rotunti٠ dus. p

26 Burlingp.

tinocrinus ster-Jur. Iowa, p. 43,

1860, (Actino-lew Pal. Foss., Acad. Sci., p. 13, muth says it is

84, Bull. No. 2, p, 26, and Geo. Keokuk Gr. hen, 1868, Proc. . 354, and Geo. 372, Burlington

ctinocrinus turwa, p. 587, Bur-

(Actinocrinus is,) Geo. Rep. ı Gr. in press,) Geo. t. Louis Gr.), (Actinocrinus . U. S. Geo. Sur.

p. Ind. Geo. Sur.,

Springer, 1881, Phil., p. 343,

(Actinocrinus ouis Acad. Sci., Bur. Ill., vol. 5,



BEL. -CAC.]

ECHINODERMATA.

BELEMNOCRINUS, White, 1862, Proc. Bost. Soc.

Nat.Hist., vol. 9, p. 14. [Ety. belemnon, dart, javelin; krinon, lily.] Basals 5, large, long, narrow and of irregular shape; radials 5; arms 10, with one or two syzygies in each joint; pinnules long, armlike, and bifurcating; azygous plate rests between radials, and upon one of the basals, and supports a large ventral sac composed of numerous hexagonal plates; column pentagonal, with or without lateral cirrhi.

Type B. typus. florifer, Wachsmuth & Springer, 1877, Am. Jour. Sci. and Arts, 3d ser., vol. 13, p. 256, Burlington Gr. pourtalesi, Wachsmuth & Springer, 1877, Am. Jour. Sci. and Arts,

3d ser., vol. 13, p. 258, Burlington Gr. typus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 14, Burlington Gr.

255.—Belem-FIG. nocrinus typus.

Burlington Gr. whitii, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 251, and Geo. Sur. Ill., vol. 3, p. 463, Burlington Gr.



Fig. 256.-Belemnocrinus whitii. Diagram x 2.

BLASTOIDOCRINUS, Billings, 1859, Can. Org. Rem., Decade 4, p. 18. [Ety. blastos, a bud; eidos, form; krinon, lily.] The general form is like a Pentremites; basals do not rest upon the top of the column, but have their inner edges turned upward, and the column passes on into the visceral

cavity; the deltoids occupy the whole space between the pseudambulacra; the orific s unknown; column round. Type B. carcharidens.

carcharidens, Billings, 1859, Geo. Sur. of Can., Decade 4, p. 18, Chazy Gr.

BRACHIOCRINUS, Hall, 1859, Pal. N. Y., vol. 3, p. 118. [Ety. brachium, an arm ; krinon, lily.

having thickened, node-like joints, and bearing pinules. Type B. nodosarius, nodosarius, Hall, 1859, Pal. N. Y., vol. 3, p. 118, Low. Held. Gr. BURSACRINUS, Meek & Worthen, 1861, Proc.

Acad. Nat. Sci. Phil., p. 136. [Ety. bursa, purse; krinon, lily.] Calyx some-what like Graphiocrinus, but arms widely different; basals 5; subradials 5; radials 2×5 ; regular interradials 0; azygous interradial 1; arms wide, flat, jointing below, in compact series, and bifurcating above. Type B. wachsmuthi.

confirmatus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 11, Burlington Gr. wachsmuthi, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 137, and Geo. Sur. Ill., vol. 3, p. 479, Burlington Gr.



FIG. 258.-Bursacrinus wachsmuthi. Diagram.

16

Cacabocrinus, Troost, 1850. Never de-scribed. The fossils referred to it belong to Dolatocrinus.



Founded up on FIG. 257.—Blastoldocri-arms rounded at the base, com-posed of single ar-ticulating plate s. amoulacra.

- Calathocrinus, Hall, 1861. The name was preoccupied by Von Meyer in 1848. See Tel. iocrinus.
- CALCEOCRINUS, Hall, 1852, Pal. N. Y., vol. 2, p. 352, and 13th Rep. N. Y. St. Mus. Nat. Hist., p. 122., Ety. calceus, shoe; krinon, lily.] Base, a single subtrian-relevant plate recomposed of gular or semioval plate, composed of four anchylosed pieces, with cicatrix, for columnar attachment at lower angle; body, above the base, consisting of 5 or 7 plates, of which two are much the larger; a central, elongated plate separates the two large lateral radial plates, and bears an arm; lateral radial plates, each, support brachials that bear bifurcating arms; azygous side arched and composed of 4 or more plates, after which a free arm arises. Type C. chrysalis.
 - articulosus, Billings, 1859, (Heterocrinus articulosus,) Can. Org. Rem., Decade
 - 4, p. 51, Trenton Gr. barrandii, Walcott, 1883, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 212, Trenton Gr. barrisi, see Deltacrinus barrisi.

bradleyi, see Deltacrinus bradleyi.

chrysalis, Hall, 1860, (Cheirocrinus chrys-alis,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 123, Niagara Gr.

clarus, see Deltacrinus clarus.

dactylus, see Deltacrinus dactylus. furcillatus, Billings, 1887, Trans. Ottawa

- Field Nat. Club, vol. 3, p. 51, Trenton Gr. inæqualis, Billings, 1859, (Heterocrinus inæqualis,) Can. Org. Rem., Decade 4,
 - p. 51, Trenton Gr.
- lamellosus, Hall, 1860, (Cheirocrinus la-mellosus,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 123, Burlington Gr. Not well defined.

nodusus, see Deltacrinus nodosus.

- perplexus, Shumard, 1866, (Cheirocrinus perplexus.) Trans. St. Louis Acad. Sci., vol. 2, p. 358, Keokuk Gr.
- punctatus, Ulrich, 1886, (Cremacrinus punctatus,) 14th Rep. Geo. Sur. Minn., p. 107, Trenton Gr.
- radicula, Ringueberg, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 120, Niagara Gr. robustus, Worthen,

(in press,) Geo. Sur. Ill., vol. 8, p. 92, Keokuk Gr.

rugotus, Billings, 1887, Trans. Ot-tawa Field Nat.

Club, vol. 3, p. 53, Trenton Gr. stigmatus, see Delta-

crinus stigmatus.

1860, (Cheirocri-

mus tunicatus,)

Hall,

tunicatus,



FIG. 259.-Calceccrinus rugusus.

13th Rep. N. Y. St. Mus. Nat. Hist., p. 124, Keokuk Gr. ventricosus, Hall, 1860, (Cheirocrinus ventricosus,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 123, Burlington Gr.

wachsmuthi, see Deltacrinus wachsmuthi. CALLOCYSTITES, Hall, 1852, Pal. N. Y., vol.

2, p. 238. [Ety. kallos, beautitul; kustis, bladder.] Ovoid; 1st series of plates 4; 2d series 8; 3d series about the same number; small plates at the apex; arms recumbent, resting in a small shallow groove; pectinated rhombs in three pairs; oral, ovarian and anal apertures. Type C. iewetti.

- jewetti. jewetti, Hall, 1852, Pal. N. Y. locystites vol. 2, p. 239, Niagara Gr. jewetti. tripectinatus, Ringueberg, 1886, Bull. Buf.
- Soc. Nat. Sci., vol. 5, p. 12, Niagara (ir. CAMAROCRINUS, Hall, 1879, 28th Rep. N. Y.
 - St. Mus. Nat. Hist., p. 205. [Etv. kamara,' arching chambers; krinon, lily.] Body large, unsymmetrical, externally lobed, chambered within and bearing no arms; wall of the dome composed of two layers, the infolding of the inner one forming the partitions dividing the chambers; subcircular area in the basal portion composed of spreading, radiciform, bifurcating rays, composed of plates resembling those of a crinoid column, and connected by irregular polygonal plates; ambulacral openings between bifurcations near the outer rim of the area; column cylindrical, internal canal fiverayed. Type C. stellatus.
 - clarki, Hell, 1879, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 209, Low. Held. Gr. saffordi, Hall, 1879, 28th Rep. N. Y. St.
 - Mus. Nat. Hist., p. 208, Low. Held. Gr. stellatus, Hall, 1879, 28th Rep. N. Y. St.
- Mus. Nat. Hist., p. 207, Low. Held. Gr.
- Campanulites, Troost, 1850. Not defined. tessellatus, Troost, 1850. Not defined. Canistrocrinus, Wachsmuth & Springer,
- 1885, Palæocrinidæ, vol. 1, pt. 3, p. 94. Founded upon Glyptocrinus i ichardsoni and G. patiersoni, two widely different species. The generic characters are not Satisfactorily pointed out. CARABOCRINUS, Billings, 1857, Rep. of Progr.
- Geo. Sur. Can., p. 275, and Can. Org. Rem., D cade 4, p. 30. [Etv. karabos,



FIG. 261 .- Carabocrinus radiatus. Diagram

a crab; krinon, lily.] Calyx globular or ovoid; basals 5; subradials 5; primary radials 5; arms five, and frequently



dividing; reg interradials

basal plate;

krinon, lily.] 1st series of series 6, whic or less; vaul plates of mod gous side, nea vault, 6 trian conical elevat or anal orifice ous, and also i from the cente pectinated rh Type C. ornatu globosus, Troost, 1 granulatus, Troost hexagonus, Troost insculptus, Troost loricatus, Say, 182

vol. 4. syn. for meconoideus, Troos



FIG. 262.-Caryocrinu ornatus.

ocystites cylindr CATILLICRINUS, Troos scribed by Shui Louis Acad. Sci. catillus, a small Calyx hemisphe bottom; basals 5 secondary radials arms numerous, 1 summit of the ra Type C. tennessee bradleyi, Meek & Acad. Nat. Sci. P

Sur. Ill., vol. 5, p. tennesseeæ, Troost, described by Shun

230

CAL.-CAR.

CAL.-CAR.



FIG. 260.-Cal-Υ. locystites jewetti. 1886, Bull. Buf.

12. Niagara Gr. 28th Rep. N. Y. p. 205. [Ety. mbers; krinon, ymmetrical, exred within and 1 of the dome ayers, the in-one forming the chambers; e basal portion , radiciform, bied of plates reoid column, and olygonal plates; etween bifurcam of the area; ernal canal five-**US**.

Rep. N. Y. St. Low. Held. Gr. Rep. N. Y. St. Low. Held. Gr. Rep. N. Y. St. Low. Held. Gr. Not defined. Not defined.

1 & Springer, 1, pt. 3, p. 94. inusiichardsoni widely different haracters are not

1t. 7, Rep. of Progr. and Can. Org. [Ety. karabos,



alyx globular or

dials 5; primary and frequently

ECHINODERMATA.

dividing; regular interradials 0; azygous interradials 3, the first one resting on a basal plate; five calycinal, ambulacral grooves on the dome; opening in the Type margin over the azygous plates. C. radiatus.

CAR.-CLE.]

radiatus, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 276, and Can. Org. Rem., Decade 4, p. 31, Trenton Gr.

tuberculatus, Billings, 1859, Can. Org. Rem., Decade 4, p. 33, Hud. Riv. Gr. vancortlandti, Billings, 1859, Can. Org. Rem., Decade 4, p. 32, Trenton Gr.

CARVOCRINUS, Say, 1825, Jour. Acad. Nat. Sci., vol. 4, p. 289. [Ety. karyon, a nut; krinon, lily.] Body ovoid or subglobuse; 1st series of plates 4; 2d s-ries 6; 3d series 6, which bear 9 to 13 arms more or less; vault covered by polygonal plates of moderate size; upon the azygous side, near the outer edge of the vault, 6 triangular plates, forming a conical elevation, represent the mouth or anal orifice; calycine pores numerous, and also in double rows radiating from the center of the body plates; no pectinated rhombs; column round. Type C. ornatus.

globosus, Troost, 1850. Not defined. granulatus, Troost, 1850. Not defined. hexagonus, Troost. Not defined. insculptus, Troost. Not defined. loricatus, Say, 1825, Jour. Acad. Nat. Sci., vol. 4, syn. for C. ornatus. meconoideus, Troost. Not defined

Sci., vol. 4, p. 289, and Pal. N. Y.,

vol. 2, p. 216,

Clinton and Ni-

Buch, as cited

by Hall in 1861,

in Geo. Rep.

Wis. See Holo-

cystites alterna-

agara Gr.

cystites.

tus.

ornatus, Say, 1825, Jour. Acad. Nat. aryocystites, Von alternatus, see Holo-

FIG. 262.-Caryocrinus ornatus.

cylindricus, see Holocystites cylindricus.

CATILLICRINUS, Troost, 1850, Cat. Foss. described by Shumard, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 357. [Ety. catillus, a small bowl; krinon, lily.] Calyx hemispherical concave at the bottom; basals 5; primary radials 1 x 5; secondary radials 1 x 5, very irregular; arms numerous, rising directly from the summit of the radials; column round. Type C. tennesseeæ.

Acad. Nat. Sci. Phil., p. 342, and Geo. Sur. Ill., vol. 5, p. 504, Keokuk Gr.

tennesseeæ, Troost, 1850, Catalogue, but described by Shumard, in 1866, in Trans. St. Louis Acad. Nat. Sci., vol. 2, p. 358, Warsaw Gr.

wachsmuthi, Meek & Worthen, 1866, (Synbathocrinus wachsmuthi,) Proc. Acad. Nat. Sci. Phil., p. 231, and Geo. Sur. Ill., vol. 3, p. 465, Burlington Gr.

Centrocrinus, Wachsmuth & Springer, 1881, Proc. Acad. Nat. Sci. Proposed as a subgenus under Actinocrinus, to in-

clude A. multicornis and A. pentaspinus, but the name was pre-occupied by Austin in 1843.

tennesseensis, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 95, Niagara Gr.

Ceriocrinus, White, 1880, proposed as a subgenus of

occupied. Cheirocrinus, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 122. This name was preoccupied by Eichwald in 1856, and is a syn. for Calceocrinus.

chrysalis, see Calceocrinus chrysalis. clarus, see Deltacrinus clarus. dactylus, see Deltacrinus dactylus. lamellosus, see Calceocrinus lamellosus. nodosus, see Deltacrinus nodosus. perplexus, see Calceocrinus perplexus. stigmatus, see Deltacrinus stigmatus. tunicatus, see Deltacrinus tunicatus. ventricosus, see Calceocrinus ventricosus.

- CHOLASTER, Worthen & Miller, 1883, Geo. Sur. Ill., vol. 7, p. 328. Ety. cholos, defective; aster, star.] Body truncated pentagonal; central area circular, large, deep; rays distant, small, short, truncated; centro-dorsal plate large, surrounded by five plates in the position of radials. Type C. peculiaris. peculiaris, Worthen & Miller,
 - 1883. Geo. Sur. Ill., vol. 7, p. 328, Kaskaskia Gr.
- CLEIOCRINUS, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 276, and Can. Org. Rem., Decade 4, p. 52. [Ety. kleio, I close; krinon, lily.] Calyx conical or pyriform; basals 5; primary radials 3x5; secondary radials 4x10; tertiary radials numerous; azygous interradials forming a single series from the base to the top of the calyx; regular interradials none; arms numerous and com-

pact. Type C. regius. grandis, Billings, 1869, Can. Org. Rem., Decade 4, p. 54, Trenton Gr.

libanus, Safford, 1869, Geo. of Tenn. Not defined.



231



Erisocrinus, but the name was pre-wachsmuthi wachsmuthi

ECHINODERMATA.

magnificus, Billings, 1859, Can. Org. Rem., Decade 4, p. 54, Trenton Gr.
regius, Billings, 1857, Rep. of Prog. Geo. Sur. Can., p. 277, and Can. Org. Rem., Decade 4, p. 53, Trenton Gr.



FIG. 264.-Cleiocrinus regius. Diagram.

CLOSTEROCRINUS, Hall, 1852, Pal. N. Y., vol. 2, p. 79. [Ety. kloster, a spindle; krinon, lily.] Body obconic; basals 3; sub-radials 1x5; number of radials unknown; azygous interradials present; arms composed of a single series of plates; column round. Type C. elongatus.

elongatus, Hall, 1852, Pal. N. Y., vol. 2, p. 179, Clinton Gr.

COCCOCRINUS, Muller, 1855, Verhand, Naturhist. Vereins Rhein und Westph., Jahr. 12, p. 20. [Ety. kokkos, a berry; krinon, lily.] Basals 3; radials 2x5; inter-radials 1; column round; distinguished from Haplocrinus by the characters of the first radials and the oral plates, and from Platycrinus by the character of the vault which is composed of five oral plates resting upon the five interradials, and by the character of the column. Type C. rosaceus.



FIG. 265. Coccocrinus bacca

bacca, Roemer, 1860, Sil. Fauna West Tenn., p. 57, Niagara Gr.
CODASTER, McCoy, 1849, Ann. & Mag. Nat. Hist., 2d ser., vol. 3, p. 250. [Ety. kodon, a bell; aster, star.] Calyx inverted conical; summit broad; basals 3, one

CLO.-COD.

tetragonal and two pentagonal, each having its inner apex notched to form part of the round columnar canal; radials 1 x 5, large, equal, reaching to the truncated summit, to which, from their mesial gibbosity, they give a pentagonal outline: deltoid plates on the summit; mouth central, and from it five prominent ambulacra diverge, one to each angle, each being on a thick tapering ridge, divided by a mesial sulcus; from the re-entering angles of these interradial ridges four other ridges extend to the middle of the four straight sides, the fifth space having no ridge, but, instead, a large ovate opening; hydrospire slits in four interradial areas, but no hydrospire canals, and no pores. Type C. acutus.

alternatus, Lyon, 1857, Geo. Sur. Ky., vol. 3, p. 493. A misprint for C. attenuatus. americanus, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 239, Up. Held. Gr. Syn. (?) for C. pyramidatus.

attenuatus, Lyon, 1857, Geo. Sur. Ky., vol. 3, p. 493–498, Up. Held Gr.

canadensis, Billings. Not defined.

atiosus, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. FIG. 266.-Codaster 257, Keokuk Gr. The hydrospire slits are visible on the casts gratiosus, S. A. Miller,

- hindii, Etheridge & Carpenter, 1882, Ann. and Mag. Nat. Hist., p. 235, Ham. Gr.
- C. canadensis. (?) kentuckiensis, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 239, Burling-

ton Gr.

pentalobus, see Stephanocrinus pentalobus.



FIG. 267.—Codaster pulchellus. Summit and side views.

pulchellus, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 35, Niagara Gr. Possibly a Stephanocrinus.



сор.—сом.]

whitii, Hall, p. 10, and H p. 237, Burl CODONITES, Mee Acad. Nat. Sur. Ill., vo bell; lithos, obpyramida distinguishe ites and all constricted i large, remot lacra narroy side plates having pini parallel or su the slits are the interrac absent in t Codaster. 7 campanulatus

Louis Acad. Burlington (



FIG. 268 -

conicus, Wachs press,) (Oro Geo. Sur. I (Oro Waverly or H gracilis, Meek Proc. Acad. N Ill., vol. 5, p. fu



arms. Type (riniferus, Wo cariniferus, Wo wortheni,) Ge St. Louis Gr.

[CLO.-COD.

entagonal, each notched to form olumnar canal; ual, reaching to to which, from algibbosity, they stagonal outline; ates on the sumith central, and five prominent a diverge, one to e, each being on tapering ridge, by a mesial sul-1 the re-entering these interradial ur other ridges) the middle of traight sides, the e having no ridge, ad, a large ovate hydrospire slits nterradial areas, ydrospire canals, pores. Type C.

Lyon, 1857, Geo. vol. 3, p. 493. A for C. attenuatus. Shumard, 1858, St. Louis Acad. 1, p. 239, Up. r. Syn. (?) for r. nidatus.



IG. 266.--Codaster gratiosus. Summit and side view of cast, the latter showing an aper-ture at the summit

penter, 1882, Ann. p. 235, Ham. Gr.

, 1858, Trans. St. 1, p. 239, Burling-

crinus pentalobus.



lus. Summit and

er, 1878, Jour. Cin. 1, p. 35, Niagara anocrinus. 1858, Trans. St. d. 1, p. 238, Up.

ECHINODERMATA

whitii, Hall, 1861, Desc. New Crinoidea, p. 10, and Bost. Jour. Nat. Hist., vol. 7, p. 237, Burlington Gr.

сор.—сом.]

CODONITES, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 84, and Geo. Sur. Ill., vol. 5, p. 463. [Ety. kodon, bell; lithos, stone.] Calyx truncate-obpyramidal, clongate below, which distinguishes it, in form, from Pentremites and allied genera; deltoid plates constricted in the middle; anal opening large, remote from the center; ambulacra narrow, without marginal pores; side plates large, their apposed edges having pinnule sockets; ten spiracles parallel or subparallel to the ambulacra; the slits are equally developed in all the interradial areas, while they are absent in the azygous interradius of Codaster. Type C. stelliformis.

campanulatus, Hambach, 1884, Trans. St. Louis Acad. Sci., Vol. 4, p. 548, Burlington Gr.



FIG. 268.—Codonites conicus.

conicus, Wachsmuth & Springer, (in press,) (Orophocrinus conicus.) Geo. Sur. Ill., vol. 8, p. 201, Waverly or Kinderhook Gr. gracilis, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. and Geo. Sur. Ill., vol. 5, p. 467, Burlington Gr.

fusiformis, Wachsmuth &Springer, (in press,) (Orophocrinus fusiformis,) Geo. Sur. Ill., vol. 8, p. 203, Waverly or Kinderhook Gr. stelliformis, Owen & Shumard, 1850. (Pentremites stelliformis,) Jour. Acad. Nat. Sci. Phil., 2d ser., vol. 2, p. 67, Burlington Gr. CŒLIOCRINUS, White,

1863, Jour. Bost. Soc. Nat. Hist., vol. 7, p. 499. [Ety. koilia, belly; krinon, lily.] Distinguished from Hydreionocrinus and Zea-

FIG. 269. – Co-donites fusi-formis. crinus by its balloonshaped ventral sac or proboscis, and from the former, also, by the less robust body and comparatively longer

arms, Type C. dilatatus. cariniferus, Worthen, 1873, (Zeacrinus wortheni,) Geo. Sur. Ill., vol. 5, p. 535, St. Louis Gr.

- dilatatus, Hall, 1861, (Poteriocrinus dilatatus,) Desc. New Crinoidea, p. 6, and Bost. Jour. Nat. Hist., p. 300, Burlington Gr.
- lyra, Meek & Worthen, 1869, (Zeacrinus lyra,) Proc. Acad. Nat. Sci., p. 152, and Geo. Sur. Ill., vol. 5, p. 432, Burlington Gr.
- subspinosus, White, 1863, Jour. Bost. Soc. Nat. Hist., vol. 7, p. 501, Burlington Gr.
- ventricosus, Hall, 1861, (Poteriocrinus ventricosus,) Desc. New Crinoidea, p. 6, and Bost. Jour. Nat. Hist., p. 301, Burlington Gr.
- Cælocrinus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., and Geo. Sur. Ill., vol. 2, p. 214, syn. for Dorycrinus.
- concavus, see Dorycrinus concavus.

COMARCCYSTITES, Billings, 1854, Can. Jour., vol. 2, p. 269, and Can. Org. Rem.,

FIG. 270.—Comarocystites shumardi. Diagram of part of it.

Decade 3, p, 61. [Ety. komaron, strawberry; kustis, bladder.] Body ovate; 1st series of plates 3, above which there are from 5 to 11 series, in irregular order; mouth or valvular orifice near the summit; arms free, grooved, bearing pinnules; ambulacral orifice at the apex; column round; all the plates poriferous. Type C. punctatus.



ECHINODERMATA.

- obconicus, Meek & Worthen, 1865, (C. shumardi var. obconicus,) Proc. Acad. Nat. Sci. Phil., p. 144, and Geo. Sur. Ill., vol. 3, p. 294, Trenton Gr.
- punctatus, Billings, 1854, Can. Jour., vol. 2, p. 270, and Can. Org. Rem., Decade 3, p. 61, Trenton Gr.
- shumardi, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 143, and Geo. Sur. 111, vol. 3, p. 292, Trenton Gr. Comparater, Worthen & Miller, 1883, Geo.
- Sur. 111., vol. 7, p. 327. [Ety. kompsos, elegant; aster, star.] Central disk small; rays large, long, fusiform; grooves deep, bordered by numerous adambu-lacral plates; several rows of diskplates upon each side of the ambulacral furrows. Type C. formosus.
- formosus, Worthen & Miller, 1883, Geo.
- Sur. Ill., vol. 7, p. 327, Kaskaskia Gr. Compsocurnus, S. A. Miller, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 233. [Ety. kompsos, elegant; krinon, lily.] Basals 4; primary radials, 3x5; secondary radials 2 or more by 10; tertiary radials more or less numerous; median line of radials keeled; interradials numerous; column four-sided. Type C. harrisi. harrisi, S. A.

Miller,

Gr.

harrisi,) Jour.

Cin. Soc. Nat. Hist., vol. 4, p.

74, Hud. Riv.

Not defined.

Angelin, 1878,

Icon. Crin.

Suec., p. 3. [Ety. kordyle,

1881. Glyptocrinus

Conocrinus, Troost. CORDYLOCRINUS,

FIG. 271. — Compsoerinus harrisi. Mag. 2 diam.

a cudgel; kri-non, lily.] Body resembling Platycrinus; basals 3; unequal; radials 3x5; arms single or branching; pinnules long; interradials between the upper edges of the first radials; followed by 3 or 4 more; column cylindrical. Type C. comtus.





- 272.—Compsocrinus harrisi. Diagram of basai part and a specimen flattened, natural
 - parvus, Hall, 1861, (Platycrinus parvus,) Pal. N. Y., vol. 3, p. 114, Low Held. Gr.

plumosus, Hall, 1861, (Platycrinus plumosus,) Pal. N. Y., vol 3, p. 113, Low. Held. Gr.

COM.-CTE.

- ramulosus, Hall, 1861, (Platycrinus ram-ulosus,) Pal. N. Y., vol. 3, p. 115, Low. Held, Gr.
- CORONOCRINUS, Hall, 1859, Pal. N. Y., vol. 3, p. 124. [Ety. korone, a crown; krinon. lily.] Founded upon the fragment of the upper part of the calyx showing great breadth, probably hemispheric form, and as many as 40 arm openings in the circumference. Wachsmuth says it is a syn. for Dolatocrinus, but as that genus is not known, in rocks, so low as this is found, there is great doubt about the synonymy. Type C. polydactylus.
- polydactylus, Hall, 1859, Pal. N. Y., vol. 3, p. 124, Low. Held. Gr.
- COTYLEDONOCRINUS, Casseday & Lyon, 1860, Proc. Am. Acad. Arts and Sci., vol. 5, p. 26. [Ety. kotyledon, any cup-shaped cavity; krinon, lily.] Basals 2; radials 3x5; secondary radials 2x10; arms 10; interradials 3x5. Distinguished from Dichocrinus by having no azygous plate in line with the first radials, and believed, by Wachsmuth, to have been founded upon an abnormal Dichocrinus. Type C. pentalobus. pentalobus, Casseday & Lyon, 1860,
- Proc. Am. Acad. Arts and Sci., vol. 5, p. 26, Kaskaskia Gr.
- Cremacrinus, Ulrich, syn. for Calceocrinus. punctatus, see Calceocrinus punctatus.
- CRINOCYSTITES, Hall, 1864, 20th Rep. N. Y St. Mus. Nat. Hist., p. 361. [Ety. krinon, lily; kustis, bladder.] Elongate, swelling in the upper third of the azygous side, and contracting below the arms; covered by five or more ranges of irregularly disposed plates; central and submarginal apertures. Type C. chrysalis.
 - chrysalis, Hall, 1864, 20th Rep. N. Y. St.
- Mus. Nat. Hist., p. 362. Niagara Gr. (?) rectus, Hall, 1864, see Rhodocrinus (?) rectus.
- Crinosoma antiqua, Castelnau, 1843, Syst. Sil. Probably a fucoid. Cromyocrinus, Trautschold, 1867, syn. for
- Eupachycrinus.
- gracilis, see Eupachycrinus gracilis. Crumenæcrinites, Troost, 1850. Not defined. ovalis, Troost, 1850. Not defined.
- Cryptoblastus, Etheridge & Carpenter, 1886, Catalogue of Blastoidea, p. 229. This genus is founded upon Granatocrinus melo, and distinguished from Granatocrinus, by a slight difference, in the hydrospires. They also referred to it G. pisum, and two other species, about which they had very little information.
- Ctenocrinus, Bronn, 1840, Leonn. Bronn. Jahrb, syn. for Melocrinus Bronn, 1840, Leonh. und
- bainbridgensis, see Melocrinus bainbridgensis.

breviradiatus, tus.

Cupellæcrinus, I CUPULOCRINUS, Pal., t. 1,

Scyphoerin 1, p. 85, Z→nker. B interradials arms 10; co erocostalis.

a syn. for] heterocostalis heterocosta

Trenton Gr CYATHOCRINUS, Crinoidea. goblet; kri shaped; ba 1 x 5; as lar with articul part of the irregular

branching: interradials which is fol proboscis,

planus. æmulus, Hall,

p. 10, and Hist., India angulatus, see



FIG. 273.-Cyatho

arboreus, Meel Acad. Nat. S Sur. Ill., vol. barrisi, Hall, 18 Desc. New C Nat. Hist., p. barydactylus,

1878, Proc. A lington Gr. bulbosus, see Ar bullatus, see Ba

conglobatus, Tro

COM.-CTE.

Platycrinus plud 3, p. 113, Low.

Platycrinus ram . 3, p. 115, Low

Pal. N. Y., vol. 3, crown; krinon, the fragment of e calyx showing oly hemispheric 40 arm openings Wachsmuth olatocrinus, but own, in rocks, so , there is great ymy. Type C.

Pal. N. Y., vol. r.

ay & Lyon, 1860, and Sci., vol. 5, any cup-shaped Basals 2; radials ls 2x10; arms Distinguished ving no azygous first radials, and nuth, to have ibnormal Dicholobus.

& Lyon, 1860, nd Sci., vol. 5,

or Calceocrinus. is punctatus. 20th Rep. N. Y p. 361. [Ety. der.] Elongate, r third of the acting below the or more ranges plates; central tures. Type C.

1 Rep. N. Y. St. Niagara Gr. Rhodocrinus (?)

au, 1843, Syst.

1867, syn. for

18 gracilis. 0. Not defined. defined. Carpenter, 1886, a, p. 229. This n Granatocrinus d from Granatofference, in the to referred to it er species, about little informa-

Leonh. und Melocrinus. us bainbridgenECHINODERMATA.

breviradiatus, see Melocrinus breviradiatus

CUP.-CYA.]

- Cupellæcrinus, Troost, 1850. Not defined. CUPULOCRINUS, D'Orbigny, 1850, Prodr. d. Pal., t. 1, p. 23. Proposed instead of Scyphocrinus, Hall, Pal. N. Y., vol. 1, p. 85, that was preoccupied, by Z-nker. Basals 5 radials 4 x 5, regular interradials 3; azygous interradials 4; arms 10; column round. Type C. het
 - erocostalis. Wachsmuth regards it as a syn. for Taxocrinus heterocostalis, Hall., 1847. (Scyphocrinus heterocostalis,) Pal. N. Y., vol. 1, p. 85, Trenton Gr.
- CYATHOCRINUS, Miller, 1821, Nat. Hist. Crinoidea, p. 85. [Ety. cyathos, cup or goblet; krinon, lily.] Calyx saucer-shaped; basals 5; subradials 5; radials $1 \ge 5$; as large or larger than the basals, with articulating facet occupying only part of the width of a plate; brachials irregular in number; arms long, branching; column round; no regular interradials; azygous interradial 1, which is followed, in the ventral sac or proboscis, by other plates. Type C. planus.
 - æmulus, Hall, 1879, Desc. new spec. foss., p. 10, and 11th Rep. Geo. and Nat. Hist, Indiana, p. 266, Niagara Gr. angulatus, see Barycrinus angulatus.



FIG. 273.-Cyathocrinus arboreus. Diagram.

- arboreus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 160, and Geo. Sur. Ill., vol. 3, p. 520, Keokuk Gr.
- barrisi, Hall, 1861, (Poteriocrinus barrisi,) Desc. New Crin., p. 5, and Bost. Jour. Nat. Hist., p. 303, Burlington Gr.
- barydactylus, Wachsmuth & Springer, 1878, Proc. Acad. Nat. Sci., p. 257, Bur-

lington Gr. bulbosus, see Arachnocrinus bulbosus. bullatus, see Barycrinus bullatus.

conglobatus, Troost. Not defined.

- cora, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 366, Niagara Gr. cornutus, see Barycrinus cornutus.
- corrugatus, Troost. Not defined. crassibiachiatus, see Barycrinus crassibrachiatus.
- crassus, see Eupachycrinus crassus.
- crateriformis, Troost. Not defined. crawfordsvillensis, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 79, Keokuk Gr.
- decadactylus, Lyon & Casseday, 1860, Am. Jour. Sci. and Arts, vol. 29, p. 73, Keokuk Gr.
- depressus, Troost, see Zeacrinus depressus. divaricatus, Hall, 1858, Geo. Sur. Iowa, p. 554, Burlington Gr.
- enormis, Meek & Worthen, 1865, (Poteri-ocrinus enormis,) Proc. Acad. Nat. Sci. Phil., p. 152, and Geo. Sur. Ill., vol. 3, p. 481, Burlington Gr.



FIG. 274.—Cyathocrinus farleyi. Diagram.

farleyi, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 252, and Geo. Sur. Ill., vol. 3, p. 517, Keokuk Gr. fasciatus, see Macrostylocrinus fasciatus.

- forealis, see Zeacrinus florealis. fragilis, Meek & Worthen, 1868, Proc. Acad. Nat. Sci. Phil., p. 237, and Geo. Sur. Ill., vol. 5, p. 401, Burlington Gr. globósus, Troost. Not defined.
- gilesi, Wachsmuth & Springer, 1878, Proc. Acad. Nat. Sci., p. 259, Burlington Gr.
- granuliferus, Shumard, 1854, Red Riv. Expl. Louisiana, p. 199, Kaskaskia Gr.
- hamiltonensis, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 32, syn. for C. parvibrachiatus.
- harrisi, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 255, Keokuk Gr. As suggested at the time of describing this species, it may become the type of a new genus. harrodi, Wachsmuth & Springer, 1879,
- Proc. Acad. Nat. Sci., p. 87, Keokuk Gr.
- hexadactylus, Lyon & Casseday, 1860, Am. -Jour. Sci., vol. 29, p. 74, syn. for Vas-ocrinus lyoni. The name was essentially incorrect and definition wrong.

- inæquidactylus, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 219, Kaskaskia Gr.
- incipiens, Hall, 1861, Desc. New Crinoidea, p. 5, and Bost. Jour. Nat. Hist., vol. 7, p. 296, Burlington Gr. inflatus, Troost. Not defined.
- inflexus, see Erisocrinus inflexus.
- inspiratus, Lyon, 1860, Trans. Am. Phil. Soc., vol. 13, p. 457, Keokuk Gr. intermedius, Hall, 1858, Geo. Rep. Iowa,
- p. 627, Keokuk Gr.
- iowensis, Owen & Shumard, 1850, Jour. Acad. Nat. Sci., 2d ser., vol. 2, p. 63, and Geo. Sur. Wis., Iowa, and Minn., p. 591, Burlington Gr.

kelloggi, see Barycrinus kelloggi.

Leeviculus, Lyon, 1861, Proc. Acad. Nat. Sci. Phil., p. 409, Up. Held. Gr. latus, Hall, 1861, Desc. New Crinoidea,

p. 5, syn. for Barycrinus sculptilis.

alamellosus, White, 1863, Jour. Bost. Soc. Nat. Hist., vol. 7, p. 504, Burlington Gr.

lyoni, see Vasocrinus lyoni. macropleurus, see

Vasocrinus macropleurus. magister, see Barycrinus magister.

m agnoliiformis, see Zeacrinus magnolii-

formis. malvaceus, Hall, 1858, Geo. Sur. Iowa, p. 554, Burlington Gr. Wachsmuth says it is founded on a depressed specimen of $^{\rm C}$ iowensis.

maniformis, see Zeacrinus maniformis.

marshallensis, Worthen,1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 33, and Geo. Sur. Ill., vol. 7, p. 310, Waverly or Kinderhook

Gr. multibrachiatus, Lyon & Casseday, 1859, Am. Jour. Sci., vol. 28, p. 245, Keo-

FIG. 275.—Cyathocrinus multibrachiatus.

- kuk Gr. 1876, (Dendrocrinus Rep. N. Y. St. Mus. nucleus, Hall,
- nucleus, Hall, 1876, (Dendrocrinus nucleus,) 28th Rep. N. Y. St. Mus. Nat. Hist., p. 136, Niagara Gr.
 ornatissimus, Hall, 1843, Geo. Rep. 4th Dist. N Y., p. 247, Portage Gr.
 parvibrachiatus, Hall, 1861, Desc. New Cripidea p. 6 and Part Lour Net.
- Crinoidea, p. 6, and Bost. Jour. Nat. Hist, vol. 7, p. 294, Keokuk Gr.

pentalobus, see Eupachycrinus pentalobus. planus, Troost. Not defined.

- polyxo, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 199, and 28th Rep. N. Y. St. Mus.
- Nat. Hist., p. 135, Niagara Gr. poterium, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 24, and Geo. Sur. Ill., vol. 5, p. 489, Keokuk Gr.

protuberans, see Barycrinus protuberans. pusillus, see Lecanocrinus pusillus.

pyriformis, Murchison as identified by

Hall. See Ichthyocrinus lævis



FIG. 276.-Cyathocrinus quinquelobus.

- quinquelobus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 150, and Geo. Sur. Ill., vol. 3, p. 519, Keokuk Gr.
- rarus, Lyon, 1869, Trans. Am. Phil. Soc.,

vol. 13, p. 453, Up. Held. Gr. rigidus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 8, Burlington Gr. robustus, Troost. Not defined. rotundatus, Hall, 1858, Geo. Rep. Iowa,

p. 555, Burlington Gr.



FIG. 277.-Cyathocrinus saffordi. Diagram.

- saffordi, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 371, and Geo. Sur. Ill., vol. 2, p. 336, Keokuk Gr.
- sangamonensis, see Eupachycrinus sangamonensis.
- scitulus, Meek & Worthen, syn. for Barycrinus scitulus.
- sculptilis, see Barycrinus sculptilis. Not defined.

sculptus, Troost. Not defined.

solidus, see Barycrinus solidus.

CYC.-DEL.]

CYA.

somersi, Whi Acad. Sci., v spurius, see Ba stellatus, see Ba stillativus, Wh

Mus., vol. 2, No. 6, p. 125, subtumidus, M Acad. Nat. 8 Sur. Ill., vol. tennesseeæ, Troos

tenuibrachiatus Phil. Soc Held. Gr. Soc.,

tenuidactylus,

Proc. Acad. 1 Geo. Sur. 111 ton Gr. thomæ, see Bary tiaraformis, see

tumidus, see Ba vanhornii, S. A Soc. Nat. H agara Gr.

viminalis, Hall, p. 5, syn. for wachsmuthi, see waldronensis, M to Pal. No. 2,

muth refers it waukoma, Hall, Mus. Nat. His

wortheni, Lyon Sci. Phil., p. 4

Cyclaster, Billings This name w rioaster.

bigsbyi, see Edri CYCLOCYSTOIDES,

Can. Org. Ren kuklos, circle form.] Body disk, surround cylindrical, pe the interior is ment of smal channels, which with the chann which makes a supposed to elevations on t if for the attac

Type C. halli. anteceptus, Hall St. Mus. Nat ton Gr.



bellulus, Miller & Soc. Nat. Hist Riv. Gr.

CYA.

inus pentalobus. ed

. Alb. Inst., vol. . N. Y. St. Mus. ara Gr. nen, 1870, Proc. p. 24, and Geo. Keokuk Gr. us protuberans. pusillus.

s identified by 18 lævis



ainquelobus.

Worthen, 1865, hil., p. 150, and 3, p. 519, Ke-

Am. Phil. Soc., l. Gr. . Bost. Soc. Nat. ngton Gr. ned. ied. eo. Rep. Iowa,



rdi. Diagram

en, 1860, Proc. . 371, and Geo. Keokuk Gr. chycrinus san-

, syn. for Bary-

sculptilis. Not

ied. lidus.

- somersi, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 226, Coal Meas. spurius, see Barycrinus spurius. stellatus, see Barycrinus stellatus.

CYC.-DEL.]

- stillativus. White, 1880, Proc. U. S. Nat. Mus., vol. 2, p. 258, and Cont. to Pal. No. 6, p. 125, Up. Coal. Meas.
- subtumidus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 151, and Geo. Sur. Ill., vol. 5, p. 487, Keckuk Gr. tennesseeæ, Troost. Not defined. tenuibrachiatus, Lyon, 1869, Trans. Am.
- Phil. Soc., vol. 13, p. 460, Up. Held. Gr.
- renuidactylus, Meek & Worthen, 1868, Proc. Acad. Nat. Sci. Phil., p. 238, and Geo. Sur. Ill., vol. 5, p. 403, Burlington Gr.
- thomæ, see Barverinus thomæ.
- tiaraformis, see Ichthyocrinus tiariformis. tumidus, see Barycrinus tumidus.
- vanhornii, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 261, Niagara Gr.
- viminalis, Hall, 1861, Desc. New Crin., p. 5, syn. for C. iowensis.
- wachsmuthi, see Barycrinus wachsmuthi. waldronensis, Miller & Dyer, 1878, Cont.
- to Pal. No. 2, p. 6, Niagara Gr. Wachsmuth refers it to Macrostylocrinus. waukoma, Hall, 1864, 20th Rep. N. Y. St.
- Mus. Nat. Hist., p. 367, Niagara Gr. wortheni, Lyon, 1861, Proc. Acad. Nat.
- Sci. Phil., p. 410, Up. Held. Gr.
- Cyclaster, Billings, 1857, Rep. of Progr. This name was preoccupied. See Edrioaster.
- bigsbyi, see Edrioaster bigsbyi.
- CYCLOCYSTOIDES, Billings & Salter, 1858, Can. Org. Rem., Decade 3, p. 86. [Ety. kuklos, circle; kustis, bladder; eidos, form.] Body consisting of a circular disk, surrounded by a series of short, cylindrical, perforated, porous plates; the interior is covered by an integument of small plates, with radiating channels, which bifurcate and connect with the channel in the marginal series, which makes a complete circle; mouth supposed to be central; mammillary elevations on the exterior of the rim as if for the attachment of small spines. Type C. halli.
- anteceptus, Hall, 1866, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 219, Trenton Gr.



FIG. 278.-Cyclocystoides magnus.

bellulus, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 34, Hud. Riv. Gr.

- halli, Billings, 1858, Can. Org. Rem., Decade 3, p. 86, Trenton Gr.
- huronensis, Billings, 1865, Pat. Foss., vol. 1, p. 393, Hud. Riv. Gr.
- magnus, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 32, and vol. 4, p. 70, Hud. Riv. Gr.
- minus, Miller & Dyer, 1878, Jour. Cin. 1 Soc. Nat. Hist., vol. 1, p. 33, Hud. Riv. Gr.
- mundulus, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 34, Hud. Riv. Gr.
- nitidus, Faber, 1886, Jour. Cin. Soc. Nat. Hist., vol. 9, p. 17, Hud. Riv. Gr.
- parvus, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 33, Hud. Riv. Gr.
- salteri, Hall, 1866, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 218, Trenton Gr.
- CYSTOCRINUS, Roemer, 1860, Sil. Fauna West Tenn., p. 56. [Ety. kustis, bladder; krinon, lily.] A cylindrical body, the interior of which looks like a crinoid column, but the external part consists of a compact mass of tubes connecting with the central canal. Wachsmuth has called it a detached column, but it is anomalous, and I retain the genus. Type C. tennesseensis.

tennesseensis, Roemer, 1860, Sil. Fauna West

Tenn, p. 56, Niagara Gr. Cytocrinus, Roemer, 1860, Sil. Fauna West Tenn., p.

46, syn for Melocrinus. lævis, see Melócrinus lævis. Dæmonicri-

nites, Troost Not de-

fined. Decadactylocrinites,



- defined. Wachsmuth & Decadocrinus, Springer,
 - 1879, Proc. Acad. Nat. Sci. Phil. and Revis. Palæocrinoidea, pt. 1, p. 119. It was described as a subgenus of Poteriocrinus, but it hardly arises to that dignity. Their type is Scaphiocrinus scalaris.
- DELTACRINUS, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 109. [Ety. delta, Greek letter; krinon, lily.] Basal piece tri-angular, composed of anchylosed plates; four plates form the dorsal side above the base; lower central plate triangular and separated from the upper triangular plate by the union of the two lateral radial plates. Distinguished from Calceocrinus, which has a long plate on the dorsal side between the lateral radials instead of the two triangular plates separated, as above described by the union of the two radials. Type D. clarus.

ECHINODERMATA.

barrisi, Worthen, 1875, (Calceocrinus barrisi, Geo. Sur. Ill., vol. 6, p. 510, Ham. Gr. bradleyi, Meek &

FIG. 280. - Deltacrinus barrisi

Phil., p. 73, and Geo. Sur. Ill., vol. 5, p. 502, Keokuk Gr. clarus, Hall, 1862, (Cheirocrinus clarus,) 15th Rep. N. Y. St. Mus. Nat. Hist., p.

Worthen, 1869, (Calceocrinus

bradleyi,) Proc. Acad. Nat. Sci.

Proc.

en-

gous one; reg-

ular interradi-

als 0; azygous interradial 1:

large and long

proboscis or

ventral sac

rises from the

azygous inter-

radial; arms

88, Niagara Gr.

dactylus, Hall, 1860, (Cheirocrinus dac-tylus,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 123, Burlington Gr.

nodosus, Hall, 1860, (Cheirocrinus no-dosus,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 124, Keokuk Gr.

stigmatus, Hall, 1863, (Cheirocrinus stigmatus,)Trans. Alb. Inst., vol. 4, p. 225, Niagara Gr.



Hist., p. 124, Keokuk Gr. wachsmuthi, Meek & facrinus stigtacrinus stig-Worthen, 1869, (Cal matus, Dorwachsmuthi,) sal view of calyx enceocrinus Proc. Acad. Nat. Sci. Phil., larged p. 74, and Geo. Sur. Ill., vol. diam. 5, p. 444, Burlington Gr.

DENDROCRINUS, Hall, 1852, Pal. N. Y., vol. 2, p. 193. [Ety. dendron, tree; krinon, lily.] Calyx obconoidal; basals 5; subradials 5; radials 1x5, and an additional one caused by a division of the plate on the left side of the large azy-



long, branching; ambulacral furrow deep; pinnules wanting; column round or pentagonal; without base or roots for attachment. Type D. longidactylus.

- acutidactylus, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 266, and Can. Org. Rem., Decade 4, p. 37, Trenton Gr. ancilla, Hall, 1879, Desc. New Spec. Foss.,
- p. 9, and 11th Rep. Geo. and Nat. Hist. Indiana, p. 271, Niagara Gr.
- alternatus, Hall, 1847, (Poteriocrinus alternatus,) Pal. N. Y., vol. 1, p. 83, Trenton Gr.

angulatus, see Palæocrinus angulatus.

angustatus, Meek & Worthen, 1870, (Homocrinus angustatus,) Proc. Acad. Nat. Sci. Phil., p. 30, and Geo. Sur. Ill., vol. 6, p. 492, Hud. Riv. Gr.

- caduceus, Hall, 1866, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 208, Hud. Riv. Gr.
- casii, Meek, 1871, Am. Jour. Sci. and Arts. 3d ser., vol. 2. p. 295, and Ohio Pal., vol. 1, p. 28, Hud. Riv. Gr.
- cincinnatiensis, Meek, 1872, Proc. Acad. Nat. Sci. Phil., p. 312, and Ohio Pal., vol. 1, p. 20, Hud. Riv. Gr.
- conjugans, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 268, and Can. Org. Rem., Decade 4, p. 41, Trenton Gr.
- celsus, Ringueberg, 1888, Proc. Acad. Nat. Sci. Phil., p. 132, Niagara Gr. curtus, see Merocrinus curtus.
- cylindricus, Billings, 1859, Can. Org. Rem., Decade 4, p. 44, Trenton Gr. dyeri, Meek, 1872, Proc. Acad. Nat. Sci.
- Phil., p. 310, and Ohio, Pal., vol. 1, p. 24, Hud. Riv. Gr.
- erraticus, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 316, Hud. Riv. Gr.
- gracilis, Hall, 1847, (Poteriocrinus gracilis,)
- Pal. N. Y., vol. 1, p. 84, Trenton Gr. gregarius, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 265, and Can. Org. Rem., Decade 4, p. 36, Trenton Gr. humilis, Billings, 1857, Rep. of Progr.
- Geo. Sur. Can., p. 265, and Can. Org. Rem., Decade 4, p. 39, Trenton Gr. jewetti, Billings, 1859,

Decade 4, p. 43

latibrachiatus, Billings, 1857, Rep. Prog. Can. Geo. Sur., p. 270, and Can. Org. Rem.,

Decade 4, p. 39, Hud. Riv. Gr.

longidactylus, Hall, 1852, Pal. N. Y., vol. 2, p. 193, Ni-FIG. 283. -Dendrocrinus jewetti. agara Gr.

modestus, Safford. Not defined.

navigiolum, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 235, Utica Slate Gr.

nucleus, see Cyathocrinus nucleus.



FIG. 284.-Dendrocrinus oswegoensis. Diagram

oswegoensis, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 333, Hud. Riv. Gr.



Acad. Sci., v vol. 1, p. 22, posticus, Hall, cus,) 24th R Hist., p. 209, 22, Hud. Riv proboscidiatus,

Progr. Can. (Org. Rem., ton Gr.

retractilis, Wal St. Mus. N ton Gr.

rusticus, Billing Sur. Can., p. Decade 4, p.

similis, Billings Sur. Can., p.

Decade 4, p. tener, Billings, Antic., p. 9, 1

DICHOCRINUS, MU Petref., vol. two parts; k cup-shaped; primary radi upon each b notch at one opposite which plate in line w ceeding radial last supportin bifurcating an interradials above the firs elevated, with the azygous sic

D. radiatus. angustus, White Nat. Hist.,

ton Gr. chesterensis, see P constrictus, Me

Proc. Acad. N. Geo. Sur. Ill. saw Gr.

conus, Meek & Acad. Nat. Sci Sur. Ill., vol. 2

cornigerus, see Ta coxanus, Worthe St. Mus. Nat. I

Ill., vol. 7, p. 3 crassitestus, Whi

Nat. Hist., vol. crassus, see Ptero dichotomus, Hal

Sur. Iowa, p. 8 elegans, Casseday

elegans. expansus, Meek

name was pred & LeHon, but synonym for D.

ficus, Casseday & Acad. Arts and Geo. Sur. Ill., vo



DEN



DEN.

DIC.]

- th Rep. N. Y. St. 3, Hud. Riv. Gr. our. Sci. and Arts, 5, and Ohio Pal., L. Gr. 1872, Proc. Acad.
- 2, and Ohio Pal., 7. Gr.
- 57, Rep. of Progr. 58, and Can. Org. Trenton Gr. Proc. Acad. Nat. gara Gr.
- urtus. 1859, Can. Org. , Trenton Gr.
- c. Acad. Nat. Sci. io, Pal., vol. 1, p.

1881, Jour. Cin. 4, p. 316, Hud.

riocrinus gracilis,) 4, Trenton Gr. 7, Rep. of Progr. 5, and Can. Org. , Trenton Gr. Rep. of Progr. 5, and Can. Org. , Trenton Gr.



FIG. 283.-Dendrocrinus jewetti.

lefined. r, 1880, Jour. Cin. 3, p. 235, Utica

s nucleus.



egoeusis. Diagram orthen, 1868, Geo. , Hud. Riv. Gr.

ECHINODERMATA.

- polydactylus, Shumard, 1857, (Homocrinus polydactylus,) Trans. St. Louis Acad. Sci., vol. 1, p. 78, and Ohio Pal., vol. 1, p. 22, Hud. Riv. Gr.
 posticus, Hall, 1872, (Poteriocrinus posticus,) 24th Rep. N. Y. St. Mus. Nat. Hist and Polymer Poly and Poly and Polymer Pol
- Hist., p. 209, and Ohio Pal., vol. 1, p. 22, Hud. Riv. Gr.
- proboscidiatus, Billings, 1857, Rep. of Progr. Can. Geo. Sur., p. 267, and Can. Org. Rem., Decade 4, p. 38, Trenton Gr.
- retractilis, Walcott, 1883, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 211, Trenton Gr.
- rusticus, Billings, 1857, Rep. of Prog. Geo. Sur. Can., p. 270, and Can. Org. Rem.,
- Suri Can, p. 24, and Can. Org. Rem., Decade 4, p. 41, Trenton Gr. similis, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 267, and Can. Org. Rem., Decade 4, p. 40, Trenton Gr.
- tener, Billings, 1866, Catal. Sil. Foss. Antic., p. 9, Hud. Riv. Gr.
- DICHOCRINUS, Munster, 1839, Beitrag. Zur. Petref., vol. 1, p. 2. [Ety. dicha, in two parts; krinon, lily.] Calyx deep, cup shaped; plates delicate; basals 2 primary radials 5, large, resting two upon each basal, and the other in a notch at one end of the basal suture, opposite which there is a large azygous plate in line with the first radials; succeeding radials 1 to 3, in each ray, the last supporting arms; arms 10, long, bifurcating and bearing stout pinnules; internadials 4 or 5, small, situate above the first radials; vault slightly elevated, with a small opening upon the azygous side; column round. Type D. radiatus.
- angustus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 19, Burlington Gr.
- chesterensis, see Pterotocrinus chesterensis. constrictus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 381, and Geo. Sur. Ill., vol. 2, p. 263, Warsaw Gr.
- conus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 381, and Geo. Sur. Ill., vol. 2, p. 169, Burlington Gr. cornigerus, see Talarocrinus cornigerus. coxanus, Worthen, 1882, Bull. No. 1, Ill.
- St. Mus. Nat. Hist., p. 35, and Geo. Sur. Ill., vol. 7, p. 313, Keokuk Gr. crassitestus, White, 1862, Proc. Bost. Soc.
- Nat. Hist., vol. 9, p. 19, Burlington Gr. crassus, see Pterotocrinus crassus.
- dichotomus, Hall, 1860, Supp. to Geo. Sur. Iowa, p. 85, Warsaw Gr. elegans, Casseday & Lyon, see Talarocrinus
- elegans.
- expansus, Meek & Worthen, 1868. The name was preoccupied by DeKoninck & LeHon, but the name is probably a synonym for D. polydactylus.
- ficus, Casseday & Lyon, 1860, Proc. Am. Acad. Arts and Sci., vol. 5, p. 24, and Geo. Sur. Ill., vol. 5, p. 502, Keokuk Gr.

inornatus, Wachsmuth & Springer, (in press,) Geo. Sur. Ill.,

vol. 8, p. 190, Waverly

or Kinderhook Gr. hamiltonensis, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 35, and Geo. Sur. Ill., vol. 7, p. 313, Keokuk Gr.

- lachrymosus, Hall, 1860, Supp. to Geo. Sur.
- Iowa, p. 84, Burlington Gr. Wachsmuth says it is a syn. for Platy-
- crinus subspinulosus. lævis, Hall, 1860, Supp.
- Geo. Sur. Iowa, p. 83, Burlington Gr.
- lineatus, Meek & Worth- FIG. 285. Dichoen, 1869, Proc. Acad. crinus inornatus. Nat. Sci. Phil., p. 69,
- and Geo. Sur. Ill., vol. 5, p. 440, Burlington Gr.
- liratus, Hall, 1861, Desc. New Crinoidea, p. 5, and Jour. Bost. Nat. Hist., vol. 7, p. 290, Burlington Gr.
- ornatus, Wachsmuth & Springer, 1881, Proc. Acad. Nat. Sci. Phil. and Revis. Palæocrin., p. 84, Keokuk. Gr. This name was proposed instead of D. sculptus, Casseday & Lyon, because the latter was preoccupied.
- ovatus, Owen & Shumard, 1850, Jour. Acad. Nat. Sci., 2d ser., vol. 2, p. 61, and Geo. Sur. Iowa, Wis., and Minn., p. 590. Burlington Gr.
- pisum, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 69, and Geo. Sur. Ill., vol. 5, p. 441, Burlington Gr. plicatus, Hall, 1861, Desc. New Crinoidea,
- p. 4, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 288, Burlington Gr.
- pocillum, Hall, 1861, Desc. New Crinoidea, p. 5, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 291, Burlington Gr.
- polydactylus, Casseday & Lyon, 1860, Proc. Am. Acad. Arts and Sci., vol. 5, p. 20, Keokuk Gr.
- protuberans, Hall, see Pterotocrinus protuberans.
- scitulus, Hall, 1861, Desc. New Crinoidea, p. 4, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 289, Burlington Gr.
- sculptus, Casseday & Lyon, 1860, Proc. Am. Acad. Arts and Sci., vol. 5, p. 25. The name was preoccupied by DeKoninck & LeHon in 1853. See D. ornatus.
- sexlobatus, see Talarocrinus sexlobatus.
- simplex, Shumard, 1857, Trans. St. Louis Acad. Sci., p. 74, and Geo. Sur. Iowa, p. 654, Warsaw Gr.
- striatus, Owen & Shumard, 1850, Jour. Acad. Nat. Sci., 2d ser., vol. 2, and Geo. Sur. Iowa, Wis., and Minn., p. 590, Burlington Gr.
- symmetricus, see Talarocrinus symmetricus.



Dictyocrinus, Conrad, 1841, (Dictuocrinites,) Ann. Rep. N. Y. and Pal. N. Y., vol. 3, p. 135, syn. for Receptaculites.

squamifer, Hall, see Receptaculites souamifer.

- DOLATOCRINUS, Lyon, 1857, Geo. Sur. Ky., vol. 3, p. 482. [Ety. dolatus, hewn or tooled; krinon, lily.] Body subsphe-roidal; calyx basin-shaped; vault hemispherical, depressed in the interradial areas; basals anchylosed and probably numbering 5; radials 3x5; secondary radials 2 x 10; sometimes tertiary radials 2 x 20; arms 20 to 40, bifurcating and bearing pinnules; interradials 5 or more, the first one large; aperture sub-central; column round. Type D. lacus. canadensis, Whiteaves, 1887, Cont. to Can. Pal. vol. 1, p. 99, Ham. Gr.
 - glyptus, Hall., 1862, (Cacabocrinus glyp-tus,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 140, Ham. Gr.





FIG. 286. -Dolatocrinus lacus. Side view

ray

FIG. 287.—Dolatocrinus lacus. Ventral view.

glyptus var. intermedius, Hall, 1862, (Cacabocrinus glyptus var. intermedius,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 141, Ham. Gr.

lacus, Lyon, 1857, Geo. Sur. Ky., vol. 3, p. 482, Up. Held. Gr.

lamellosus, Hall, 1862, (Cacabocrinus lamellosus,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 141, Up. Held. Gr. liratus, Hall, 1862, (Caca-bocrinus liratus,) 15th Rep. N. Y. St. Mus. Nat.

Hist., p. 139, Ham. Gr. liratus var. multilira, Hall, FIG. 288.-Dola-1862, (Cacabocrinus litocrinas lacus. ratus var. multilira,) 15th Rep. N. Y. St. Mus. Nat. Diagram of a

Hist., p. 139, Ham. Gr. marshi, Lyon, 1869, Trans. Am. Phil. Soc., vol. 13, p. 461, Up. Held. Gr.

ornatus, Meek, 1871, Proc. Acad. Nat. Sci.,

p. 57, Up. Held. Gr.

speciosus, Hall, 1862, (Cacabocrinus speci-osus,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 137, Up. Held. Gr.

triadactylus, Barris, 1885, Proc. Dav. Acad.

Sci., vol. 4, p. 100, Ham. Gr. troosti, Hall, 1862, (Cacabocrinus, troosti,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 138. Ham. Gr.

Donacicrinites, Troost. Not defined. simplex, Troost. Not defined.

- DORYCRINUS, Roemer, 1854, Archiv. f. Naturgesch Jahrg. 19, p. 207. [Ety. dory, spear; krinon, lily.] Body turbinate or subglobose, truncate at the base, depressed in the interradial spaces so as to make it pentalobate; dome convex and usually bearing from 1 to 6 spines; basals 3; primary radials 3 x 5; secondary radials 2×2 ; or where there are tertiary radials, there are only 1×2 secondaries; arms 24 to 40; interradials 2 or 3, in two series; azygous area very different from the interradial areas, and having several more plates and an aperture near the top directed laterally; readily distinguished from Batocrinus and Eretmocrinus by the lobed form of the body, by the azygous area and lateral opening, and by the shortness of the arms. Type D. mississippiensis.
- canaliculatus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci., p. 166, and Geo. Sur. Ill., vol. 5, p. 381, Burlington Gr. concavus, Meek & C

Worthen, 1861, (Actinocrinus concavus,) Proc. Acad. Nat. Sci. Phil., p. 131, and Geo. Sur. O Ill., vol. 2, p. 215, Low. Burlington

cornigerus, Hall, 1858, FIG. 289.-Dorycrinus concavus. Diagram. (Actinocrinus cornigerus,) Geo. Rep. Iowa, p. 576, Bur-

lington Gr.

gouldi, Hall, 1858, (Actinocrinus gouldi,) Geo. Rep. Iowa, p. 613, Keokuk Gr.



immaturus, Wachsmuth & Springer, (in press,) Geo. Sur. Ill., vol. 8, p. 175,

Waverly or Kinderhook Gr. kelloggi, Worthen, 1875, Geo. Sur. Ill. vol. 6, p. 513, Keokuk Gr.

ECH.]

DIC.-DOR.

lineatus, S. A. Nat. Hist., ton Gr. mississippiensi fur Nat. J kuk Gr. mississippiensi Supp. to Ge kuk Gr. missouriensis. nus missour 190, Burlingt parvibasis, Wa press,) Geo. 8 derhook Gr.



FIG. 291 Dorycrint terior, a

parvus, Shuman vus,) Geo. Su lington Gr. pendens, Hall, dens,) Supp. Burlington G præcursor, Hall cursor,) 15th Hist., p. 131, j quinquelobus, quinquelobus



FIG. 292.-Dorycrint ant

quinquelobus v Worthen, 1868 346, and Geo. **Burlington** Gr radiatus, Wach press,) Geo. Si derhook Gr. roemeri, Meek Acad. Nat. Geo. Sur. Ill., ton Gr.

spinulosus, Ha spinulosus,) S 52, Keokuk Gi





Dapl

Gr.

DIC.-DOR.

ECH.]

Not defined. efined.

I, Archiv. f. Natur-207. [Ety. dory, Body turbinate te at the base, deadial spaces so as te; dome convex rom 1 to 6 spines: lials 3 x 5; secondwhere there are e are only 1x2 to 40; interradials azygous area very erradial areas, and e plates and an directed laterally: from Batocrinus y the lobed form azygous area and by the shortness e D. mississippi-

; Worthen, 1869, , p. 166, and Geo. , Burlington Gr.



oncavus. Diagram.

lowa, p. 576, Bur-

inocrinus gouldi,) 3, Keokuk Gr.



-Dorycrinus imma-Posterior and antews.

1 & Springer, (in ., vol. 8, p. 175, ok Gr. 5, Geo. Sur. Ill. Gr.

- lineatus, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 310, Burlington Gr.
- mississippiensis, Roemer, 1853, Archiv. fur Nat. Jahr. 19, p. 207, Keokuk Gr.
- mississippiensis, var. spiniger, Hall, 1860, Supp. to Geo. Sur. Iowa, p. 53, Keokuk Gr.
- missouriensis, Shumard, 1858, (Actinocrinus missouriensis,) Geo. Rep. Mo., p. 190, Burlington Gr.
- parvibasis, Wachsmuth & Springer, (in press,) Geo. Sur. Ill., vol. 8, p. 177, Kinderhook Gr.



FIG. 291. – Dorycrinus parvibasis. Anterior, posterior, and ventral views.

- parvus, Shumard, 1855, (Actinocrinus parvus,) Geo. Sur. Mo., p. 193, Upper Burlington Gr.
- pendens, Hall, 1860, (Actinocrinus pendens,) Supp. to Geo. Sur. Iowa, p. 31, Burlington Gr.
- præcursor, Hall, 1862, (Actinocrinus præcursor,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 131, Ham. Gr.
- quinquelobus, Hall, 1860, (Actinocrinus quinquelobus,) Supp. to Geo. Rep. Iowa, p. 15, Burlington Gr.



FIG. 292.-Dorycrinus radiatus. Posterior and anterior views.

- quinquelobus var. intermedius, Meek & Worthen, 1868, Proc. Acad. Nat. Sci., p. 346, and Geo. Sur. Ill., vol. 5, p. 385, Burlington Gr.
- radiatus, Wachsmuth & Springer, (in press,) Geo. Sur. Ill., vol. 8, p. 176, Kinderhook Gr.
- roemeri, Meek & Worthen, 1868, Proc. Acad. Nat. Sci. Phil., p. 346, and Geo. Sur. Ill., vol. 5, p. 383, Burlington Gr.
- spinulosus, Hall, 1860, (Actinocrinus spinulosus,) Supp. Geo. Sur. Iowa, p. 52, Keokuk Gr.

subaculeatus, Hall, 1858, (Actinocrinus subaculeatus,) Geo, Rep. Iowa, p. 570, Burlington Gr.



Ill., vol. 2, FIG. 293.—Dorycrinus subturbinatus. Diagram. lington Gr.

symmetricus, Hall, 1858, (Actinocrinus symmetricus,) Geo. Sur. Iowa, p. 574, Burlington Gr.

trinodus,) Hall, 1858, (Actinocrinus trinodus,) Geo. Sur. Iowa, p. 575, Burlington Gr.

> unicornis, Owen & Shumard, 1850, (Actinocrinus unicornis,) Jour. Acad. Nat. Sci. Phil., vol. 2, new ser., p. 67, and Geo. Sur. Ill., vol. 5, p. 380, Burlington Gr.

unispinus, Hall, 1861, Actinocrinus unispinus,) Desc. New 'Crinoidea, p. 2, and Bost. Jour. Nat. Hist., vol. 7, p. 270, Burlington Gr.

FIG. 294.—Dorycrinus unicornis.

Echinocystites, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 360. The name was preoccupied by Wyville Thompson. See Lysocystites.

nodosus, see Lysocystites nodosus.

- ECHINODISCUS, Worthen & Miller, 1883, Geo. Sur. Ill., vol. 7, p. 335. [Ety. echinos, sea urchin; diskos, quoit.] Body discoid; depressed convex, larger plates in the center of the interradial areas, none imbricating; narrow elongate plates form the border and pass to the under side forming a non-sessile rim; ambulacra 5, connected near the center, and composed of numerous interlocking plates; mouth central or subcentral. Type E. optatus.
 - kaskaskiensis, Hall, 1858, (Agelacrinus kaskaskiensis,) Geo. Sur. Iowa, p. 696, Kaskaskia Gr.
 - optatus, Worthen & Miller, 1883, Geo. Sur. Ill., vol. 7. p. 336, Kaskaskia Gr.
- Echino-encrinites, Meyer, 1826, Karst. Archiv. Nat., vol. 7. [Ety. echinos, sea urchin; krinon, lily.]

anatiformis, see Glyptocystites anatiformis. fenestratus, Troost. Not defined.

s Echinus drydenensis, see Eocidaris drydenensis.

gyracanthus, see Tentaculites gyracanthus.

ECHINODERMATA.

binate or su the calyx in wide rim; p openings 12 t pound, long, portions; int interradials, boscis excent the infolding

ERI.-EUC.]

Type E. magn adultus, Wachs Proc. Acad. Keokuk Gr.

attenuatus, Hal tuta var. atter

p. 14 Burling calyculoides, H calyculoides,)

p. 17, Burling carica, Hall, 18

Desc. New Cri clio, Hall, 1861, New Crinoide

Nat. Hist., v ton Gr. clœlia, Hall, 186

Desc. New C Jour. Nat. His ton Gr. corbulis, Hall,

bulis,) Desc. N Jour. Nat. His ton Gr.

coronatus, Hall, natus,) Supp. Burlington Gr.

gemmiformis, H gemmiformis,)





FIG. 298. Eretmocrinus konincki.

seday, 1859, A vol. 28, p. 241, matuta, Hall, 1861 Desc. New Cri ton Gr. matuta var. attenua neglectus, Meek d crinus neglecti Sci., p. 355, an p. 377, Burlingt originarius, Wach

Proc. Acad. Nat. ramulosus, Hall, 1 ulosus,) Geo. S kuk Gr.



[Ety. ekteino, I krinon, lily.] General very form elongate; calyx small, subcylindrical, moderately expanding; basals 5, unequal; radials irregular, four plates in three series, before the bifurcation of the free arms, and three in each of the other two series; arms 10, long; pinnules strong; azygous plates 3, following each other, but not in a direct line; vault unknown; column very long, round, tripartite, and attaching by an expanded base. Type E. simplex. This genus is founded upon Heterocrinus simplex, Hall, as the type, be-cause the genus Heterocrinus was founded upon H. heterodactylus, as

0

011

000

DDDO

the type, which is quite widely removed from H. simplex.

ings, 1859, (Heterocrinus canadensis,) Can. Org. Rem., Decade

plex var. grandis,) Pal. Ohio,

vol. 1, pl. 1, FIG. 296.-Ectenocrinus fig. 7, Hud. simplex. Diagram. Hud. simplex. Diagram.

- simplex, Hall, 1847, (Heterocrinus simplex,) Pal. N. Y., vol. 1, p. 280, Trenton and Hud. Riv. Gr.
- EDRIOASTER, Billings, 1858, Can. Org. Rem., Decade 3, p. 82. [Ety. edrion, seat; aster, star.] A substitute for Cyclaster, proposed in 1857, the latter name having been preoccupied. Body sessile, discoid; plates numerous, irregular, polygonal; ambulacral grooves 5, tapering, composed of two series of ablong ossicles; with four rows of ambulacral pores in each; mouth large, formed of five oral and five internal ossicles. Type E. bigsbyi.
- bigsbyi, Billings, 1857, (Cyclaster bigsbyi,) Rep. of Progr. Geo. Sur. Can., p. 293, and Can. Org. Rem., Decade 3, p. 82,
- EDRIGCRINUS, Hall, 1859, Pal. N. Y., vol. 3, p. 119. [Ety. edrion, seat; krinon, lily.] Body obconic; base solid, without column; radials 5, resting, in depressions, in the base; azygous plates 2, one large, resting in a basal depres-

sion, the other smaller and succeeding the first; arms composed of transversely linear plates and bifurcating. Type E. pocilliformis.

pocilliformis, Hall, 1859, Pal. N. Y., vol. 3, p. 121, Low. Held. Gr.

 by P. 124, 126 at 143, Oriskany sandstone.

Elæacrinus, Roemer, 1852, syn. for Nucleocrinus

kirkwoodensis, see Nucleocrinus kirkwood. ensis.

verneuili, see Nucleocrinus verneuili.

- ELEUTHEROCRINUS, Shumard & Yandell. 1856, Proc. Acad. Nat. Sci. Phil., vol. 8. p. 73. [Ety. el-utheros, free; krinon, lily.] Calyx subelliptical, resembling Nucleocrinus in form but depressed on the azygous side; trunca ed at the summit and bulged on one side; subtriangular at the base and prolonged on one of its sides; basals 3, one small, two irregular and much elongated; radials 1 x 5, four-forked, occupying nearly the length of the calyx, one short and not forked; interradials 1x5; pseudambulacral areas 5, four linear, extending nearly the entire length of the calyx, one short, subtriangular, situated on the summit plane; apertures 8 (?). Type E. cassedayi. cassedayi, Shumard & Yandell, 1856,
 - Proc. Acad. Nat. Sci. Phil., vol. 8, p. 74, Up. Held. Gr. whitfieldi, Hall, 1862, 15th Rep. N. Y. St.

Mus. Nat. Hist., App. C, p. 123, Ham. Gr. EOCIDARIS, Desor, 1858, Synopsis des Echinides Fossiles. [Ety. eos, dawn ; cilaris, turban.] Plates hexagonal; one large tubercle on each plate, smooth at the base and perforated at the summit; distinguished from Archæocidaris by the absence of a second ring. Type E.

drydenensis, Vanuxem, 1842, (Echinus drydenensis,) Geo. Rep. 3d Dist. N. Y., p. 184, and 20th Rep. N. Y. St. Mus. Nat. Hist., p. 343, Chemung Gr. hallanus, Geinitz, 1866, Carb. und Dyas. in Neb., p. 61, and Pal. E. Neb., p. 152, Up. Coal Meas.

squamosus, see Lepidocidaris squamosus. Eocystitus, Billings, 1868, Acad. Geol., p.

643. [Ety. eos, dawn; kustis, bladder.] Plates numerous, varying in size, form, and ornamentation, usually radiately sculptured. Type E. primævus.

eretmos, oar; krinon, lily.] Body bitur-

longidactylus, Walcott, 1886, Bull. U. S. Geo. Sur., No.

30, p. 94, Upper Taconic. Geol. p. 643, Up. Taconic, St. John's Gr. ERETMOCRINUS, Lyon & Casseday, FIG. 297. 1859, Am. Jour. Sci. and Eccevatiles Arts, vol. 28, p. 241. [Ety.



ECT.-ERE.

r and succeeding

Pal. N. Y., vol.

ir. 5th Rep. N. Y. 88, Up. Held. Gr. . N. Y., vol. 3, p.

syn. for Nucleo-

crinus kirkwood-

is verneuili. urd & Yandell, Sci. Phil., vol. 8, os, free; krinon, tical, resembling but depressed on unca ed at the 1 one side; sube and prolonged sals 3, one small, nuch elongated; ked, occupying the calyx, one d; interradials al areas 5, four arly the entire ne short, subtrie summit plane; E. cassedayi.

Yandell, 1856, Phil., vol. 8, p.

h Rep. N. Y. St. , p. 123, Ham. Gr. nopsis des Echis. dawn ; cilaris, onal; one large , smooth at the at the summit; rchæocidaris by 1 ring. Type E.

Rep. N. Y. St. Chemung Gr. larb. und Dyas. Pal. E. Neb., p.

ris squamosus. Acad. Geol., p. kustis, bladder.] ng in size, form, sually radiately rimævus. 1886.

, No. Acad. conic.

c.



ERI.-EUC.]

posed of transand bifurcating.

ie.

1842, (Echinus p. 3d Dist. N.

FIG 298 Eretmocrinus konineki.

seday, 1859, Am. Jour. Sci. and Arts, vol. 28, p. 241, Keokuk Gr. matuta, Hall, 1861, (Actinocrinus matuta,) Desc. New Crinoidea, p. 14, Burling-

ton Gr.

motula var. attenuata, see E. attenuatus. neglectus, Meek & Worthen, 1869, (Batocrinus neglectus,) Proc. Acad. Nat. Sci., p. 355, and Geo. Sur. Ill., vol. 5, p. 377, Burlington Gr.

originarius, Wachsmuth & Springer, 1881, Proc. Acad. Nat. Sci., p. 348, Keokuk Gr. ramulosus, Hall, 1858, (Actinocrinus ramulosus,) Geo. Sur. Iowa, p. 615, Keokuk Gr.

binate or subglobose, vault exceeding

the calyx in size; basals 3, forming a

wide rim; primary radials 3x5; arm

openings 12 to 22; arms simple or com-

pound, long, flattened in the upper

portions; interradials 1 to 3; azygous

interradials, 8 or more; tube or pro-

boscis excentric and extending beyond

the infolding arms; column round.

Proc. Acad. Nat. Sci. Phil., p. 349,

adultus, Wachsmuth & Springer, 1881.

attenuatus, Hall, 1861, (Actinocrinus ma-

calyculoides, Hall, 1860, (Actinocrinus

carica, Hall, 1861, (Actinocrinus carica,)

clio, Hall, 1861, (Actinocrinus clio,) Desc. New Crinoidea, p. 1, and Bost. Jour. Nat. Hist., vol. 7, p. 262, Burling-

clœlia, Hall, 1861, (Actinocrinus clœlia,) Desc. New Crinoidea, p. 1, and Bost.

Jour. Nat. Hist., vol. 7, p. 266, Burling-

corbulis, Hall, 1861, (Actinocrinus cor-bulis,) Desc. New Crin., p. 1, and Bost.

coronatus, Hall, 1860, (Actinocrinus coro-natus,) Supp. Geo. Sur. Iowa, p. 28,

gemmiformis, Hall, 1860, (Actinocrinus

gemmiformis,) Supp. Geo. Sur. Iowa,

Keokuk Gr.

intermedius, Wachsmuth

konincki, Shumard, 1855,

(Actinocrinus kon-

incki,) Geo. Sur. Mo.,

Desc. New Crin., p. 1,

and Bost. Jour. Nat. Hist., vol. 7, p. 261,

magnificus, Lyon & Cas-

Burlington Gr.

leucosia,)

p. 194, Burlington Gr. leucosia, Hall, 1861, (Ac-tinocrinus leucosia,)

& Springer, 1881, Proc.

Acad. Nat. Sci., p. 348,

Jour. Nat. Hist., vol. 7, p. 265, Burling-

Desc. New Crin., p. 10, Burlington Gr.

tuta, var. attenuatus,) Desc. New Crin.,

calyculoides,) Supp. to Geo. Sur. Iowa,

Type E. magnificus.

p. 14, Burlington Gr.

p. 17, Burlington Gr.

Keokuk Gr.

ton Gr.

ton Gr.

ton Gr.

Burlington Gr.

p. 23, Burlington Gr.

remibrachiatus, Hall, 1861, (Actinocrinus remibrachiatus,) Desc. New Crinoidea, p. 11, Burlington Gr.

varsouviensis, Worthen, 1882, Bull. No. 1, 111 St. Mus. Nat. Hist., p. 30, and Geo. Sur. Ill., vol. 7, p. 306, Warsaw Gr.

verneuilanus, Shumard, 1855, (Actinocrinus verneuilianus.) Geo. Sur.



muth & Springer,

1887, Note to p. 255, Revis. Palæo-

syn.

1865,

Geinitz,

crinoidea,

Worthen,

for E. planus.

conoideus, Meek &

Proc. Acad. Nat. Sci. Phil., p. 150, and Geo. Sur. Ill.,

vol. 2, p. 318, Up. Coal Meas.

Mo., p. 193, Burlington Verneuilanus. Gr.

- ERISOCRINUS, Meek & Worthen, 1865, Am. Jour. Sci. and Arts, vol. 89, p. 174. [Ety. eris, contention; krinon, lily.] Calyx saucer-shaped; basals 5, small; subradials 5, large; radials 2 x 5, large; no interradials; arms 10; column round. Type E. typus. antiquus, Meck & Worthen, 1869, Proc.
 - Acad. Nat. Sci. Phil., p. 71, and Geo. Sur. Ill., vol. 5, p. 447, Burlington Gr. cognatus, Wachs-



FIG. 300. – Erisocrinus conoideus. Side view, inflexus, natural size; b, dia-gram, 2 diam.

1866, (Cyathocrinus inflexus,) Carb. und Dyas, in Neb., p. 62, and

White's Cont. to Pal., No. 6, p. 128, Coal. Meas.

nebraskensis, Meek & Worthen, 1865, Am. Jour. Sci., vol. 89, p. 174, Up. Coal Meas. Regarded a variety of E. typus. planus, White, 1880, Proc. U. S. Nat. Mus., vol. 2, p. 257, and Cont. to Pal., No. 6, p. 127, Coal Meas.



FIG. 301.-Erisocrinus typus. Two side views, basal view, and top view of calyx.

typus, Meek & Worthen, 1865, Am. Jour. Sci. and Arts, vol. 89, p. 174, and Geo. Sur. Ill., vol. 2, p. 319, Up. Coal Meas. tuberculatus, see Eupachycrinus tuberculatus.

hatus.
whitii, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 72, and Geo. Sur. Ill., vol. 5, p. 448, Burlington Gr.
EUCALYPTOCRINUS, Goldfuss, 1826, Petref. Germ., p. 212. [Ety. eu, well; kalyptos, covered; krinon, lily.] Body turbinate

243

or bowl-shaped from base to arms. and with arms and interbrachial plates subovate or subelliptical; basals 4, concealed in basal cavity and developed in the interior; primary radials 3x5, the first large; secondary radials 2×10 ; interradials 3, one very large; arms 20, composed of a double series of plates, which fill the interbrachial spaces; interbrachial plates solid, extending from the interradial plates as high as the arms reach, and uniting at the summit; proboscis or tube extending to the top, and sometimes far beyond; column round; attaching by branching roots. Type É. rosaceus.

armosus, see Siphonocrinus armosus.

- cælatus, Hall, 1843, (Hypanthocrinites cælatus,) Geo. Rep. 4th Dist. N. Y., p. 113, and 28th Rep. N. Y. St. Mus. Nat.
- Hist., p. 142, Niagara Gr. chicagoensis, Winchell & Marcy, 1865, Mem. Bos. Soc. Nat. Hist., p. 90, Ni-agara Gr. conicus, Troost. Not defined.

- constrictus, Hall, 1879, Trans. Alb. Inst., vol. 10 (Abstract, p. 10), and²11th Rep. Geol. and Nat. Hist. Ind., p. 273, Niagara Gr.
- cornutus, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 363, Niagara Gr.
- cornutus var. excavatus, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 364, Niagara Gr.



FIG. 302.-Eucalyptocrinus crassus.

- crassus, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 197, and 28th Rep. N. Y. St. Mus. Nat. Hist., p. 141, Niagara Gr.
- decorus, Phillips, 1839, (Hypanthocri-nites decorus,) Murch. Sil. Syst., p. 672, and Pal. N. Y., vol. 2, p. 207, Niagara Gr.
- depressus, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 232, Niagara Gr.

egani, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 140, Niagara Gr. extensus, Troost. Not defined.

gibbosus, Troost. Not defined.

goldfussi, Troost. Not defined.

- inconspectus, Ringueberg, 1884, Proc. Acad. Nat. Sci., p. 148. Not properly defined. lævis, Troost. Not defined.
- magnus, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 501, Niagara Gr.
- nashvillæ, Troost. Not defined. obconicus, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 365, Niagara Gr.
- ornatus, Hall, 1861, Rep. of Progr. Geo. Sur. of Wis., p. 20, Niagara Gr.
- ovalis, Troost, as figured by Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 143, Niagara Gr.
- papulosus, Hall, 1852, Pal. N. Y., vol. 2, p. 211, Niagara Gr. phillipsi, Troost. Not defined. proboscidalis, S. A. Miller, 1882, Jour.
- Cin. Soc. Nat. Hist., vol. 5, p. 224, Niagara Gr.
- ramifer, Roemer, 1860, Sil. Fauna West Tenn., p. 51, Niagara Gr. rotundus, S. A. Miller, 1882, Jour. Cin.
- Soc. Nat. Hist., vol. 5, p. 82, Niagara Gr.
- splendidus, Troost, Catal. Hall & Whit-field, 1875, Ohio Pal., vol. 2, p. 128, Niagara Gr.
- tennesseeæ, Troost. Not defined.

tuberculatus, Miller & Dyer, 1878, Jour. Čin. Soc. Nat. Hist.,

vol. 1, p. 36, Niagara Gr. turbinatus, S. A Miller, 1882, Jour. Cin. Soc.



- p. 82, Niagara Gr. EUCLADOCRINUS, FIG. 803 Eu calyptocrinus tuberculatus. Meek, 1871, U.S.
 - Geo. Sur. Terr., p. 373. [Ety. eu, very; k/ados, branch; krinon, lily.] Calyx like Platycrinus, and distinguished by having the radial series extended in the form of tubular free rays, which bear arms, alternately, on either side, throughout their length; arms composed of a double series of interlocking plates. Type E. montanensis.
 - millebrachiatus, Wachsmuth & Springer, 1878, Proc. Acad. Nat. Sci. Phil., p. 245, Burlington and Keokuk Gr.
- montanensis, Meek, 1871, Hayden's Rep. U. S. Geo. Sur. Ter., p. 373, Subcarboniferous.
- pleuroviminus, White, 1862, (Platycri-nus pleuroviminus,) Proc. Bost. Soc. Nat. Hist., vol. 9, p. 17, Up. Burlington Gr.
- EUGASTER, Hall, 1868, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 332. [Ety. euge, pre-eminent, remarkable; aster, star.] A central, alated disk, with five long, slender flexuous rays; disk composed on the ventral side of small polygonal

0

EUC.-EUG

plates; rays series of alter bulacral ossicl cral plates; or two rows in and disk-plate logani.

concinnus, Ring Soc. Nat. Sci. ara Gr.

logani, Hall, 186 Mus. Nat. Hist

EUPACHYCRINUS, M Proc. Acad. N [Ety. eu, very lily.] Calyx s plates heavy, t defined; basal dials 2 x 5, and third radials the second ra bearing; azygo 5 or 10, compo

of plates, bear round. Type H alis.

asperatus, Worth Ill. St. Mus. N Geo. Sur. Ill., kaskia Gr.

bassetti, Worthen vol. 6, p. 528, C boydi, Meek & Acad. Nat. Sc Geo. Sur. Ill.,

kaskia Gr. craigi, Worthen, 6, p. 527, Coal 1

crassus, Meek & V crinus crassus,) Phil., p. 392, an

p. 314, Low. Coa



FIG. 304.-Eupachycri

fayettensis, Worthe vol. 5, p. 565, Up formosus, Worthe formosus,) Geo. S

Kaskaskia Gr. germanus, S A. Mi Soc. Nat. Hist., v kia Gr.

EUC.-EUG.

EUP.]

efined. 1884, Proc. Acad. properly defined.

ed. 5, Geo. Sur. Ill., Ġr. efined. 20th Rep. N. Y.

, p. 365, Niagp. of Progr. Geo. agara Gr. d by Hall, 1876, us. Nat. Hist., p.

al. N. Y., vol. 2,

fined. iller, 1882, Jour. ol. 5, p. 224, Ni-

Sil. Fauna West Gr. 1882, Jour. Cin.

5, p. 82, Niagal. Hall & Whitvol. 2, p. 128, Ni-

defined.



303 -Eu calyptocriis tuberculatus.

[Ety. eu, very ; m, lily.] Calyx distinguished by ies extended in ree rays, which on either side, gth; arms comries of interlocknontanensis.

nuth & Springer, Sci. Phil., p. 245, k Gr.

, Hayden's Rep. p. 373, Subcar-

1862, (Platycri-Proc. Bost. Soc. 7, Up. Burling-

Rep. N. Y. St. 332. [Ety. euge, ble; aster, star.] , with five long, ; disk composed small polygonal

ECHINODERMATA.

plates; rays consisting of a double series of alternating, subquadrate, am-bulacral ossicles, with curved ambulacral plates; oral plates 10; pores large, two rows in each ray; adambulacral and disk-plates spine-bearing. Type E. logani.

concinnus, Ringueberg, 1886, Bull. Buff. Soc. Nat. Sci., vol. 5, p. 8, Niagara Gr.

logani, Hall, 1868, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 333, Ham. Gr.

- EUPACHYCRINUS, Meek & Worthem, 1865, Proc. Acad. Nat. Sci. Phil., p. 159. [Ety. eu, very; pachys, thick; krinon, iily.] Calyx saucer or bowl shaped; plates heavy, tumid; sutures strongly defined; basals 5; subradials 5; radials $2 \ge 5$, and sometimes there are third radials in some of the rays; the second radials are often spinebearing; azygous interradials 3; arms 5 or 10, composed of a double series of plates, bearing pinnules; column round. Type E. quatuordecembrachalis.
- asperatus, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 34, and Geo. Sur. Ill., vol. 7, p. 311, Kaskaskia Gr.
- bassetti, Worthen, 1875, Geo. Sur. Ill.,
- vol. 6, p. 528, Coal Meas. boydi, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 30, and Geo. Sur. Ill., vol. 5, p. 554, Kaskaskia Gr.
- craigi, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 527, Coal Meas.
- crassus, Meek & Worthen, 1870, (Cyathocrinus crassus,) Proc. Acad. Nat. Sci. Phil., p. 392, and Geo. Sur. Ill., vol. 2, p. 314, Low. Coal Meas.



FIG. 304.-Eupachycrinus crassus. Diagram.

- layettensis, Worthen, 1873, Geo. Sur. Ill.,
- vol. 5, p. 565, Up. Coal Meas. formosus, Worthen, 1873, (Zeacrinus formosus,) Geo. Sur. Ill., vol. 5, p. 549, Kaskaskia Gr.
- germanus, S A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 40, Kaskaskia Gr.

17

gracilis, Wetherby, 1880, (Cromyocrinus gracilis,) Jour. Cin. Soc. Nat. Hist., vol. 2, p. 248, Kaskaskia Gr.

hemisphericus, Shumard, 1858, (Poterio-crinus hemisphericus,) Trans. St. Louis, Acad. Sci., vol. 1, p. 221, and Geo. Sur. Ill., vol. 5, p. 561, Coal Meas.



FIG. 305.—Eupachycrinus sangamonensis Diagram.

- monroensis, Worthen, 1882, Bull. No. 1, St. Mus. Nat. Hist., p. 30, Kaskaskia Gr.
- orbicularis, Hall, 1861, (Scaphiocrinus orbicularis,) Bost. Jour. Nat. Hist., p. 311, Keokuk Gr.
- pentalobus, Hall, 1858, (Cyathocrinus pentalobus,) Geo. Sur. lowa, p. 687, Kaskaskia Gr.
- platybasis, White, 1876, Geo. Uinta Mountains, p. 108, and Cont. to Pal., No. 6, p. 124, Low. Aubrey Gr.
- quatuordecembrachialis, Lyon, 1857, (Graphiocrinus quatuordecembrachi-alis,) Geo. Sur. Ky., vol. 3, p. 477, Kaskaskia Gr.
- sanctiludovici, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 98, St. Louis Gr.
- sangamonensis, Meek & Worthen, 1861, (Cyathocrinus sangamonensis,) Proc. Acad. Nat. Sci. Phil., p. 392, and Geo. Sur. Ill., vol. 2, p. 310, Up. Coal Meas.
- spartarius, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 38, Kaskaskia Gr.
- subtumidus, Worthen, 1867, (Zeacrinus subtumidus,) Geo. Sur. Ill., vol. 5, p. 548, Kaskaskia Gr.
- tuberculatus, Meek & Worthen, 1865, (Erisocrinus tuberculatus,) Proc. Acad. Nat. Sci. Phil., p. 150, and Geo. Sur. Ill., vol. 2, p. 319, Coal Meas.
- verrucosus, White & St. John, 1869, Trans. Chi. Acad. Sci., p. 117, Coal Meas.

ECHINODERMATA.

1878, Iconogr. Crinoid Suec., p. 24.

Ety. euspeires,

winding; krinon,

lily.] Calyx cyathi-

form; basals 5; subradials 5, large; radials 1x5, wider

than high, excavated

for the attachment

of the arms;

azygous area wide,

plates large ; ventral

tube composed of

multibrachiatus, see Taxocrinus multibrachiatus.

norwoodi, see Onychocrinus norwoodi. nuntius, see Taxocrinus nuntius. parvus, Wetherby, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 138, Kaskaskia Gr.



FIG. 308.-Forbesocrinus wortheni.

pratteni, see Melocrinus pratteni.

ramulosus, Lyon & Casseday, see Onychocrinus ramulosus.

ramulosus, Hall, see Taxocrinus ramulosus. saffordi, see Taxocrinus saffordi.

semiovatus, see Taxocrinus semiovatus. shumardanus, see Taxocrinus shumardanus. spiniger, see Taxocrinus spiniger. subramulosus, Shumard, 1866, syn. for

Taxocrinus ramulosus. thiemii, see Taxocrinus thiemii. whitfieldi, see Taxocrinus whitfieldi. wortheni, Hall, 1858, Geo. Rep. Iowa, p. 632, Keokuk Gr.



FIG. 309.-Gaurocrinus nealli. Diagram.

GAUROCRINUS, S. A. Miller, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 228. [Ety. gauros, haughty; proud; krinon, lily.] [Ety. GEN.-GLY.]

Calyx havin depressed in ary radial ar primary ra posterior ray 10 to 16 x 10 ous and sma by a ridge plates; vault which are co the arm ful bearing pinn angularis, Mill crinus angul Hist., vol. 1, cognatus, S. A.

FIG. 310, -Gaurocrit nealli.

GENN ÆOCRINUS, 1882, Proc. Ac gennaios, of n Body wider th vault low; b 3x5; second radials 5 to 7; numerous, an the second re Actinocrinus; Type G. corni calypso, Hall, 186 15th Rep. N. 133, Ham. Gr. cassedayi, Lyon, sedayi,) Proc. 410, Up. Held. cauliculus, Hal cauliculus,) 151 Nat. Hist., p. 1 cornigerus, Ly (Actinocrinus Sci., vol. 28, p. eucharis, Hall, charis,) 15th R Hist., p. 130, H kentuckiensis, Shi crinus kentuck Acad. Sci., p. nigerus.

EUSPIROCRINUS, Angelin,

306. - Euspiro-FIG. crinus obconicus.

large plates; vault covered with large plates; Type E. arms bifurcate. spiralis.

obconicus, W. R. Billings, 1885, Ottawa Field Nat. Club, vol. 2, p. 248, Trenton Gr.



FIG. 307.-Euspirocrinus obconicus. Diagram.

- FORBESOCRINUS, DeKoninck & LeHon, 1854. Resch. Crin. Carb. Belg., p. 118. [Ety. proper name; krinon, lily.] Calyx Calyx large, plates heavy ; basals 3 ; subradials 5; primary radials 3 or 4×5 ; secondary radials 2 to 4×10 ; tertiary radials 2 to 4×20 ; arms 50 to 60, long and sometimes dividing; regular interradials 10 to 20 or more; azygous interradials numerous; interaxillaries 10 to 20 or more. Type F. nobilis. agassizi, Hall, 1858 and 1860, Geo. Sur. of Iowa, p. 631, Burling
 - ton Gr. agassizi var. giganteus, Meek & Worthen, 1861, Proc. Acad. Worthen, 1861, Proc. Acad. Nat. Sci. Phil. p. 131, and Geo. Sur. Ill., vol. 3, p. 495, Burlington Gr.
 - asteriformis, see Onychocrinus as Duccova DIO teriformis.
 - cestriensis, Hall, 1860, Supp. to Geo. Iowa, p. 68, Kaskaskia Gr.
 - communis, see Taxocrinus communis.

giddingi, see Taxocrinus giddingi. juvenis, see Taxocrinus givenis. kelloggi, see Taxocrinus kelloggi. lobatus, see Taxocrinus lobatus. lobatus var. tardus, see Taxocrinus

lobatus var. tardus. meeki, see Taxocrinus meeki.

monroensis, see Onychocrinus monroensis.



EUS.-GAU.

'axocrinus mul-

nus norwoodi. nuntius. 9. Jour. Cin. Soc. 38, Kaskaskia Gr.



aus wortheni

s pratteni. asseday, see Ony-

ocrinus ramulosus. s saffordi. ius semiovatus. inusshumardanus. spiniger. rd, 1866, syn. for 18. thiemii. 18 whitfieldi.

Jeo. Rep. Iowa, p.





COLODADU

li. Diagram.

er, 1883, Jour. Cin. d. 6, p. 228. [Etv. oud; krinon, lily.

GEN.-GLY.]

ECHINODERMATA.

Calyx having strong radial ridges and depressed interradial and intersecondary radial areas; basals 5; subradials 5; primary radiats 3x5, or the left posterior ray only 2; secondary radials 10 to 16×10 ; interradial plates numerous and small; azygous area supported by a ridge up the middle series of plates; vault covered by small plates, which are continued as a covering over the arm furrows; arms 20 or more, bearing pinnules. Type G. nealli.

angularis, Miller & Dyer, 1878, (Glypto-crinus angularis,) Jour. Cin. Soc. Nat. Hist., vol. 1, p. 28, Hud. Riv. Gr.

cognatus, S. A. Miller, 1881, (Glyptocrinus cognatus,) Jour. Cin, Soc. Nat. Hist., vol. 4, p. 75, Hud.

Riv. Gr. magnificus, S. A. Miller, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 230, Hud. Riv. Gr.

nealli, Hall, 1866,

(Glyptocrinus nealli,) Adv.

Sheets 24th Rep. N. Y. St. Mus.

Nat. Hist., p. 206, and Obio Pal., vol.

1, p. 34, Hud. Riv.

Miller, 1883, Jour.

Cin. Soc. Nat.

splendens, S. A.



FIG. 310, -Gaurocrinus nealli.

Hist., vol. 6, p. 230, Trenton Gr. GENN EOCRINUS, Wachsmuth & Springer, 1882, Proc. Acad. Nat. Sci., p. 334. [Ety. gennaios, of noble birth; krinon, lily.] Body wider than high, lobed, striated vault low; basals 3; primary radials 3x5; secondary radials 1x10; interradials 5 to 7; azygous interradials more numerous, and having three plates in the second row instead of two, as in Actinocrinus; interaxillaries 1 to 3.

Gr.

Type G. cornigerus. calypso, Hall, 1862, (Actinocrinus calypso,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 133, Ham. Gr.

- cassedayi, Lyon, 1861, (Actinocrinus cassedayi,) Proc. Acad. Nat. Sci. Phil., p. 410, Up. Held. Gr.
- cauliculus, Hall, 1862, (Actinocrinus cauliculus,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 132, Ham. Gr.
- cornigerus, Lyon & Casseday, 1859.(Actinocrinus cornigerus,) Am. Jour.
- Sci., vol. 28, p. 238, Ham. Gr. eucharis, Hall, 1862, (Actinocrinus eu-charis,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 130, Ham. Gr.
- kentuckiensis, Shumard, 1860, (Actino-crinus kentuckiensis,) Trans. St. Louis Acad. Sci., p. 345, syn. for G. cornigerus.

nyssa, Hall, 1862, (Actinocrinus nyssa,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 129. Ham. Gr.

- pocillum, Hall, 1862, (Actinocrinus pocillum,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 134, Ham. Gr.
- GLYPTASTER, Hall, 1852, Pal. N. Y., vol. 2, p. 187. [Ety. glyptos, sculptured; aster, star.] Calyx obconical, depressed between the arm bases, radial portion ridged; basals 5; subradials 5; primary radials 3 x 5; secondary radials 2 or more by 10; interradials 6 or more; azygous interradials more numerous; arms 10, composed of double series of plates. Type G. brachiatus.

brachiatus, Hall, 1852, Pal. N. Y., vol. 2, p. 187, Niagara Gr.



FIG. 311.--Glyptaster egani. enlarged. Natural size and

egani, S. A. Miller, 1881, Jour. Cin. Soc. Nat Hist., vol. 4, p. 261, Niagara Gr. inornatus, Hall, 1863, Trans. Alb. Inst.,

vol. 4, p. 205, and 29th Rep. N. Y. St. Mus. Nat. Hist., p. 134, Niagara Gr. occidentalis, Hall,

1863, Trans. Alb. Inst., vol. 4, p. 204, and 28th Rep. N. Y. St. Mus. Nat. Hist., p. 134, Niagara Gr. occidentalis var. crebescens, Hall, 1879, 28th Rep. N. Y. St. Mus. Nat. Hist., p.



133, Niagara Gr. pentangularis, Hall, FIG. 312.—Glyptaster occidentalis. N. Y. St. Mus. Nat. Hist., p. 369, Ni-

agara Gr.

GLYPTOCRINUS, Hall, 1847, Pal. N. Y., vol. 1, p. 280. [Ety. glyptos, " sculptured;



FIG. 813. — Glyptocrinus decadactylus. Part of vault mag. 6 diam, showing excurrent opening.

krinon, lily.] Calyx obconoidal, interradial areas flattened or depressed ; surface sculptured and having radial ridges; basals 5; primary radials 3 x 5;

ECHINODERMATA.

scondary radials 1 or more by 10; tertiary radials usually present; arms 10 to 20 or more, bearing pinnules; first interradial resting upon the first



FIG. 314.-Glyptocrinus decadactylus. Diagram.

primary radials, and followed by succeeding ranges of two or more, which graduate into the vault; vault slightly

convex, with sunken interradial areas; plates becoming smaller as they approach the inner face of the arms, and becom-ing a somewhat granular continuous cover over the ambulacral furrows: excurrent opening subcentral on the upper face

of the vault; column FIG.315.--Glypto-round, without base or crinus decaroots for attachment. dactylus. Type G. decadactylus.

angularis, see Gaurocrinus angularis. argutus, Walcott, 1883, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 207,

Trenton Gr.

nus armosus.

baeri.

carleyi.

cognatus.

armosus, see Siphonocri-

baeri, see Xenocrinus

carleyi, see Mariacrinus

cognatus, see Gaurocrinus

decadactylus, Hall, 1847,

dyeri, Meek, 1872, Proc. Acad. Nat. Sci. Phil., p.

Pal. N. Y., vol. 1, p. 281, Hud. Riv. Gr.

314, and Ohio Pal., vol.

1, p. 32, Hud. Riv. Gr.

deca-



FIG. 316. — Glyp-tocrinus forn-shelli.

A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 103, Hud. Riv. Gr.

fimbriatus, Shumard, 1855, Geo. Sur. Mo. p. 194, Trenton Gr.

GLY.

- fornshelli, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 348, Hud. Riv. Gr. gracilis, Wetherby, syn. for Gaurocrinus angularis.
 - harrisi, see Compsocrinus harrisi.
 - lacunosus, see Archæocrinus lacunosus. libanus, Safford, 1869, Geo. of Tenn. Not defined.
 - marginatus, see Archæocrinus marginatus.
 - miamiensis, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 34, Hud. Riv. Gr.
 - nealli, see Gaurocrinus nealli
 - nobilis, see Siphonocrinus nobilis.
 - ornatus, Billings, 1857, Rep. of Progr.
 - Geo. Sur. Can., p. 260, and Can. Org. Rem., Decade 4, p. 60, Trenton Gr. parvus, Hall, 1872, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 207, Hud. Riv. Gr.
 - pattersoni, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 80, Utica Slate Gr.
- plumosus, Hall, 1843, (Actinocrinus plumosus,) Geo. Rep. 4th Dist. N. Y., p. 72, and Pal. N. Y., vol. 2, p. 180, Clinton Gr. Founded upon fragments too poor for even generic determina-
- tion.
- Discus, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 257, and Can. Org Rem., Decade 4, p. 56, Black Riv. and Trenton Grs.
- quinquepartitus, Billings, 1859, Can. Org. Rem., Decade 4, pl. 8, fig. 4a, 4b, Trenton Gr.
- ramulosus, Billings, 1856, Can. Nat. Geo., vol. 1, and Can. Org. Rem., Decade 4. p. 57, Trenton Gr.
- richardsoni, Wetherby, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 245, Hud. Riv. Gr.
- sculptus, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 37, Hud. Riv. Gr.
- shafferi, see Pycnocrinus shafferi.
- shafferi var. germanus, see Pycnocrinus germanus.
- siphonatus, Hall, 1861, syn. for Siphonocrinus armosus.
- subglobosus, Meek, 1873, (G. dyeri var subglobosus,) Pal. Ohio, vol. 1, p. 34, Hud. Riv. Gr.
- subnodosus, see Rhaphanocrinus subnodosus.
- GLYPTOCYSTITES, Billings, 1854, Can. Jour., vol. 2, p. 215, and Can. Org. Rem., Decade 3, p. 53. [Ety. glyptos, sculptured; kustis, bladder.] Body elongate, cylin-drical; four series of plates, 4 in the basal and 5 in each succeeding series; mouth in one of the plates of the second series; ambulacral orifice at the center of the summit where it receives the five ambulacral grooves; arms recumbent upon the apex of the fossil,

GOM.-GON.]

to 13 pectina tapering to a anatiformis, H anatiformis, Trenton Gr. forbesi, Billing Sur. Can., p Decade 3, p. logani, Billing Geo. Sur. C Rem., Decad



FIG. 317.—Glyptoc tites multiporu

Rep. N. Y. 8 [Ety. gompho bladder.] El



FIG. 318.—Goniast

below, inflated ranged ; ambula upper surface; sessile, and cur ral orifice outwa of greatest dian

clavus, Hall, 1864, Nat. Hist., p. 35 glans, Hall, 1864, Nat. Hist., p. 3

GLY.

5, Geo. Sur. Mo.,

1874, Cin. Quar. 8, Hud. Riv. Gr. n. for Gaurocri-

nus harrisi. rinus lacunosus. Geo. of Tenn.

hæocrinus mar-

iller, 1882, Jour. t., vol. 5, p. 34,

1 nealli. nus nobilis. 7, Rep. of Progr. 30, and Can. Org. 30, Trenton Gr. 24th Rep. N. Y. 3., p. 207, Hud.

ller, 1882, Jour. t., vol. 5, p. 80,

3, (Actinocrinus). 4th Dist. N. Y., r., vol. 2, p. 180, upon fragments neric determina-

ep. of Progr. Geo. Can. Org Rem., k Riv. and Tren-

8, 1859, Can. Org. fig. 4a, 4b, Tren-

3, Can. Nat. Geo., Rem., Decade 4,

1880, Jour. Cin. 2, p. 245, Hud.

1882, Jour. Cin. 5, p. 37, Hud.

shafferi. Pycnocrinus ger-

yn. for Siphono-

3, (G. dyeri var hio, vol. 1, p. 34,

inocrinus subno-

1854, Can. Jour., 1. Org. Rem., Decyptos, sculptured; elongate, cylin-plates, 4 in the succeeding series; plates of the secral orifice at the where it receives grooves; arms repex of the fossil, GOM.-GON.]

ECHINODERMATA.

Bill-

and grooves beset with small plates; 10 to 13 pectinated rhombs; column short, tapering to a point. Type G. multiporus. anatiformis, Hall, 1847, (Echinoencrinites anatiformis,) Pal. N. Y., vol. 1, p. 89, Trenton Gr.

forbesi, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 283, and Can. Org. Rem., Decade 3, p. 59, Chazy Gr.

logani, Billings, 1857, Rep. of Progress, Geo. Sur. Can., p. 282, and Can. Org. Rem., Decade 3, p. 57, Trenton Gr.

gani var. gra-cilis, Billings, logani 1858, Can. Org. Rem., Decade 3, p. 59, Trenton Gr. multiporus, ings, 1854, Can. Jour., vol. 2, p. 215, and Can. Org. Rem., Decade 3, p. 54, Trenton Gr. FIG. 317.—Glyptocys-tites multiporus. GOMPHOCYSTITES,

Rep. N. Y. St. Mus. Nat. Hist., p. 351,

[Ety. gomphos, nail or rudder; kustis, bladder.] Elongate pyriform, narrow



indianensis n. sp., Niagara Gr. Upper part elliptical in outline and regularly convex; five ambulacral grooves curve, spirally outward from an ambulacral

orifice within the groove near the mouth, and extend below the summit; mouth round, situate between two of the ambulacral grooves; each am bulacral groove has a suture in the bottom of it, but there is no other evidence of the subdivision of the top into plates; even the mouth

'IG. 319. — Gompho-cystites indianensis. Summit view. FIG. Gompho-

appears as a hole through a solid test; whole surface tuberculated, and each tubercle pierced with a pair of pores. Collected by J. F. Hammell in Jefferson County, Indiana. tenax, Hall, 1864, 20th Rep. N. Y. St.

Mus. Nat. Hist., p. 352, Niagara Gr. GONIASTEROIDOCRINGS, Lyon & Casseday, 1859, Am. Lour. Sci., vol. 28,

2d series, p. 233. [Ety. like the recent genus Goniaster; krinon, lily.] Body short, cylindrical, or subglobose ; basals 5; subradials 5, often protuberant; primary radials 3 x 5; secondary radials 2 to 4 x 10; arms numerous, delicate, pend-



320. Dia grammatic view of Gilbertsocri-nus bursa to nus bursa to show it is dis-tinct from Goniasteroidocrinus

FIG. 318.—Goniasteroidocrinus fiscellus. Diagram 2 diam.

below, inflated above; plates spirally arranged; ambulacral orifice central on the upper surface; mouth excentric; arms sessile, and curving from the ambulac-ral orifice outward to or below the point of greatest diameter. Type G. glans. clavus, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 353, Niagara Gr. glans, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 352, Niagara Gr.

ent, supporting pinnules; interradials 10 to 18 in each area; vault depressed and extending in five or six pseudo-brachial appendages star-like, which bifurcate, then spread, curve, and terminate each in a point; these brachial appendages separate the interradial areas from the dome; excurrent orifice sublateral, not protruding. Type S. tuberosus. There are some who use Ollacrinus as the

generic name, but it was not defined or established; there are others who use Gilbertsocrinus, but it, probably, is a distinct genus, and, so far, not known in America.

fiscellus, Meek & Worthen, 1861, (Trematocrinus fiscellus,) Proc. Acad. Nat. Sci. Phil., p. 383, and Geo. Sur. Ill., vol. 2, p. 222, Burlington Gr.



f. 321.—Goniasteroidocrinus tuberosus. A is the vault: O, the opening; B, side view of vault; C, under side of false arms; D, eulargement of base of arms.



FIG. 322.-Three views of Gilbertsocrinus cal-Goniasteroidocrinus.

- obovatus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci., Phil., p. 76, and Geo. Sur. Ill., vol. 5, p. 391, Burlington Gr. papillatus, Hall, 1860, (Trematocrinus papillatus,) Supp. to Geo. Rep. Iowa,
- p. 76, Burlington Gr.
- reticulatus, Hall, 1861, (Trematocrinus reticulatus,) Desc. New Crinoidea, p. 9, and Bost. Jour. Nat. Hist. vol. 7, p. 325, Burlington Gr.

- robustus, Hall, 1860, (Trematocrinus robustus,) Supp. to Geo. Rep. Iowa, p. 77, Keokuk Gr.
- spinigerus, Hall, 1862, (Trematocrinus spinigerus,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 128, Ham. Gr.
- tenuiradiatus, Meek & Worthen, 1869, Proc Acad. Nat. Sci. Phil., p. 75, and Geo. Sur. Ill., vol. 5, p. 389, Burlington Gr.
 - tuberculosus, Hall, 1860, (Tremato-crinus tuberculosus,) Supp. to Geo. Rep. Iowa, p. 75, Burlington Gr.
 - tuberosus, Lyon & Casseday, 1859. Am. Jour. Sci., vol. 28, 2d ser., p. 233, Kaskaskia Gr.
 - typus, Hall, 1860, (Trematocrinus typus, Supp. to Geo. Rep. Iowa, p. 73, Burlington Gr. RANATOCRINUS, Troost, 1850, Cat.
 - Foss. in Am. Jour. Sci., vol. 8, p. 420, and described by Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 146. [Ety. gran-atos, granular; krinon, lily.] Calyx subglobose oval or elliptic; the proportions of the plates giving a very different outline to the calyx from that of a Pentremites; summit depressed convex; base flattened or concave; ambulacral areas like those in Pentremites, but narrower, and extending nearly or quite the entire length; basals 3, sunken so as not to be visible in a side view; radials and deltoids similar to those of Pentremites and proportionally as variable; slender, thread-like arms, or pinnules, as in Pentremites; ambulacra and lancet-plates in narrow sinuses; anal opening as in Pentremites; central openby small plates; ten narrow hydrospiral canals open externally by either five or ten aper-Type G. norwoodi. tures.

- cidariformis, Troost. Not defined. cornutus, Meek & Worthen, 1861, (Pentremites cornutus,) Proc. Acad. Nat.
- sci. Phil., p. 141, and Geo. Sur. Ill., vol. 2, p. 276, St. Louis Gr. curtus, Shumard, 1855, (Pentremites cur-tus,) Geo. Rep. Mo., p. 187, Warsaw Gr.
- glaber, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 91, and Geo. Sur. Ill., vol. 5, p. 537, St. Louis Gr.
- granulatus, Roemer, 1852, (Pentatremat-ites granulatus,) Monog. Blast., p. 43, Warsaw Gr.
- granulosus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 165, and Geo. Sur. Ill., vol. 5, p. 508, Keokuk Gr. leda, Hall, 1862, (Pentremites leda,) 15th
- Rep. N. Y. Mus. Nat. Hist., p. 149, Ham. Gr.

lotoblastus, V Foss., p. 15 Mer., vol. 4,



melo, Owen & mites melo, Phil., 2d ser. Gr. Etherid species the t toblastus, ai genus G. pis ters, however melo var. project

jectus. melonoides, see missouriensis,

Louis Acad. S neglectus, Meel Acad. Nat. S

Sur. Ill., vol. norwoodi, Owe tremites nory Sci. Phil., 2d



FIG. 324.-Granato projectus. Diag

Phil., p. 42, an 496, Burlingto roemeri, Shuma meri,) Geo: Re sayi, see Schizob

shumardi, Meel Acad. Nat. So Sur. Ill., vol. 3

GRAPHIOCRINUS, D Rech. Crin. [Ety. graphic krinon, lily.] this genus as radials, but a muth, there by the column 1 x 5, upper m 1 x 5; suture heavy, short pinnules long small, but ext strong ventral G. encrinoides

carbonarius, Me phiocrinus ca

GRA.

GRA.

GRA.]

ematocrinus ro-Rep. Iowa, p.

(Trematocrinus N. Y. St. Mus. Gr.

rthen, 1869, Proc p. 75, and Geo. Burlington Gr. , 1860, (Trematoosus,) Supp. to , p. 75, Burling-

Casseday, 1859, vol. 28, 2d ser., ia Gr.

(Trematocrinus Geo. Rep. Iowa,

n Gr. post, 1850, Cat. our. Sci., vol. 8, cribed by Hall, N. Y. St. Mus. 46. [Ety. gran-rinon, lily.] Ca-oval or elliptic; ; of the plates lifferent outline m that of a Penit depressed conned or concave; as like those in it narrower, and y or quite the basals 3, sunken be visible in a als and deltoids of Pentremites ally as variable; -like arms, or n Pentremites; lancet-plates in ; anal opening es; central openes often closed es; ten narrow als open exterfive or ten aperodi. defined.

hen, 1861, (Penroc. Acad. Nat. Geo. Sur. Ill., Gr. Pentremites cur-

, p. 187, War-

en, 1869, Proc. p. 91, and Geo. St. Louis Gr. 2, (Pentatrematog. Blast., p. 43,

then, 1865, Proc. p. 165, and Geo. Keokuk Gr. mites leda,) 15th t. Hist., p. 149, ECHINODERMATA.



lotoblastus, White, 1874, Rep. Invert. Foss., p. 15, and Geo. Sur. W. 100th

FIG. 323-Granatocrinus melo.

melo, Owen & Shumard, 1850, (Pentremites melo,) Jour. Acad. Nat. Sci. Phil., 2d ser., vol. 2, p. 65, Burlington Gr. Etheridge & Carpenter made this species the type of a new genus, Cryp-toblastus, and referred to the same genus G. pisum. The generic characters, however, are not apparent. melo var. projectus, see Granatocrinus pro-

jectus.

melonoides, see Schizoblastus melonoides. missouriensis, Shumard, 1866, Trans. St. Louis Acad. Sci., vol.2, p. 375, Waverly Gr. neglectus, Meek & Worthen, 1869, Proc.

Acad. Nat. Sci. Phil., p. 90, and Geo. Sur. Ill., vol. 5, p. 471, Burlington Gr. norwoodi, Owen & Shumard, 1850, (Pentremites norwoodi,) Jour. Acad. Nat.

Sci. Phil., 2d ser., vol. 2, p. 64, Burlington Gr. pisum, Meek &



Phil., p. 89, and Geo. Sur. Ill., vol. 5, p. 470, Burlington Gr. projectus, Meek & Worthen, 1861, Proc. Acad. Nat. Sci.

Worthen,

1869. Proc.

Acad. Nat. Sci.

projectus. Diagram.

Phil., p. 42, and Geo. Sur. Ill., vol. 3, p. 496, Burlington Gr. roemeri, Shumard, 1855, (Pentremites roe-

meri,) Geo. Rep. Mo., p. 186, Waverly Gr. sayi, see Schizoblastus sayi.

shumardi, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 257, and Geo. Sur. Ill., vol. 3, p. 498, Burlington Gr. GRAPHIOCRINUS, DeKoninck & LeHon, 1853,

Rech. Crin. Carb. Belg., p. 115. [Ety. graphion, writing instrument; krinon, lily.] The authors described this genus as having only basals and radials, but as re-defined, by Wachs-muth, there are five basals concealed by the column; subradials 5; radials 1 x 5, upper margins straight; brachials 1 x 5; sutures gaping; arms 10, long, heavy, short joints, parallel sutures; pinnules long; azygous interradial 1, small, but extending above the radials; strong ventral sac or proboscis. Type G. encrinoides.

carbonarius, Meek & Worthen, 1861, (Scaphiocrinus carbonarius.) Proc. Acad. Nat. Sci. Phil., p. 140, and Geo. Sur. Ill., vol. 5, p. 562, Coal Meas. dactylus, Hall, 1860,

Supp. to Geo. Rep. Iowa, p. 80, and Geo. Sur. Ill., vol. 5, p. 559, St. Louis Gr. longicirrifer, Wachsmuth & Springer, (in press,) Geo. Sur., Ill., vol. 8, p. 193, Kinderhook Gr. macadamsi, Worthen, 1873, (Scaphiocrinus macadamsi,) Geo. Sur. Ill., vol. 5, p. 495, Keokuk Gr. quatuordecembrachialis, see Eupachycrinus decembrachialis.

rudis, Meek & Wor-

ocrinus rudis,) FIG. 325.-Graphiceri-Proc. Acad. Nat. Sci. Phil. p. 20 Sci. Phil., p. 39, and Geo. Sur. Ill., vol.

5, p. 412, Burlington Gr. simplex, Hall, 1858, (Scaphiocrinus simplex,) Geo. Sur. Iowa, p. 551, Burlington Gr. spinobrachiatus, Hall, 1861, (Scaphiocrinus spino-brachiatus,) New Pal.

Crin., p. 8, and Bost. Jour. Nat. Hist., p. 306, Burlington Gr.

striatus, Meek & Worthen, 1869, (Scaphiocrinus stri-FIG. 326. - Graphiocrinus rudis. atus,) Proc. Acad. Nat. Geo. Sur. Ill., vol. 5, p. 418, Burlington Gr.



FIG. 327.-Graphiocrinus wachsmuthi. Diagram, 2 diam.

tortuosus, Hall, 1861, (Scaphiocrinus tortuosus,) Desc. New Crin., p. 7, and Bost. Jour. Nat. Hist., p. 309, Burlington Gr.

- wachsmuthi, Meek & Worthen, 1861, (Scaphiocrinus wachsmuthi,) Proc. Acad. Nat. Sci. Phil., p. 141, and Geo. Sur. Ill., vol. 3, p. 488, Burlington Gr. HADROCEINUS, Lyon, 1869, Trans. Am.
- Phil. Soc., vol. 13, p. 445. [Ety. adros, full grown; krinon, lily.] Calyx broad, low vasiform, dome hemispherical; basals 3, hidden by the column; primary radials 2x5; secondary, tertiary, and higher orders of radials, having 2 in each series; arm-openings numerous, and not separated by interradials; inter-radials 3 or 4; column round. Type H. plenissimus.
- discus, Lyon, 1869, Trans. Am. Phil. Soc., vol. 13, p. 448, Up. Held. Gr.
- pentagonus, Lyon, 1869, Trans. Phil. Soc., vol. 13, p. 446, Up. Held. Gr.
- plenissimus, Lyon, 1869, Trans. Phil. Soc., vol. 13, p. 445, Up. Held. Gr. Halysiocrinus, Ulrich, 1886, 14th Rep. Geo.
- Sur. Minn., p. 110, syn. for Deltacrinus.
- HAPLOCRINUS, Steininger, 1834, Bul. Soc. Geol. rance, t. 8, 1st series, p. 232. [Ety. haploos, simple; krinon, lily.] Calyx small subturbinate; basals 5; radials 2×3 plus 1×2 , protruding at the center of the superior face for the attachment of arms; dome convex, composed of 5 plates, having sutures from the center of the arm-openings toward the central part of the dome. Type H. sphæroideus. clio, Hall, 1862, 15th Rep. N. Y. St. Mus.
 - Nat. Hist., App. C., p. 115, Marcellus shale.

granulatus, Troost, Not defined. hemisphericus, Troost. Not defined. maximus, Troost. Not defined.

- ovalis, Troost. Not defined. HEMICOSMITES, Von Buch, 1840, Monatsber. d. Berlin Akad., p. 129, and Geol. Russia, vol. 2, p. 31. [Ety. hemi, half; kosmos, sphere.] Body having four series of plates; basals 4; second series 6; third series 9; ovarian orifice be-tween second and third series; mouth central. Type H. malum.

subglobosus, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 359, Niagara Gr. Немисуятитеs, Hall, 1852, Pal. N. Y., vol. 2,

p. 245. [Ety. hemi, half; kustis, blad-der.] Parasitic, circular, more or less convex on the upper surface and sometimes sac-like in form; composed of numerous imbricating plates; ambu-lacra 5, straight, radiating from the center and composed each of a double series of alternating plates, forming part of the upper surface; aperture excentric. Type H. parasiticus,



altus, syn. for H. granulatus

granulatus, Hall, 1872, 24th Rep. N. Y. St. Mus. Nat. Hist., pl. 6, fig. 164, Hud. Riv. Gr.

FIG. 328.-Hemicystites stella-tus.

parasiticus, Hall, 1852, Pal. N. Y., vol. 2, p. 246, Niagara Gr.

stellatus, Hall, 1866, Adv. Sheets 24th Rep. N. Y. St. Mus. Nat. Hist., p. 215, Hud. Riv. Gr.

HAD.-HET.

- HETEROCRINUS, Hall, 1847, Pal. N. Y., vol. 1, p. 278. 1, p. 278. [Éty. heteros, irregular; krinon, lily.] Calyx, small, slightly expanded; basals 5; radials irregular, two or three of the rays having two plates each, and the others only one; four radials supported on the basals; the other is smaller and rests on the azygous plate, and supports the ventral sac on one side and the brachials on the other; brachials, generally, four to each ray, the last one axillary, and supporting two arms, which sometimes branch at irregular distances; pinnules strong; azygous plate pentagonal; column pentagonal, pentapartite; attaching base small. Type H. heterodactylus.
- articulosus, see Calceocrinus articulosus.
- bellevillensis, W. R. Billings, Trans. No. 4, Ottawa Field Naturalists Club, p. 49, Trenton Gr.

canadensis, see Ectenocrinus canadensis. constrictus, see Ohiocrinus constrictus.

constrictus var. compactus, see Ohiocrinus compactus.

crassus, see Iocrinus crassus.

- exilis, Hall, 1866, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 213, Trenton and Hud. Riv. Gr.
- exiguus, Meek, syn. for H. exilis.
- gracilis, Hall, 1847, Pal. N. Y., vol. 1, p. 280, Hud. Riv. Gr. Not properly defined.
- geniculatus, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 16, Utica Slate Gr. heterodactylus, Hall, 1847, Pal. N. Y., vol.

1, p. 279, Hud. Riv. Gr.

inæqualis, see Calceocrinus inæqualis. incurvus, see Anomalocrinus incurvus. isodactylus, syn. for Ohiocrinus com-

pactus. juvenis, Hall, 1866, 24th Rep. N. Y. St. Nat. Hist.,

p. 212, Hud. Riv. Gr. laxus, see Ohiocrinus laxus. milleri, Wetherby, 1880, Jour. Cin. Soc. Nat. Hist.,

vol. 3, p, 153, Trenton Gr.

- *ahanus*, see Ohiocrinus cehanus.
- pentagonus, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., FIG. 329.-Heter-
- vol. 5, Hud. Riv. Gr. ocrinus juvenis. polyxo, syn. for Iocrinus

subcrassus.

simplex, see Ectenocrinus simplex.

simplex var. grandis, see Ectenocrinus grandis.

subcrassus, see Iocrinus subcrassus.

tenuis, Billings, 1557, Rep. of Progr. Geo. Sur. Can., p. 273, and Can. Org. Rem., Decade 4, p. 50, Trenton Gr.

vaupeli, syn. for H. constrictus.



HETEROCYSTITES. 2, p. 229. [E bladder.] B second serie numerous, b undetermine armatus, Hall, 229, Niagara HETEROSCHISMA, Ill., vol. 7, p. lar; schisma, from Codast



gracile, Wachsr vol. 7, p. 354



FIG. 331.- Heterosci section of h

- HOLOCYSTITES, Ha St. Mus. Nat. entire; kustis, drical, subova or attaching | numerous ran larger and sn ambulacral o central; mouth ing between t processes. Ту abnormis, Hall, Mus. Nat. His
- alternatus, Hall, natus,) Rep. of

p. 23, and 20th

Hist., p. 355, 1 baculus, S. A. M Nat. Hist., vol
HAD.-HET.

Sheets 24th Rep. list., p. 215, Hud.

Pal. N. Y., vol. small, slightly exials irregular, two naving two plates s only one; four the basals; the rests on the azyrts the ventral sac brachials on the rally, four to each ary, and supportometimes branch pinnules strong; nal; column pen-

attaching base odactylus. ius articulosus.

lings, Trans. No. lists Club, p. 49,

ius canadensis. s constrictus.

see Ohiocrinus

sus. p. N. Y. St. Mus. enton and Hud.

. exilis. N. Y., vol. 1, p. Not properly de-

, Jour. Cin. Soc. Utica Slate Gr. 7, Pal. N. Y., vol.

18 inæqualis. ous incurvus. hiocrinus com-



", FIG. 329.-Heterocrinus juvenis.

simplex. e Ectenocrinus

ibcrassus.). of Progr. Geo. Can. Org. Rem., n Gr. rictus.

ECHINODERMATA.

of

HETEROCYSTITES, Hall, 1852, Pal. N. Y., vol. 2, p. 229. [Ety. heteros, irregular; kustis. bladder.] Basals 4, irregular in size; second series 10, large; higher plates numerous, but exact order and number undetermined. Type H. armatus. armatus, Hall, 1852, Pal. N. Y., vol. 2, p.

HET.-HOL.]

229, Niagara Gr. HETEROSCHISMA, Wachsmuth, 1883, Geo. Sur.

Ill., vol. 7, p. 352. [Ety. heteros, irregular; schisma, slit.] It is distinguished from Codaster by the sunken hydro-

spiral areas and exposure of the orals, only, immediately contiguous to the mouth; the limbs are extended interradially, into pyra-midal ridges, which the hydrospires enter obliquely. Type H. gracile. alternatum var. elongatum, Wachsmuth, 1883, Geo. Sur. Ill.,

vol. 7, p. 354. Founded upon a FIG. 330.-Heteroschisma gracile. Side view, 3 diam. magnified view Codaster attenuatus.

gracile, Wachsmuth, 1883, Geo. Sur. Ill., vol. 7, p. 354, Ham. Gr.



FIG. 331.— Heteroschisma gracile. He section of hydrospires, 5 diam. Horizontal

- HOLOCYSTITES, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 353. [Ety. holos, entire; kustis, bladder.] Body cylindrical, subovate or globose, free, sessile, or attaching by roots, and covered by numerous ranges or irregular series of larger and smaller poriferous plates; ambulacral opening central or sub-central; mouth excentric; smaller opening between these; arms mere spinous
- processes. Type H. cylindricus. abnormis, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 355, Niagara Gr.
- alternatus, Hall, 1861, (Caryocystites alternatus,) Rep. of Progress Geo. Sur. Wis., 23, and 20th Rep. N. Y. St. Mus. Nat. Hist., p. 355, Niagara Gr. baculus, S. A. Miller, 1879, Jour. Cin. Soc.
- Nat. Hist., vol. 2, p. 105, Niagara Gr.

brauni, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 130, Niagara Gr. canneus n. sp.





FIG. 382.-Holocystites canneus of which

reach the mouth, and one of which bears the anal orifice; there are no arms, ambulacral spines, or cicatrices; there are eight plates in the next range, two of which join the mouth; the mouth in this genus is generally upon the flat-tened side of the specimen and opposite the posterior bulge, but not so in this species, for the ambulacral area is prolonged on the flattened side, and the bulge is opposite thereto, while the mouth is on the side of the summit between the bulge and the flattened side;



FIG. 333.-Holocystites canneus. Summit view.

all the plates are very poriferous, the pores penetrating the plates in clusters of from two to seven instead of by pairs as is usual in this genus; the flattened

side is covered by numerous pits and a thickening of the plates; these pits do not pass through the plates, though they cover a series of plates, sutures and all such pits have been found on different species, and it is probable they represent a disease of the test, as they seem to destroy the pores and anchylose the sutures. Collected by J. F. Hammell, of Madison, in Jefferson County, Indiana. cylindricus, Hall, 1861, (Caryocystites cylindricus,) Ann. Rep. Geo. Wis., p. 23, and 20th Rep. N. Y. St. Mus. Nat.

Hist., p. 354, Niagara Gr.

dyeri, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 108, Niagara Gr. elegans, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 136, Nagara Gr.

obovate;

large axial

canal passes

the column;

seven plates

in the first

range; two small inter-

c a l a t e d

plates on the

posterior

sidebetween

the first and

second

ranges;

seven plates

in the second

into

down

faberi, n. sp. Niagara Gr. Body somewhat

FIG. 334.-Holocystites faberi.

range; above the second range the plates are polygonal, of all sizes, and not disposed in ranges; if they were in ranges there would be about seven below the summit; ambulacral orifice on the posterior side of the summit, elliptical, surrounded by six plates, four of which are protuberant or swollen at the orifice, but no arms ever attached, nor are there cicatrices for spines; mouth pentagonal, on the anterior side of the summit, separated from the ambulacral orifice by

two plates, one of which bears the anal orifice; on the posterior side, below the summit, there are three circular pits, which do not seem to have been of any economical use; entire surface porifer- FIG. 385.-Holocys-

ous in pairs, which tites fab open through small tubercles. Collected by Charles Faber, of Cincinnati, (in whose honor I have given the specific name,) in Jefferson County, Indiana.

globosus, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 133, Niagara Gr.

hammelli n. sp. Niagara Gr. Body subglobose, flattened on the anterior side sessile, no perforation for a column; basals seven; between the first and second se-

ries there are five plates in. serted on the poste-rior side; ten plates in the second series; ten in the third; nine i n the fourth, and nine i n the fifth, which se-



FIG. 336 - Holocystites hammellli. Anterior side. ries reaches

mit; anal

opening in

the plate

adjoining

the mouth

and be-

tween it

and the

ambula-

cral orifice;

all the

plates po-

riferous in

pairs; on

the ante-

the mouth; above these there are eight plates in the series which bore the ambulacral spines, and some smaller plates surrounding the ambulacral orifice on the summit; four cicatrices for ambulacral spines; mouth at the margin of the sum-



FIG. 337. - Holocystites, ham melli. Summit view ; mouth on the lower side.

rior side below the mouth there is one plate in the third series, and one in the fourth series, each bearing a prominent tubercle, with a circle of pores passing through it, giving it a radiate appearance on top; this character may not be of specific importance, but the tubercles are different from those observed on other specimens. Collected by J. F. Hammell, in Jefferson County, Indiana, in whose honor I have given the specific name. jolietensis, S. A. Miller, 1882, Jour. Cin.

Soc. Nat. Hist., vol. 5, p. 223, Niagara (ir. ornatus, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 132, Niagara (ir.

ovatus, Hall, 1864, 20th Rep. N. Y. St.

Mus. Nat. Hist., p. 357, Niagara Gramperlongus, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 132, Niagara Gr. plenus, S. A. Miller, 1878, Jour. Cin. Soc.

Nat. Hist., vol. 1, p. 135, Niagara Gr. pustulosus, S. A. Miller, 1878, Jour. Cin.

Soc. Nat. Hist., vol. 1, p. 134, Niagara Gr. rotundus, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 107, Niagara Gr. HOM.-HYB.]

[HOI,.

scutellatus, Hal Mus. Nat. H sphæricus, Win Bost. Soc. Na agara Gr. 1

recognized. subglobosus n. globose; no species was s first range; a ranges below plates, each w the third ran ambulacral o summit, elor rounded by have cicatrice orifice near a

orifice; the w



338.-Holocys F16. subglobosus.

Miller, 1879, J vol. 2, p. 107, tumidus, S. A. M Nat. Hist., vo.



turbinatus, S. A. Soc. Nat. Hist. ventricosus, S. A Soc. Nat. Hist. wetherbyi, S. A Soc. Nat. Hist. winchelli, Hall, Mus. Nat. His HomocRINUS, Hall, p. 185. [Ety. Basals 5; sub azygous inter

ventral sac lon

HOI.

HOM.-HYB.]

Gr. Body sub he anterior side a for a column ; n the first and



Holocystites ham-Anterior side.

ese there are eight nich bore the amme smaller plates ulacral orifice on strices for ambuat the margin of the summit; anal

	opening in
	the plate
	adjoining
	the mouth
	and be-
	tween it
	and the
	ambula-
	cral orifice;
m- th	all the
	plates po-
	riferous in
	pairs; on

the anteouth there is one es, and one in the uring a prominent of pores passing a radiate appearicter may not be of t the tubercles are bserved on other by J. F. Hammell, Indiana, in whose he specific name. 1882, Jour. Cin. p. 223, Niagara Gr. 1878, Jour. Cin. p. 132, Niagara Gr. h Rep. N. Y. St. 57, Niagara Gram 1878, Jour. Cin. p. 132, Niagara Gr. 78, Jour. Cin. Soc. 35, Niagara Gr. 1878, Jour. Cin. p. 134, Niagara Gr.

, 1879, Jour. Cin. p. 107, Niagara Gr.

ECHINODERMATA.

scutellatus, Hall, 1864, 20th Rep.N. Y. St. Mus. Nat. Hist., p. 357, Niagara Gr. sphæricus, Winchell & Marcy, 1865, Mem.

Bost. Soc. Nat. Hist., vol. 1, p. 111, Niagara Gr. Not defined so as to be recognized.

globose; no axial canal, hence the species was sessile; seven plates in the first range; above this there are four ranges below the summit of fourteen plates, each with an additional plate in the third range on the posterior side; ambulacral orifice in the center of the summit, elongated transversely, surrounded by six plates, four of which have cicatrices for attaching spines ; anal orifice near a cicatrix and near the oral orifice; the whole surface is poriferous in pairs which



subglobosus n. sp. Niagara Gr. Body

face in ornamental sculptured figures, somewhat like the Greek letter (Omega). Collected by Charles Faber, in Jefferson County, Indiana. subrotundus, S. A.

open on the sur-

Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 107, Niagara Gr. tumidus, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 104, Niagara Gr.



FIG. 339.-Holocystites turbinatus

turbinatus, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 259, Niagara Gr. ventricosus, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 108, Niagar I Gr. wetherbyi, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 131 Niagara Gr. winchelli, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 356, Niagara Gr. HOMOCRINUS, Hall, 1852, Pal. N. Y., vol. 2,

p. 185. [Ety. homos, like; krinon, lilv.] Basals 5; subradials 5; radials 1×5 ; azygous interradials 2; proboscis or ventral sac long and large; arms bifurcating; pinnules wanting; column Distinguished from Dendroround. crinus by the proportionally larger basals, and absence of one radial, and from Poteriocrinus by the arrangement of the azygous plates and absence of pinnules. Type H. parvus.

255

angustatus, see Dendrocrinus angustatus. crassus, Whiteaves, 1887, Cont. to Can.

Pal., vol. 1, p. 95, Ham. Gr. cylindricus, Hall, 1852, Pal. N. Y., vol. 2, p. 186, Niagara Gr.

parvus, Hall, 1852, Pal. N. Y., vol. 2, p. 185, Niagara Gr.

polydactylus, see Dendrocrinus polydactylus.

proboscidialis, Hall, 1859, Pal. N. Y., vol. 3. p. 38, Oriskany sandstone.

scoparius, Hall, 1859, Pal. N. Y., vol. 3, 102, Low. Held. Gr. HYBOCHINUS, Worthen Miller, 1883, Geo. Sur. Ill.,

vol. 7, p. 331. [Ety. hubos, [Ety. hubos, humpbacked; echinos, sea-urchin.] Test flexible, subspheroidal, five ambulacral areas, with numerous ranges of interlocking plates imbricating up-ward, and

FIG. 340.-Homocrinus scoparius

azygous side;

basals 5; radials

1 x 5; azygous interradials 2;

arms 5; no pin-

column

nules; column round. Type H

conicus.

each perforated with a pair of pores; interambulacral areas narrower; plates imbricate downward; surface granular; jaws strong. Type H. spectabilis.

spectabilis, Worthen & Miller, 1883, Geo.

Sur. Ill., vol. 7, p. 332, Kaskaskia Gr. HYBOCRINUS, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 274, and Can. Org. Rem., Decade 4, p. 23. [Ety. hubos, humpbacked; krinon, lily.] Calyx pro-turburght for the program of the program of the tuberant on the

FIG. 341.—Hybocrinus coni-cus. Diagram.

conicus, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 274, and Can. Org. Rem., Decade 4, p. 29, Trenton Gr. pristinus, Billings, 1859, Can. Org. Rem.,

Decade 4, p. 23, Chazy Gr. tumidus, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 275, and Can. Org. Rem., Decade 4, p. 28, Trenton Gr.



HYBOCYSTITES, Wetherby, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 150. [Ety. hubos, humpbacked; kustis, bladder.] Hystricrinus, Hinde, 1885, Ann. and Mag. Nat. Hist., p. 158, syn. for Arthracantha. carpenteri, see Arthracantha carpenteri. Calyx like Hybocrinus, and order of

arrangement of the two series of plates is the same, but dis-tinguished by having three arm-like projections, and two or more recumbent arms with ambulacral opening central; from the peristome, the five ambulacra diverge; three are directed to the armlike projections, and are supposed to pass

over the top of them and extend downward upon the exterior; valvular opening between the upper azygous plate and the mouth. Type H. problematicus. problematicus, Wetherby, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 150, Tren-

- ton Gr. HYDREIONOCRINUS, DeKoninck, 1858, Bull. Acad. Royale Belgique, vol. 8, pt. 2, p. 13. [Ety. hydreion, water-bucket; kri-non, lily.] Calyx short, rounded below; basals 5; subradials 5; radials 1×5 ; brachials $1 \times 4 + 2 \times 1$; arms as in Zeacrinus, and pinnules short; distinguished from Zeacrinus by the ventral sac, which extends beyond the arms and covers them like a roof; the upper plates are convex or spinous; respiratory pores in the sutures of the cylindrical part of the sac, which is covered, by the arms. Type H. woodanus. acanthophorus, Meek & Worthen, 1870,
 - (Zeacrinus acanthophorus,) Proc. Acad. Nat. Sci. Phil., p. 28, and Geo. Sur. Ill., vol. 5, p. 563, Up. Coal Meas. armiger, Meek & Worthen, 1870, (Zea-
 - crinus armiger,) Proc. Acad. Nat. Sci. Phil., p. 27, and Geo. Sur. Ill., vol. 5, p. 547, Kaskaskia Gr.
 - depressus, Troost, as defined by Hall, 1858, (Zeacrinus depressus,) Geo. Sur.
- Iowa, p. 546, Kaskaskia Gr. discus, Meek & Worthen, 1860, (Zeacri-nus discus,) Proc. Acad. Nat. Sci. Phil., p. 39, and Geo. Sur. Ill., vol. 2, p. 312, Up. Coal Meas.
- mucrospinus, McChesney, 1859, (Zeacrinus mucrospinus,) Desc. New Pal. Foss., p. 10, and Trans. Chi. Acad. Sci., p. 7, and Geo. Sur. Ill., vol. 5, p. 563, Coal Meas.
- verrucosus, see Eupachycrinus verrucosus. wetherbyi, Wachsmuth & Springer, 1886, Revis. Palæocrinoidea, pt. 3, p. 245, Kaskaskia Gr.
- HYPANTHOCRINITES, Phillips, 1839, Murch. Sil. Syst. [Ety. upo, under; anthos, flower; krinon, lily.]

cælatus, see Eucalyptocrinus cælatus. decorus, see Eucalyptocrinus decorus. carpenteri, see Arthracantha carpenteri.

ICHTHYOCENNUS, COnrad, 1842, Jour. Acad. Nat. Sci. Phil., vol. 8, p. 279. [Ety. ichthys, fish; krinon, lily.] General form, including incumbent arms, ovoid or pear-shaped; calyx cup-shaped; ba-sals 3; subradials 1 x 5; primary radials 3 or 4 x 5, short and increasing, in width, upward; secondary and tertiary radials similar in form to the primaries: arms 40 to 60 or more. Type

I. lævis.

lington Gr.

FIG 343 -Ichthyocrinus corbis. vol. 1, p. 89, and Jour. Cin.

agara Gr.

lævis, Con-rad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 279, and Pal. N. Y., vol. 2, p. 195. Niagara Gr. nobilis, Wachsmuth & Springer, 1878, Proc. Acad. Nat. Sci., p. 254, Upper Bur-

burlingtonensis, Hall, 1858. Geo. Sur. Iowa, p. 557, Bur-

clintonensis, Hall, 1852, Pal. N. Y., vol. 2, p. 181, Clinton Gr. corbis, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist.

Soc. Nat. Hist., vol. 4, p. 175, Ni-

lington and

Keokuk FIG. 344 -- Ichthyocrinus laevis Gr.

subangularis, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 207, and 11th Rep. Geo. Ind., p. 268, Niagara Gr.

tiariformis, Troost, as defined by Hall, 1858, (Cyathocrinus tiariformis,) Geo. Sur. Iowa, p. 558, Subcarboniferous.

Icosidactylocrinites. Not defined.

IOCRINUS, Hall, 1866, Advance sheets, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 212. [Ety. io, in triumph; krinon, lily.] Calyx pentag-

onal

midal

deeply con-cave; basals

downthe mid-

dle; radials

3 to 6 x 5;

arms long,

indented

pyra-

sides



FIG. 345.—Iocrinus. Diagram; b, basals; r, radials; a, azygous plate; t, plates of

frequently bifurcating, but bearing no pinnules: ventral sac very long, extending beyond the arms, subcylindrical longiLAM.-LEP.]

[HYB.--10C.

tudinally, fiv transversely; onal. Type rassus, Meek rocrinus cras Phil., p. 147,



Fig. 346.- Ioerinus subcrassus.

radials 3 x 5; interradials 8 vault; azygou ous; vault uns subcentral pro unknown. T inflatus, Hall, flatus,) Rep. 22, and 20th Hist., p. 328, parvus, Hall, 18 p. 9, and 11 Ind., p. 272, 1 sculptus, syn. fo tennesseensis, Roemer, 1860, Sil Fauna West Tenn., p. 37, Niagara Gr. LECANOCRINUS, Hall, 1852, Pal. N. Y., vol. 2, p. 199. [Ety. lekane,

basin; kri non, lily.] Body and arms subglobose; plates heavy; basals 3; subradials 1 x 5; primary ra-dials 2 or 3 x 5; secondary radials 1 to 3 x

2; arms as in round. Type

Fig. 342.—Hybocy-stites problematicus.

[HYB.-10C.

5, Ann. and Mag. for Arthracantha. intha carpenteri. 1842, Jour. Acad.

8, p. 279. [Ety. lily.] General mbent arms, ovoid x cup-shaped; ba-5; primary radials increasing, in ndary and tertiary n to the primaries; 60 or more. Type

isis, Hall, 1858. Iowa, p. 557, Bur-

Hall, 1852, Pal. N. p. 181, Clinton Gr. hell & Marcy, 1865, t. Soc. Nat. Hist., 19, and Jour. Cin. ١. 4, p. 175, Ni-



chthyocrinus laevis. Trans. Alb. Inst., th Rep. Geo. Ind.,

defined by Hall, tiariformis,) Geo. bcarboniferous. efined. vance sheets, 24th Nat. Hist., p. 212. ph; krinon, lily.] Calyx pentagonal. pyramidal sides deeply conbasals cave; indented 5. downthemiddle; radials 3 to 6 x 5; arms long, frequently bing no pinnules: ig, extending becylindrical longiLAM.-LEP.]

tudinally, five partite, and corrugated transversely; column sharply pentagonal. Type I. subcrassus. rassus, Meek & Worthen, 1865, (Hete-

roerinus crassus,) Proc. Acad. Nat. Sci. Phil., p. 147, and Geo. Sur. Ill., vol. 3, p. 325, Hud. Riv. Gr.

polyxo, syn. for I. subcrassus.

subcrassus, Meek & Worthen, 1865, (Heterocrinus, subcrassus,) Proc. Acad. Nat. Sci. Phil., p. 148, and Geo. Sur. Ill., vol. 3, p. 325, Hud. Riv. Gr.

trentonensis, Walcott, 1884, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 210, Trenton Gr.

LAMPTEROCRINUS, ROEMER, 1860, Sil. Fauna West Tenn., p. 37. [Ety. lamp-ter, lamp; krinon, lily. Calyx urn-shaped, contracted between the armbases, and bulged out on F1G. 346.- Ioerithe azygous side; basals nus subcrassus 5; subradials 5; primary

radials 3 x 5; secondary radials, 1 x 10; interradials 8 or 10, graduating into the vault; azygous interradials more numerous; vault unsymmetrical, and bearing a subcentral proboscis or ventral sac; arms Type L. tennesseensis. unknown.

- inflatus, Hall, 1861, (Balanocrinus inflatus,) Rep. of Progr. Sur. of Wis., p. 22, and 20th Rep. N. Y. St. Mus. Nat. Hist., p. 328, Niagara Gr.
- parvus, Hall, 1879, Desc. New Spec. Foss., p. 9, and 11th Rep. Geo. Nat. Hist. Ind., p. 272, Niagara Gr. sculptus, syn. for L. tennesseensis.

ten nesseensis, Roemer, Sil.

1860, Fauna West Tenn., p. 37, Niagara Gr. C A N OCRINUS. Hall, 1852, Pal. N. Y., vol. 2, p. 199. [Ety. lekane, basin; kri non, lily.] Body and arms subglobose; plates heavy; ba-sals 3; subradials 1 x 5; primary ra-dials 2 or

FIG. 347.-Lampterocrinus 3 x 5; sectennesseensis. ondary ra-

dials 1 to 3 x 10; azygous interradials 2; arms as in Ichthyocrinus; column round. Type L. macropetalus.

caliculus, Hall, 1852, Pal. N. Y., vol. 2, p. 203, Niagara Gr.

elegans, see Taxocrinus elegans. excavatus, Ringueberg, 1886, Bull. Buf.

Soc. Nat. Sci., vol. 5, p. 11, Niagara Gr. cisus, Ringueberg, Bull. Buf. Soc. incisus, Ringueberg, Bull. Buf. Nat. Sci., vol. 5, p. 10, Niagara Gr. lavis, see Taxocrinus lavis.

> macropetalus, Hall, 1852, Pal. N. Y., vol. 2, p. 199, Ni-

nitidus, Ringueberg, 1886, Bull. Buf. Soc. Nat.

Sci., vol. 5, p. 9,

Pal. N. Y., vol. 2, p. 201, Ni-

ornatus, Hall, 1852,

pusillus, Hall, 1863,

agara Gr.

Niagara Gr.

agara Gr.



FIG. 348.—Lecanocrinus macropetalus.

pusillus,) Trans. Alb. Inst., vol. 4, p. 200, and 11th Rep. Geo. and Nat. Hist. Ind.,

- p. 267, Niagara Gr. pusillus, Winchell & Marcy, syn. for L. pusillus.
- puteolus, Ringueberg, 1886, Bull. Buf. Soc. Nat, Sci., vol. 5, p. 11, Niagara Gr. simplex, Hall, 1852, Pal. N. Y., vol. 2, p. 202, Niagara Gr.
- Nat. Mus., vol. 2, p. 257. This name was preoccupied by Muller in 1858, and by Zittel in 1879. See Menocrinus.
- olliculiformis, see Menocrinus olliculiformis.

LEPADOCRINUS, Conrad, (Lepocrinites,) 1840, Ann. Rep. N. Y., p. [Ety. from the 207. resemblance to the Lepas or Barnacle Anatifa; krinon, lily.] Body oblong or ovoid, consisting of four series of plates; first series 4; second series 5; third series 4; fourth series 5; pectinated rhombs 3 to 5; arms 3 or 4, recumbent, and consisting of a double series of interlocking plates, resting, in shallow grooves; plates poriferous, column taper-Type L. gebing. h**a**rdi.



(Cyathocrinus

solidus, Ringueberg, 1886, Bull. Buf. Soc.

- Nat. Sci., vol. 5, p. 8, Niagara Gr. LECYTHIOCRINUS, White, 1880, Proc. U. S.
- adamsi, see Menocrinus adamsi.

gebhardi, Conrad, 1840, F1G. 349-Lepado-(Lepocrinites geb-crinus gebhardi.



moorii, Meek, 1871, (Lepocrinites moorii,) Am. Jour. Sci., 3d series, vol. 2, p. 296, and Ohio Pal., vol. 1, p. 39, Hud. Riv. Gr.

258

LEPIDECHINUS, Hall, 1861, Desc. New Spec. Crinoidea, p. 18. [Ety. lepis, scale echinus, sea-urchin.] Subspheroidal ambulacral area having a double row of plates imbricating downward, with two pores in each plate, near the outer end; interambulacral areas wide, and having numerous ranges of plates, imbricating from below upward, and from the center outward. Type L. imbricatus.

imbricatus, Hall, 1861, Desc. New Crinoidea, p. 18, Burlington Gr.

rarispinus, Hall, 1867, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 340, Waverly Gr. LEPIDESTHES, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 522. [Ety. lepis,

scale; esthes, garment.] Subspheroidal;



FIG. 350.—Lepidesthes coreyl. Diagram 3 diam.; (a.) ambulacrals; (b.) section of them; position of interambulacrals.

ambulacral areas wide, having numerous plates, and imbricating from above downward, and having two pores in each plate, nearly central; interambulacral areas narrow, plates imbricating from below upward, 88 well as outward from the middle; jaws well developed ; surface granular.

- Type L. coreyi. colletti, White, 1878, Proc. Acad. Nat. Sci. Phil., p. 33, and Cont. to Pal., No. 8, p. 163, Keokuk Gr.
- corevi, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 525. Keokuk Gr.
- formosus, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 41, Keokuk Gr.
- LEPIDOCIDARIS, Meek & Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 478. Ety. lepis, scale; Cidaris, a genus.] Body large, globose, eight or more rows of imbricating plates in the middle of each interambulacral area, but only two reach the oral apertures; plates hexagonal or pentagonal; tubercles for the support of primary spines smooth and in the center of each plate; pustules near the outer edge of the plates for the secondary spines; ambulacra narrow; plates slightly imbricating in the opposite direction from the interambulacral series, and each pierced by two pores; jaws strong. Type L. squamosus.

squamosus, Meek & Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 478, Burlington Gr.

LEP.-LYR.

LEPIDODISCUS, Meek & Worthen, 1875, Geo. Sur. Ill., vol. 5, p. 573. [Ety. lepis, scale; diskos, quoit.] A proposed subgenus for Agelacrinus, founded upon A. squamosus.

- Lepocrinites, Conrad, 1840. The correct orthography seems to be Lepadocrinus. moorei, Meek, see Lepadocrinus moorii.
- LICHENOCRINUS, Hall, 1866, Adv. sheets 24th Rep. N. Y. St. Mus. Nat. Hist., p. 216. [Ety. lichen, tree-moss; krinon, lily.] Body parasitic, discoid, more or less crateriform, from the center of which arises a long tapering column, each ring of which is composed of small interlocking plates; upper surface of body covered with polygonal plates, which are supported in the interior by numerous radiating lamellæ. Type L. dyeri, affinis, S. A. Miller, 1882,

10

Jour. Cin. Soc. Nat. Hist., vol. 5, p. 229, Hud. Riv. Gr. crateriformis, Hall, 1866. Adv. sheets 24th Rep. N. Y. St. Mus. Nat. Hist., p. 217, Hud.

Riv. Gr. dubins, S. A. Miller. 1880, Jour. Cin. Soc. Nat. Hist., vol. 3. p. 234, Utica Slate Gr. dyeri, Hall, 1866, Adv. sheets, 24th Rep. N. Y



FIG. 351 -Lichenocrinus tuberculatus; one specimen shows the radiating lamellæ

pattersoni, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 118, Utica Slate Gr.

tuberculatus, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 346, Hud. Riv.

Gr. LYRIOCRINUS, Hall, 1852, Pal. N. Y., vol. 2, p. 197. [Ety. lyrion, small lyre krinon, lily.] Calvx hemispherical; basals 5; subradials 5; primary radials



3x5; secondary FIG. 352 – Lyriocrinus dac-tylus. Side view. radials 2 x 10;

interradial areas 4 or 5, which are in closed above by the secondary radials; LYS.-MAR.]

azygous are interradial depressed i small plates 10, composed locking plate



353. dactylus. Basal

> 198, and 1 Hist. Ind., p.



FIG. 354.-Lyrioc

sculptilis, Hall Mus. Nat. Hi sculptus, see Archæocrinus sculptus.

LYSOCYSTITES, n. gen.

[Ety.] lysis, setting free; kustis, bladder.] Body subspheroidal, composed of four ranges of plates; basal plates probably 4. succeeded bу two ranges of 5 plates each and dome plates; mouth central; ovarian aperturelateral. Type L. no. F

dosus. This generic nam LEP.-LYR.

orthen, 1873, Geo. , Burlington Gr. orthen, 1875, Geo. 573. [Ety. lepis, A proposed subus, founded upon

40. The correct) be Lepadocrinus. idocrinus moorii 5, Adv. sheets 24th Nat. Hist., p. 216. krinon, lily.] Body re or less crateriof which arises a n, each ring of f small interlocksurface of body nal plates, which nterior by numeræ. Type L. dyeri, S. A. Miller, 1882. r. Cin. Soc. Nat. vol. 5, p. 229, l. Riv. Gr.

formis, Hall, 1866, . sheets 24th Rep. Y. St. Mus. Nat. t., p. 217, Hud. Gr.

s, S. A. Miller. Jour. Cin. Soc. ١, Hist., vol. 3. p. Utica Slate Gr. Hall, 1866, Adv. ets, 24th Rep. N. Y ., p. 216, Hud.



srculatus; one speciting lamellæ.

1879, Jour. Cin. 2, p. 118, Utica



2 - Lyricerinus dac-us. Side view. r 5, which are in

econdary radials;

LYS.-MAR.]

azygous area similar to the regular interradial areas; vault almost flat, depressed interradially, composed of small plates; opening excentric; arms 10, composed of a double series of interlocking plates. Type L. dactylus.

dactylus, Hall, (Mar-1843, supiocrinites(?) dactylus,) Geo. Rep. 4th Dist. N. Y., p. 114, and Pal. N. Y., vol. 2, p. 197, Niagara Gr. melissa, Hall, 1863, (Rhodo-

crinus melissa,)

Trans. Alb.

353. Lyriocrinus dactylus. Basal view.

Inst., vol. 4, p. 198, and 11th Rep. Geo. and Nat. Hist. Ind., p. 269, Niagara Gr.



FIG. 354.-Lyriocrinus melissa. Basal view

sculptilis, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 368, Niagara Gr.

sculptus, see Archæocrinus sculptus. LYSOCYSTITES, n. gen.

[Ety. lysis, settingfree; kustis, bladder.] Body subspheroidal, composed of four ranges of plates; basal plates probably 4. succeeded by two ranges of 5 plates each and dome plates; mouth central; ova-

rian aperturelateral. Type L. no. F 1 G. - Macrostylocrinus 355. fusibrachiatus.

dosus. This generic name is proposed instead of Echinocystites, Hall, which was preoccupied. The genus is known only from casts.

- nodosus, Hall, 1864, (Echinocystites no-dosus, 20th Rep. N. Y. Mus. Nat. Hist., p. 360, Niagara Gr.
- MACROSTYLOCRINUS, Hall, 1852, Pal. N. Y., vol. 2, p. 203. [Ety. makros, long; stylos, an arm ; krinon, lily.] Calyx urnshaped; basals 3; primary radials 3 x 5; secondary radials 1 or more by 10; regular interradials 3; azygous interradials 4; arms 10. Type M. ornatus.
- fasciatus, Hall, 1876, (Cyathocrinus fas-ciatus,) 28th Rep. N. Y. St. Mus. Nat. Hist., p. 130, Niagara Gr. Probably a syn. for M. meeki.
- fusibrachiatus, Ringueberg, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 119, Niagara (ir.
- meeki, Lyon, 1861, (Actinocrinus meeki,) Proc. Acad. Nat. Sci. Phil., p. 411, Niagara Gr.
- ornatus, Hall, 1852, Pal. N. Y., vol. 2, p. 204. Niagara Gr.
- striatus, Hall, 1868, Trans.

Alb. Inst., vol. 4, p. 207, and 20th Rep. N. Y. St. Mus. Nat. Hist., p. 327, Niagara Gr.

Niagara Gr. striatus var. granulosus, Hall, 1879, 28th Rep. N. Y. St. Mus. Nat. Hist., FIG. 356.-Ma-

357. - Malo-

FIG.

- p. 129 Niagara Gr. erostylocri-
- MALOCYSTITES, Billings, nus striatus. 1858, Can. Org. Rem.,

Decade 3, p. 66. [Ety. malum, apple; kustis, bladder.] Body ovate or globular; plates nonporiferous and in very irregular series; first series 3; second series 10 or 12, and in all the series 40 or 50; mouth apical: ambulacral orifice near the upper part; arms recumbent, 8 or more. Type M. murchisoni. barrandi, Billings, 1858, Can. Org. Rem., Decade 3, p. 67, Chazy Gr.

murchisoni, Billings, 1858, 👳 Can. Org. Rem., Dec-ade 3, p. 66, Chazy Gr. MARIACRINUS, Hall, 1859, Pal. N. Y., vol. 3, p. 104. [Ety. Maria, proper name; krinon, [ily.] Body obconoidal, interradial areas depressed, surface ornamented; basals 4;

cystites murch-isoni. ni. primary radials 3×5 ; secondary radials 3×10 ; tertiary radials 1 or more by 20; interradials 3 to 10, the first one supported by the first radials; azygous area large and plates numerous; vault inflated, plates small; arms composed of a double series of interlocking plates, and not unfrequently bearing armlets consisting also of a double series of interlocking plates; column round. Type M. nobilissimus.





1

leyi,) Trans. Alb,

Inst., vol. 4, p. 203. and 11th Rep. Geo.

and Nat. Hist. Ind.,

p. 261, Niagara Gr.

macropetalus, Hall, 1859, Pal. N. Y., vol. 3, p. 111, Low. Held. Gr.

nobillissimus, Hall, 1859, Pal. N. Y.,

carleyi, Hall, 1862, (Glyptocrinus car-

260



FIG. 358. - Mariacrinus carleyi.

- vol. 3, p. 105, Low. Held. Gr. pachydactylus, Conrad, 1841, (Astrocrinites pachydactylus,) Ann. Rep. N. Y., p. 34, and Pal. N. Y., vol. 3, p. 107, Low. Held. Gr. Syn. (?) for M. polydactvlus.
- paucidactylus, Hall, 1859, Pal. N. Y., vol. 3, p. 109, Low Held. Gr.
- plumosus, Hall, 1859, Pal. N. Y., vol. 3, p. 110, Low. Held. Gr. polydactylus, Bonny, 1837, (Actinocrinus
- polydactylus,) Am. Jour., vol. 31, syn. for M. pachydactylus?
- ramosus, Hall, 1859, Pal. N. Y., vol. 3, p. 147, Low. Held. Gr.
- stoloniferus, Hall, 1859, Pal. N. Y., vol. 3, p. 112, Low. Held. Gr.
- warreni, Ringueberg, 1888, Proc. Acad. Nat. Sci. Phil., p. 133, Niagara Gr. MARSUPIOCRINUS, Phillips, 1839, Murch. Sil.
- Syst., p. 672. [Ety. marsupos, bag; krinon, lily.] Basals 3; primary radials 2 x 5; secondary radials 2 x 5; arms 20; distinguished from Platycrinus by the higher order of radials, by the round column, instead of elliptic, and by having a larger canal. Type M. cælatus.

dactylus, see Lyriocrinus dactylus.

- tennesseensis, Roemer, 1860, (Platycrinus (tennesseensis,) Sil. Fauna West Tenn., p. 35, Niagara Gr.
- tentaculatus, Hall, 1861, (Platycrinus tentaculatus,) Pal. N. Y., vol. 3, p. 116, Low. Held, Gr.
- MEGISTOCRINUS, Owen & Shumard, 1852, Geo. Sur. Wis., Iowa, and Minn., p. 594. [Ety. megistos, very great; krinon, lily.] Body basin-shaped; basals 3; primary radials 3 x 5; secondary radials 1 x 10; tertiary radials 1 or more x 20; interradials numerous; first azygous plate like the first radials, and resting on the basals, succeeded by three plates, and these by numerous smaller ones; arms in double series of short plates, bifurcating and bearing pinnules; vault convex; orffice excentric or lateral; column round. Type M. evansi. abnormis, Lyon, 1857, (Actinocrinus ab-normis,) Geo. Sur. Ky., vol. 3, p. 479,
 - Up. Held. Gr.
 - concavus, Wachsmuth, 1885, Proc. Dav. Acad. Sci. vol. 4; p. 96, Ham. Gr.
 - brevicornis, Hall, 1858, (Actinocrinus brevicornis,) Geo. Sur. Iowa, p. 571, Burlington Gr.

crassus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 17, Burlington Gr.

MAR.-MEG.

- depressus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 134, Hamil ton Gr.
- evansi, Owen & Shumard, 1850, (Actinocrinus evansi,) Jour. Acad. Nat. Sci. vol. 1, pt. 2, p. 68, and Geo. Sur. Wis., Iowa,
- and Minn., p. 594, Burlington Gr. farnsworthi, White, 1876, Proc. Acad. Nat. Sci., p. 29, Ham. Gr.

infelix, see Saccocrinus infelix.

- knappi, Lyon & Casseday, 1857, Proc. Acad. Nat. Sci. Phil., p. 412, Up. Held. Gr. latus, Hall, 1858, Geo. Sur. Iowa, vol. 1,
- pt. 2, p. 480, Ham. Gr.

marcouanus, see Saccocrinus marcouanus. necis, see Saccocrinus necis.

nobilis, Wachsmuth & Springer, (in press,) Geo. Sur. Ill., vol. 8, p. 169, Waverly or Kinderhook Gr.

nodosus, Barris, 1879, Proc. Dav. Acad. Nat. Sci., vol. 2, p. 285, Up. Held. Gr. nodosus var. multidecoratus, Barris, 1885, Proc. Dav. Acad. Nat. Sci.,



1862, 15th tus. 1887, 18888, 1888, 1888, 1888, 1888, 1888, 1888, 1888, 1888, 1

parvirostris, syn. for M. plenus.

parvus, Wachsmuth & Springer, (in press, Geo. Sur. Ill., vol. 8, p. 171, Kinderhook Gr. pileatus.

> ler, 1879. Jour. Cin. Soc. Nat. Hist., vol. 2, p. 114, Up. Held. Gr. plenus, White, 1862, Proc. Bost. Soc. Nat.Hist., vol. 9, p. 16, Bur-

S. A. Mil-

FIG. 360.—Megistocrinus pilea-tus. View from below.

- Gr. rugosus, Lyon & Casseday, 1859. Am. Jour. Sci., vol. 28, p. 243, Up. Held Gr.
- white Gr.
 white, Hall, 1861, Jour. Acad. Nat.
 Sci. Phil., p. 413, Up. Held. Gr.
 whitii, Hall, 1861, Jour. Bost. Soc. Nat.
 Hist., vol. 7, p. 271, Burlington Gr.

MEL.]

MELOCRINUS, Gol



FIG. 361. -- Melocrin bridgensis

to 12; azygou vault convex Type M. hier bainbildgensis, Hall & Whitfield, 1875. (Ctenocrin u s bainbridgensis,)Ohio Pal., vol. 2, p. 158, Portage Gr. breviradia t u s. Hall & Whit-field, 1875, Ctenocrinus brevir a diatus, Ohio Pal., vol. 2, p. 160, Ham. Gr.

clarkiı, William Sci., p. 31, Ch lævis Roemer, 1 Sil. Fauna V

ara Gr. nodosus Hall, 1

19, Devonian.



FIG. 363.-Me

obconicus, Hall, vol. 4, p. 20d, obpyrainidalis, V (Actinocrinus Bust. Soc. Nat. agara Gr. pratteni, McChes pratteni,) New Trans. Chi. A

saw Gr.

lington

MAR.-MEG.

oc. Bost. Soc. Nat. lington Gr. ith Rep. N. Y. St 134, Hamil p.

'd, 1850, (Actinocad. Nat. Sci. vol. .Sur. Wis., Iowa, rlington Gr. , Proc. Acad. Nat

ıfelix. day, 1857, Proc. 412, Up. Held. Gr. Sur. Iowa, vol. 1,

nus marcouanus. 18. ringer, (in press,) p. 169, Waverly



egistocrinus pileaiew of vault. at. Hist., p. 136,

lenus. ringer, (in press,) p. 171, Kinder-

	oneatus,	
	S. A. Mil-	
	ler. 1879.	
	Lour Cin	
	See Nat	
*	Soc. Nat.	
	Hist., vol.	
	2, p. 114,	
	Up Held	
	Gr	
	01.	
1	plenus,	
	White,	
	1862, Proc.	
	Bost. Soc.	
	Not Hist	
	Nat. mst.,	
	voi. 9, p.	
1-	16, Bur-	
	lington	
	Gr.	
day	1859 Am	
uay,	049 IIn	
р.	245 , Up.	
,		
our.	Acad. Nat.	
eld.	Gr.	

Bost. Soc. Nat. rlington Gr.

MEL.]



bridgensis.

interradials 8 to 12; azygous plates more numerous; vault convex, with orifice excentric. Type M. hieroglyphicus.

MELOCRINUS, Goldfuss, 1826, Petref. Germ.,

bainbidgensis, Hall & Whitfield, 1875, (Ctenocrin u s bainbridgensis,)Ohio Pal., vol. 2, p. 158, Portage Gr. breviradia tus, Hall & Whitfield, 1875, Ctenocrinus brevir adia-

tus, Ohio Pal., FIG. 362.-Meloerinus bainvol. 2, p. 160, bridgensis. Basal view Ham. Gr.

clarkii, Williams, 1882, Proc. Acad. Nat. Sei., p. 31, Chemung Gr.

lævis Roemer, 1860, (Cytocrinus lævis,) Sil. Fauna W. Tenn., p. 56, Niagara Gr.

nodosus Hall, 1861, Geo. Rep. Wis., p. 19, Devonian.



FIG. 363.-Melocrinus obconicus.

obconicus, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 206, Niagara Gr. obpyramidalis, Winchell & Marcy, 1865,

(Actinocrinus obpyramidalis,) Mem. Bost. Soc. Nat. Hist., vol. 1, p. 87, Niagara Gr.

pratteni, McChesney, 1860, (Forbesocrinus pratteni,) New Pal. Foss., p. 29, and Trans. Chi. Acad. Sci., p. 22, Warsaw Gr.

sculptus, Hall, 1852, Pal. N. Y., vol. 2, p.

ECHINODERMATA

p. 197. [Ety. melo, melon; krinon, lily.] Body obcon-oidal; surface

ornamente d ;

interradial

areas de-

pressed; ba-

sals 4; radials

3 x 5; second-

ary radials 2

or 3 x 10; ter-

tiary radials

2 or 3×20 ;

228, Niagara Gr. verneuili, Troost, 1850, (Actinocrinus verneuili,) and Hall, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 327, Niagara Gr. MELONITES, Owen & Norwood, 1846, Am. Jour. Sci., 2d series, vol. 2, p. 225. [Ety. melon, melon; lithos, stone.] Test spheroidal, divided into five convex ambulacral and five convex interambulacral areas, resembling in form a melon, with ten ribs or convex elevations and as many sharply defined depressions; plates of the interambulacral areas large, thick, hexagonal, not overlapping, arranged in series, 8 or 10 of which cover the wider part, but not more than two reach the apical disk ; ambulacral areas covered with about 8 or 10 rows of plates, each plate having two pores, so arranged that the pores of the central two ranges are at the ends most distant from the median line; ocular plates, without pores, and



FIG. 364.—Melonites multiporus. Apical disk, genital and ocular pores

much smaller than the genital, which have numerous pores that differ, in number, in the same species; jaws very strong. Type M. multiporus.

crassus, Hambach, 1884, St. Trans. Louis Acad. Sci., vol. 4, p. 548, St. Louis Gr. danz, see Oligoporus danæ. irregularis, Hambach, 1884, Trans. St. Louis Acad. Sci.,

18



vol 4, p. 548, St. Louis Gr. FIG. 365 - Melonites multiporus. Oral opening and jaws, displaced at z so as to multiporus, Owen & Norleave an opening

wood, 1846, Am. Jour. Sci., 2d ser., vol. 2, p. 225, St. Louis Gr.

stewarti, Safford, 1869, Geo. of Tenn., p. 346, St. Louis Gr.



FIG. 366. -Melonites multiporus. -Melonites multiporus. Diagram, showing pores in ambulacral area, 2 diam.

- MENOCRINUS, n. gen. Ety. menos, strength of body; krinon, lily.] Calyx somewhat globular; basals 3; subradials 1 x 5; radials 1 x 5; azygous and interradials 0; which distinguishes the genus from Platycrinus. Type M. olliculiformis. This generic name is proposed as a substitute for Lecythiocrinus, White, 1880, because that name was preoccupied by Muller in 1858, and by Zittel in 1879.
- adamsi, Worthen, 1882, (Lecythiocrinus adamsi,) Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 37, and Geo. Sur. Ill., vol. 7, p. 317, Coal Meas.
- olliculiformis, White, 1880, (Lecythio-crinus olliculiformis,) Proc. U. S. Nat.
- Mus., vol. 2, p. 257, and Cont. to Pal., No. 6, p. 124, Up. Coal. Meas.
 MEROCHINUS, Walcott, 1883, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 208. [Ety. meros, hip-joint; krinon, lily.] Basals 5, pentangular, low, broad; subradials 5, hexagonal, short, broad; radials pentagonal, four support upon the upper truncate face of each a row of six or seven brachials, and the azygous plate from the same level, the fifth radial; right posterior radial like the azygous plate, but having an angular upper side, giving off, on one side, the ventral tube, and on the other a row of brachials; arms long, bifurcating, with-out pinnules. Type M. typus. curtus, Ulrich, 1879, (Den-

drocrinus curtus,) Cin. Soc. Nat. Hist., vol. 2, p. 18, Utica Slate Gr. corroboratus, Walcott, 1883, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 210, Trenton Gr. typus, Walcott, 1883, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 209, Trenton Gr. MESPILOCRINUS, DeKoninck & LeHon, 1854, Rech. Crin. Terr. Carb. Belg.,

p. 111. [Ety. mespilum, medlar; krinon, lily.] Body small, with arms globular or pyriform;

basals 3; subradials 5; radials 3 x 5; arms 10, which divide once, taper rapidly, infold and incline

FIG. 367.-Mero-

crinus curtus.

obliquely from left to right; azygous plate 1, resting upon the larger basal; column round. Type M. forbesanus.

MEN.-NUC.

konincki, Hall, 1860, Supp. to Geo. Sur. Iowa, p. 69, Burlington Gr. scitulus, Hall, 1861, Desc. New Crinoidea, p. 9, Burlington Gr.

MYELODACTYLUS, Hall, 1852, Pal. N. Y., vol. 2, p. 191. [Ety. myelos, the inside pith; dactylus, finger.] Body consisting of a coil rolled, in the same plane, with finger-like processes, from each coil, overlapping the next inner one; coil and processes perforated so as to form connecting channels. Type M. convolutus. brachiatus, Hall, 1852, Pal. N. Y., vol. 2, p. 232, Niagara Gr.



FIG. 868.-Myelodactylus bridgportensis.

- bridgportensis, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 141, Niagara Gr.
- convolutus, Hall, 1852, Pal. N. Y., vol. 2, p. 192, Niagara Gr.
- Myrrillus, Sandberger, 1856, Verst. der Rhein. Schi. Syst. in Nassau. [Ety. myrtillus, myrtle; krinon, hly.] Body subglobose or ovoid; basals 5; subradials 5; radials 1 x 5; dome consisting of 5 plates alternating with the radials; arms 5; columnar canal, quadrangular. Type M. elongatus.
 - americanus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., App. C., p. 114, Up. Held. Gr.
- Nematocrinus, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 251, syn. for Catillocrinus.
- NIPTEROCRINUS, Wachsmuth, 1868, Proc. Acad. Nat. Sci. Phil., p. 341. [Ety. nipter, washing vessel; krinon, lily.] Calyx basin-shaped; basals 3, nearly hidden by the column; subradials 1×5 ; radials 3 or 4×5 , the first one very large; arms bifurcating; column round. Type N. wachsmuthi. arboreus, Worthen, 1863, Geo. Sur. Ill.,
 - vol. 5, p. 436, Burlington Gr.
 - wachsmuthi, Meek & Worthen, 1868, Proc. Acad. Nat. Sci. Phil., p. 341, and Geo. Sur. Ill., vol. 5, p. 435, Burlington Gr.
- NUCLEOCRINUS, Conrad, 1842, Jour. Acad. Nat. Sci. Phil., vol. 8, p. 280, [Ety. nucleus, a little nut: krinon, lily.] Calyx ellipsoidal; basals 3, small, hidden within the columnar cavity; radials 5, forming a small cup, deeply scalloped

OHI.-QLI.]

for receiving elongate aml jecting lips deltoid plate three-fourths intercalated p reaches from and divides t row curving extending th calyx; ambul long and ve numerous; h tubes or elong an ambulacru which notch t large, covered azygous openi

and N. verneu angularis, Lyon laris,) Geo. S Ham. Gr.

canadens s, Mon and Geol. Vol. conradi, Hall, 1 Mus. Nat. Hi

Held. Gr. elegans, Conrad

Sci. Phil., p. 28 halli, syn. for N kirkwoodensis, l

nus kirkwood Acad. Sci., vol

lucina, Hall, 18 Mus. Nat. H



FIG. 369.—Nucleocrin vatus. Cross section drospires, 2 diam.

verneuili, Troost, neuili,) 6th R the Geo. of Te 14, and Geo. St vol. 3, p. 48 Held. Gr.

verneuili var. pomu eridge & Carpe simply a round very common other specimer without varieta acters.

OHIOCRINUS, Wachs Palæocrinoidea. proper name; calyx arranged

MEN.-NUC.

o right; azygous the larger basal; Type M. forbe-

30, Supp. to Geo. Burlington Gr. Desc. New Criington Gr.

, 1852, Pal. N. Y., [Ety. myelos, dactylus, finger.] of a coil rolled, in with finger-like each coil, overer one; coil and so as to form conpe M. convolutus. Pal. N. Y., vol. 2,



bridgportensis.

Liller, 1880, Jour. vol. 3, p. 141, Ni-

Pal. N. Y., vol. 2,

ger, 1856, Verst. yst. in Nassau. le; krinon, hily.] ovoid; basals 5; 1x5; dome conernating with the mnar canal, quadongatus.

15th Rep. N. Y. App. C., p. 114,

rthen, 1866, Proc. , p. 251, syn. for

uth, 1868, Proc. l., p. 341. [Etv. el; krinon, lily.] basals 3, nearly 1mn; subradials x 5, the first one urcating; column hsmuthi.

33, Geo. Sur. Ill., ton Gr. Worthen, 1868, Phil., p. 341, and p. 435, Burling-

1842, Jour. Acad. 8, p. 280, [Ety. rinon, lily.] Calyx 3, small, hidden cavity; radials 5, deeply scalloped

OHI.-OLI.]

ECHINODERMATA.

for receiving the bases of the narrow, elongate ambulacra, and having projecting lips forming a quinquepol; deltoid plates 6, elongate, forming three-fourths of the calyx; a narrow intercalated plate, on the azygous side, reaches from the aperture to the radial, and divides the deltoid into two narrow curving plates; sinuses narrow, extending the entire length of the calyx; ambulacra narrow; lancet plates long and very narrow; side plates numerous; hydrospires pendent, two tubes or elongated sacs on each side of an ambulacrum; spiracles in five pairs, which notch the deltoid plates; mouth large, covered normally with plates; azygous opening large. Types N. elegans and N. verneuili.

angularis, Lyon, 1857, (Olivanites angularis,) Geo. Sur. Ky., vol. 3, p. 492, Ham. Gr.

canadens s, Montgomery, 1881, Can. Nat. and Geol. Vol. 10, p. 83, Ham. Gr. conradi, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., App. C., p. 121, Up.

Held. Gr.

elegans, Conrad, 1842, Jour. Acad. Nat. Sci. Phil., p. 280, Ham. Gr.

halli, syn. for Nucleocrinus elegans.

kirkwoodensis, Shumard, 1863, (Eleacri-nus kirkwoodensis,) Trans. St. Louis Acad. Sci., vol. 2, p. 113, St. Louis Gr. lucina, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., App. C., p. 120,



Ill., vol. 7, p.

358, Ham. Gr.

FIG. 369.—Nucleocrinus obo-vatus. Cross section of hy-drospires, 2 diam.

verneuili, Troost, 1841, (Pentremites verneuili,) 6th Rep. on

the Geo. of Tenn., p. 14, and Geo. Sur. Ky., vol. 3, p. 488, Up. Held. Gr. verneuili var. pomum, Eth-eridge & Carpenter, is

simply a rounded form very common among other specimens, and

without varietal char- FIG. 370.-Nucleocrinus verneuili. acters.

OHIOCRINUS, Wachsmuth & Springer, 1885, Palæocrinoidea, pt. 3, p. 208. [Ety. proper name; krinon, lily.] Plates of calyx arranged as in Heterocrinus; arms 10, bearing bifurcating pinnules; ventral tube large, having a spiral form somewhat like the cast of a

Murchisonia, and covered with hexagonal plates; column pentagonal and pentapartite. Type O. laxus. compactus, Meek, 1873, (Hete-

rocrinus constrictus var. com-

pactus,) Ohio Pal., vol. 1, pl. FIG. 371. 11, Hud. Riv. Gr. constrictus, Hall, 1866, (Hete- compactus, rocrinus constrictus,) 24th Rep. N. Y.

St. Mus. Nat. Hist., p.



210, Hud. Riv. Gr. laxus, Hall, 1866, (Heterocrinus laxus,) 24th Rep. N. Y. St. Mus. Nat. Hist., p. 211, Hud. Riv. Gr. œhanus, Ulrich, 1882.

(Heterocrinus œhanus,) Jour. Cin. Soc. Nat. Hist., vol. 5, p. 175, Hud. Riv. Gr.

FIG. 372. Ohiocrinus constrictus.

OLIGOPORUS, Meek & Wor-, then, 1860, Proc. Acad. Nat. Sci. Phil., p. 474.

[Ety. oligos, few; poros, passage.] In form like Melonites, but distinguished by having only four rows of ambulacral plates, and four double rows of pores in each ambulacral area. Type O. danæ. Desor used the name Oligopores, in 1858, for a section of the Cidaridæ, and Prof. Meek said if desirable to change Oligoporus, for that reason he would suggest Melonopsis in its place.

coreyi, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 34, Keokuk Gr.



Fig. 373.-Oligoporus danæ; 2 diam.

- danæ, Meek & Worthen, 1860, (Melonites danæ.) Proc. Acad. Nat. Sci. Phil., p. 397, and Geo. Sur. Ill., vol. 2, p. 249, Keokuk Gr.
- nobilis, Meek & Worthen, 1868, Proc. Acad. Nat. Sci. Phil., p. 358, and Geo. Sur. Ill., vol. 5, p. 476, Burlington Gr.

parvus, Hambach, 1884, Trans. St. Louis Acad. Sci., vol. 4, p. 548, Keokuk Gr.

Olivanites, syn. for Nucleocrinus. angularis, see Nucleocrinus angularis. verneuili, see Nucleocrinus verneuili.

magnus, Wort vol. 6, p. 520 monroensis, M (Forbesiocrin Acad. Nat. 8 Sur. Ill., vol.

ORO.-PAL.]



FIG. 377. -Ony

norwoodi, Meek iocrinus norv Sei. Phil., p. vol. 2, p. 245, ramulosus, Ly (Forbesiocrin Sci. and Arts, Orophocrinus was in 1864, in 1 sench. Gottir mites stellifo The definition was made in foreign counts no circulation fossil occurs. scure, its appl

not noticed u in 1878, and p been, had M scribed the g Codonites, in their great wo nois. Neither nition of yon 8 Orophocrinus t Codonites.



FIG. 378. -Ottawa typus.

ical, basals 5; 1 x 5; arms 5

Ollacrinus, Cumberland, 1826, Appendix to Reliquize Conservata. Figured without description, and subsequently declared

by DeKoninck & LeHon to be a Rhodocrinus. Wachsmuth & claim Springer priority for this name over Goni- VDD asteroidocrinus. without good reason, however, as shown by Meek in Ill. Geo. Sur., vol. 2, p. 217.

264

ONYCHASTER, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 1868. 3, p. 526. [Ety. onyx, claw; aster star.] A smal small sub discoid body, with five long, slender, rounded, flexible rays; dorsal side of disk composed of an outer circle of five pairs of plates each, pierced with an ovarian pore, and two inner circles of five pairs each, non por iferous, and surrounding a central anal opening; out-

side the pore plates, each pair is followed by two or three pairs of interlocking transverse plates, connecting with the dorsal side of the rays; farther there are lanceolate plates, furrowed and having pores between the inner ends. Type O. fl-xilis.

barrisi, Hall, 1861, (Protaster barrisi,) Desc. New. Crinoidea, p. 18, and Geo. Sur. 111, vol. 5, p. 476,

Burlington Gr. flexilis, Meek & Wor-then, 1868, Geo. Sur. Ill., vol. 3, p. 526, Keokuk Gr.

ONYCHOCRINUS, Lyon & Casseday, 1859, Am. Jour. Sci., 2d series, vol. 29, p. 77. [Ety. onyx, claw; krinon, lily.] Calyx low, arms like the talons of a fowl; ha-als 3; sub-

radials 5; radials 4 to 7 x 5; arms short, branching; interradials 3 to 20; vault depressed; column large. Type O. exculptus.

asteriformis, Hall, 1861, (Forbesiocrinus asteriformis,) Desc. New Crin., p. 9, and Geo. Sur. Ill., vol. 2, p. 243, Keokuk Gr.

diversus, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 256, and Geo. Sur. Ill., vol. 3, p. 492, Burlington Gr.

FIG. 375.—Onychocrinus diversus. Diagram.



FIG. 376.—Onychocrinus exculptus.

exculptus, Lyon & Casseday, 1859, Am. Jour. Sci. and Arts, vol. 29, p. 78, Keokuk Gr.



FIG. 374.--Onychas-ter flexilis.

distensus, Worthen, 1882, Bull. No. 1, III, St. Mus. Nat. Hist., p. 31, and $G_{\rm H0}$. Sur. Ill., vol. 7, p. 307, Kaskaskia Gr.

OLL.-ONY

ORO.-PAL.]

82, Bull. No. 1, III. p. 31, and Geo. Kaskaskia Gr.



gram.

orthen, 1866, Proc. p. 256, and Geo. 92, Burlington Gr.



nus exculptus. seday, 1859, Am. vol. 29, p. 78, Keo-

ECHINODERMATA.

magnus, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 520, St. Louis Gr. monroensis, Meek & Worthen, 1861, (Forbe-iocrinus monroensis,) Proc. Acad. Nat. Sci. Phil., p. 130, and Geo. Sur. Ill., vol. 2, p. 244, Keokuk Gr.



FIG. 377. -Onychocrinus exculptus. Diagram.

norwoodi, Meek & Worthen, 1860, (Forbesiocrinus norwoodi,) Proc. Acad. Nat. Sci. Phil., p. 389, and Geo. Sur. Ill., vol. 2, p. 245, syn for O. exculptus. ramulosus, Lyon & Casseday, 1859, (Forbesiocrinus ramulosus,) Am. Jour. Sci. and Arts, vol. 28, p. 235, Keokuk Gr. Orophocrinus was proposed by von Seebach, in 1864, in Nachr. k. Gesellsch. Wissench. Gottingen, p. 110, for Pentre-mites stelliformis, Owen & Shumard. The definition was very imperfect, and was made in a foreign language, in a foreign country, and in a journal having no circulation in America, where the fossil occurs. The definition was so obscure, its application to the species was not noticed until Ludwig discovered it in 1878, and probably never would have been, had Meek & Worthen not described the genus, under the name of Codonites, in 1869, and illustrated it in their great work on the Geology of Illinois. Neither the publication or definition of von Seebach is such as to allow Orophocrinus to stand in preference to Codonites.



typus.

Calvx obconical, basals 5; subradials $1 \ge 5$; radials 1 x 5; arms 5; azygous plate rests on a

TTAWACRINUS, W. R. Bill-

ings, 1887,

Ottawa Nat.

Club, vol. 1, p. 49. [Ety.

propername;

krinon, lily.]

basal as in Dendrocrinus, and from which it is distinguished only by the arrangement of the plates on the azy-

- gous side. Type O. typus. typus, W. R. Billings, 1887, Ottawa Nat. Club, vol. 1, p. 49, Trenton Gr.
 - PACHYCRINUS, Billings, 1859, Can. Org. Rem., Decade 4, p. 22. [Ety. pachys, thick ; krinon, lily.] Calyx saucer-shaped; basals 1 x 5; ra-dials 1 x 5. Type P. crassibasalis.
 - crassibasalis, Billings, 1859, Can. Org. Rem., Decade 4, p. 22, Chazy Gr.
 - chylocrinus, Wachsmuth & Springer, 1879, Proc. Acad. Nat. Sci. Phil., p. 115. Proposed for a division of Poteriocrinus of less than generic importance, but later the same authors referred their type to Woodocrinus.
 - PALEASTER, Hall, 1852, Pal. N. Y., vol. 2, p. 247. [Ety. palaios, ancient; aster, star.] Stellate, disk small; two ranges of plates in each ambulacral groove, and two on either side, adambulacral and marginal; four ranges of pores in each groove; oral plates in pairs at the base of the rays; dorsal

plates polygonal, sometimes spinous, madreporic tubercle. Type P. niagarensis.

- antiqua, Locke, 1846, (Asterias antiqua,) Proc. Acad. Nat. Sci. Phil., vol. 3, p. 38, Hud. Riv. Gr. Too poorly defined for determination:
- antiquus, Troost, 1835, (Asterias antiqua,) Trans. Geo. Soc. Penn., vol. 1, p. 232, Hud. Riv. Gr.

clarkanus, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 236, Hud. Riv. Gr.

clarki, S. A. Miller, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 102, see Palæa ster 🐲 clarkanus. crawfords-

villensis. 8. A. Mil-

5. A. Mil- Fig. 379.—Palæaster crawfords-ler, 1880, villensis, showing madrepori-Jour. Cin. form tubercle. Soc. Nat.

Hist, vol. 2, p. 256, Keokuk Gr.

- dubius, Miller & Dyer, 1878, Cont. to Pal., No. 2, p. 256, Utica Slate Gr.
- dyeri, Meek, 1872, Am. Jour. Sci., 3d series, vol. 3, p. 257, and Ohio Pal., vol. 1, p. 58, Hud. Riv. Gr.
- eucharis, Hall, 1868, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 330, Ham. Gr.

- exculptus, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 69, Hud. Riv. Gr.
- finii, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 19, Utica Slate Gr. granti, Spencer, 1884, Bull. No. 1, Mus.
- Univ. St. Mo., p. 53, Clinton Gr. granulosus, Hall, 1868, 20th Rep. N. Y. St.
- Mus. Nat. Hist., p. 327, Hud. Riv. Gr. harrisi, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 117, Hud. Riv. Gr.
- incomptus, Meek, 1872, Am. Jour. Sci., 3d series, vol. 3, p. 275, and Ohio Pal., vol. 1, p. 64, Hud. Riv. Gr.
- jamesi, Dana, 1863, (Palæsterina (?) jamesi,) Am. Jour. Sci., 2d series, vol. 35, p. 295, Hud. Riv. Gr.
- longibrachiatus, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 102, Hud. Riv. Gr.
- magnificus. S. A. Miller, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 16, Hud. Riv. Gr.
- matutinus, Hall, 1847, (Asterias matu-tina,) Pal. N. X., vol. 1, p. 91, Trenton Gr.
- miamiensis, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 143, Hud. Riv. Gr.
- parviusculus, Billings, 1860, Can.Nat. and Geo., vol. 5, p. 69, and Acad. Geol., p. 594, Mid. Sil.
- niagarensis, Hall, 1852, Pal. N. Y., vol. 2, p. 247, Niagara Gr.
- pulchellus, see Stenaster pulchellus.

shafferi, Hall, 1868, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 326, Hud. Riv. Gr.

1878,

Riv. Gr.

spinulosus, Mil-ler & Dyer, 1878, Jour. Cin.

Soc. Nat. Hist., vol. 1, p. 32, Hud. Riv. Gr.



FIG. 380.-Palæaster simplex.

wilberanus, Meek & Worthen, 1861, (Petraster wilberianus,) Proc. Acad. Nat. Sci. Phil., p. 142, Hud. Riv. Gr.

- PALÆASTERINA, McCoy, 1851, Brit. Pal. Foss., p. 59, but first defined, by Salter, 1857, Ann. Mag. Nat. Hist. [Ety. palaios, ancient; aster, star; inus, resemblance.] Pentagonal, depressed, with plated disk that fills up the angles, leaving the rays but slightly produced; ambulacra shallow, bordered by subquadrate plates. Type P.
 - approximata, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 30, Hud. Riv. Gr.

fimbriata, see Schaenaster fimbriatus. jamesi, see Palæaster jamesi. rigida, see Petraster rigidus.

rugosa, Billings, 1857, Rep of Progr. Geo. Sur. Cau., p. 291, and Can. Org. Rem. Dec. 3, p. 77, Hud. Riv. Gr.



FIG. 381.-Palæasterina speciosa.

- speciesa, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 30, Hud. Riv. Gr.
- stellata, Billings, 1857, Rep. of Progr. Geo.
- Sur. Can., p. 290, and Can. Org. Rem., Decade 3, p. 76, Trenton Gr. PALÆCHINUS, McCoy, 1844, Carb. Foss. Ire-land, p. 172. [Ety. palaios, ancient; cohinus sea-upphi]] Large guid or echinus, sea-urchin.] Large, oval or spheroidal; plates spinous; 5 to 8 ranges of plates in the interambulacral areas; 2 ranges in the ambulacral areas, each plate perforated at the outer end by two pores. Type P. koenigi.
 - burlingtonensis, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 396, and Geo. Sur. Ill., vol. 2, p. 230, Burlington Gr.



FIG. 382-Palæchinus burlingtonensis, 2 diam.

- gracilis, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 82, and Geo. Sur. Ill., vol. 5, p. 473, Burlington Gr. PALECOMA, Salter, 1857, Ann. and Mag. Nat.
- Hist., 2d series, vol. 17. [Ety. palaios, ancient: coma. hair.] Disk small, ancient; coma, hair.] plates spinous, rays shallow, and having ambulacral, adambulacral, and marginal plates, the latter bearing spines, inclined toward the extremity of the ray. Type P. marstoni.

PAL.-PEN.]

cylindrica, see ' princeps, Hall ceps,) 20th Hist., p. 334, spinosa, see Tæ PALÆOCRINUS, Bil Decade 4, p. krinon, lily.] basals 5; rad radials 4 to 3 radiating fro of the arms.



FIG. 383. - Palæocrinus striatus.

> Can. Org. Re Decade 4, p. Trenton Gr. striatus, Billin 1859, Can. C Rem., Decade p. 25, Chazy

sulcatus, Saffo Not defined. PALEOCYSTITES,

Rem., Decad ancient; kus or pyriform poriferous at tenuiradiatus chapmani, Billi

Decade 3, p. dawsoni, Billin

Decade 3, p. pulcher, Billin vol. 4, p. 430, tenuiradiatus,

tenuiradiatus Chazy Gr.

Parisocrinus, Wac Proc. Acad. [Ety. parisos, A division than generic as the type,

P. salignoide Cyathocrinus

Pentacrinites hamp Rep. N. Y., merely the pl Pentagonites, prop

crinoid colum PENTREMITES, Say 2, p. 36. [H board or plat or pyriform; lobate, nor line; section

basals 3, form

or fork plat

the greater

PAL.



PAL.

PAL.-PEN.]

tep of Progr. Geo. I Can. Org. Rem. iv. Gr.



na speciosa

. 1878, Jour. Cin. 1, p. 30, Hud.

tep. of Progr. Geo. d Can. Org. Rem., on Gr.

4, Carb. Foss. Irepalaios, ancient; Large, oval or nous; 5 to 8 ranges ambulacral areas:

lacral areas, each e outer end by two igi. & Worthen, 1860,

Phil., p. 396, and , p. 230, Burling-



igtonensis, 2 diam.

then, 1869, Proc. p. 82, and Geo. Burlington Gr. nn. and Mag. Nat. 17. [Ety. palaios, Disk small, r.] shallow, and havambulacral, and e latter bearing rd the extremity marstoni.

ECHINODERMATA.

cylindrica, see Tæniaster cylindricus. princeps, Hall, 1868, (Ptilonaster prin-ceps,) 20th Rep. N. Y. St. Mus. Nat. Hist., p. 334, Chemung Gr. spinosa, see Tæniaster spinosus.

PALEOCRINUS, Billings, 1859, Can. Org. Rem., Decade 4, p. 24. [Ety. palaios, ancient; krinon, lily.] Calyx oval or pyriform; basals 5; radials 1 x 5; azygous interradials 4 to 3; calycinal ambulacra 5, radiating from the center to the bases of the arms. Type P. striatus.

angulatus, Billings, 1857, (Dendrocrinus an-(gulatus,) Rep. of Prog. Geo. Sur. Can., p. 269, and Can. Org. Rem., Decade 4, p. 24, Trenton Gr. pulchellus, Billings, 1859,

FIG. 383 - Pal-Can. Org. Rem., Decade 4, p. 45, Trenton Gr. æocrinus striatus. rhombiferus, Billings, 1859,

Can. Org. Rem., Decade 4, p. 45, Trenton Gr. striatus, Billings, 1859, Can. Org.

Rem., Decade 4, p. 25, Chazy Gr. FIG. 384. – Palæocrinus licatus, Safford. striatus. Diagram.

- sulcatus, Not defined.
- PALZOCYSTITES, Billings, 1858, Can. Org. Rem., Decade 4, p. 68. [Ety. palaios, ancient; kustis, bladder.] Body oval or pyriform; plates numerous and poriferous at the margins. Type P. tenuiradiatus.
- chapmani, Billings, 1858, Can. Org. Rem., Decade 3, p. 71, Chazy Gr. dawsoni, Billings, 1858, Can. Org. Rem., Decade 3, p. 70, Chazy Gr. pulcher, Billings, 1859, Can. Nat. Geo., vol. 4, p. 430, Chazy Gr.
- tenuiradiatus, Hall, 1847, (Actinocrinus tenuiradiatus,) Pal. N. Y., vol. 1, p. 18, Chazy Gr.
- Parisocrinus, Wachsmuth & Springer, 1879, Proc. Acad. Nat. Sci. Phil., p. 115. [Ety. parisos, resembling; krinon, lily.] A division of Poteriocrinus of less than generic value, with P. perplexus as the type, and including P. nereus, P. salignoides, P. teniubrachiatus, and Cyathocrinus intermedius.
- Pentacrinites hamptoni, Emmons, 1842, Geo. Rep. N. Y., Trenton Gr. This is

merely the plate of a crinoid column. Pentagonites, proposed by Rafinesque for a crinoid column.

PENTREMITES, Say, 1820, Am. Jour. Sci., vol. 2, p. 36. [Ety. pente, five; remos, a board or plate.] Calyx globose, ovoid, or pyriform; base never distinctly trilobate, nor excavated in the middle line; section more or less triangular; basals 3, forming a small cup; radials or fork plates 1 x 5, long, forming the greater part of the calyx; limbs

long, with flat or concave sides and truncated above; sinus, subpetaloid; deltoid plates 1 x 5, small; ambulacra subpetaloid, resting in the sinuses or forks of the radials; lancet plates resting below on under lancet plates, and forming about a third the width of the ambulacra; side plates numerous and abutting the lancet plates; hydrospire or ambulacral pores partially excavated out of the sides of the sinuses; pinnules attached between the pores; hydrospires from 3 to 9, pendent, but partially contained within the substance of the radials near their distal ends; spiracles or apertures single or double, partially excavated in the deltoid plates; posterior spiracles confluent with the azygous opening; peristome covered by minute polygonal plates; column round. Type P. godoni.

- abbreviatus, Hambach, 1880, Trans. St. Louis Acad. Sci., vol. 4, p. 155, Kaskaskia Gr.
- angularis, Lyon, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 631, Kaskaskia Gr. basilaris, Hambach, 1880, Trans. St. Louis
- Acad. Sci., vol. 4, p. 145, Kaskaskia Gr. bipyramidalis, Hall, 1858, see Troostocrinus bipyramidalis.
- bradleyi, Meek, 1873, 6th Rep. Geo. Sur. Terr., p. 470. Not satisfactorily defined
- broadheadi, Hambach, 1880, Trans. St. Louis Acad. Sci., vol. 4, p. 145, Kaskaskia Gr.
- burlingtonensis, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., and Geo.
- Sur. Ill., vol. 5, p. 461, Burlington Gr. calyce, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 122, Ham. Gr. calycinus, Lyon, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 628, Kaskaskia Gr. carvinus, Hall 1858, Geo. Sur. Lows cervinus, Hall, 1858, Geo. Sur. Iowa, p.
- 690, Kaskaskia Gr. cherokeus, Troost, 1850, Catal. Proc. Am.
- Assoc. Ad. Sci. and Geo. Sur. Iowa, p. 691, Kaskaskia Gr. chesterensis, Hambach, 1880, Trans. St.
- Louis Acad. Sci., vol. 4, p. 145, Kaskaskia Gr.
- clavatus, Hambach, 1880, Trans. St. Louis Acad. Sci., vol. 4, Kaskaskia Gr. conoideus, Hall, 1858, Trans. Alb. Inst.,
- vol. 4, p. 5, and Geo. Sur. Iowa, p. 655, Warsaw Gr.
- cornutus, see Granatocrinus cornutus.

curtus, see Granatocrinus curtus.

- decussatus, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 243, Keokuk Gr.
- elegans, Lyon, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 632, Kaskaskia Gr.
- elongatus, Shumard, 1855, Geo. Rep. Mo., p. 187, Burlington Gr. florealis, Schlotheim, 1820, syn. for P.
- godoni.

gemmiformis, Hambach, 1884, Trans. St. Louis Acad. Sci., vol. 4, p. 548, Kaskaskia Gr.

globosus, Say, as identified by Troost, 1850, probably Pentremites sulcatus.



268

godoni, DeFrance, 1818, Dict. Sci. Nat., t. 14, p. 467, Kaskaskia Gr.

-Pentremites FIG. 385.godoni.

granulatus, see G ranatocrinus granulatus. grosvenori, Shu-

mard, see Troostocrinus grosvenori. hemisphericus, Hambach, 1880, Trans. St Louis Acad. Sci., vol. 4, p. 145, Kas-/ kaskia Gr.

kentuckiensis, see Codaster kentuckiensis. koninckanus, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 4, and Geo. Sur. Iowa, p. 656,

Warsaw Gr.

laterniformis, Owen & Shumard, 1850, Jour. Acad. Nat. Sci, 2d series, vol. 2, p. 66, Kaskaskia Gr.

leda, Hall, see Granatocrinus leda.

lineatus, see Troostocrinus lineatus.

- longicostalis, Hall, 1860, Supp. to Geo. Iowa, p. 85, Warsaw Gr. Not satisfac-torily defined.
- lycorias, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 123, Ham. Gr. maia, Hall, 1862, 15th Rep. N. Y. St. Mus.

Nat. Hist., p. 122, Ham. Gr.

melo, see Granatocrinus melo.

- missouriensis, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 81, Kaskaskia Gr.
- nodosus, Hambach, 1880, Trans. St. Louis Acad. Sci., vol. 4, p. 145, Kaskaskia Gr.

norwoodi, see Granatocrinus norwoodi. obesus, Lyon, 1857, Geo. Sur. Ky., vol. 3,

p. 469, Kaskaskia Gr. obliquatus, see Tricœlocrinus obliquatus. ovalis, Owen./ Not de-

fined. potteri. Ham bach,

1880, Trans. St. Louis Acad. Sci., d vol. 4, p. 156, Burlington Gr.

pyriformis, Say, 1825, Jour. Acad. Nat. Sci. Phil., vol. 4, p.

294. Kaskaskia Gr. FIG. 386.-Pentremites reinwardti, Troost, pyriformis. surface; d, deltoid plates. see Troostocrinus

reinwardti. robustus, Lyon, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 629, Kaskaskia Gr.

entra

roemeri, see Granatocrinus roemeri.

sampsoni, Hambach, 1884, Trans. St. Louis Acad. Sci., vol. 4, p. 548, Choteau or Waverly Gr.

sayi, see Schizoblastus sayi. sirius, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 20, Burlington Gr. spinosus, Hambach, 1880, Trans. St. Louis Acad. Sci., vol. 4, p. 145, Kaska-kia Gr. stelliformis, see Orophocrinus stelliformis. subconoideus, Meek, 1873, Hayden's Geo. Sur. Terr., p. 471, Subcarb.



FIG. 387.--Pentremites pyriformis. One shows the deltoid plates extended to the summit.

subcylindricus, see Troostocrinus subcylindricus

- subtruncatus, see Troostocrinus subtruncatus.
- sulcatus, Roemer, 1852, Monog. Blastoid., p. 354, Kaskaskia Gr.
- symmetricus, Hall, 1858, Geo. Rep. Iowa, p. 694, Kaskaskia Gr.

tennesseeæ, Troost. Not defined.

- troosti, Shumard, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 386, Kaskaskia Gr. truncatus, Conrad, 1843, Proc. Acad. Nat.
- Sci. Phil., vol. 1, p. 334, Warsaw Gr. varsouviensis, see Tricelocrinus varsou-
- viensis.
- verneuili, see Nucleocrinus verneuili. whitii, Hall, 1862, 15th Rep. N. Y. St.
- Mus. Nat. Hist., p. 122, Ham. Gr. woodmani, see Triccelicrinus woodmani.
- wortheni, see Tricœlicrinus wortheni. PENTREMITIDEA D'ORBIGNY, 1849, Prodr. d.
 - Paléont., t. 1, p. 102. [Ety. from Pen-tremites.] Number and disposition of plates as in Pentremites, but the deltoids are inconspicuous, confined to the summit, rarely visible in a side view; spiracles large. It is also closely connected with Troostocrinus, and is of doubtful generic value. Type Ρ. schultzi.
 - americana, Barris, 1883, Geo. Sur. Ill., vol. 7, p. 363, Ham. Gr.
 - filosa, Whiteaves, 1887 Cont. to Can. Pal., vol. 1, p. 104, Ham. Gr.
- PERISCHODOMUS, McCoy, 1849, Ann. Nat. Hist., vol. 3, p. 251. [Ety. perischos, inclosing; do-

mus, house.] Spheroidal, subpentagonal; ambu- Fig. 388. lacra narrow, two rows americana; of small plates imbricat-2 diam. ing downward, each

pierced by one pair of simple pores; interambulacra wide, with five rows of



plates imbr the center of the rows adj supporting 1 forated, but rounded by plates havin openings 8 biserialis. illinoisensis, Geo. Sur. ka-kia Gr. Pereiochocronus, Mag. Nat. H defined so as

some author crinus. PETRASTER, Billii

Decade 3, p aster, star.] ter, and ha adambulacra plates, on th rigidus.



F1G. 389

bellulus, Billin p. 393, Niaga rigidus, Billing idus,) Rep. o 291, and Can 80, Trenton (wilberianus, see Philocrinus, Kon favorite; krin pelvis, Meek & Sci., 2d serie

crinus typus. PHOLIDOCIDARIS, Proc. Acad. 1 philidos, scale

ambulacrals t upward and rows; only t ties; margina lower side h showing a p surrounded areas wide, v plates imbri plate pierced

larger ones Type P. irreg irregularis, M

Acad. Ni t. Se Sur. Ill., vol.





PEN.-PER

PEN.-PER

30, Trans. St. Louis 45, Kaskaskia (ir. rinus stelliformis. 373, Hayden's Geo. bcarb.



formis. One shows d to the summit

- tocrinus subcylin-
- tocrinus subtrun-

52, Monog. Blas-

tia Gr. 3, Geo. Rep. Iowa,

defined.

Trans. St. Louis 86, Kaskaskia Gr. Proc. Acad. Nat. 34, Waisaw (ir. elocrinus varsou-

us verneuili h Rep. N. Y. St. 22, Ham. Gr. inus woodmani. us wortheni.

IX, 1849, Prodr. d. [Ety. from Penand disposition of ites, but the delous, confined to

visible in a side It is also closely tocrinus, and is of alue. Type P.



F16. 388. - Pen-)utremitidea americana; WS at-2 diam. ich

of simple pores; with five rows of

- plates imbricating upward, and from | PHYSETOCRINUS, Meek & Worthen, 1869, the center outward ; primary spines on the rows adjoining the ambulacra, the supporting tubercle being small, perforated, but not crenulated, and surrounded by a double ring; ovarian plates having 6 pores; mouth and anal openings small, central. Type P. biserialis. illinoisensis, Worthen & Miller, 1883,
- Geo. Sur. Ill., vol. 7, p. 333, Kaska-kia Gr.
- Pereiochocronus, Austin, 1843, Ann. and Mag. Nat. Hist., vol. 11, p. 203. Not defined so as to be recognized, though some authors use it instead of Saccocrinus
- PETRASTER, Billings, 1858, Can. Org. Rem., Decade 3, p. 79. [Ety. petros, stone; aster, star.] Closely related to Palæaster, and having both marginal and adambulacral plates, with a tew diskplates, on the ventral side. Type P. rigidus.



FIG. 389.—Petraster bellulus

- bellulus, Billings, 1865, Pal. Foss., vol. 1, p. 393, Niagara Gr.
- rigidus, Billings, 1857, (Palæasterina rigidus,) Rep. of Progr. Geo. Sur. Can., p. 291, and Can. Org. Rem., Decade 3, p. 80, Trenton Gr.

- wilberianus, see Palæaster wilberanus. Philocrinus, Koninck, 1863. [Ety. philos, favorite; krinon, lily.]
 - pelvis, M.ek & Worthen, 1865, Am. Jour. Sci., 2d series, vol. 39, syn. for Erisocrinus typus.
- PHOLIDOCIDARIS, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 77. [Evy. [Ey. philidos, scale; kideris, turban.] Interambulacrals thin, irregular, imbricating upward and laterally; five or more rows; only two reaching the extremities; marginal rows and those on the lower side having primary tubercles, showing a pit in the top, and being surrounded by two rings; ambulacral areas wide, with six or more rows of plates imbricating downward, each plate pierced by two pores, and the larger ones having additional pores. Type P. irregularis.
- irregularis, M., k & Worthen, 1869, Proc. Acad. N. t. Sci. Phil., p. 78, and Geo. Sur. Ill., vol. 5, p. 512, Keokuk Gr.

- Proc. Acad. Nat. Sci. Phil., p. 158. [Evy. physetos, inflated; krinon, lily.] Distinguished from Actinocrinus, in the form and construction of the vault, which has no proboscis, and has pores along the radial portions of the dome; and, also, in having no hook-like projections along the pinnules. Type P. ventricosus.
- asper, Meek & Worthen, 1869, Proc. Acid. Nat. Sci. Phil., p. 161, and Geo. Sur. Ill., vol. 5, p. 351, Burlington Gr.
- copei, S. A. Miller, 1881, (A c tinocrinus copei,) Jour. Cin. Soc. Nat. Hist., vol. 4, p. 310, Burlington Gr. dilatatus, Meek



- 1869, (Stroto- FIG. 390. Physetocrinus crinus dilatacopei tus,) Proc.
- Acad. Nat. Sci. Phil. p. 162, and Geo. Sur. Ill., vol. 5, p. 363, Burlington Gr. ornatus, Hall, 1858, (Actinocrinus ornatus,) Geo. Sur. Iowa, p. 583, Burlington Gr.
- reticulatus, Hall, 1861, (Actinocrinus reticulatus) Desc. New Crin., p. 3, Burlington Gr.
- subventricosus, McChesney, 1860, [Actinocrinus subventricosus,) Desc. New Crin. Pal. Foss., p. 21, and Trans. Chi. Acad. Sci., p. 16, Burlington Gr.
- ventricosus, Hall, 1858, (Actinocrinus ventricosus,) Geo. Sur. Iowa, p. 595, Burlington Gr.
- ventricosus var. cancellatus, Hall, 1861, Actinocrinus ventricosus var. cancellatus,) Bost. Jour. Nat. Hist., vol. 7, p. 279, Burlington Gr.
- ventricosus var. internodus, Hall, 1861, (Actinocrinus ventricosus var. inter-nodus,) Bost. Jour. Nat. Hist., vol. 7, p. 278, Burlington Gr.
- PISOCRINUS, DeKoninck, 1858, Bull. Acad. Roy. Belgique, 2me ser., tome 3, p. 24. [Ety. pisos, pea; krinon, lily.] Calyx round globular; basals 5, forming a triangle; these are followed by three large plates, forming nearly the entire calyx; one of these supports two small plates, and a small plate is supported, in a notch, between the other two larger plates; arms 5; column round. Type P. pilula.



FIG. 391.-Pisocrinus gemmifor-mis. Natural size and magnifled.

globosus, Ringueberg, 1884, (Triacrinus globosus,) Proc. Acad. Nat.

113, Niagara Gr.

gemmiformis, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p.

Sci. Phil., p. 146, Clinton Gr.

PER.-PIS.]



pyriformis, Ringueberg, (Triacrinus pyriformis,) Proc. Acad. Nat. Sci. Phil., p. 145, Clinton Gr.

270

- PLATYCRINUS, Miller, 1821, Nat. Hist. Crinoidea, p. 73. [Ety. platys, flat; krinon, lily.] Calyx bowl-shaped; basals 3; primary radials 2x5; regular interradials 1x4; azygous interradials, 1 large and 3 small; dome elevated; arms 10 to 35, bearing pinnules; column large and twisted. Type P. lævis.
 - aequalis, Hall, 1861, Desc. New. Crin., p. 117, and Geo. Sur. Ill., vol. 5, p. 456, Burlington Gr.
 - americanus, Owen & Shumard, 1850, Jour. Acad. Nat. Sci. Phil., 2d ser., vol. 2, p. 89, Burlington Gr.

anndixoni, Troost. Not defined.



FIG. 392.-Platycninus asper. Diagram.

- asper, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 129, and Geo. Sur. Ill., vol. 3, p. 468, Burlington Gr. bedfordensis, Hall & Whitfield, 1875,
- Ohio Pal., vol. 2, p. 161, Erie Shales. bloomfieldensis, S. A. Miller, 1880, Jour.
- bloomfieldensis, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 257, Keokuk Gr.
- bonoensis, White, 1878, Proc. Acad. Nat. Sci. Phil., p. 30, and Cont. to Pal., No. 6, p. 160, Keokuk Gr.
- brevindus, Hall, 1861, Desc. New Crinoidea, p. 4, and Bost. Jour. Nat. Hist., vol. 7, p. 286, Keokuk Gr.
- burlingtonensis, Owen & Shumard, 1850, Jour. Acad. Nat. Sci., 2d ser., vol. 2, p. 60, Burlington Gr.
- calyculus, Hall, 1861, Desc. New Crin., p. 16, Burlington Gr.
- canaliculatus, Hall, 1858, Geo. Sur. Iowa, vol. 1. nt. 2. p. 539, Burlington Gr.
- vol. 1, pt. 2, p. 539, Burlington Gr. cavus, Hall, 1858, Geo. Sur. Iowa, p. 527, Burlington Gr.
- clytis, Hall, 1861, Desc. New Crin., p. 4, and Bost. Jour. Nat. Hist., vol. 7, p. 285, Burlington Gr.
- contritus, Hall, 1863, 17th Rep. N. Y. St. Mus. Nat. Hist., p. 54, and Ohio Pal., vol. 2, p. 166, Waverly Gr.
- *corporiculus*, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 12, Niagara Gr. Not properly defined.

- corrugatus, Owen & Shumard, 1850, Jour. Acad. Nat. Sci., vol. 2, p. 59, Burlington Gr.
- depressus, Owen. Not defined.
- discoideus, Owen & Shumard, 1850, Jour. Acad. Nat. Sci., 2d ser., vol. 2, p. 58, Burlington Gr.
- eboraceus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 119, Ham. Gr.
 elegans, Hall, 1861, Desc. New Crin., p. 4.
- elegans, Hall, 1861, Desc. New Crin., p. 4, and Bost. Jour. Soc. Nat. Hist., vol. 7, p. 285, Burlington Gr.
- eminulus, Hall, 1861, Desc. New Crin., p. 17, Burlington Gr.
- eriensis, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat Hist., p. 119, Ham Gr.
- excavatus, Hall, 1861, Desc. New Crin., p. 4, and Bost. Jour. Nat. Hist., vol. 7, p. 286, Burlington Gr.
- exsertus, Hall, 1858, Geo. Sur. Iowa, p. 539, Burlington Gr.

faberi, n. sp. Calyx bowl-shaped; subcylindrical above;

by three keels, corresponding with the sutures between the basal plates, and along which the



along which the FIG. 393.—Platycrinus sutures may be dis-faberi, x 2. tinguished; radials

large, width a little greater than height; cicatrix for attachment of arms in the center of the upper face of each radial, and occupying about one-third of the width of the plate; surface marked by a row of tubercles radiating on each



FIG. 394 -Platycrinus hemisphericus. Diagram.

plate from the angle of union of basal and radial plates, and also a few scattering tubercles; collected in Scott County, West Va., in the St. Louis or Kaskaskia Gr. PLA.]

PLA.

georgii, Hall, Iowa, p. 82, J glyptus, Hall, 16, Burlingto graphicus, Hal Mus. Nat. H vol. 2, p. 166, halli, Shumaro Acad. Sci., vo Ill., vol. 5, p. haydeni, Meek Terr., p. 469, p. 122, Subca



FIG. 395.—Platyc hemisphericu

Trans. Am. I Up. Held. Gr. lodensis, Hall Pal., vol. 2, p. monroensis, We Ill. St. Mus. 1 Sur. Ill., vol.

montanensis, see ensis.

multibrachiatus 1861, Proc. A 135, Warsaw

- niotensis, Meek &
- Worthen, 1865, Proc.
- Acad. Nat.
- Sci. Phil.,
- p. 162, and Geo. Sur.
- Ill., vol. 3, 3 p.513.Keo-
- kuk Gr. 7 nodobrachia-

tus, Hall, 1858, Geo.

Sur. Iowa, Fi

p. 542, Burlington Gr nodulosus, Hall, 541, Burlingto [PLA.

PLA.]

imard, 1850, Jour. 2, p. 59, Burling

efined. mard, 1850, Jour. er., vol. 2, p. 58,

5th Rep. N. Y. St.), Ham. Gr. New Crin., p. 4. Nat. Hist., vol. 7.

Desc. New Crin.,

h Rep. N. Y. St. , Ham Gr. Desc. New Crin., Nat. Hist., vol. 7.

eo. Sur. Iowa, p.

owl-shaped : sub-



IG. 393 .- Platycrinus faberi, x 2

ater than height; it of arms in the ce of each radial, one-third of the rface marked by a diating on each



iericus. Diagram

of union of basal l also a few scatllected in Scott the St. Louis or

- georgii, Hall, 1860, Supp. to Geo. Sur. Iowa, p. 82, Warsaw Gr. glyptus, Hall, 1861, Desc. New Crin., p.
 - 16, Burlington Gr.
- graphicus, Hall, 1863, 17th Rep. N. Y. St. Mus. Nat. Hist., p. 55, and Ohio Pal., vol. 2, p. 166, Waverly Gr.
- halli, Shumard, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 388, and Geo. Sur. Ill., vol. 5, p. 454, Burlington Gr. haydeni, Meek, 1872, Hayden's Geo. Sur.
- Terr., p. 469, and Cont. to Pal., No. 6, p. 122, Subcarboniferous.

hemisphericus,

Meek & Wor-

then, 1865,

Proc. Acad. Nat. Sci. Phil.,

p. 16, and Geo. Sur. Ill., vol. 3,

Not defined.

ncomptus White, 1863, Jour. Bost. Soc.

Nat. Hist., vol.

7, p. 503, and Geo. Sur. Ill.,

vol. 5. p. 459,

Burlington Gr.

P. burlington-

ensis.

kuk Gr.

511, Keo-



FIG insculptus, Troost. Not defined.

leai, Lyon, 1869, Trans. Am. Phil. Soc., vol. 13, p. 459, Up. Held. Gr.

- lodensis, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 168, Waverly Gr. monroensis, Worthen, 1882, Bull. No. 1,
- Ill. St. Mus. Nat. Hist., p. 30, and Geo. Sur. Ill., vol. 7, p. 306, St. Louis Gr. montanensis, see Eucladocrinus montan-

ensis. multibrachiatus, Meek & Worthen,

1861, Proc. Acad. Nat. Sci. Phil., p. 135, Warsaw Gr.

- niotensis, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 162, and Geo. Sur. Ill., vol. 3, ⊅ p.513, Keokuk Gr. nodobrachiatus, Hall, 1858, Geo.
 - Sur. Iowa, FIG. 396.-Platycrinus niotensis-542, Diagram. Burlington Gr.
- nodulosus, Hall, 1858, Geo. Sur. Iowa, p. 541, Burlington Gr.

- nucleiformis, Hall, 1858, Geo. Sur. Iowa, p. 540, Burlington Gr.
- olla, Hall, 1861, Desc. New Crin. The name was preoccupied. See P. halli.
- nine was protopical sector infini-ornigranulus, McChesney, 1860, Desc. New Pal. Foss., p. 5, and Trans. Chi. Acad. Sci., p. 3, Burlington Gr. oweni, Meek & Worthen, 1861, Proc.
- Acad. Nat. Sci. Phil., p. 120, Burlington Gr.
- parvinodus, Hall, 1861, Desc. New Cri-
- noidea, p. 17. Burlington Gr. parvulus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 163, and Geo. Sur. Ill., vol. 5, p. 555, Kaskaskia Gr.
- parvus, see Cordylocrinus parvus. penicillus, Meek & Worthen, 1860, Proc.
- Acad. Nat. Sci. Phil., p. 380, and Geo. Sur. Ill., vol. 2, p. 266, St. Louis Gr. perasper, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 161, Burlington Gr.
- pileiformis, Hall, 1858, Geo. Sur. Iowa, p. 529, Burlington Gr.
- planus, Owen & Shumard, 1850, Jour. Acad. Nat. Sci. Phil., 2d ser., vol. 2, p. 57, Burlington Gr.
- plenus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 380, and Geo. Sur. Ill., vol. 2, p. 267, St. Louis Gr.
- pleurovimineus, see Eucladocrinus pleurovimineus.
- plumosus, see Cordylocrinus plumosus.
- pocilliformis, Hall, 1858, Geo. Sur. Iowa, p. 528, Burlington Gr.
- poculum, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 311, Burlington Gr.
- polydactylus, Troost. Not defined. præmaturus, Hall & Whitfield, 1875, Ohio
- Pal., vol. 2, p. 124, Niagara Gr. prænuntius, Wachsmuth & Springer, 1878, Proc. Acad. Nat. Sci. Phil., p. 249, Burlington Gr.
- prattenanus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 379, and Geo. Sur. Ill., vol. 2, p. 264, St. Louis Gr.
- pratteni, Worthen, 1860, Trans. St. Louis Acad. Sci., vol. 1. p. 69, Burlington Gr.
- pumilus, Hall, 1860, Supp. to Geo. Sur. Iowa, p. 82, Warsaw Gr.
- quinquenodus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 18, Burlington Gr.
- ramulosus, see Cordylocrinus ramulosus. regalis. Hall, 1861, Desc. New Crinoidea,
- p. 16, Burlington Gr. richfieldensis, Hall & Whitfield, 1875,
- Ohio Pal., vol. 2, p. 167, Waverly Gr. saffordi, Troost, 1850, Hall, 1858, Geo.
- Sur. Iowa, p. 634, Keokuk Gr. saræ, Hall, 1858, Geo. Sur. Iowa, p. 673,
- St. Louis Gr. Scobina, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 129, and Geo. Sur. Ill., vol. 3, p. 466, Burlington Gr. sculptus, Hall, 1858, Geo. Sur. Iowa, p.
- 536, Burlington Gr.

shumardanus, Hall, 1858, Geo. Sur. Iowa, vol. 1, pt. 2, p. 532, Burlington Gr. siluricus, Hall, 1879, Desc. New Spec. Foss., p. 9, and 11th Rep. Geo. Sur. Ind., p. 256, Niagara Gr.



FIG. 397 - Platverinus scobina Diagram

- striobrachiatus, Hall, 1861, Desc. New Crinoidea, p. 4, and Bost. Jour. Nat. Hist., vol. 7, p. 287, Burlington Gr. subspinosus, Hall, 1858, Geo. Sur. Iowa,
- p. 536, Burlington Gr.

subspinulosus, Hall, 1860, Supp. to Geo. Sur. Iowa, p. 81, Burlington Gr. symmetricus, Wachsmuth & Springer, (in press,) Geo. Sur. Ill., vol. 8, p. 186,

Waverly or Kinderhook Gr.

tennesseensis, see Marsupiocrinus tennesseensis.

tentaculatus, see Marsupiocrinus tentaculatus.

- tenuibrachiatus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 16, and Geo. Sur. Ill., vol. 5, p. 450, Burlington Gr.
- truncatulus, Hall, 1858, Geo. Sur. Iowa, p. 538, Burlington Gr.

truncatus, Hall, 1858, Geo. Sur. Iowa, p. 537, Burlington Gr.

tuberosus, Hall, 1858, Geo. Sur. Iowa, p. 534. Burlington Gr.

verrucosus, White, 1863, Jour. Bost. Soc. Nat. Hist., vol. 7, p. 502, Burlington Gr. vexabilis, White, 1875, U. S. Sur. W.

100th Meridian, vol. 4, p. 81, Sub. Carb. wortheni, Hall, 1858, Geo. Sur. Iowa, p.

- 530, Burlington Gr. yandelli, Owen & Shumard, 1850, Jour.
- Acad. Nat. Sci., 2d ser., vol. 2, p. 58, Burlington Gr.
- PLATYCYSTITES, n. gen. [Ety. platys, flat; kustis, bladder.] General form com-pressed elliptical, or like the kernel of a peach seed, with a narrow rim on the border; axial canal passes down into the column; three plates in the first range, one of them bending around the rim and the other two having the dividing suture in the rim itself; there are five large plates in the second range, and above these there are three large plates, on the azygous side, with six or more smaller ones on the border; the whole surface is granular and every plate full of minute pores. Type P. faberi.

[PLA. -PLE.

faberi, n. sp. Basal plates hexagonal, longer than wide, one of them bending around the bordered rim, and the other two uniting at the middle of the rim; a large subcentral hexagonal plate in the second range on the azygous side rests upon the upper side of the plate, which is separated by a suture in the rim from an adjoining basal plate, but does not reach the other basal; this large hexagonal plate joins two plates in the second range with its under sloping sides; three large plates rest upon the three upper faces of this large hexagonal plate; the one upon the superior face is octagonal, resting between the other two large plates and having five smaller ones joining its upper faces. The specimen is worn at the upper edge

so as to destroy the orifices. It was received by Charles Faber among a lot of fossils from the Kaskaskia Group in the southern part of West Virginia, but as no cystideans have ever been found above the Lower Devonian, and as the



Silurian rocks.

PLEUROCYSTITES, Billings, 1854, Can. Jour., vol. 2, p. 250. Ety. pleuron, side ; kustis, bladder.] Body oval, flat; dorsal side with large plates, ventral with smaller ones; two free arms: mouth at the base on the left side; small orifice near the apex; three pectinated rhombs, two in the upper half and one in the lower; column short. Type P. squamosus.

anticostiensis, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 288, and Can. Orz. R-m., Decade 3, p. 52, Hud. Riv. Gr.

- elegans, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 287, and Can. Org. Rem., Decade 3, p. 51, Trenton
- exornatus, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 287, Trenton Gr.

filitextus, Billings, 1854, Can. Jour., vol. 2, p. 252, and Can. Org. Rem., Decade 3, p. 48, Trenton Gr.

cystites squamo-sus. robustus, Billings, 1854, **Can. Jour.**, vol. 2, p. **252, and Can. Org. Rem.**, Decade 3, p. 49, Trenton Gr.

No. 2, p. 42, Poteriocrinus, M noidea, p. 68 krinon, lily.] sub-radials 5

ble number o ray often hav azygous plate succeeded by part of the v in a long sac or branching

Type P. crass æqualis, Hall, lowa, p. 63, 1 alternatus, see D





399.-Pleuro-

FIG.





POR.-POT.]

squamosus, B vol. 2, p. 251 ade 3, p. 49, POROCRINUS, Bill Geo. Sur. Ca poriferous a rhombs.] Ca radials 1 x 5



F1G. 400. Porocrit Diagran Sur. Can., p. Decade 4, p.



FIG. 401. -Poro

Acad. Nat. S

Sur. Ill., vol.

& Worthe

Acad. Nat. 8

Phil., p. 1 and Geo. S

Ill., vol. 3, 332, Trenton (

1881, Trans.

tawa Field N

uralists' Ch

smithi, Gra

Pro

pentagonus, Mo

1865,

crassus, Meek

PLA. -PLE.

plates hexagonal, of them bending rim, and the other hiddle of the rim; exagonal plate in the azygous side side of the plate, y a suture in the g basal plate, but other basal; this) joins two plates ith its under slop-) plates rest upon of this large hexupon the superior ting between the s and having five

its upper faces. at the upper edge



if F1G. 398. Platycystites faberi 16

t belongs to the

1854, Can. Jour., leuron, side ; kustis, , flat; dorsal side itral with smaller mouth at the base ll orifice near the ted rhombs, two and one in the . Type P. squa-

tiensis, Billings, Rep. of Progr. Sur. Can., p. 288, Can. Orz. R-m., de 3, p. 52, Hud. Gr.

, Billings, 1857, of Progr. Geo. Can., p. 287, and Org. Rem., Dec-3, p. 51, Trenton

tus, Billings, 1857, of Progr. Geo. Oan., p. 287, Tren-

3r. us, Billings, 1854, Jour., vol. 2, p. and Can. Org. , Decade 3, p. 48, ton Gr. 18, Billings, 1854,

Jour., vol. 2, p. Rem., Decade 3,

pectinated

rhombs nu-

merous. Туре Р.

conicus. conicus, Bill-ings, 1857,

squamosus, Billings, 1854, Can. Jour., vol. 2, p. 251, and Can. Org. Rem., Decade 3, p. 49, Trenton Gr.

POROCRINUS, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 279. [Ety. from the poriferous areas similar to pectinated rhombs.] Calyx conical; basals 5; subradials 1 x 5; radials 1 x 5; azygous interradials2:



POR.-POT.]

Rep. of Progr. Geo. Sur. Can., p. 279, and Can. Org. Rem., Decade 4, p. 34, Trenton Gr.



FIG. 401. -Porocrinus crassus, Diagram

crassus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 115, and Geo. Sur. 111., vol. 3, p. 330, Hud. Riv. Gr. pentagonus, Meek

& Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 146, and Geo. Sur. Ill., vol. 3, p. 332, Trenton Gr.

smithi, Grant, 1881, Trans. Ot- FIG. 402.—Porocrinus cras-tawa Field Nat-uralists' Club subradials enlarged. uralists' Club,

No. 2, p. 42, Trenton Gr.

POTERIOCRINUS, Miller, 1821, Nat. Hist. Crinoidea, p. 68. [Ety. poterion, goblet; krinon, lily.] Calyx obconical; basals 5; sub-radials 5; radials 1 x 5, with a variable number of smaller ones, the azygous ray often having more than the others; azygous plates 3 or 4, within the calyx, succeeded by smaller ones that form part of the ventral sac; vault produced in a long sac or proboscis, arms simple or branching and bearing pinnules. Type P. crassus.

acqualis, Hall, 1860. Supp. to Geo. Sur. lowa, p. 63, Burlington Gr.

alternatus, see Dendrocrinus alternatus.

- anomalos, Wetherby, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 158, Kaskaskia Gr.
- arachniformis, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 13, and Geo. Sur. Ill., vol. 7, p. 281, Keokuk Gr.
- asper, Worthen, 1882, Bull. No. 1, 111. St. Mus. Nat. Hist., p. 11, and Geo. Sur. 111., vol. 7, p. 278, K+okuk Gr.
- asperatus, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 12, and Geo. Sur. Ill., vol. 7, p. 280, Keokuk Gr. barrisi, see Cyathocrinus barrisi.

bayensis, see Scaphiocrinus bayensis.

bisselli, Worthen, 1873, Geo. Sur. Ill., vol.

5, p. 546, Kaskaskia Gr. briareus, see Scaphiocrinus briareus.

buffaloensis, Worthen, (in press,) Geo. Sur. Ili., vol. 8, p. 89, Ham. Gr.

burketi, see Scaphiocrinus burketi.

bursiformis, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 10, Burlington Gr. caduceus, see Dendrocrinus caduceus.

calyculus, Hall, 1858, Geo. Sur. lowa, p. 553, Burlington Gr.

calyx, Hall, 1879, Desc. New Spec. Foss., p. 10, and 11th Rep. Geo. Sur. Ind., p. 266, Niagara Gr.

carbonarius, see Graphiocrinus carbonarius.



FIG. 403.—Poteriocrinos carinatus. Diagram.

- carinatus, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 139, and Geo. Sur. Ill., vol. 3, p. 486, Burlington Gr.
- clarkii, Williams, 1882, Proc. Acad. Nat. Sci. Phil., p. 21, Chemung Gr. claytonensis, Worthen, 1882, Bull. No. 1,
- Ill. St. Mus. Nat. Hist., p. 18, and Geo. Sur. Ill., vol. 7, p. 288, Warsaw Gr. clytis, Worthen, 1882, Bull. No. 1, Ill. St.
- Mus. Nat. Hist., p. 16, and Geo. Sur. Ill., vol. 7, p. 294, St. Louis Gr.
- columbiensis, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 22, and Geo. Sur. Ill., vol. 7, p. 293, Kaskaskia Gr.
- kia Gr. concinnus, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 26, and Geo. Sur. Ill., vol. 5, p. 490, Keokuk Gr. coreyi, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 516, Keokuk Gr. cornellanus, Williams, 1882, Proc. Acad. Nat. Sci. Phil., p. 18, Chemung Gr.

- corycia, Hall., 1863, 17th Rep. N. Y. St. Mus. Nat. Hist., p. 57, and Ohio Pal., vol. 2, p. 173, Waverly Gr.
- coxanus, see Scaphiocrinus coxanus. crineus, Hall, 1863, 17th Rep. N. Y. St. Mus. Nat. Hist., p. 56, and Ohio Pal.,
- vol. 2, p. 172, Waverly Gr.

cultidactylus, see Scaphiocrinus cultidactylus.

FIG. 404.-Poteriocrinus indianensis. Diagram.

cylindricus, Lyon, 1860, Trans. Am. Phil. Soc., vol. 13, p. 458, Up. Held. Gr.

- davisanus, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 226, Up. Held. Gr.
- decadactylus, see Scaphiocrinus decadactylus.

diffusus, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 121, Ham. Gr. dilatatus, see Cœliocrinus dilatatus.

divaricatus, Hall, 1860, Supp. to Geo. Sur.

Iowa., p. 65, Warsaw Gr. elsahensis, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 88, Kinderhook Gr. enormis, see Cyathocrinus enormis.

florealis, see Zeacrinus florealis.

fountainensis, Worthen, 1882, Bull. No. 1,

Iountainensis, wortnen, 1882, Bull. No. 1, Ill. Mus. Nat. Hist., p. 17, and Geo. Sur. Ill., vol. 7, p. 286, St. Louis Gr.
fusiformis, Hall, 1861, Desc. New Crinoidea, p. 6, and Bost. Jour. Nat. Hist., vol. 7, p. 302, Burlington Gr.

gracilis, see Dendrocrinus gracilis.

gregarius, Williams, 1882, Proc. Acad. Nat. Sci. Phil., p. 22, Chemung Gr. hamiltonensis, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 7, and Geo.

- Sur. Ill., vol. 7, p. 273, Keokuk Gr.
- hardinensis, Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 533, St. Louis Gr.

hemisphericus, see Eupachycrinus hemisphericus.

- hoveyi, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 516, Keokuk Gr. illinoisensis, Worthen, 1882, Bull. No. 1,
- Ill. St. Mus. Nat. Hist., p. 19, and Geo. Sur. Ill., vol. 7, p. 289, Warsaw Gr. indentus, Hall, 1862, 15th Rep. N. Y. St.
- Mus. Nat. Hist., p. 122, Ham. Gr. indianensis, Meek & Worthen, 1865, Proc.
 - Acad. Nat. Sci. Phil., p. 155, and Geo. Sur. Ill., vol. 3, p. 515, Keo
 - kuk Gr. iowensis, see Scaphiocrinus iowensis.
 - jesupi, Whitfield, 1881, Bull. No. 1, Am. Nat. Hist., p. 7, syn. for P. swallovi.

kaskaskiensis, see Scaphiocrinus kaskaskiensis.

- keokuk, Hall, 1860, Supp. to Geo. Sur. Iowa, p. 64, Keokuk Gr.
- lasallensis, Worthen, 1875. Geo. Sur. Ill., vol. 6, p. 526, Coal Meas.
- latidactylus, see Scaphiocrinus latidactylus.
- lepidus, Hall, 1861, Desc. New Crin., p. 6, and Bost. Jour. Nat. Hist., vol. 7, p. 304, Burlington Gr.
- longidactylus, Shumard, 1855. The name was preoccupied. See P. missouriensis.
- macoupinensis, Worthen. 1873, Geo. Sur. Ill., vol. 5, p. 561, Up. Coal Meas.
- mammiformis, Worthen, (in

press,) Geo. Sur. Ill., vol. 8, p. 91, Warsaw Gr.

- maniformis, see Zeacrinus maniformis. meekanus, Shumard, 1855, Geo. Rep. Mo.,
- p. 188, Burlington Gr. milleri, Wetherby, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 330, Kaskaskia Gr.

missouriensis, Shumard. 1857, Trans. St. Louis Acad. Sci., p. 80, and Geo. Sur. Iowa, p. 669,

St. Louis Gr. montanensis, see Scaphiocrinus montanensis.

municipalis, Troost. Not defined.

- nassa, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 120, Ham. Gr.
- nauvooensis, see Scaphiocrinus nauvooensis.
- nereus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat.
- FIG. 405 Po-Hist., p. 121, Ham. Gr. teriocrinus nettlerothanus, S. Α.
- missouriensis. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 227, Up.
- Held. Gr. nodobasalis, Worthen, (in press,) Geo.
- Sur. Ill., vol. 8, p. 89, St. Louis Gr.

norwoodi, Mee Acad. Nat. Sci

nycteus, Hall, Mus. Nat. H obuncus, Whit

Nat. Hist., p. occidentalis, Ow sizocrinus oc occidentalis, W

occidentalis. okawensis, see S orestes, see Scap

otterensis, Wor Ill. St. Mus. 1 Sur. Ill., vol.

peculiaris, Wor Ill. St. Mus. Sur. Ill., vol.

penicilliformis, Ill. St. Mus.

Sur. Ill., vol. perplexus, Mee Acad. Nat. S Sur. Ill., vol

pisif rmis, see A pleias, Hall, 18 Mus. Nat. H vol. 2, p. 173, popensis, see Sca

posticus, see De proboscidialis, Ill., vol. 6, p.

propinguns, see & rhombijerus, see richfieldensis, V

Ill. St. Mus. 1 Sur. Ill., vol. rowleyi, Worth Ill., vol. 8, p. rugosus, Shuma

Acad. Sci., vo salignoides, Wh Nat. Hist., vo salteri, see Scaph sculptus, Worth St. Mus. Nat.

Ill., vol. 7, p.



FIG. 406.-Poter

similis, Worthen Mus. Nat. Hi Ill., vol. 7, p. 1



POT.



POT.

POT.]

Geo. |Sur. Ill., Gr. 1882, Bull. No. 1, t., p. 19, and Geo. Warsaw Gr. ith Rep. N. Y. St. 2, Ham. Gr. orthen, 1865, Proc. p. 155, and Geo. rol. 3, p. 515, Keo-

١,

e Scaphiocrinus

tfield, 1881, Bull. h. Nat. Hist., p. 7, . swallovi.

see Scaphiocriskiensis.

II, 1860, Supp. to Iowa, p. 64, Keo-

Worthen, 1875, Ill., vol. 6, p. 526,

see Scaphiocrinus

18 all, 1861, Desc. ., p. 6, and Bost. . Hist., vol. 7, p.

ngton Gr. , Shumard, 1855. was preoccupied.

souriensis. sis, Worthen,

. Sur. Ill., vol. 5,). Coal Meas. is, Worthen, (in

vol. 8, p. 91, War-

is maniformis. 55, Geo. Rep. Mo.,

, Jour. Cin. Soc. p. 330, Kaskasrd uie nd 69 hi Not 5th us. m. io 5th at. FIG. 405 - Poteriocrinus Α. missouriensis. in. 5, p. 227, Up.

(in press,) Geo. St. Louis Gr.

- norwoodi, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 159, Kaskaskia Gr. mycteus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 120, Ham. Gr. obuncus, White, 1862, Proc. Bost. Soc.
- Nat. Hist., p. 10, Burlington Gr. occidentalis, Owen & Shumard, see Agas-
- sizocrinus occidentalis. occidentalis, Worthen, see Scaphiocrinus occidentalis.

okawensis, see Scaphiocrinus okawensis. orestes, see Scaphiocrinus orestes

- otterensis, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 14, and Geo. Sur. Ill., vol. 7, p. 283, Keokuk Gr.
- peculiaris, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 25, and Geo. Sur. Ill., vol. 7, p. 298, Kaskaskia Gr. penicilliformis, Worthen, 1882, Bull. No. 1,
- Ill. St. Mus. Nat. Hist., p. 9, and Geo. Sur. Ill., vol. 7, p. 276, Keokuk Gr.
- perplexus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 138, and Geo. Sur. Ill., vol. 5, p. 405, Burlington Gr. pisif rmis, see Arachnocrinus pisitormis.
- pleias, Hall, 1863, 17th Rep. N. Y. St. Mus. Nat. Hist., p. 57, and Ohio Pal., vol. 2, p. 173, Waverly Gr. popensis, see Scaphiocrinus popensis.
- posticus, see Dendrocrinus posticus. proboscidialis, Worthen, 1875, Geo. Sur.
- Ill., vol. 6, p. 518, St. Louis Gr. propinguus, see Scaphiocrinus propinguus. rhombijerus, see Barycrinus rhombiferus. richfieldensis, Worthen, 1882, Bull. No. 1,
- Ill. St. Mus. Nat. Hist., p. 15, and Geo. Sur. Ill., vol. 7, p. 285, Kinderhook Gr.
 rowleyi, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 90, Kaskaskia Gr.
 rugosus, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 223, Coal Meas.
 salignoides, White, 1862, Proc. Bost. Soc. Net Hist. vol. 9, p. 00, Rushington Gr.
- Nat. Hist., vol. 9, p. 10, Burlington Gr. salteri, see Scaphiocrinus salteri.
- sculptus, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 21, and Geo. Sur. Ill., vol. 7, p. 292, Kaskaskia Gr.

Mus. Nat. Hist., p. 23, and Geo. Sur. Ill., vol. 7, p. 295, Keokuk Gr.

- simplex, Lyon, 1869, Trans. Am. Phil. Soc., vol. 13, p. 458, Up. Held. Gr.
- solidus, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 140, Burlington Gr.
- spinobrachiatus, Scaphiocrinus brachiatus. spinuliferus, Worthen, 1884, Bull. No. 2,
- Ill. St. Mus. Nat. Hist., p. 27, and Geo. Sur. Ill., vol. 8, p. 86, Kaskaskia Gr.
- Zeacrinus spinuliferus.
- subimpressus, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 13, and Geo. Sur. Ill., vol. 3, p. 485, Burlington Gr.
- subramulosus, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 14, and Geo. Sur. Ill., vol. 7, p. 284, Keokuk Gr. subtumidus, Meek & Worthen, 1865, Proc.
- Acad. Nat. Sci. Phil., p. 159, Kaskaskia Gr.
- swallovi, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 394, and Geo. Sur. Ill., vol. 2, p. 183, Burlington Gr.
- talboti, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 7, and Geo. Sur. Ill., vol. 7, p. 287, St. Louis Gr. tentaculatus, Worthen, 1882, Bull. No. 1,
- Ill. St. Mus. Nat. Hist., p. 10, and Geo. Sur. Ill., vol. 7, p. 277, Keokuk Gr.

tenuibrachiatus, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 138, and Geo. Sur. Ill., vol. 3, p. 484, Burlington Gr.

tenuidactylus, Meek & Worthen, see T Scaphiocrinus

tenuidactylus. tenuidactylus, Fro. 407. – Poterioerinus Worthen, 1882, tenuibrachiatus. Di-Bull, No. 1, 111.

St. Mus. Nat. Hist., p. 6, and Geo. Sur. 111., vol. 7, p. 271, Keokuk Gr. Wachsmuth says this is a Scaphiocrinus, and he has proposed to call it Scaphiocrinus obscurus.

ulrichi, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 87. Keokuk Gr.

- tumidus, see Agassizocrinus tumidus.
- validus, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 18, and Geo. Sur. Ill., vol. 7, p. 287, Warsaw Gr.
- vanhornei, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 517, St. Louis Gr."
- FIG. 408.-Poteriocrinus varsoviensis, see Scaphiocrinus ulrichi. varsoviensis.

ventricosus, see Cœliocrinus ventricosus. venustus, see Scaphiocrinus venustus.









verticillus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 94, Ham. Gr. wachsmuthi, Meek & Worthen, see Graphiocrinus wachsmuthi.

- wachsmuthi, Wetherby, 1880, (Scyta-locrinus wachsmuthi,) Jour. Cio. Soc. Nat. Hist., vol. 3, p. 155, Kaskaskia Gr. wetherbyi, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 36, Kas-
- ka-kia Gr. zethus, Williams, 1882, Proc. Acad. Nat.
- Sci., p. 27, Chemung Gr.
- PROTASTER, Forbes, 1849, Mem. Geo. Sur. Great Britain, Decade 1. [Ety. protos, first ; aster, star.] Disk circular, compos d of squamiform plates; rays flexuous, composed of two series of ambulacral plates, bordered by spinous adambulacral ones; oral plates five. Type P. miltoni.

barrisi, see Onychaster barrisi.



276

flexuosus, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 31, Utica Slate & Hud. Riv. Gr. forbesi, Hall,

1859, Pal.

- N. Y., vol. 3, p. 134, Low. Held. Gr. granuliferus, Meek, 1872, Am. Jour. Sci., 3d ser., vol. 3, p. 274, and Ohio Pal., vol. 1, p. 68, Hud. Riv. Gr.
- gregarius, Me-k & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 169, and Geo.
- Sur. Ill., vol. 5, p. 509, Keokuk Gr. miamiensis, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 116, Hud. Riv. Gr.
- stellifer, Ringueberg, 1886, Bull. Buff. Soc. Nat. Sci., vol. 5, p. 7, Niagara Gr. Protasterina, syn. for Protaster.

fimbriuta, syn for Protaster flexuosus.

PTEROTOCRINUS, Lyon & Casseday, 1860, Am. Jour. Sci., vol. 29, p. 68. [Ety. pterotos, feathered; krinon, lily.] Caly x saucershaped, wider than high; vault high, with five wing like processes that characterize this genus; basals 2; radials 1 or 2 x 5, the second being small; secondary radials 1 x 10; tertiary radials 2 or 3 x 20; azygous in-

terradial 1; arms 20, reaching only to the vault; column round. Type P. capitalis.

- acutus, Weine. 1879. Jour. Cin. Soc. Nat. Hist., vol. 2, p. 134, Kaskas-
- FIG. 410.—Pterotocrinus kia Gr. chesterensis. Diabifurcatus, Wethergram.

by, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2. p. 136, Kaskaskia Gr.

capitalis, Lyon, 1857, (Astrocrinus capitalis,) G-o. Sur. Ky., vol. 3, p. 472, Kaskaskia Gr.

[PRO.—PYC.

- chesterensis, Meek & Worthen, 1860, (Actinocrinus chesterensis,) Proc. Acad. Nat. Sci. Phil., p. 383, and Geo. Sur. Ill., vol. 2, p. 292, Kaskaskia Gr.
- coronarius, Lyon, 1857, (Asterocrinus cor-onarius,) Geo. Sur. Ky., vol. 3, p. 476, Kaskaskia Gr.



FIG. 411.-Pterotocrinus crassus. Diagram

- crassus, Meek & Worthen, 1860, (Dichocrinus crassus,) Proc. Acad. Nat. Sci. Phil., p. 382, and Geo. Sur. Ill., vol. 2, p. 290, Ka-kaskia Gr.
- depressus, Lyon & Casseday, 1860, Am. Jour. Sci., vol. 29, p. 68, and Geo. Sur. Ill., vol. 5, p. 559, Kaskaskia Gr.
- protuberans, Hall, 1858, (Dichocrinus protuberans.) Geo. Sur. Iowa, p. 689, Kaskaskia Gr.
- pyramidalis, Lvon & Cassedav, 1860, Am. Jour. Sci., vol. 29, p. 69, Kaskaskia Gr.
- rug sus, Lyon & Casseday, 1860, Am. Jour. Sci., vol. 29, p. 71, Kaskaskia Gr.
- sexlobatus, see Talarocrinus sexlobatus.
- spatulatus, Wetherby, 1879, Jour. Cin. S.c. Nat. Hist., vol. 2, p. 137, Kaskaskia Gr.
- Pti onaster, Hall, 1868, syn. for Palæocoma. princeps, see Palæocoma princeps.
- Ptychocrinus, Wachsmuth & Springer, 1886, Revis. Palæocrinoidea, pt. 3, p. 99, syn. for Gaurocrinus.
- PYCNOCRINUS, S. A. Miller, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 231. [Ety. Calyx puknos, deuse; krinon, lily.] small, cup-shaped; basals

5; radials 3x5; regular interradials 3; arms 10, sometimes dividing after b coming free. Type P.

- shafferi. germanus, S. A. Miller, 1880, (Glyptocrinus shaff ri var. FIG. 412 germanus,) Jour. Cin. Soc. Pyto. 412 Nat. Hist., vol. 3, p. 233, germanus. Hud. Riv. Gr.
- shafferi, S. A. Miller, 1875, (Glyptocrinus shafferi,) Cin. Quar. Jour. Sci., vol. 2,



p. 277, and vol. 3, p. 23



FIG. 413.—Pycnoer nus shafferi.

Pygorhynchus gou RETIOCRINUS, Bill Decade 4, p. 6 lily.] Calyx | very promin radials 5, lar secondary ra interradial a large central extending up column roun fimbriatus. Billi

Decade 4, p. gracilis, Wether angularis.



FIG. 416. - Retiocri-nus stellaris.

1883, Glyptoc Rep. N. Y. St Trenton Gr. RHODOCRINUS, Mill noidea, p. 10 krinon, lily.] wider than h arm bases; ba

5; primary rac radials 1 to 3 rated, and co interlocking p wide, plates orifice excentr umn round.

asperatus, Billing Decade 4, p. 27 barrisi, Hall, 186

and Jour. Bost p. 322, Burling PRO.-PYC.

Astrocrinus capivol. 3, p. 472, Kas.

Worthen, 1860, rensis,) Proc. Acad. 33, and Geo. Sur. skaskia Gr. (Asterocrinus cor-Ky., vol. 3, p. 476,



rassus. Diagram

hen, 1860. (Dicho-. Acad. Nat. Sci. o. Sur. Ill., vol. 2,

isseday, 1860, Am. 68, and Geo. Sur. skaskia Gr. 858, (Dichocrinus Sur. Iowa, p. 689,

Cassedav, 1860, 29, p. 69, Kaskas-

seday, 1860, Am. p. 71, Kaskas-

nus sexlobatus. 1879, Jour. Cin. 2, p. 137, Kaskas-

1. for Palæocoma. princeps.

& Springer, 1886, a, pt. 3, p. 99, syn.

r, 1883, Jour. Cin. 6, p. 231. [Ery. 6, p. 231 on, lily.] Calyx ion, basals egular s 10, after pe P.

1880, ri var.

FIG. 412. 1. Soc. Pycnocrinus b. 233, germanus.). 233,

875, (Glyptocrinus Jour. Sci., vol. 2,

ECHINODERMATA.

Col

p. 277, and Jour. Cin. Soc. Nat. Hist., vol. 3, p. 233, Hud. Riv. Gr.



nus shafferi.

PYG.-RHO.]

F1G. 415. Pyenoeri nus shaf-FIG. 414.-Pycferi. n ocrinus shafferi. Enumn coilshafferi. En-larged 21/2 diam

ed around a column of Glypto-crinus. Pygorhynchus gouldi. Not recognized. RETIOCRINUS, Billings, 1858, Can. Org. Rem., Decade 4, p. 63. [Ety. retium, net; krinon, lily.] Calyx basin-shaped; radial ridges very prominent; basals 5, large; sub-radials 5, large; primary radials 4 x 5; secondary radials 4 to 6 x 10; plates in interradial areas, numerous, with a large central row in the azygous area

extending up the side of a ventral tube; column round. Type R. stellaris. fimbriatus, Billings, 1859, Can. Org. Rem., Decade 4, p. 65, Hud. Riv. Gr. gracilis, Wetherby, syn. for Gaurocrinus

Gr.

Can. Org. Rem., Decade 4, p. 64, Trenton

muth & Springer,

1885, Revis. Palaeocri-

noidea, pt. 3, p. 98. [Ety. raphanos, rad-isb; krinon, lily.]

Calyx short; basals

5, small; subradials



5; primary radials 3x5; interradials numerous; column round. Type R. sub-FIG. 416. - Retiocrinus stellaris. nodosus.

subnodosus, Walcott, 1883, Glyptocrinus subnodosus,) 35th Rep. N. Y. St. Mus. Nat. Hist., p. 208, Trenton Gr.

RHODOCRINUS, Miller, 1821, Nat. Hist., Crinoidea, p. 106. [Ety. rhodon, rose; krinon, lily.] Body subglobose, often wider than high, constricted near the arm bases; basals 5, small; subradials 5; primary radials 3 to 4 x 5; secondary radials 1 to 3 x 10; arms widely separated, and composed of two rows of interlocking plates; interradial areas wide, plates large; vault depressed; orifice excentric and protruding; column round. Type R. verus.

asperatus, Billings, 1859, Can. Org. Rem., Decade 4, p. 27, Chazy Gr. barrisi, Hall, 1861, Desc. New Crin., p. 9,

and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 322, Burlington Gr.

19

barrisi var. divergens, Hall, 1861, Desc. New Crin., p. 9, and Jour. Bost, Soc. Nat. Hist., vol. 7, p. 322, Burlington Gr. coxanus, Worthen, 1882, Bull. No. 1, Ill.

277

St. Mus. Nat. Hist., p. 29, and Geo. Sur. Ill., vol. 7, P. 305, Keokuk Gr.



FIG. 417.-Rhodocrinus. Diagram.

gracilis, Hall, 1862, 15th. Rep. N. Y. Mus. Nat. Hist., p. 127, Ham. Gr. halli, Lyon, 1861, Proc.

Acad. Nat. Sci. Phil., p. 412, Low. Held. Gr.

kirbyi, Wachsmuth & Springer, (in press,) (ieo. Sur. Ill., vol. 8, p. 180, Kinderhook Gr.

melissa, see Lyriocrinus melissa.

microbasalis, see Arch-

aeocrinus microba- FIG. 418. -Rhodocrinus nanus salis. nanus, Meek & Wor-

then, 1866, Proc. Acad. Nat. Sci. Phil.,



FIG. 419.-Rhodocrinus nanus. Diagram

254, and Geo. Sur. Ill., vol. 3, p. 476, Burlington Gr.



pyriformis, see Archeocrinus pyriformis. rectus, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 368, Niagara Gr. spinosus, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 127, Ham. Gr. varsoviensis, Hall, 1860, Supp. to Geo. Sup. Long. p. 20, Warner Gr. Sur. Iowa, p. 80, Warsaw Gr. vesperalis, White, 1880, Proc. U. S. Nat. wortheni, Hall, 1858, Geo. Súr. Iowa, p 556, Burlington Gr.

SACCOCRINUS, Hall, 1852, Pal. N. Y., vol. 2, p. 205. [Ety. sakkos, bag; krinon, lily] Calyx large, urn-shaped; basals 3; pri-mary radials. 3 x 5; secondary radials 1 (a) 10. testing radials in some of the same second secon to 4 x 10; tertiary radials, in some species; regular interradials 10 to 17; vault depressed, opening subcentral; arms 10 to 30; column round. Type S. speciosus.

FIG. 420.-Saccocrinus amplus. Diagram.

Mus., vol. 2, p. 259, and Cont. to. Pal. No. 6, p. 129, Up. Coal Meas. wachsmutbi, Hall, 1861, Desc. New Crin., p. 18, Burlington Gr.

watersianus, wachsmuth & Springer, (in press,) (ieo. Sur. Ill., vol. 8, p. 184, Kinderhook, Gr.

whitii, Hall, 1861, Desc. New Crin., p. 9, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 324, Burlington Gr.

hitii var. burling-tonensis, Hall, 1861, FIG. 421-Rhodoeri nus watersianus whitii Desc. New Crin., p. 9, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 325, Burlington Gr.

amplus, Meek & Worthen, 1861, (Actino-crinus amplus,) Proc. Acad. Nat. Sci. Phil., p. 133, and Geo. Sur. Ill., vol. 3. p. 470, Burlington Gr.

christyi, Hall, 1863, (Actinocrinus, christyi,) Trans. Alb. Inst. vol. 4, p. 196, and 28th Rep. N. Y. Mus. Nat. Hist., p. 127,

Nat. 1100, Niagara Gr. egani, S. A. Miller, 1881, Jour. Cin. Soc. F16. 422. – Sacce 1881, Jour. Cin. Soc. F16. 422. – Sacce

422. -- Saccocri Nat. Hist., vol. 4, p. 173, Niagara Gr.

infelix, Winchell & Marcy, 1865, (Megis-tocrinus infelix,) Mem. Bost. Soc. Nat. Hist., p. 110, Niagara Gr.



marcouanus, (Megistocri Soc. Nat. H necis, Winch

crinus nec Hist., p. 110 ornatus, Hall vol. 2, p. 12 pyriformis, 8 Soc. Nat. agara Gr. semiradiatus, St. Mus. Na speciosus, Ha 205, Niagara tennesseensis, field, 1875, agara Gr.

urniformis, S. Soc. Nat. agara Gr.

whitfieldi, Hall crinus chris SCAPHIOCRINUS,

p. 550. [Et lily.] Calya radials 5; ra dials 0; azy arms 10, sit projecting 1 Type S. s Springer refe

and substitu tomus. abnormis, Wo vol. 6, p. 519 egina, Hall, 14

Nat. Hist., p æqualis, Hall, 1 and Geo. St kuk Gr.

Acad. Nat. Geo. Sur. 11 kia Gr.

briareus, Wort briareus,) Bu

Hist., p. 12, a 279, Keokuk burketi, Worth

burketi,) Bul Hist., p. 5, an 270, Keokuk

carbonarius, see arius.

carinatus, Hall, 8, and Jour. 7, p. 310, Bur

clio, Meek & W Nat. Sci. Phil.

vol. 5, p. 408, coreyi, Meek Acad. Nat. Geo. Sur. Il kuk Gr.

coxanus, Worth coxanus,) Bul Hist., p. 43, ar 269, Keokuk (



SAC.

[SAC

SCA.]

eo. Súr. Iowa,

I. N. Y., vol. 2, p. ig; krinon, lily
ed; basals 3; pri condary radials als, in some speals 10 to 17; vault bcentral; arms 10 Type S. speciosus.

en, 1861, (Actino-c. Acad. Nat. Sci. p. Sur. Ill., vol. 3,



422. -- Saccocri F10. nus christyi

m. Bost. Soc. Nat. Gr.

- marcouanus, Winchell & Marcy, 1865, (Megistocrinus marcouanus,) Mem. Bost.
- Soc. Nat. Hist., p. 87, Niagara Gr. necis, Winchell & Marcy, 1865, (Megisto-crinus necis,) Mem. Bost. Soc. Nat. Hist., p. 110, Niagara Gr.
- ornatus, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 126, Niagara Gr.
- pyriformis, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 81, Niagara Gr.
- semiratiatus, Hall, 1867, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 370, Niagara Gr. speciosus, Hall, 1852, Pal. N. Y., vol. 2, p.
- 205, Niagara Gr. tennesseensis, Troost, Ms., Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 125, Niagara Gr.
- urniformis, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 170, Niagara Gr.
- whitfieldi, Hall, 1867, synonym for Saccocrinus christyi.
- SCAPHIOCRINUS, Hall, 1858, Geo. Sur. Iowa, p. 550. [Ety. scaphion, skiff; krinon, lily.] Calyx obconoidal; basals 5; subradials 5; radials 2x5; regular interradials 0; azygous interradials 1 to 6; arms 10, simple or bifurcating, plates projecting laterally; sutures gaping. Type S. simplex. Wachsmuth & Springer refer the type to Graphiocrinus and substitute, as the type S. dichotomus.
 - tomus. abnormis, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 519, St. Louis Gr. ægina, Hall, 1863, 17th Rep. N. Y. Mus. Nat. Hist., p. 57, Waverly Gr. æqualis, Hall, 1861, Desc. New Crin. p. 8,

 - and Geo. Sur. Ill., vol. 5, p. 494, Keokuk Gr.
 - bayensis, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 157, and Geo. Sur. Ill., vol. 5, p. 550, Kaskaskia Gr.
 - briareus, Worthen, 1882, (Poteriocrinus briareus,) Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 12, and Geo. Sur. Ill., vol. 7, p. 279, Keokuk Gr.
 - burketi, Worthen, 1882, (Poteriocrinus burketi,) Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 5, and Geo. Sur. Ill., vol. 7, p. 270, Keokuk Gr.
- carbonarius, see Graphiocrinus carbonarius
- carinatus, Hall, 1861, Desc. New Crin., p. 8, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 310, Burlington Gr.
- clio, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 144, and Geo. Sur. Ill., vol. 5, p. 408, Burlington Gr. coreyi, Meek & Worthen, 1869, Proc.
- Acad. Nat. Sci. Phil., p. 148, and Geo. Sur. Ill., vol. 5, p. 494, Keokuk Gr.
- coxanus, Worthen, 1882, (Poteriocrinus coxanus,) Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 43, and Geo. Sur. Ill., vol. 7, p. 269, Keokuk Gr.

- cultidactylus, Hall, 1860, (Poteriocrinus cultidactylus,) Supp. to Geo. Sur. Iowa, p. 62, and Geo. Sur. Ill., vol. 7, p. 301, Burlington Gr.
- dactyliformis, Hall, 1858, Geo. Sur. Iowa. p. 670, St. Louis Gr.
- decabrachiatus, Hall, 1858, Geo. Sur. Iowa, p. 679, St. Louis Gr.

decadactylus, Meek &

Worthen, 1860, (Poteriocrinus decadactylus,) Proc. Acad. Nat. Sci. Phil., p. 394, and Geo. Sur. Ill., vol. 2, p. 238. Keokuk Gr.

delicatus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 144, and Geo. Sur. Ill., vol. 5, p. 407, Burlington Gr.

depressus, Meek & Worthen, 1870, Fig. 423.—Scaphiocri-Proc. Acad. Nat. nus decadactylus.

nus decadactylus Diagram. Sci. Phil., p. 27, and Geo. Sur. Ill.,

- vol. 5, p. 492, Keokuk Gr. dichotomus, Hall, 1858, Geo. Sur. Iowa, p. 553, Burlington Gr.
- divaricatus, Hall, 1860. Supp. to Geo.
- Sur. Iowa, p. 65, Burlington Gr. doris, Hall, 1861, Desc. New Crin., p. 7, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 312, Burlington Gr.

elegantulus, Wachsmuth & Springer, (in press) (ico. Sur. Ill., vol. 8, p. 195, Kinderhook Gr.

extensus, Wachsmuth Springer, 1886, Revis. Palæocrinoidea pt. 3, p. 237. Proposed instead of Poteriocrinus asper, Worthen, but the latter name was not preoccupied.

fiscellus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 146, and Geo. Sur. Ill., vol. 5, p. 424, Burlington Gr.

gibsoni, White, 1878, Proc. Acad. Nat. Sci. Phil., p. 31, and

Cont. to Pal., No. 8, p. 161, Keokuk Gr.

globosus, Wachsmuth & Springer, (in press) Geo. Sur. Ill., vol. 8, p. 196,

ele-

F10. 424-Scaph iocrinus

gantulus.

Kinderhook Gr. gurleyi, White, 1878, Proc.

Acad. Nat. Sci. Phil., p.

32, and Cont. to Pal., FIG. 425.—Scaph-No. 8, p. 162, Keokuk (ir. iocrinus globo-halli, Hall, 1861, Desc. sus.

New Crin., p. 7, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 308, Burlington Gr.

huntsvillæ, Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 534, St. Louis Gr.

280

- internodius, Hall, 1858, Geo. Sur. Iowa, p. 679, St. Louis Gr.
- iowensis, Worthen, 1882, (Poteriocrinus iowensis,) Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 6, and Geo. Sur. Ill., vol. 7, p. 272, Keokuk Gr.
- juvenis, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 146, and Geo. Sur. Ill., vol. 5, p. 417, Burlington Gr.
- kaskaskiensis, Worthen, 1882, (Poterio-crinus kaskaskiensis,) Bull. No. 1, Ill.
- St. Mus. Nat. Hist., p. 27, and Geo. Sur. Ill., vol. 7, p. 300, Kaskaskia Gr. latidactylus, Worthen, 1882, (Poterio-crinus latidactylus,) Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 8, and Geo. Sur. Ill., vol. 7, p. 275, Keokuk Gr.
- liliiformis, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 138, Burling-
- ton Gr. liriope, Hall, 1863, 17th Rep. N. Y. Mus. Nat. Hist., p. 58, Waverly Gr. longidactylus, McChesney, 1860, New Pal.
- Foss., p. 7, Kaskaskia Gr.
- macadamsi, see Graphiocrinus macadamsi.
- macrodactylus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 140, and Geo. Sur. Ill., vol. 5, p. 415, Burlington Gr.
- montanensis, Meek, 1872, (Poteriocrinus montanensis,) Hayden's Geo. Sur. Terr., p. 469, and Cont. to Pal., No. 6,
- p. 128, Subcarboniferous. nanus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 141, and Geo. Sur. Ill., vol. 5, p. 423, Burlington (ir. nauvooensis, Worthen, 1882, (Poterio-crinus nauvooensis) Bull. No. 1, Ill.
- St. Mus. Nat. Hist., p. 13, and Geo. Sur. Ill., vol. 7, p. 282, Keokuk Gr.
- nodobrachiatus, Hall, 1861, Desc. New Crin., p. 8, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 314, Keokuk Gr.
- notabilis, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 148, and Geo. Sur. Ill., vol. 5, p.
- 410, Burlington Gr. obscurus, Wachsmuth & Springer,
- 1886, Revis. Palæocrinoidea, pt. 3, p. 236, Keokuk Gr.
- occidentalis, Worthen, 1882, (Poteriocrinus occidentalis,) Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 10, and Geo. Sur. Ill., vol. 7, p. 278, Keokuk Gr.
- okawensis, Worthen, 1882, (Poteriocrinus okawensis,) Bull. No. 1,
 - Ill. St. Mus. Nat. Hist., p. 24, and Geo. Sur. Ill., vol. 7, p. 296, Kaskaskia Gr.
- orbicularis, see Eupachycrinus orbicularis.
- restes, Worthen, 1882, (Poteriocrinus orestes,) Bull. No. 1, Ill. St. Mus. Nat. orestes, Hist., p. 7, and Geo. Sur. Ill., vol. 7, p. 273. Keokuk Gr.

- penicillus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 142, and Geo. Sur. Ill., vol. 5, p. 414, Burlington Gr.
- popensis, Worthen, 1882, (Poteriocrinus popensis,) Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 23, and Geo. Sur. Ill., vol. 7, p. 296, Kaskaskia Gr.
- propinquus, Worthen, 1882, (Poteriocrinus propinguus,) Bull. No. 1, Hl. St Mus. Nat. Hist., p. 26, and Geo. Sur. Ill., vol. 7, p. 299, Kaskaskia Gr. ramulosus, Hall, 1861, Desc. New Urin.,
- p. 7, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 307, Burlington Gr. randolphensis, Worthen, 1873, Geo. Sur.
- Ill., vol. 5, p. 551, Kaskaskia Gr. robustus, Hall, 1861, Desc. New Crin., p. 7, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 315, Keokuk Gr.
- rudis, see Graphiocrinus rudis.
- rusticellus, White, 1863, Proc. Bost. Soc. Nat. Hist., vol. 7, p. 505, Burlington Gr.
- salteri, Worthen, 1882, (Poteriocrinus salteri,)' Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 13, and Geo. Sur. Ill., vol. 7, p. 291, Kaskaskia Gr.
- scalaris, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 145, and Geo. Sur. Ill., vol. 5, p. 421, Burlington Gr.
- scoparius, Hall, 1858, Geo. Sur. Iowa, p. 680, Kaskaskia Gr.
- simplex, see Graphiocrinus simplex.
- spinifer, Wetherby, 1880, Jour. Cin. Soc.
- Nat. Hist., vol. 3, p. 157, Kaskaskia Gr. spinobrachiatus, see Graphiocrinus spinobrachiatus.
- spinobrachiatus, Worthen, 1882, (Poterio-crinus spinobrachiatus,) Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 20, and Geo. Sur. Ill., vol. 7, p. 290, Kaskaskia Gr.
- striatus, see Graphiocrinus striatus.
- subcarinatus, Hall, 1863, 17th Rep. N. Y. Mus. Nat. Hist., p. 58, Waverly Gr.



FIG. 426,--Scaphiocrinus tenuidactylus. Diagram.

- subtortuosus, Hall, 1863, 17th Rep-N. Y. Mus. Nat. Hist., p. 59, Wa-verly Gr.
- tenuidactylus, Meek & Worthen, 1865. Proc. Acad. Nat. Sci. Phil., p. 156, and Geo. Sur. Ill., vol. 3, p. 490, Burlington Gr.

SCH.-SIP.]

tethys, Meel Acad. Nat Geo. Sur. ton Gr. tortuosus, see unicus, Hall. and Geo. 8 kuk Gr. varsoviensis. crinus var St. Mus. Geo. Sur. saw Gr. venustus, We venustus,) Nat. Hist., vol. 7, p. 29 wachsmuthi. smuthi. whitii, Hall, and Jour. 1 p. 306, Burl SCHIZOBLASTUS, Ann. & Ma [Ety. schiza] in form 1 confined to in a side vi in a side vie sublinear, e calyx; lanc by the side in number: each side of minute line cet-plate ar face orname sayi. melonoides.

(Granatoeri) Acad. Nat. Geo. Sur. I ton Gr. savi, Shumard

Geo. Rep. ton Gr.



FIG. 427.—Schizocri nus nodosus.

striatus, Hall. 316, Trenton another gen SCHENASTER, ME Acad. Nat. ! Ill., vol. 2, p

SCA

SCH.-SIP.]

369, Proc 142, and Burling-

riocrinus St. Mus. Sur. Ill.,

(Poterio 1. Hl. St Geo. Sur. ir.

ew Crin., at. Hist.,

Geo. Sur. Gr. Crin., p.

Hist., vol.

Bost. Soc. Burling-

eriocrinus Mus. Nat. Il., vol. 7,

869, Proc. 145, and , Burling-

. Iowa, p.

lex. Cin. Soc. kaskia Gr. aus spino-

(Poterio-II. No. 1, , and Geo. skia Gr. tus.

Rep. N. Y. rly Gr.



Diagram. 17th Rep-). 59, Wa-

then, 1865, p. 156, and 0, Burling-

- tethys, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil, p. 143, and Geo. Sur. Ill., vol. 5, p. 419, Burlington Gr.
- tortuosus, see Graphiocrinus tortuosus.
- unicus, Hall, 1861, Desc. New Crin., p. 8, and Geo. Sur. Ill., vol. 5, p. 493, Keokuk Gr.
- varsoviensis, Worthen, 1882, (Poterio-crinus varsoviensis,) Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 20, and Geo. Sur. Ill., vol. 7, p. 290, Warsaw Gr.
- venustus, Worthen, 1882, (Poteriocrinus venustus,) Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 24, and Geo. Sur. Ill., vol. 7, p. 297, Kaskaskia Gr.
- wachsmuthi, see Graphiocrinus wachsmuthi.
- whitii, Hall, 1861, Desc. New Crin., p. 7. and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 306, Burlington Gr.
- SchizoBLASTUS, Etheridge & Carpenter, 1882, Ann. & Mag. Nat. Hist., vol. 9, p. 243. [Ety. schiza, cleft; blastos, bud.] Calyx in form like Granatocrinus; basals confined to the base, sometimes visible, in a side view; deltoids always visible in a side view; ambulacra narrow and sublinear, extending the height of the calvx; lancet-plates nearly concealed by the side plates; latter from 20 to 80 in number; 1 to 4 hydrospire folds on each side of an ambulacrum; spiracles minute linear slits between the lancet-plate and the deltoid ridges; surface ornamented with striæ. Type S. savi.
- melonoides, Meek & Worthen, 1869, (Granatoerinu melonoideas,) Proc. Acad. Nat. Sci. Phil., p. 88, and Geo. Sur. Ill., vol. 5, p. 468, Burlington Gr.

sayi, Shumard, 1855, (Pentremites sayi,) Geo. Rep. Mo., p. 185, Burlington Gr.

Schizocrinus, Hall, 1847, Pal. N. Y., vol. 1, p. 81. [Ety. schiza, cleft; krinon, lily.] Basals 5; primary radials 3 x 5; secondary radials 2 x 10; interradials 5 or more; arms short, branching, bearing pinnules; column round. Type S. nodosus.

- FIG. 427.-Schizocrinodosus, Hall, 1847, Pal. nus nodosus. N. Y., vol. 1, p. 81. Trenton Gr.
- striatus, Hall, 1847, Pal. N. Y., vol. 1, p. 316, Trenton Gr. Probably belongs to another genus.
- SCHENASTER, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 449, and Geo. Sur. Ill., vol. 2, p. 277. [Ety. schoinos, rope;

aster, star.] Pentagonal disk, with angles produced into ravs; margins between rays concave and spinous; plates alternating on dorsal side of rays, and on ventral side of disk imbricating inward and laterally toward the ambulacra; furrows wide, deep, bordered with a single row of adambulacrals, which become the marginal plates of the free rays. Type S. fimbriatus.

281

- fimbriatus, Meek & Worthen, 1860, (Palæasterina fimbriata,) Proc. Acad. Nat. Sol. Phil., p. 449, and Geo. Sur. Ill., vol. 2, p. 278, St. Louis Gr.
- wachsmuthi, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 259, and Geo. Sur. Ill., vol. 3, p. 499, Burling-® ton Gr.
- Scyphocrinus, Hall, 1847, Pal. N. Y., vol. 1. Preoccupied, by Zenker, in 1839. See Cupulocrinus.
- heterocostalis, see Cupulocrinus heterocostalis.
- Scytalocrinus, Wachsmuth & Springer, 1879, Proc. Acad. Nat. Sci. Phil. A division of Poteriocrinus of less than generic importance, with P. robustus as the type.
- wachsmuthi, see Poteriocrinus wachsmuthi.
- SIPHONOCRINUS, S. A. Miller, 1888, Am. Geol., vol. 1, p. 263. [Ety. siphón, bent tube; krinon, lily.] Basals 3 (?) small.



FIG. 428.-Siphonocrinus nobilis; lateral view of an internal cast

Wachsmuth says there are 5; primary radials 3x5; first interradials nearly as large as primary radials, and succeeded by two smaller ones, and

[SCA

these by three or more; first azygous plate as large as the primaries; it rests upon the basals and is succeeded by three plates; the following ranges have more plates and cover an expanded azygous side; vault very large, high, and bears a proboscis either projected upward or recumbent; surface of plates ornamented. Type S. nobilis.

- armosus, McChesney, 1861. (Eucalypto-crinus armosus,) New. Pal. Foss., p. 95, and 20th Rep. N. Y. St. Mus. Nat.
- Hist, p. 373, Niagara Gr. nobilis, Hall, 1861, (Glypteerinus no-bilis,) Geo. Sur. Wis, p. 21, and 20th Rep. N. Y. St. Mus. Nat. Hist., p. 328, Niagara Gr.

Sphærocrinus, Meek & Worthen, 1866. The name was preoccupied, by Roemer. See Cœlocrinus.

SPHÆROCYSTITES, Hall, 1859, Pal. N. Y., vol. 3, p. 130. [Ety. sphaira, sphere; kustis, bladder.] Spheroidal, wider than high arms, in two principal pairs, with numerous bifurcations; brachial sulci obliquely lobed; mouth apical; opening subapical; ovarian opening on the summit; basal plates 4, others un-known. Type S. multifasciatus. multifasciatus, Hall, 1859, Pal. N. Y.

vol. 3, p. 130, Low. Held. Gr. Squamoster, Ringueberg, 1886, Bull. Buf. Soc. Nat. Hist., vol. 5, p. 5. STEGANOCRINUS, Meek & Worthen, 1866, Geo.

Sur. Ill., vol. 2, p. 195. [Ety. steganos, covered; krinon. lily.] General form like Actinocrinus: basals 3; primary



FIG. 429 -Steganocrinus concinnus.

radials 3×5 ; secondary radials $1 \times 2 \times 2$ 5, in each ray; regular interradials 3 to 6x4; azygous interradials 3 to 10 or more; vault elevated, with long subcentral tube; arms bifurcating; column

round. Type S. pentagonus. araneolus, Meek & Worthen, 1860. (Actinocrinus araneolus,) Proc. Acad. Nat. Sci. Phil., p. 387, and Geo. Sur. Ill., vol. 2, p. 198, Burlington Gr. concinnus, Shumard, 1855, (Actinocrinus concinnus.) Geo. Sur. Mo., p. 189, Burlington Gr.



FIG. 430—Steganocrinus pentagonus. Vault and part of the rays; a and d showing structure of the rays

pentagonus, Hall, 1858, (Actinocrinus pentagonus,) Geo. Sur. Iowa, p. 577, Burlington Gr.

sculptus, Hall, 1858, (Actinocrinus sculptus.) Geo. Sur. Iowa, p. 582, Burlington Gr.

STEMMATOCRINUS, Traut-schold, 1867, Crin. d. jungeren Bergkalkes b. Moskau, p. 28. [Ety.stemma,wreath; krinon, lily.] Calyx low, cup-shaped; basals 5, anchylosed; subradials 5; radials twice as wide as high; brachials 1 x 5; arms heavy. Type S. cornuus. This is closely related to Erisocrinus and Eupachycrinus. FIG. 431.- Stegano

- trautscholdi, Wachs-muth & Springer, 1886, Revis. Palæocrinoidea, pt. 3, p. 256, Keokuk Gr.
- STENASTER, Billings, 1858, Can. Org. Rem., Decade 3, p. 77. [Ety. stenos, narrow; aster, star.] Disk small, rays extended, flexible; dorsal side covered with small

crinus sculptus. Diagram of a ray

transverse

and

sections

SPH.-STE

plates; ada long; orals

STE.-STR.]



grandis, Meek ser., vol. 3, p p. 66, Hud. huxleyi, Bill Pal. Foss., vo Quebec Gr. pulchellus, Bi (Palæaster Geo. Sur. C and Can. Decade 3, p ton Gr. salteri, Billings Org. Rem., p. 78, Trento Stenocrinus, Wac Springer, 18 crinoidea, pt syn. for Hete STEPHANOCRINUS, 1842, Jour. Sci., vol. 8, p. stephanos, co non, lily.] with 3 basa pieces or rac orals; apertu tral; ambul pendages, bu the hydrospin known. Typ latus. Some fer this gen



Palæocrinoide

433 - Stephanocrinus angulatus

cies was desci but it was not pentalobus, Ha 1879, (Codast pentalobus Desc. New Spe Foss., p. 13, an 11th Rep. Ge Sur. Ind., p. 28 Niagara Gr.

pulchellus, Mille

SPH.-STE

tinocrinus 189, Bur



Vault and structure of

tinocrinus a, p. 577,



- Stegano s sculptus. am of a ray

ms.

Org. Rem., 28, narrow; s extended with small

transverse

ECHINODERMATA.

plates; adambulacrals square or oblong; orals 10. Type S. salteri.



FIG. 432.—Stenaster grandis

grandis, Meek, 1872, Am. Jour. Sci., 3d ser., vol. 3, p. 258, and Ohio Pal., vol. 1, p. 66, Hud. Riv. Gr.

huxleyi, Billings, 1865 Pal. Foss., vol. 1, p. 213, Quebec Gr.

STE.-STR.]

pulchellus, Billings, 1857, (Palæaster pulchellus,) Geo. Sur. Can., p. 292, and Can. Org. Rem., Decade 3, p. 79, Trenton Gr.

salteri, Billings, 1858, Can. Org. Rem., Decade 3, p. 78, Trenton Gr.

Stenocrinus, Wachsmuth & Springer, 1885, Palæocrinoidea, pt. 3, p. 207, syn. for Heterocrinus.

STEPHANOCRINUS, Conrad, 1842, Jour. Acad. Nat. Conrad, Sci., vol. 8, p. 278. [Ety. stephanos, coronet; kri-non, lily.] A blastoid, with 3 basals, 5 fork pieces or radials, and 5 orals; aperture subcentral: ambulacral appendages, but thus far the hydrospires are unknown. Type S. angulatus. Some authors refer this genus to the Palæocrinoidea.

FIG. 433.-

latus

angulatus, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 279, and Pal. N. Y., vol. 2, p. 212, Niagara Gr. gemmiformis, Hall, 1852, Pal. N. Y., vol. 2, p. 215, Niagara Gr.

osgoodensis, S. A. Miller, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 116,Niagara Gr. Wachs-- Stephanocrinus angumuth has said this spe-

cies was described from internal casts, but it was not.

pentalobus, Hall, 1879, (Codaster pentalobus,) Desc. New Spec.



Foss., p. 13, and FIG. 434.—Stephanocrinus 11th Rep. Geo. pulchellus, instead of pulchellus, instead of Codaster pulchellus, as Sur. Ind., p. 280, Niagara Gr. shown by fig. 268

pulchellus, Miller & Dyer, 1878, (Codaster

pulchellus, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 35, Niagara Gr.

STEREOCRINUS, Barris, 1879, Proc. Dav. Acad. Sci., vol. 2, p. 282. [Ety. ste-reos, firm; krinon, lily. Distinguished from Dolatocrinus by having 2x5 instead of 3x5 primary radials; one large interradial succeeded by a smaller one, and this by smaller ones, within the depressions, between the arm bases. Type S. triangulatus.

triangulatus, Barris, 1879, Proc. Dav. Acad. Sci., vol. 2, p. 283, Up. Held. Gr.



FIG. 435.—Strotoerinus perumbrosus. Under side of canopy with calyx broken away.

triangulatus var. liberatus, Barris, 1879, Proc. Dav. Acad. Sci., vol. 2, p. 284, Up. Held. Gr.

STROBILOCYSTITES, White, 1876, Proc. Acad. Nat. Sci. Phil., p. 28. [Ety. strobilos, pine cone; kustis, bladder.] Subspherical; 3 pectinated rhombs, two above the middle and one below; ovarian aperture below the summit; 4 principal arm grooves extending below the middle, and 4 secondary grooves. Type S. calvini

calvini, White, 1876, Proc. Acad. Nat. Sci. APhil., p. 28, Devonian.

STROTOCRINUS, Meek & Worthen, 1866, Geo. Sur. Il., vol. 2, p. 188. [Ety. strotos, spread; krinon, lily.] Calyx bowlshaped, with vault spreading beyond like a canopy; basals 3; primary ra-dials $3 \ge 5$; secondary radials 1 or $2 \ge 3$ 10, succeeded by tertiary and other divisions, which, with the interaxillaries and interbrachials, unite to form the under side of a greatly expanded hor-

izontal disk, completely isolating the azygous and interradial areas, from the vault, and supporting the free, ascend-

glyptus,

FIG. 436.-Strotocrinus regalis.

ing arms around its margin; interradials 9 or 10 or more; azygous interradials 9 to 13 or more, the first one resting on the basals; vault depressed, opening subcentral; arms 30 to 72 or more; column round. Type S. perumbrosus. as perrimus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 160, and Geo. Sur. Ill., vol. 5, p. 349, Burlington Gr.



FIG. 437.-Strotocrinus regalis. Diagram, ½ diam.

bloomfieldensis, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 258, and vol. 4, p. 76, Up. Burlington or Keokuk Gr.

dilatatus, see Physetocrinus dilatatus.

ectypus, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 159, and Geo. Sur. Ill., vol. 5, p. 353, Burlington Gr. Hall,

1860, (Actinocrinus glyptus,) Supp. to Geo. Sur. Iowa, p. 2, Burlington Gr. perumbrosus, Hall, 1860 (Actinocrinus perumbrosus,) Supp. to Geo. Sur. Iowa, p. 7, Burlington Gr. regalis, Hall 1860, (Actinocrinus regalis,) Supp. to Geo. Sur. Iowa, p. 8, and Geo. Sur.

[SYN

Ill., vol. 2, p. 192, Burlington Gr. umbrosus, Hall, 1858, (Actinocrinus umbrosus,) Geo. Sur. Iowa, p. 590, Burlington Gr.

SYNBATHOCRINUS, Phillips, 1836, Geol. Yorkshire, pt. 2, p. 206. [Ety. syn, together; bathos, depth; krinon, lily.] Calyx small; arms large and of great length; basals 3; radials 2x5; azygous plates 1

2 or more; arms simple and composed of plates in single series. Type S. conicus. Meek brevis, & Worthen, 1869. Proc. Nat. Acad. Sci. Phil., p. 68, and Geo. Sur. Ill., vol. 5, p. 439,

Burlington

Gr. entatus, Owen & Shumard, 1852, Geo. Sur. Wis., Iowa, and Minn., Fig. 438.

IG, 438. — Synbathoerl-nus granuliferus. An-terior and posterior p. 597, Bur-lington Gr. views. granulatus, Troost. Not defined. granuliferus Wetherby, 1880, Jour. Cin.

Soc. Nat. Hist., vol. 2, p. 250, Waverly Gr.

matutinus, Hall, 1858, Geo. Sur. Iowa, p. 483, Ham. Gr.



oweni, Hall, 18 Nat. Hist., p. papillatus, Hal p. 18, Burling robustus, Shum Acad. Sci., vo Ill., vol. 6, p. swallovi, Hall, 672, St. Louis tennesseæ, Troost tennesseensis, West Tenn.,

machsmuthi, see wortheni, Hall, 560, Burlingte SYRINGOCRINUS, H

Rem., Decade pipe; krinon, on the fragm all events, genus. Type paradoxicus, Bil

Decade 4, p. 6 TENIASTER, Billin Decade 3, p. aster, star.] M rays long, fle lacral plates ambulacral po



FIG. 439.-Tænias spinosus.

Org. Rem., De TALAROCRINUS, V . 1881, Proc. A 259. [Ety. ta

Calyx sub-co pressed; disti nus by its hig opening throu of a tube, and radials form p cornigerus.

cornigerus, Shu cornigerus,) Sci., vol. 1, p.

elegans, Lyon & crinus elegans

and Sci., vol. & ovatus, Worthe St. Mus. Nat. 1 Ill., vol. 7, p.

[SYN

), and Geo. agton Gr. Hall, tus, 30, (Actinonus glyps,) Supp. to eo. Sur. wa, p. 2, irlington u m brosus. all, 1860, **ctinocr**inus rumbros,) Supp. to eo. Sur.

lis, Hall 60, (Actinoinus rega-,) Supp. to eo. Sur. wa, p. 8, d Geo. Sur. ington Gr. crinus um-90. Burling-

p. 7,

urlington

wa.

Geol. Yorkn, together; Calyx y.] reat length ; ous plates 1

synbathoeri aliferus. An-nd posterior

, Jour. Cin. p. 250, Wa-Sur. Iowa, p. oweni, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 111, Waverly Gr. papillatus, Hall, 1861, Desc. New Crin.,

ECHINODERMATA.

- p. 18, Burlington Gr. robustus, Shumard, 1866, Trans. St. Louis
- Acad. Sci., vol. 2, p. 397, and Geo. Sur. Ill., vol. 6, p. 514, Keokuk Gr. swallovi, Hall, 1858, Geo. Sur. Iowa, p.
- 672, St. Louis Gr. tennesseæ, Troost. Not defined.
- tennesseensis, Roemer, 1860, Sil. Fauna
- West Tenn., p. 55, Niagara Gr. wachsmuthi, see Catillocrinus wachsmuthi. wortheni, Hall, 1858, Geo. Sur. Iowa, p. 560, Burlington Gr.
- SYRINGOCRINUS, Billings, 1859, Can. Org. Rem., Decade 4, p. 65. [Ety. syrinx, pipe; krinon, lily.] Founded, possibly,
- on the fragment of a ventral sac; at all events, not a well-characterized genus. Type S. paradoxicus.
- paradoxicus, Billings, 1859, Can. Org. Rem., Decade 4, p. 65, Trenton Gr.
- TENIASTER, Billings, 1858, Can. Org. Rem., Decade 3, p. 80. [Ety. tainia, ribbon; aster, star.] No disk or marginal plates; rays long, flexible, spinous; adambulacral plates elongated; two rows of ambulacral pores; ossicles contracted in the middle. Type T. spinosus.

cylindricus, Billings, 1857, (Palæocoma cylindrica,) Geo. Sur. Can., p. 292, Trenton Gr.

elegans, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 41, Hud. Riv. Gr. spinosus, Billings, 1857, (Palæo-coma spinosa,)

Geo. Sur. Can.,

p. 292, and Can.

FIG. 439.-Tæniaster spinosus.

- Org. Rem., Decade 3, p. 80, Trenton Gr. TALAROCRINUS, Wachsmuth & Springer, 1881, Proc. Acad. Nat. Sci. Phil., p. 259. [Ety. talaros, basket; krinon, lily.] Calyx sub-conical; suture lines impressed; distinguished from Dichocrinus by its higher vault and having the opening through it and not at the end of a tube, and in having the secondary radials form part of the calyx. Type T. cornigerus.
- cornigerus, Shumard, 1857, (Dichocrinus cornigerus,) Trans. St. Louis Acad. Sci., vol. 1, p. 72, Kaskaskia Gr.
- elegans, Lyon & Casseday, 1860, (Dichocrinus elegans,) Proc. Am. Acad. Arts
- and Sci., vol. 5, p. 22, St. Louis Gr. ovatus, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 36, and Geo. Sur. Ill., vol. 7, p. 314, Kaskaskia Gr.

sexlobatus, Shumard, 1857, (Dichocrinus sexlobatus,) Trans. St. Louis Acad. Sci., vol. 1, p. 73, Kaskaskia Gr.

- symmetricus, Lyon & Casseday, 1860, (Dichocrinus symmetricus,) Proc. Am. Acad. Arts and Sci., vol. 5, p. 22, Kaskaskia Gr.
- TAXOCRINUS, Phillips, 1843, Morris Cat. Brit. Foss., p. 90. [Ety. taxus, yew-tree; krinon, lily.] Calyx short, cup-shaped; basals 3, small, unequal; subradials 5, one larger than the others; primary radials 3 or 4 by 5; secondary radials 3 to six by 10; tertiary radials supporting arms; interradials 0 to 9; azygous interradials 2 to 5; arms dividing once or twice. Type T. egertoni. communis, Hall, 1863, (Forbesocrinus
 - communis,) 17th Rep. N. Y. St. Mus. Nat. Hist., p. 55, and Ohio Pal., vol. 2, p. 169, Waverly Gr.
- curtus, Williams, 1882, Proc. Acad. Nat. Sci. Phil., p. 30, Chemung Gr.
- elegans, Billings, 1857, (Lecanocrinus elegans,) Geo. Sur. Can., p. 278, and Can. Org. Rem., Decade 4, p. 47,

fletcheri, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 31, and Geo. Sur. Ill., vol. 7, p. 308, Keokuk Gr.



Meek &

Worthen.

1865. Proc.

Acad. Nat.

Sci. Phil., p. 142, and

Geo. Sur.

Ham. Gr.

muth &

Springer,

(in press,)

Geo. Sur.

(?) elegans. giddingei, Hall, 1858, (Forbesocrinus giddingei,) Geo. Sur-Iowa, p. 633, Keokuk Gr.



FIG. 441-Taxocrinus gracilis. Diagram.

Ill., vol. 8, p. 199, Kinderhook Gr. interscapularis, Hall, 1858, Geo. Sur. Iowa, -p. 482, Ham. Gr.

ithacensis, Williams, 1882, Proc. Acad. Nat. Sci. Phil., p. 28, Chemung Gr.

- juvenis, Hall, 1861, (Forbesocrinus juvenis,) Bost. Jour. Nat. Hist., vol. 7, p. 319, Burlington Gr.
- kelloggi, Hall, 1863, (Forbesocrinus kel-loggi,) 17th Rep. N. Y. St. Mus. Nat. Hist., p. 56, and Ohio Pal., vol. 2, p. 171, Waverly Gr.

285



1869, Proc.

SYR.-TAX.]

Trenton Gr.

- lævis, Billings, 1857, Geo. Sur. Can., p. 278, and Can. Org. Rem., Decade 4, p. 47, Trenton Gr.
- lobatus, Hall, 1862, (Forbesocrinus lobatus,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 124, Ham. Gr.
- lobatus var. tardus, Hall, 1863, (Forbesocrinus lobatus var. tardus, 17th Rep. N. Y. St. Mus. Nat. Hist., p. 56 and Obio Pal., vol. 2, p. 171, Waverly Gr.
- meeki, Hall, 1858, (Forbesocrinus meeki,) Geo. Sur. Iowa, p. 631, Keokuk Gr.
- multibrachiatus, Lyon & Casseday, 1858, (Forbesocrinus multibrachiatus,) Am. Jour. Sci. and Arts, vol. 28, p. 235,
- Keokuk Gr. multibrachiatus var. colletti, White, 1881,

2d Ann. Rep. / Bureau of Statistics of Indiana, p. 506/ Keokuk Gr.

nuntius, Hall, 1862, (Forbesocrinus nuntius,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 124, Ham Gr. ramulosus, Hall, 1860, (Forbesocrinus ramulosus,) Supp. Geo. Sur. Iowa, p. 67, Burlington Gr. robustus, Wachsmuth, (in Geo. press.) Sur. Ill., vol 8, Kinderhook Gr.

FIG. 442.-Taxocrinus robustus.

- semiovatus, Meek & Worthen, 1860, (Forbesocrinus semiovatus,) Proc. Acad. Nat. Sci. Phil., p. 389, and Geo. Sur. Ill., vol. 2, p. 272, St. Louis Gr.
- shumardanus, Hall, 1858, (Forbesocrinus shumardanus,) Geo. Sur. Iowa, p. 671, St. Louis Gr.
- niemii, Hall, 1861, (Forbesocrinus thiemii,) Desc. New Crin., p. 8, and Geo. Sur. Ill., vol. 5, p. 389, Burlington thiemii, Hall, Gr.
- whitfieldi, Hall, 1858, (Forbesocrinus whitfieldi,) Geo. Sur. Iowa, p. 632, Kaskaskia Gr.
- TECHNOCRINUS, Hall, 1859, Pal. N. Y., vol. 3, p. 139. [Ety. techne, art; krinon, lily.] Basals 4, one larger than the others; primary radials 3×5 ; second-ary radials 1×10 ; tertiary radials 2×20 ; interradials 3×5 ; arms simple, bearing pinnules; column round. Type T. andrewsi.
 - andrewsi, Hall, 1859, Pal. N. Y., vol. 3, p. 141, Oriskany sandstone.
 - sculptus, Hall, 1859, Pal. N. Y., vol. 3, p. 143, Oriskany sandstone.
 - spinulosus, Hall, 1859, Pal. N. Y., vol 3, p. 140, Oriskany sandstone.

striatus, Hall, 1859, Pal. N. Y., vol. 3, p. 142, Oriskany sandstone.

- TELEIOCRINUS, Wachsmuth & Springer, 1881, Proc. Acad. Nat. Sci. Phil., p. 320. [Ety. teleios, perfect; krinon, lily.] Dis-tinguished from Strotocrinus, with which it has generally been classed, by having a long ventral tube, instead of a simple opening through the vault. Type T. umbrosus.
- ægilops, Hall, 1860, (Actinocrinus ægilops,) Supp. to Geo. Sur. Iowa, p. 5, Up. Burlington Gr.
- althea, Hall, 1861, (Actinocrinus althea,) Desc. New Crin., p. 13, Up. Burlington Gr.
- clivosus, Hall, 1861, (Actinocrinus clivo-sus,) Bost. Jour. Nat. Hist., vol. 7, p. 274, Up. Burlington Gr.
- erodus, Hall, 1861, (Actinocrinus erodus,) Desc. New Crin., p. 12, Up. Burlington Gr.
- insculptus, Hall, 1861, (Actinocrinus in-sculptus,) Desc. New Crin., p. 12, Up. Burlington Gr.
- liratus, Hall, 1860; (Actinocrinus liratus,) Supp. to Geo. Sur. Iowa, p. 1, and Geo. Sur. Ill., vol. 5, p. 355, Burling-, ton Gr.
- rudis, Hall, 1860, (Actinocrinus rudis,) Supp. to Geo. Sur. Iowa, p. 33, Burlington Gr.
- tenuiradiatus, Hall, 1861, (Actinocrinus tenuiradiatus,) Desc. New Crin., p. 12, Burlington Gr.
- umbrosús, Hall, 1858, (Actinocrinus umbrosus,) Geo. Sur. Iowa, p. 590, Up. Burlington Gr.
- THYSANOCRINUS, Hall, 1852, Pal. N. Y., vol. 2, p. 188. [Ety. thysanos, fringed; krinon, lily.] Calyx small, subglobose; basals 5; subradials 5; primary radials 3x5;; secondary radials 2 or more x 10; regular interradials 3; azygous area wide, lower plates large, smaller above; arms composed of a double series of plates, with pinnules; column round. Type T. liliiformis.
 - aculeatus, Hall, 1852, Pal. N. Y., vol. 2, p. 190, Niagara Gr.
 - canaliculatus, Hall, 1852, Pal. N. Y., vol. 2, p. 189, Niagara Gr.
 - immaturus, Hall, 1852, Pal. N. Y., vol. 2, p. 191; Niagara Gr.
 - liliiformis, Hall, 1852, Pal. N. Y., vol. 2, p. 188, Niagara Gr.
 - microbasalis, see Archæocrinus microbasalis.
- pyriformis, see Archæocrinus pyriformis. TREMATASTER, Worthen & Miller, 1883, Geo. Sur. Ill., vol. 7, p. 330. [Ety. trema, opening; aster, star.] Central part discoid; rays long, flexuous, a double series of ambulacral plates, with tapering ends directed toward the apices of the rays, upon each side of which there is a series of curved adambulacral plates, which form the margin of the rays; pores large between the con-

tracting sides and the conca adambulacrals each pore; o ficilis.

difficilis, Worth Sur. Ill., vo kia Gr.

Trematocrinus, nus.

fiscellus, see Go lus.

papillatus, see G. reticulatus, see G. robustus, see G. ro spinigerus, see G. tuberculatus, see typus, see G. typu

Triacrinus, Ringue Nat. Sci. Phil.

preoccupied; syn. for Pisocr globosus, see Piso pyriformis, see Pi

- TRICCELOCRINUS, M Proc. Acad. N Geo. Sur. Ill., three; koilos, Calyx subpyr base short, ti along the inte contracted; ra deltoids small deeply situate spires small, spiracles and large; column
- mani. meekanus, Ether Catal. of Bla saw Gr.
- obliquatus, Roen tites obliquatur Jahrg. xvii, p. varsouviensis, W
- Ill., vol. 6, p. 5 woodmani, Meek
- tremites, Tro nus woodman
- Phil., p. 356, a p. 506, Warsaw TROOSTOCRINUS, Sh Louis Acad. S proper name
 - tinguished fro slender, subfus bulacra, lance angular base, a ture; spiracles imal side pla open into line
- Type T. reinwa bipyramidalis, H bipyramidalis,)
- Keokuk Gr. grosvenori, Shur grosvenori,) Tra vol. 1, p. 240, V

TRE.-XEN.]

TEC.-TRE

[TEC.-TRE.

Y., vol. 3, p.

pringer, 1881, >hil., p. 320. a, lily.] Discrinus, with n classed, by we, instead of h the vault.

ocrinus ægi-Iowa, p. 5,

inus althea,) -Up. Burling-

crinus clivost., vol. 7, p.

inus erodus,) Up. Burling-

nocrinus in-., p. 12, Up.

inus liratus,) , p. 1, and 355, Burling-

inus rudis,) p. 33, Bur-Actinocrinus

Crin., p. 12,

ocrinus ump. 590, Up.

I. N. Y., vol. fringed; krisubglobose; imary radials 2 or more 3; azygous arge, smaller a double seiles; column b. Y., vol. 2, p.

1. N. Y., vol.

N. Y., vol. 2,

Y., vol. 2, p.

inus micro-

pyriformis. er, 1883, Geo. [Ety. trema, tral part disis, a double , with taperthe apices of which there idambulacral pargin of the en the conECHINODERMATA. **

tracting sides of the ambulacral plates, and the concave sides of the curving adambulacrals; four plates border on each pore; orals 10. Type T. difficilis.

- difficilis, Worthen & Miller, 1883, Geo. Sur. Ill., vol. 7, p. 330, Kaskaskia Gr.
- Trematocrinus, syn for Goniasteroidocrinus.
- fiscellus, see Goniasteroidocrinus fiscellus.

papillatus, see G. papillatus. reticulatus, see G. reticulatus.

- robustus, see G. robustus.
- spinig-rus, see G. spinigerus.
- tuberculatus, see G. tuberculatus.

typus, see G. typus.

TRE. - XEN.]

Triacrinus, Ringueberg, 1887, Proc. Acad. Nat. Sci. Phil., p. 144. The name was preoccupied; beside it is probably a syn. for Pisocrinus. globesus, see Pisocrinus globosus.

pyriformis, see Pisocrinus pyriformis.

- TBICCLOCRINUS. Meek & Worthen, 1868, Proc. Acad. Nat. Sci. Phil., p. 356, and Geo. Sur. Ill., vol. 5, p. 507. [Ety. treis, three; koilos, hollow; krinon, lily.] Calyx subpyramidal, or subfusiform; base short, trihedral, and "excavated along the interbasal sutures; summit contracted; radials long and narrow; deltoids small; ambulacra narrow, deeply situated in the sinuses; hydrospires small, three (?) on a side; spiracles and mouth small; anus large; column circular. Type T. woodmani.
- meekanus, Etheridge & Carpenter, 1886, Catal. of Blastoidea, p. 208, Warsaw Gr.
- obliquatus, Roemer, 1851, (Pentatrematites obliquatus,) Archiv f. Naturgesch., Jahrg. xvii, p. 367; St. Louis Gr. varsouviensis, Worthen, 1875, Geo. Sur.
- Ill., vol. 6, p. 521, St. Louis Gr. woodmani, Meek & Worthen, 1868, (Pen-
- woodmani, Meek & Worthen, 1868, (Pentremites, Troostocrinus) Tricœlocrinus woodmani,) Proc. Acad. Nat. Sci. Phil., p. 356, and Geo. Sur. Ill., vol. 5, p. 506, Warsaw Gr.
- TROOSTOCRINUS, Shumard, 1865, Trans. St. Louis Acad. Sci., vol. 2, p. 384. [Ety. proper name; krinon, lily.] Distinguished from Pentremites by the slender, subfusiform shape, linear ambulacra, lancet plates concealed, triangular base, and simple summit structure; spiracles at the sides of the proximal side plates; hydrospiral canals open into linear spiracular apertures. Type T. reinwardti.
- bipyramidalis, Hall, 1858, (Pentremites bipyramidalis,) Geo. Sur. Iowa, p. 607, Keokuk Gr.
- grosvenori, Shumard, 1858, (Pentremites grosvenori,) Trans. St. Louis Acad. Sci., vol. 1, p. 240, Warsaw Gr.

lineatus, Shumard, 1858, (Pentremites lineatus,) Trans. St. Louis Acad, Sci.,

- vol. 1, p. 241, Burlington Gr. This is made the type of the genus Metablastus by Etheridge & Carpenter, to which they also refer T. wortheni and Tricelocrinus varsouviensis. reinwardti, Troost, 1835,
- (Pentremites reinwardti,) Trans. Geo. Soc. Pa., vol. 1, p. 224, Niagara Gr.
- subcylindricus, Hall & Whitfield, 1875, (Pentremites subcylindricus,) Fig. 443. Obio Pal. vol. 2, p. 129. – Troostorius

Ohio Pal., vol. 2, p. 129, wortheni. Niagara Gr.

- subtruncatus, Hall, 1858, (Pentremites subtruncatus,) Geo. Sur. Iowa, p. 485, Ham. Gr.
- wortheni, Hall, 1858, (Pentremites wortheni,) Geo. Sur. Iowa, p. 606, Keo^{2/} kuk Gr.
- VASOCRINUS, Lyon, 1857, Geo. Sur. Ky., vol. 3, p. 485. [Ety. vas, vessel; krinon, lily.] Calyx low, vase-shaped; basals 5; subradials, 5; primary radials, 1 x 5; secondary radials 2 x 5; arms, 10 or more; azygous interradials 2 or more, first one large; ventral sac. Type V. valens.
 - lyoni, Hall, 1861, (Cyathocrinus lyoni,) Desc. New Crin., p. 3, and Bost. Jour. Nat. Hist., vol. 7, p. 298, Keokuk Gr. macropleurus, Hall, 1861, (Cyathocrinus
 - macropleurus, Hall, 1861, (Cyathocrinus macropleurus,) Desc. New Crin., p. 5, ~ and Bost. Jour. Nat. Hist., vol. 7, p. 295, Burlington Gr.
 - sculptus, Lyon, 1857, Geo. Sur. Ky., vol. 3, p. 486, Ham. Gr.
 - valens, Lyon, 1857, Geo. Sur. Ky., vol. 3, p. 485, Ham. Gr.
- XENOCRINUS, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 71 and 176. [Ety. xenos, strange; krinon, lily.] Ba-



FIG. 444.—Xenocrinus penicillus. Azygous and opposite side views and end of column.

sals 4; primary radials 3×5 ; secondary radials 4 to 6×10 ; interradial areas excavated and filled with numerous



plates; azygous area having a central vertical series of plates which continue up the ventral sac; column square. Type X. penicillus.

- baeri, Meek, 1872, (Glyptocrinus baeri,) Am. Jour. Sci. and Arts, 3d ser., vol. 3, p. 260, and Ohio Pal., vol. 1, p. 37, Hud. Riv. Gr.
- penicillus, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 72, Hud.
- Riv. Gr. ZEACRINUS, Troost, Catal. Foss. 1850, and described by Hall, 1858, Geo. Sur. Iowa, p. 541. [Ety. zea, Indian corn; krinon, lily.] Calyx low, basin-shaped; basals 5, bidden by the column; subradials 5; radials 2 x 5, with from 1 to 6 additional in the azygous ray; azygous interradials 4 to 7; arms 10 to 40, with pinnules; ventral sac subpyramidal, covered with small plates; column round. Type Z. magnoliiformis.
 - acanthophorus, see Hydreionocrinus acanthophorus.
 - arboreus, Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 534, St. Louis Gr.

 - *armiger*, see Hydreionocrinus armiger. asper, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 150, and Geo. Sur. Ill., vol. 5, p. 430, Burlington Gr.
 - bifurcatus, McChesney, 1860, New Pal. Foss., p. 10, and Trans. Chi. Acad. Sei., vol. 1, p. 71, Kaskaskia Gr.
 - cariniferus, see Cœliocrinus cariniferus. compactilis. Worthen, 1873, Geo. Sur. Ill.,
 - vol. 5, p. 536, Kaskaskia Gr. coxanus, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 27, and Geo. Sur.
 - Ill., vol. 7, p. 302, Keokuk Gr. crassus, see Eupachycrinus crassus. crateriformis, Troost. Not defined.

depressus, see Hydreionocrinus depressus. discus, see Hydreionocrinus discus. elegans, Hall,

1858, Geo. Sur. Iowa, p. 547, Burlington Gr. florealis, Yandell & Shumard, 1847, (Cyatho-crinus florealis,) Cont. to Geo. Ky., p. 24, Kaskaskia Gr. formosus, see Eu-

pachycrinus formosus. intermedius, Hall, 1858, Geo.Sur.Iowa, p. 681, Kaskaskia Gr. keokuk, Wor-

then, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 28, and Geo. Sur. Ill., vol. 7, p. 30, Keokuk Gr.

lyra, see Cœliocrinus lyra.

- magnoliiformis, Owen & Norwood, 1846, (Cyathocrinus magnoliiformis,) Research Pot. Carb. Rocks Ky., and Geo. Sur. Iowa, p. 684, Kaskaskia Gr. maniformis, Yandell & Shumard, 1847.
- maniformis, Yandeli & Shumard, 1847, (Poteriocrinus maniformis,) Cont. to Geo. Ky., p. 24, Kaskaskia Gr.
 merope, Hall, 1863, 17th Rep. N. Y. St.
 Mus. Nat. Hist., p. 60, and Ohio Pal., vol. 2, p. 178, Waverly Gr.
 moorii, Whitfield, 1882, Ann. N. Y. Acad.
 Sei uol. 2, 2927 Cael Mass.
- Sci., vol. 2, p. 227, Coal Meas. mucrospinus, see Hydreionocrinus mucrospinus.
- nodosus, Wachsmuth & Springer, 1886, Revis. Palæocrinoidea, pt. 3, p. 243, Keokuk Gr.
- ovalis, Lyon & Casseday, 1858, Am. Jour. Sci., 2d ser., vol. 29, p. 71, Kaskaskia Gr. paternus, Hall, 1863, 17th Rep. N. Y. St.
- Mus. Nat. Hist., p. 59, Waverly Gr. perangulatus, White, 1862, Proc. Bost. Soc.

- perangulatus, winke, 1802, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 11, Burlington Gr.
 pikensis, Worthen, 1882. Bull., No. 1, Ill.
 St. Mus. Nat. Hist., p. 29, and Geo. Sur. Ill., vol. 7, p. 304, Burlington Gr.
 planobrachiatus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 391, and Geo. Sur. Ill. vol. 2, p. 240, Kochuk Geo.
- Geo. Sur. Ill., vol. 2, p. 240, Keokuk Gr. ramosus, Hall, 1858, Geo. Sur. Iowa, p. 548, Burlington Gr.
- sacculus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 12, Burlington Gr.



FIG. 446.—Zeacrinus spinuliferus.

sacculus var. concinnus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 12, Burlington Gr.

scobina, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 149, and Geo. Sur. Ill., vol. 5, p. 426, Burlington

Gr. scoparius. Hall, 1861, Desc. New Crin., p. 6, and Jour. Bost. Soc. Nat. Hist., vol. 7, p. 305, Burlington Gr. serratus, Meek &

FIG. 447.-Zeacrinus troostanus. Diagram. Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 151, and Geo. Sur. Ill., vol. 5, p. 428, Burlington Gr.



spinosus, Owen riocrinus spin Sci. Phil., vol. spinuliferus, Wo riocrinus spin vol. 8, p. 90, K stimpsoni, Lyon Soc., vol. 13, p

JB.

THE Bryozoa like compound st into which it can The Flustra or Se crustations so com ozoa were marine, to distinguish from

This calcared encrusting other o other cases, appar cell-tubes as about sively gemmiparou fissiparous reprodu

The animal of stomach, and inte but the anal ope mouth. Thus co openings correspo side of this sac is mal retracts itself tacles. Ova may occium, or in an gonœcium is a m tures. Many Br The avicularia ma tached to the zooed excavated summit

Some natural and probably the liporidæ are refer order called the G




/.F.A.

orwood, 1846. formis,) Re-Ky., and Geo. kia Gr.

umard, 1847. is,) Cont to a Gr. ep. N. Y. St. nd Ohio Pal. r. n. N. Y. Acad

688. crinus mucro-

pringer, 1886. ot. 3, p. 243,

58. Am. Jour. Kaskaskia Gr. Rep. N. Y. St. averly Gr. roc. Bost. Soc Burlington Gr ull., No. 1, Ill. and Geo. Sur. ton Gr. Vorthen, 1860 1., p. 391, and 0 Keokuk Gr. Sur. Iowa, p.

Bost. Soc. Nat. gton Gr.



liferus ite, 1862, Proc. 9, p. 12, Bur-



us. Diagram il., p. 151, and 428, BurlingMOLLUSCOIDA.

spinosus, Owen & Shumard, 1852, (Poteriocrinus spinosus,) Jour. Acad. Nat. Sci. Phil., vol. 2, p. 91, Kaskaskia Gr. spinuliferus, Worthen, (in press,) (Pote-

riocrinus spinuliferus,) Geo. Sur. Ill., vol. 8, p. 90, Kaskaskia Gr. stimpsoni, Lyon, 1869, Trans. Am. Phil. Soc., vol. 13, p. 465, Subcarb.

subtumidus, see Eupachycrinus subtumidus.

289

troostanus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 390, and Geo. Sur. Ill., vol. 2, p. 186, Burlington Gr.

wortheni, Hall, 1858, Geo. Sur. Iowa, p. 683, Kaskaskia Gr.

SUBKINGDOM MOLLUSCOIDA.

....

CLASS BRYOZOA.

THE Bryozoa are small animals that grow in clusters, forming branched or mosslike compound structures. Each animal lives in a separate cell, called a zocecium, into which it can retract itself, though some connection exists between the animals. The Flustra or Sea-mats, abundant on the shores of the ocean, and the moss-like encrustations so common on marine shells, are examples. All known Palæozoie Bryozoa were marine, and lived in calcareous cells, forming a mass that is often difficult to distinguish from the true corals.

This calcareous mass or skeleton is called the bryozoum or zoarium. It is found encrusting other objects, or standing on a foot-stalk, with basal attachment, and, in other cases, apparently free. There are rarely any such calcareous partitions in the cell-tubes as abound in the true corals, and the method of reproduction was exclusively gemmiparous, while the true corals were increased by both gemmiparous and fissiparous reproduction.

The animal consists of a bent tube or alimentary canal, having an esophagus, stomach, and intestine. The two orifices of the canal are situated close together. but the anal opening is beyond the ring of ciliated tentacles that surround the mouth. Thus constituted, the alimentary canal is inclosed in a sac having two openings corresponding to the two extremities of the canal. Generally the upper side of this sac is flexible, and admits of being invaginated, so that when the animal retracts itself into its cell the inverted portion forms a sheath around the tentacles. Ova may be developed in a receptacle attached to the zocecium, called the occium, or in an inflation of the surface of the zoarium, called a gonocyst. The gonoccium is a modified zooccium. The term occia is also applied to these structures. Many Bryozoa have appendicular organs called avicularia and vibracula. The avicularia may be pedunculate, and sway to and fro, or fixed and firmly attached to the zoccium. The vibracula are flexible, bristle-like structures, set in the excavated summit of a knob-like elevation or blunt spine.

Some naturalists refer the Monticuliporidæ and Stelliporidæ to the Bryozoa. and probably the latter should be so classed on as good grounds as the Fistuliporidæ are referred to the Bryozoa. The Palæozoic Bryozoa are referred to an order called the Gymnolæmata, which are supposed to have had a complete ring of

ZEA.]

MOLLUSCOIDA.

tentacles around the mouth. This order has been divided into five suborders, viz.: Chilostomata, Cryptostomata, Trepostomata, Cyclostomata, and Ctenostomata. The families which we recognize are as follows:

- FAMILY ACANTHOLLADIDÆ.—Acanthocladia, Diplopora, Glauconome, Ichthyorachis, Ptilopora, Ramipora, Septopora, Synocladia.
- FAMILY AMPLEXOPORIDE. Amplexopora, Atactopora, Discotrypa, Leptotrypa, Petalotrypa.
- FAMILY ARTHROSTYLIDÆ.—Arthroclema, Arthrostylus, Helopora, Nematopora, Nematoporella, Sceptropora.
- FAMILY ASCODICTYONIDÆ.—Ascodictyon, Rhopalonaria.
- FAMILY BATOSTOMELLIDÆ.—Anisotrypa, Batostoma (?), Batostomella, Leioclema, Peronopora.
- FAMILY BOTRYLLORORIDÆ.—Botryllopora.
- FAMILY BYTHOPORIDÆ.—Bythopora.
- FAMILY CERAMOPORIDÆ.—Aspidopora, Ceramella, Ceramopora, Ceramoporella, Chiloporella, Crepipora, Eridopora, Glossotrypa, Idiotrypa, Lichenalia, Lichenotrypa, Odontotrypa, Petigopora, Phractopora, Pileotrypa, Sagenella, Selenopora, Spatiopora.

FAMILY CRISINELLIDÆ.—Crisinella.

· FAMILY ENALLOPORIDE.—Diploclema, Enallopora, Protocrisina.

- FAMILY FENESTELLIDÆ.—Archimedes, Clathropora, Coscinella, Coscinium, Coscinotrypa, Evactinopora, Fenestella, Fenestralia, Fenestrapora, Helicopora, Hemitrypa, Isotrypa, Loculipora, Lyropora, Phyllopora, Polypora, Ptilopora, Ptiloporella, Ptiloporina, Reptaria, Reteporina, Semicoscinium, Semiopora, Tectulipora, Unitrypa.
- FAMILY FISTULIPORIDÆ.—Actinotrypa, Buscopora, Callopora, Calloporella, Callotrypa, Chilotrypa, Cœlocaulis, Eridopora, Favicella, Fistulipora, Lichenotrypa, Pinacotrypa, Selenopora, Strotopora.
- FAMILY HELIOTRYPIDÆ.—Heliotrypa.
- FAMILY LABECHIIDÆ.—Labechia.
- FAMILY PALESCHARIDE. --- Paleschara.
- **FAMILY PHACELOPORIDÆ.**—Phacelopora.
 - FAMILY PTILODICTYONIDÆ.—Coscinella, Cyclopora, Cycloporella, Escharopora, Graptodictya, Heterodictya, Phænopora, Proutella, Ptilodictya, Ptilotrypa. Streblotrypa, Worthenopora.
 - FAMILY RHABDOMESONTIDÆ.—Acanthoclemá, Anisotrypa, Bactropora, Cœloconus, Nemataxis, Rhombopora, Tropidopora.

FAMILY RHINOPORIDÆ.-Rhinopora.

FAMILY SPHRAGIOPORIDE. - Sphragiopora.

FAMILY STICTOPORIDÆ.—Acrogenia, Arthropora, Cystodictya, Dichotrypa,
 Dicranopora, Eurodictya, Euspilopora, Goniotrypa, Heliotrypa, Intrapora, Pachydictya, Phractopora, Phyllodictya, Prismopora, Rhinidictya, Scalaripora, Stictopora, Stictoporella, Stictoporina, Stictotrypa, Sulcopora, Tæniodictya, Tæniopora, Thamnotrypa.

FAMILY SUBRETIPORIDE.—Chainodictyon, Drymotrypa, Subretepora. FAMILY THAMNISCIDE.—Criscinella, Diplopora, Thamniscus. FAMILY THE FAMILY TRE porella, P pella, N Tropidon FAMILY TUE nodia, S

ACANTHOCLADIA, K Nat. Hist., 2d a akantha, spine symmetrically more or less or furcating; brai casionally elo bilaterally bra one side only; and arranged i tudinal series, ridges. Type americana, Swall Acad. Sci., vol.

fruticosa, Ulrich Ill., vol. 8, pl.

ACANTHOCLEMA, Hi 6, p. 72. [Ety twig.] Ramos a central axis; longitudinal pa a branch, sep ridges; betwee longitudinal di form nodes. 7

alternatum, Hall ternata,) Bryo: Gr., and Pal. Held. Gr.

bispinulatum, H spinulata, (Tra 882, and Pal. Ham. Gr.

confluens, Ulrich fluens,) Bull. Cuyahoga Shal

divergens, Hall, 73, Up. Held G ovatum, Hall, 18

73, Up. Held. scutulatum, Ha scutulata,) Tra 180, and Pal.

Ham. Gr. sulcatum, Hall, 1

192, Ham. Gr. triseriale, Hall, rialis,) Rep. S

vol. 6, p. 74, U

ACROGENIA, Hall, 1 [Ety. akros, e Frond ramose ing from the each precedin division obcor

ACA -AMP.]

FAMILY THEONOIDE.—Scenellopora.

FAMILY TREMATOPORIDE. - Acanthoclema, Amplexopora, Atactopora, Atactoporella, Bactropora, Chilotrypa, Diamesopora, Homotrypa, Homotrypella. Nemataxis. Nicholsonella, Orthopora, Trematella, Trematopora. Tropidopora.

MOLLUSCOIDA.

- FAMILY TUBULIPORIDA:-Berenicea, Clonopora, Cystopora, Hederella, Hernodia, Stomatopora.
- ACANTHOCLADIA, King, 1849, Ann. and Mag. Nat. Hist., 2d ser., vol. 3, p. 389. [Ety. akantha, spine; klados, branch.] Stem symmetrically and bilaterally branched. more or less on one plane; rarely bifurcating; branches short, simple, occasionally elongated and becoming bilaterally branched: celluliferous on one side only; cell apertures circular and arranged in three or more longitudinal series, separated by dividing ridges. Type A. anceps.
 - americana, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 180, Permian Gr. fruticosa, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 65, Up. Coal Meas.
- ACANTHOCLEMA, Hall, 1887, Pal. N. Y., vol. 6, p. 72. [Ety. akantha, spine; *klema, twig.] Ramose, solid, cells arising from a central axis; cell apertures oval, in longitudinal parallel rows, about ten on a branch, separated by longitudinal ridges; between the apertures, in the longitudinal direction, there are spiniform nodes. Type A. alternatum.
- alternatum, Hall, 1881, (Trematopora alternata,) Bryozoans of the Up. Held. Gr., and Pal. N. Y., vol. 6, p. 72, Up. Held. Gr.
- bispinulatum, Hall, 1881, (Callopora bispinulata, (Trans. Alb. Inst., vol. 10, p. 882, and Pal. N. Y., vol. 6, p. 182, Ham Gr.
- confluens, Ulrich, 1888, (Rhombopora confluens,) Bull. Denison Univ., p. 91, Cuyahoga Shales.
- divergens, Hall, 1887. Pal. N. Y., vol. 6, p. 73, Up. Held Gr.
- ovatum, Hall, 1887, Pal. N. Y., vol. 6, p. 73, Up. Held. Gr.
- scutulatum, Hall, 1881, (Trematopora scutulata,) Trans. Alb. Inst., vol. 10, p. 180, and Pal. N. Y., vol. 6, p. 190, Ham. Gr.
- sulcatum, Hall, 1887, Pal. N. Y., vol. 6, p. 192, Ham. Gr.
- triseriale, Hall, 1883, (Stictopora trise-rialis,) Rep. St. Geol. and Pal. N. Y., vol. 6, p. 74, Up. Held. Gr.
- ACROGENIA, Hall, 1884, Rep. St. Geol. p. 51. [Ety. akros, sharp; genea, growth.] Frond ramose; two branches proceeding from the truncate termination of each preceding one; base of each division obconical, terete above and

flattened and celluliferous; margins noncelluliferous; apertures in rows separated by ridges, central range of apertures the smaller. Type A. prolifera. prolifera, Hall, 1884, Rep. St. Geol., p. 52, and Pal. N. Y., vol. 267. 6, p. 26 Ham. Gr.

ACTINOTRYPA,

strongly striated, gradually becoming

Ulrich, Geo. Sur. Ill., vol. Fig. 448-Acrogenia prolifera 8, p. 386, (in press.) [Ety. aktin, a ray; trupa, an opening.] Like Dichotrypa. Cell apertures showing the projecting ends of from eight to ten vertical septalike ridges, that extend down on the inner side of the tubular vestibule nearly or quite to the primitive aper-

tures. Type A. peculiaris. peculiaris, Rominger, 1866, (Fistulipora peculiaris,) Proc. Acad. Nat. Sci. Phil., p. 10, Keokuk Gr.

- Alecto, Lamouroux, 1821, Exposi. Method. It was preoccupied by Leach in the class Echinodermata, when Lamouroux used it, and hence Stomatopora is used in its place.
- auloporoides, see Stomatopora auloporoides

canadensis, see Hederella canadensis.

confusa, see Stomatopora confusa.

- frondosa, see Stomatopora frondosa.
- inflata, see Stomatopora inflata.

nexilis, see Stomatopora nexilis.

- AMPLEXOPORA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 154. [Ety. amplexus, an encircling; poros, pore.] Ramose; cells of one kind only; walls thin in the axial part of the branches, but thicker in the peripheral region; acanthopores numerous. Type A. cingulata
- affinis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 36, Hud. Riv. Gr.
- canadensis, Foord, 1883, Cont. to Micropalæontology, p. 17, Trenton Gr.

borders, viz. omata. The

ome, Ichthy-

Leptotrypa.

Nematopora.

mella. Leio-

ramoporella. Lichenalia. trypa, Sage-

Coscinium, pora. Helicoa. Polypora. micoscinium,

Calloporella, Fistulipora,

Escharopora, a, Ptilotrypa,

opora, Cœlo-

Dichotrypa, trypa, Intra-

Rhinidictya, a, Sulcopora,

ora.

MOLLUSCOIDA.

cingulata, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 254, Hud. Riv. Gr.



1G. 449.—Amplexopora cingulata. Tangential section x 50, showing wall structure, and verti-FIG. 449.cal section x 50.

discoidea, Nicholson, 1875, (Chetetes discoideus,) Ohio Pal., vol. 2, p. 206, Hud. Riv. Gr.



292

FIG. 450.-Amplexopora robusta funnel-shaped diaphrag m, supposed to be a modified cystiphrag m.

pustulosa, Ulrich, (in press,) Geo. Sur. Ill., vol. Ulrich. 8, pl. 36, Hud. Riv. Gr. robusta, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 82, Hud. Riv. Gr. septosa, Ulrich, 1879, (Atac-

topora septosa,) Jour. Cin. Soc. Nat. Hist., vol. 2, p. 125, Hud. Riv. Gr. superba, Foord, 1883, Micropalæon-Cont. to tology, p. 16, Tren-ton Gr.

winchelli, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 91, Trenton Gr.

ANISOTRYPA, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 275. [Ety. anisos, unequal; trupa, perforation.] Ramose, hollow, inner side lined with an epitheca; walls of tubes thin in the interior, and thickened exteriorly; no interstitial cells or spiniform tubuli. Type A. symmetrica. fistulosa, Ulrich, (in press,) Geo. Sur. Ill.,

vol. 8, pl. 72, St. Louis Gr.

ramulosa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 72, St. Louis Gr.

- solida, Ulrich, (in press,) Geo. Sur. Ill.,
- vol. 8, pl. 72, Kaskaskia Gr. symmetrica, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 76, Kaskaskia Gr,
- ARCHIMEDES, LeSueur, 1842, (Retepora ar-chimedes,) Am. Jour. Sci., vol. 43, p. 19. [Ety. from its resemblance to the machine for raising water, consisting of a tube rolled in a spiral form around a cylinder, invented by Archimedes. Distinguished from Fenestella by its axis and mode of growth; the flabelliform expansion acquiring a solid central axis, around which it revolves in an ascending spiral form, spreading equally in all directions. Type A. wortheni.

communis, Ulrich, (in press), Geol. Sur. Ill., vol. 8, pl. 63, Kaskaskia Gr. compactus, Ulrich,



rich, (in press), Geol. Sur. Ill., vol. 8, pl. 63, Kaskaskia Gr.

invaginatus, Ulrich, (in press), Geol. Sur. Ill., vol. 8, pl. 63, Kaskaskia Gr.

FIG. 451.-Archimedes

reversus.

Sci.,

Kas-

(in

III.,



- owenanus, Hall, 1857, Proc. Am. Ass'n Ad. Sci., vol. 10, p. 176, Keokuk Gr. perminimus, Ulrich, (in press), Geo. Sur. Ill., vol. 8, pl. 63, Kaskaskia Gr. proutanus, Ulrich, (in press), Geo. Sur.

- Ill., vol. 8, pl. 63, Kaskaskia Gr. reversus, Hall, 1858, Geo. Rep. Iowa, p. 652, Warsaw Gr.
- sublaxus, Ulrich, (in press), Geo. Sur. Ill., vol. 8, pl. 63, Kaskaskia Gr.
- swallovanus, Hall, 1857, Proc. Am. Ass'n Ad. Sci., vol. 10, p. 176, Kaskaskia Gr.
- terebriformis, Ulrich, (in press), Geo. Sur. Ill., vol. 8, pl. 63, Kaskaskia Gr. wortheni, Hall, 1857, Proc. Am. Ass'n
- Ad. Sci., vol. 10, p. 176, and Geo. Sur. Iowa, p. 651, Warsaw Gr. Archimedipora, D'Orb., 1850, Prod. de Pal.
 - t. 1, p. 102, syn. for Archimedes. Archimedipora archimedes was too tautological, and by common consent Archimedes has become the generic name.

archimedes, see Archimedes.

ART. -ATA.]

ARTHROCLEMA, B 1, p. 54. [twig.] Cylin long, slende oval. Type angulare, Ulrie Ill., vol. 8, p billingsi, Ulrich vol. 8, Trente pulchellum, B vol. 1, p. 54, spiniforme, see] Arthronema, Ulrie Nat. Hist., v

was preoccup



FIG. 453.---

curtum, see Arth tenue, see Arthr



ig. 454. – shafferi. section. FIG. Arthro Magni

> rounded by in shafferi. shafferi, Meek, (Stictopora feri,) Proc. Nat. Sci., p. and Ohio Pal.

> 1, p. 69, Hud. Gr. simplex, Ulrich,

14th Rep. Geo. Minn., p. 65, 1 ton Gr.

ARTHROSTYLUS, Ul 1888, Am. 6 vol. 1, p. 230. arthron, stylos, pillar.] subcylindrical each end, cel striated on the vated lines. T curtus, Ulrich, tum,) Jour. Ci p. 161, Hud. R ANI.-ARC

ART.-ATA.]

i), Geol. Sur. tia Gr.



Archimede rersus.

s), Geol. Sur. ia Gr. laxus, Hall, 1857, Proc. Am. Ass'n Sci. Ad. vol. 10, p. 176, Kaskaskia Gr. meekanus, Hall, 1857. Proc. Am. Ass'n Ad. Sci., vol. 10. p. 176, Kaskaskia Gr. negligens, Ulrich, (in press), Geo. Sur. Ill., vol. 8, pl. III., 63, Keokuk Gr. Am. Ass'n eokuk Gr. ss), Geo. Sur. ia Gr. s), Geo. Sur. ia Gr. lep. Iowa, p.), Geo. Sur. ia Gr.

c. Am. Ass'n 176, Kaskasess), Geo. Sur.

kia Gr. . Am. Ass'n nd Geo. Sur.

Prod. de Pal., Archimedes. les was too mon consent the generic MOLLUSCOIDA.

- ARTHROCLEMA, Billings, 1862, Pal. Foss., vol. 1, p. 54. [Ety. arthron, joint; klema, twig.] Cylindrical jointed stem, with long, slender-jointed branches; pores oval. Type A. pulchellum.
 - angulare, Ulrich, (in press), Geo. Sur. Ill., vol. 8, pl. 29, Hud. Riv. Gr.
- billingsi, Ulrich, (in press), Geo. Sur. Ill., vol. 8, Trenton Gr.
- pulchellum, Billings, 1862, Pal. Foss., vol. 1, p. 54, Trenton Gr. (See p. 329.) spiniforme, see Helopora spiniformis.
- Arthronema, Ulrich, 1882, Jour. Cin. Soc.



Nat. Hist., vol. 5, p. 160. The name was preoccupied. See Arthrostylus.



FIG. 453.-Arthropora shafferi.

curtum, see Arthustylus curtus. tenue, see Arthrostylus tenuis.

ARTHROPORA, Ulrich, 1882, Jour. Cin.

Soc. Nat. Hist., vol. 5, p. 152. [Ety. arthron, a

joint ; poros, per-foration.] Zoar-

ium like Sticto-

pora, but in

branching seg-

ments; cell aper-

tures subcircu-

lar, and sur-

jointed,

20

short.



— Arthropora Magnified 454. ---FIG shafferi. section

rounded by interstitial pits. Type A. shafferi. shafferi, Meek, 1872, (Stictopora shaf-

feri,) Proc. Acad. Nat. Sci., p. 317, and Ohio Pal., vol. 1, p. 69, Hud. Riv. Gr. simplex, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 65, Trenton Gr.



ARTHROSTYLUS, Ulrich, 1888, Am. Geol., vol. 1, p. 230. [Ety. shafferi. Tangential section x 50.

arthron, joint; stylos, pillar.] Ramose, composed of subcylindrical segments, swollen at each end, celluliferous on one side, striated on the other; cells between elevated lines. Type A. tenuis.

curtus, Ulrich, 1882, (Arthronema curtum.) Jour. Cin. Soc. Nat. Hist., vol. 5, p. 161, Hud. Riv. Gr.

tenuis, Ulrich, 1882, (Arthronema tenue,) Jour. Cin. Soc. Nat. Hist., vol. 5, p. 160, Trenton Gr.

- Asconictyon, Nicholson, 1877, Ann. and Mag. Nat. Hist., 4th ser., vol. 19, p. 463. [Ety. askos, leather bottle; dictyon, net.] Organism composite, parasitic, composed of numerous calcareous cells; minutely perforated. Type A. tusiforme. It is probably a sponge. fusiforme, Nicholson, 1877, Ann. and
- Mag. Nat. Hist., 4th ser., vol. 19, p. 463, Ham. Gr.
- stellatum, Nicholson, 1877, Ann. and Mag. Nat. Hist., 4th ser., vol. 19, p. 464, Ham. Gr.
- ASPIDOPORA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 155. [Ety. aspis, shield; poros, perforation.] Thin, free expansions; concentrically wrinkled and striated epitheca on the lower side; cells gradually increasing in size toward the center of the convex expansion; interstitial cells numerous; diaphragms cross both kinds of tubes; spiniform
- tubuli present. Type A. areolata. areolata, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 164, Utica Slate.
- caliculus, James, 1875, (Chetetes caliculus,) Int. Catal. Cin. Foss., p. 1, and Nicholson Struct. and Affin. Montic., p. 165, Utica Slate.
- parasitica, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 90, Trenton Gr.
- ATACTOPORA, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 119. [Ety. atactos, without regularity; poros, pore.] In-crusting; surface with monticules or maeulæ; cell apertures petaloid, sur-rounded by rows of blunt spines; interstitial cells in clusters; tube walls inflected; diaphragms present. Type A. hirsuta.
 - hirsuta, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 120, Hud. Riv. Gr.
 - maculata, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 121, Hud. Riv. Gr.
- multigranosa, see Atactoporella multigranosá.
- mundula, see Atactoporella mundula.
- septosa, see Amplexopora septosa.
- ? subramosa, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 124, Hud. Riv. Gr.
- tenella, see Atactoporella tenella.
- ATACTOPORELLA, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 247. [Ety. diminutive of Atactopora.] Incrusting; surface with monticules or maculæ; cell apertures petaloid; interstitial cells numerous; spiniform tubuli and diaphragms. Type A. typicalis.
- multigranosa, Ulrich, 1879, (Atactopora multigranosa,) Jour. Cin. Soc. Nat. Hist., vol. 2, p. 122, Hud. Riv. Gr.
- mundula, Ulrich, 1879, Atactopora mun-dula,) Jour Cin. Soc. Nat. Hist., vol. 2, p. 123, Hud. Riv. Gr.

newportensis, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 250, Utica Slate. ortoni, Nicholson, 1874,

(Chetetes ortoni,) Quar. Jour. Geo. Soc., vol. 30, p. 513, and Ohio Pal., vol. 2, p. 211, Hud. Riv. Gr.

FIG. 456.-Atactoporella newportensis.

schucherti, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 251, Hud. Riv. Gr.

tenella, Ulrich, 1879, (Atactopora tenella,) Jour. Cin. Soc. Nat. Hist., vol. 2, p. 123, Hud. Riv. Gr.

typicalis, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist. vol. 6, p. 248, Utica Slate. BACTROPORA, Hall, 1887, Pal. N. Y., vol. 6, p.

- 193. [Ety. baktron, staff; poros, pore.] Ramose, solid; base tapering, striated; cells tubular, curved oblique from the •center; septa thin, apertures oval, distant near the base, closer above; inter-spaces granulose. Type B. granistriata. curvata, Hall, 1887, Pal. N. Y., vol. 6, p. 194, Ham. Gr.
- granistriata, Hall, 1881, (Trematopora granistriata,) Trans. Alb. Inst., vol. 10, p. 182, and Pal. N. Y., vol. 6, p. 193, Ham. Gr.
- simplex, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 70, Keokuk Gr.
- BATOSTOMA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 154. [Ety. batos, prickly bush; stoma, mouth.] Ramose, base ex-panded; cell apertures ovate or circular, surrounded by a ring-wall; interstitial tubes numerous; spiniform tubuli

abundant. Type B. implicatum. fertile, Ulrich, 14th Rep. Geo. Sur. Minn., p. 92 Trenton Gr.

imperfectum, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 35, Hud. Riv. Gr. implicatum, Nicholson, 1881, (Monticuli-

implication, Micholi, Micholi, Monteuni-pora implicata,) Struct. and Affin. of Montic., p. 147, Hud. Riv. Gr. irrasum, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 94, Trenton Gr.



FIG. 457 Batostoma jamesi. magnified.

- jamesi, Nicholson, 1874, (Chetetes jamesi,) Quar. Jour. Geo. Soc., vol. 30, p. 506, and Ohio Pal., vol. 2, p. 200 Hud. Riv. Gr.
- manitobense, Ulrich, (in press,) Micropa-læontology, p. 7, Hud. Riv. Gr. (?)

ottawense, Foord, 1883, Cont. to Micropalæontology, p. 18, Trenton Gr. rugosum, Whitfield, 1882, (Fistulipora ru-

BAC.-BOT.

- gosa,) Geo. Wis., vol. 4, p. 255, Hud. Riv. Gr.
- variabile, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 35, Hud. Riv. Gr.
- BATOSTOMELLA, Ulrich, 1882, Jourf. Cin. Soc. Nat. Hist., vol. 5, p. 154. [Ety. dimin-utive of Batostoma.] Ramose, smooth, cell apertures small; interstitial cells and spiniform tubuli; walls of tubes in the peripheral region thick. Type B. gracilis.
 - abrupta, Ulrich, (in press,) Geo. Sur. III. vol. 8, pl. 75, Kaskaskia Gr.



FIG. 458.-Batostomella gracilis. Natural size and enlarged.

- gracilis, Nicholson, 1874, (Chetetes gracilis,) Quar. Jour. Geo. Soc., vol. 30, p. 504, and Ohio Pal., vol. 2, p. 198, Hud. Riv. Gr.
- interstincta, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 75, St. Louis Gr.
- nitidula, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 75, Kaskaskia Gr. obliqua, Ulrich, (in press,) Geo. Sur. Ill.,
- vol. 8, pl. 46, Ham. Gr.
- spinulosa, Ulrich, (in press.) Geo. Sur.
 Ill., vol. 8, pl. 75, Kaskaskia Gr.
 simulatrix, Ulrich, (in press.) Geo. Sur.
 Ill., vol. 8, pl. 35, Hud. Riv. Gr.
- BERENICEA, Lamoureux, 1821, Exp. Meth. des, genres. d. pol., 80. [Ety. mytho-logical name.] Incrusting, composed of a very thin, calcareous, foliaceous base, bearing numerous ovate, distinctly separated cells, not piled, aperture round near the broad anterior end; cells disposed in an obscurely radiated arrangement. Type B. diluviana.
 - insueta, Dawson, 1883, Rep. on Redpath,

 - Insueta, Dawson, 1885, Kep. on Kedpath, Mus. No. 2, p. 12, Subcarboniferous.
 minnesotensis, Ulrich, 1886, 14th Rep. Geo. Sur. of Minn., p. 58, Trenton Gr.
 primitiva, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 157, Hud. Riv. Gr.
 vesiculosa, Ulrich, 1882, Jour. Cin. Soc.
 Nat. Hist., vol. 5, p. 157, Hud. Riv. Gr.
- Nat. Hist., vol. 5, p. 158, Utica Slate or lower part Hud. Riv. Gr. BOTRYLLOPORA, Nicholson, 1874, Geo. Mag.
- Lond. n. s., vol. 1, p. 160. [Ety. botryl-los, cluster; poros, pore.] Incrusting, forming systems of small circular disks. the upper surfaces of which are marked with radiating, cell-bearing ridges; non-

21

US.-CAL.]

poriferous spa disk, round w occupy a sligh B. socialis.



FIG. 459.-Botryllope natural size; b, en ray to show pores.

socialis, Nichols n. s., vol. 1, p BUSCOPORA, Ulrich

p. 22. [Ety. perforation.] incrusting or a concentrica zoœcia tubula apertures and or peristome; tooth-like pro nation; acces stitial spaces with diaphrag

dentata, Ulrich,



FIG. 460.-Buscopora nata. Tangential s tion, showing ap ture or lunarium.

31, and Pal. Held. Gr. BYTHOPORA, Mille Pal. No. 2, p. (sea; poros, poi small, sometim



FIG. 461.-By

cell apertures rated by imp fruticosa.

BAC.-BOT.

to Micropaìr. tulipora ru-255, Hud.

o. Sur. Ill.,

r. Cin. Soc. Ety. diminse. smooth. stitial cells ls of tubes nick. Type

eo. Sur. Ill.,



Natural size

hetetes gra-:., vol. 30, p. p. 198, Hud. s,) Geo. Sur.

Gr. ieo. Sur. Ill., eo. Sur. Ill.,

,) Geo. Sur. a Gr. s,) Geo. Sur.

v. Gr. Exp. Meth. Ety. mythog, composed is, foliaceous ite, distinctly de aperture nterior end; rely radiated uviana. on Redpath, oniferous. 3, 14th Rep. Trenton Gr.

ar. Cin. Soc. Iud. Riv. Gr. ur. Cin. Soc. Jtica Slate or

'4, Geo. Mag. [Ety. botryl-Incrusting, circular disks, h are marked g ridges ; nonUS.-CAL.]

MOLLUSCOIDA.

poriferous space in the center of each disk, round which the radiating ridges occupy a slightly elevated zone. Type B. socialis.



FIG. 459.-Botryllopora socialis. a, Group on coral natural size; b, enlarged specimen; c, enlarged ray to show pores

socialis, Nicholson, 1874, Geo. Mag. Lond. n. s., vol. 1, p. 160, Ham. Gr.

BUSCOPORA, Ulrich, 1886, Cont. to Am. Pal., p. 22. [Ety. Busk, proper name; poros, perforation.] Zoarium thin, lamellate incrusting or free; under surface, with a concentrically wrinkled epitheca; zoœcia tubular, short, with subcircular apertures and a faintly elevated border or peristome; posterior margin, with a tooth-like process divided at its termination; accessory cells present; interstitial spaces vesiculose; zoœcial tubes, with diaphragms. Type B. lunata.

dentata, Ulrich, syn. for B. lunata.

lunata, Rominger, 1866, (Fistulipora lunata,) Proc. Acad. Nat. Sci. Phil., p. 7, and Pal. N. Y., vol. 6, p. 77, Up. Held. Gr. lunata var. tubulata,

Hall, 1887, (Lichenalia lunata var. tubulata,) Rep. St.

Geol. for 1885, pl. 31, and Pal. N. Y., vol. 6. p. 78, Up. Held. Gr.

FIG. 460.-Buscopora lu-

ture or lunarium.

nata. Tangential sec-

tion, showing aper-

BYTHOPORA, Miller & Dyer, 1878, Cont. to Pal. No. 2, p. 6. [Ety. buthos, depths of sea; poros, pore.] Dendroid, branches small, sometimes anastomosing, smooth;



FIG. 461.-Bythopora fruticosa.

cell apertures longer than wide, separated by impressed lines. Type B. fruticosa.

arctipora, Nicholson, 1875, (Ptilodictya arctipora,) Ann. and Mag., ser. 4, vol. 15, p. 180, Utica Slate.

delicatula, (?) instead of Monticulipora delicatula

fruticosa, Miller & Dyer, 1878, Cont. to Pal. No. 2, p. 6, Hud. Riv. Gr. herricki, Ulrich, 1886, 14th Rep. Geo. Sur.

Minn., p. 99, Trenton Gr. nashvillensis, S. A.

Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 143, Trenton Gr.

striata, Ulrich, (in press,) Micropalæontology, p. 10, Hud. Riv. Gr. ALLOPORA, Hall, 1852, Pal. N. Y.,

vol. 2, p. 144. FIG. 462. – Bythopora nashvillensis. Magni-fied. [Ety. kallos, beautiful; poros, pore.]

Ramose, smooth, or tuberculated; ceil tubes cylindrical; interstitial cells numerous; diaphragmsnumerous, no spiniform tubuli; intercellular space occupied by septate tubuli. Type C. elegantula.

aculeolata, see Cœlocaulis aculeolata. ?aspera, Hall, 1852, Pal. N. Y., vol. 2, p. 147, Niagara Gr.

bipunctata, Hall, 1884, Rep. St. Geol., p. 15, syn. for Streblotrypa hamiltonensis. bispinulata, see Orthopora bispinulata.

cellulosa, Hall, 1883, Rep. St. Geol., pl. 12, fig. 7-9, Low. Held. Gr.

cervicornis, Hall, 1879, Desc. New Spec. Foss., p. 3, and 11th Rep. Ind. Geo. Sur., p. 238, Niagara Gr.

cincinnatiensis, Ulrich, syn. for Leioclema occidens.

diversa, Hall, 1879, Desc. New. Spec. Foss.,



FIG. 463.- Callopora

exsul.

p. 4, and 11th Rep. Ind. Geo. Sur., p. 239, Niagara Gr. elegantula, Hall, 1852, Pal. N. Y., vol. 2, p. 144, Niagara Gr. ?exsul, Hall, 1876, (Al-

veolites exsul,) 28th Rep. N. Y. St. Mus. Nat. Hist., p. 115, Niagara Gr.

fistulosa, Hall, 1883, Rep. St. Geol., pl. 12, fig. 1-6, Low. Held. Gr.

florida, Hall, 1852, Pal. N. Y., vol. 2, p.

146, Niagara Gr. geniculata, Hall, 1887, Pal. N. Y., vol. 6, p. 75, Up. Held, Gr.

hemispherica, see Fistulipora hemispherica. heteropora, see Callotrypa heteropora.

hyale, see Cœlocaulis hyale.

incrassata, see Fistulipora incrassata. incontroversa, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 96, Trenton Gr.

internodata, see Callotrypa internodata. irregularis, see Coelocaulis irregularis. laminata, Hall, 1852, Pal. N. Y., vol. 2, p. 146, Niagara Gr.



magnopora, Foerste, 1887, Bull. Denison University, p. 173, Niagara Gr.

minutissima, see Leiclema minutissimum. missouriensis, Rominger, syn. for Leioclema punctatum.

multiseriata, see Callotrypa multiseriata. nodulosa, Nicholson, 1874, (Chetetes nodulosus,) Quar. Jour. Geo. Soc., vol. 30,

p. 506, and Ohio Pal., vol. 2, p. 200, Hud. Riv. Gr. nummiformis, Hall, 1852, Pal. N. Y., vol.

2, p. 148, Niagara Gr.

oculifera, see Callotrypa oculifera. ohioensis, Foerste, 1887, Bull. Denison

Univ., p. 174, Niagara Gr. onealli, James, 1875, (Chetetes onealli,)

Int. Catal. Cin. Foss., p. 2, Hud. Riv. Gr. oppleta, Hall, 1887, Pal. N. Y., vol. 6, p. 21, Low. Held. Gr.

parasitica, see Fistulipora parasitica. perelegans, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat.Hist.,p.102, Low. Held. Gr. ponderosa. 800 Fistulipora ponderosa. puncta'a, see Leioclema punctatum. punctillata, Winchell, 1866, Rep. Low. Penin. 88.

sigillarioides, Nicholson,

Pal., vol. 2, p. 203, Hud. Riv. Gr.

singularis, Hall,1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 115, Niagara Gr. subnodosa, Ulrich, (in press), Geo. Sur. Ill., vol. 8, pl. 33, Hud. Riv. Gr. subplana, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., Soc. Nat. Hist., vol. 5, p. 253, Hud.

Riv. Gr.

undulata, o Ulrich, Rep. Sur. Minn., Geo. p. 95, Trenton Gr.

unispina, see Callotrypa unispina. venusta, see Cœlocaulis venusta.

CALLOPORELLA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 154. [Ety. diminutive of Callopora.] Thin expansions, epitheca below; tubes with thick walls

containing interstitial cells or angular

mesopores; diaphragms and spiniform tubuli. Type C. harrisi.

CAL.-CER.

harrisi, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 91, Hud. Riv. Gr. nodulosa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 33, Hud. Riv. Gr.

- CALLOTRYPA, Hall, 1887, Pal. N. Y., vol. 6, p. 24. [Ety. kallos, beautiful; trupa, foramen.] Distinguished from Callopora by having a solid intercellular space, or one occupied with minute tubuli without septa. Type C. macropora. heteropora, Hall, 1874, (Callopora heter-opora,) 26th Rep. N. Y. St. Mus. Nat.
 - Hist., p. 102, Low. Held. Gr. internodata, Hall, 1881, (Callopora inter-
 - nodata,) Trans. Alb. Inst., vol. 10, p. 182, and Pal. N. Y. vol. 6, p. 189, Ham. Gr. macropora, Hall, 1874, (Callopora macro-pora,) 26th Rep. N. Y. St. Mus. Nat.
 - Hist., p. 101, Low. Held. Gr.
 - macropora var. signata, Hall, 1874, (Trematopora signata,) 26th Rep. N. Y. St. Mus. Nat. Hist., p. 104, Low. Held. Gr. multiseriata, Hall, 1881, (Callopora multi-
 - seriata,) Bryozoans of the Up. Held. Gr., p. 7, and Pal. N. Y., vol. 6, p. 75, Up. Held. Gr.
 - oculifera, Hall, 1879, (Callopora oculifera,) 32d Rep. N. Y. St. Mus. Nat. Hist., p. 155, Low. Held. Gr.
 - paucipora, Hall, 1887, Pal. N. Y., vol. 6, pl. 23, fig. 21, Low. Held. Gr.
 - striata, Hall, 1887, Pal. N. Y., vol. 6, p. 26, Low. Held. Gr.
 - unispina, Hall, 1874, (Callopora unispina,) 26th Rep. N. Y. St. Mus. Nat. Hist., p. 102, Low. Held. Gr.
- Carinopora, Nicholson, 1874, Ann. and Mag. Nat. Hist., 4th ser., vol. 13, and Pal. Prov. Ont., p. 109, synonym for Fenestella.
- hindi, Nicholson, 1874, Ann. and Mag. Nat. Hist., 4th ser., vol. 13, and Pal. Prov. Ont., p. 111. Not a good species.
- CERAMELLA, Hall, 1887, Pal. N. Y., vol. 6, p. [Ety. keramis, imbricated.] Thin, 19. growing from a spreading base, celluliferous on both sides, tubes oblique; peristomes elevated; maculæ sterile, depressed. Type C. scidacea. scidacea, Hall, 1887, Pal. N. Y., vol. 6, p.
 - 240, Ham. Gr.
- CERAMOPORA, Hall, 1852, Pal. N. Y., vol. 2. p. 168. [Ety: keramis, imbricated like roof tile; poros, pore.] Discoidal, free or attached by the center of the base to foreign bodies; under surface with one or more layers of small, irregular, intercommunicating cells, which do not form tubes; cells large, oblique, imbricating, arranged in a radial manner around the depressed center, communicating with each other and the mesopores by means of remote perforations in their walls; mesopores irregular, short, numerous at the center of the colony, decreasing in number toward the margin. Type C. imbricata.

CER.-CLA.]

agellus, Hall, 1 Nat. Hist., p. beani, James, Hist., vol. 7, 1 confluens, Hal

Mus. Nat. Hi explanata, Hal

Foss. p. 5, an Nat. Hist , p. foliacea, Hall, 170, Niagara

huronensis, Ni n. s., vol. 2, p imbricata, Hall p. 169, Niaga

incrustans, Hal p. 169, Niagai labecula, Hall,

Nat. Hist., p. labeculoidea, H

16, fig. 1-2, an

Low. Held. G maculata, Hall.

Nat. Hist., p.

maxima, Hall,

Nat. Hist., p.

nicholsoni, Jam Foss., p. 3, H nothus, Hall, 18

p. 6, and 11ti Hist., p. 244,



FIG. 466.-Ceramoj natural s

ohioensis, Nicho 2, p. 265, Hud orbiculata, Ring Soc. Nat. Hist erly defined. parvicella, Hall. Mus. Nat. Hi raripora, Hall,

Foss., p. 6, an Nat. Hist., p. CERAMOPORELLA,

Soc. Nat. Hist Sur. Ill., vol. 1 Ceramopora.] one or more tl short, apertur

lique, and mo by mesopores.

distincta, Ulrich

Ill., vol. 8, pl. granulosa, Ulric

Ill., vol. 8, pl.

stellata, Ulrich, vol. 8, pl. 41, 1

Ceriopora, Goldfus [Ety. kerion, h

Not a Palæozoi hamiltonensis, see ensis.



FIG. 464.-Callopora sigillarioides. Natural size and magnified.

Mich., p. Ham. Gr.

1875, (Chetetes sigillarioides,) Ohio



FIG. 465. -- Callopora, subnodosa. Tangen-tial section x 50, showing amalgama-tion of walls.

[CAL.-CER.

d spiniform

n. Soc. Nat. iv. Gr. Geo. Sur.)

Gr. V. Y., vol. 6, iful; trupa, from Callointercellular 1 minute tu-. macropora. opora heter-. Mus. Nat.

lopora interol. 10, p. 182, 9, Ham. Gr. pora macrot. Mus. Nat. ìr.

, 1874, (Tre-ep. N. Y. St. w. Held. Gr. opora multi-Up. Held. vol. 6, p. 75,

ra oculifera,) lat. Hist., p.

N. Y., vol. 6, Gr. Y., vol. 6, p.

ra unispina, Nat. Hist., p.

nn. and Mag. 13, and Pal. m for Fenes-

und Mag. Nat. id Pal. Prov. **species**. **Y., v**ol. 6, p.

ated.] Thin, base, cellulifbes oblique; 11æ sterile, de-

Y., vol. 6, p.

N. Y., vol. 2. abricated like **viscoidal**, free of the base to face with one regular, inter-:h do not form , imbricating, unner around ommunicating mesopores by tions in their ar, short, nuhe colony, derd the margin.

CER.-CLA.]

- beani, James, 1885, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 23, Hud. Riv. Gr. confluens, Hall, 1876, 28th Rep. N. Y.
- Mus. Nat. Hist., p. 119, Niagara Gr. explanata, Hall, 1879, Desc. New. Spec. Foss. p. 5, and 11th Rep. Ind. Geo. and Nat. Hist., p. 245, Niagara Gr. foliacea, Hall, 1852, Pal. N. Y., vol. 2, p.
- 170, Niagara Gr.
- huronensis, Nicholson, 1875, Geo. Mag. n. s., vol. 2, p. 37, Ham. Gr. imbricata, Hall, 1852, Pal. N. Y., vol. 2,
- p. 169, Niagara Gr.

- p. 105, Niagara Gr.
 incrustans, Hall, 1852, Pal. N. Y., vol. 2,
 p. 169, Niagara Gr.
 labecula, Hall, 1876, 28th Rep. N. Y. Mus.
 Nat. Hist., p. 119, Niagara Gr.
 labeculoidea, Hall, 1883, Rep. St. Geol., pl.
 16, fig. 1-2, and Pal. N. Y., vol. 6, p. 33,
 Low Hold Cr. Low. Held. Gr.
- maculata, Hall, 1874, 26th Rep. N. Y. Mus. Nat. Hist., p. 108, Low. Held. Gr. maxima, Hall, 1874, 26th Rep. N. Y. Mus. Nat. Hist., p. 109, Low. Held. Gr.
- nicholsoni, James, 1875, Int. to Catal. Cin. Foss., p.13, Hud. Riv. Gr. nothus, Hall, 1879, Desc. New Spec. Foss.,
- p. 6, and 11th Rep. Ind. Geo. and Nat. Hist., p. 244, Niagara Gr.



- FIG. 466.-Ceramopora ohigensis. Fragment natural size and magnified.
- ohioensis, Nicholson, 1875, Ohio Pal., vol. 2, p. 265, Hud. Riv. Gr.
- orbiculata, Ringueberg, 1880, Bull. Buf. Soc. Nat. Hist., vol. 5, p. 19. Not properly defined.
- parvicella, Hall, 1879, 32d Rep. N. Y. St. parvicella, Hall, 1879, 32d Kep. N. Y. St. Mus. Nat. Hist., p. 158, Low. Held. Gr.
 raripora, Hall, 1879, Desc. New Spec. Foss., p. 6, and 11th Rep. Ind. Geo. and Nat. Hist., p. 244, Niagara Gr.
 CERAMOPORELLA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 156, and Geo.
- Sur. Ill., vol. 8, (in press.) [Ety. from Ceramopora.] Incrusting, consisting of one or more thin layers; zoœcial tubes short, apertures rounded, direct or oblique, and more or less nearly isolated by mesopores. Type C. distincta. distincta, Ulrich, (in press.) Geo. Sur.
- Ill., vol. 8, pl. 39, Hud. Riv. Gr. granulosa, Ulrich, (in press,) Geo. Sur.
- Ill., vol. 8, pl. 41, Hud. Riv. Gr. stellata, Ulrich, (in press,) Geo. Sur. Ill.,
- vol. 8, pl. 41, Hud. Riv. Gr. / Ceriopora, Goldfuss, 1826, Germ. Petref.
- Ety. kerion, honey-comb; poros, pore.] Not a Palæozoic genus.
- hamiltonensis, see Streblotrypa hamiltonensis.

MOLLUSCOIDA.

- agellus, Hall, 1867, 28th Rep. N. Y. Mus. CHAINODICTYON, Foerste, 1887, Bull. Deni-Nat. Hist., p. 120, Niagara Gr. son Univ., p. 81. Zoaria flabellate, consisting of narrow inosculating branches, poriferous on one side only, the other with concentric or lunate plications. Fenestrules elliptical; zoœcia subtubular in two to four alternating series, their apertures rounded and placed at the bottom of sloping areas. Type C. laxum.
 - laxum, Foerste, 1887, Bull. Denison Univ., vol. 2, p. 81, Low. Coal Meas.
 - laxum var. minor, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 62, Low. Coal Meas. CHILOPORELLA, Ulrich, 1882, Jour. Cin. Soc.
 - Nat. Hist., vol. 5, p. 157. [Ety. cheilos, edge or lip; poros, pore; ella, dim.] Flabellate fronds or compressed branches, from a greatly expanded heavy crust; zoœcial tubes long, very thin-walled, large, and of irregular shape in the axial region; walls much thickened near the surface; apertures ovate, the lunarium conspicuously elevated; mesopores numerous; dia-phragms few, generally absent. Type C. flabellata.
 - flabellata, Ulrich, 1879, (Fistulipora flabellata,) Jour. Cin. Soc. Nat. Hist., vol.
 - 2, p. 28. Hud. Riv. Gr. CHILOTRYPA, Ulrich, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 49. [Ety. cheilos, edge; trupa, opening.] Ramose, small central tube to which the zoœcia are attached; interstitial spaces vesiculose; diaphragms wanting, or few. Type C. hispida.
 - hispida, Ulrich, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 50, Kaskaskia Gr. ostiolata, Hall, 1852, (Trematopora ostio-
 - lata,) Pal. N.Y., vol. 2, p. 152, Niagara Gr. CLATHROPORA,

Hall, 1852, Pal. N. Y., vol. 2, p. 159. [Ety. clathrum, lattice; poros, pore.] Reticulate, uniformly poriferouson both sides of the bifoliate fronds; apertures more or less quadrangular, regularly arranged in parallel series or obliquely in quincunx order. Type C. alcicornis. alcicornis. Hall, 1852, Pal. N. Y.,



FIG. 467.-Clathropora frondosa vol. 2, p. 159, Niagara Gr.





carinata, Hall, syn. for Coscinotrypa cri- | Coscinella, Hall, 1887, Pal. N. Y., vol. 6, p. briformis.

- clintonensis, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 113, Niagara Gr. flabellata, Hall, 1851, Foster & Whitney's Rep., vol. 2, p. 207, Trenton Gr. frondosa, Hall, 1852, Pal. N. Y., vol. 2, p.
- 160, Niagara Gr.
- gracilis, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 54, Niagara Gr. intermedia, Nicholson & Hinde, 1874,
- Can. Jour., p. 156, Niagara Gr. intertexta, Nicholson, 1874, Geo. Mag.
- Lond. n. s., vol. 1, p. 125, Corniferous Gr.

striatura, see Coscinium striaturum.

- CLONOPORA, Hall, 1881, Bryzoans of the Up. Held. Gr., p. 20. [Ety. klonos, confusion; poros, pore.] Consisting of an aggregation of elongate, cylindrical, tubular cells, which at intervals become free and turn abruptly outward in an umbelliform expansion, or in alternation; cell apertures expanded or narrowly trumpet-shaped. Type C. semireducta.
 - fasciculata, Hall, 1887, Pal. N. Y. vol. 6, p. 289, Up. Held. Gr.
 - incurva, Hall, 1881, Bryozoans of Up. Held. Gr., p. 20, Up. Held. Gr.
 - semireducta, Hall, 1881, Bryozoans of Up.
- Held. Gr., p. 20, Up. Held. Gr. CœLOCAULIS, Hall, 1887, Pal. N. Y., vol. 6, [Ety. koilos, hollow; kanlos. p. 23. stem.] Ramose, structure like Callopora, but growing as hollow stems, the thin expansion lined with a striated epitheca. Type C. venusta.
 - aculeolata, Hall, 1881, (Callopora aculeo-lata,) Bryozoans of Up. Held. Gr., p. 7, and Pal. N. Y., vol. 6, p. 76, Up. Held. Gr.
 - Hall, 1874, (Callopora hyale,) 26th
 Rep. N. Y. St. Mus. Nat. Hist., p. 100,
 and Pal. N. Y., vol. 6, p. 76, Up. Held. Gr.
 - irregularis, Hall, 1881, (Callopora irregularis,) Bryozoans of the Up. Held. Gr., p. 7, and Pal. N. Y., vol. 6, p. 76, Up. Held. Gr.
 - mediopora, Hall, 1887, Pal. N. Y., vol. 6, p. 23, Low. Held. Gr.
 - venusta, Hall, 1874, (Callopora venusta.) 26th Rep. N. Y. Mus. Nat. Hist., p. 101, and Pal. N. Y., vol. 6, p. 23, Low. Held Gr.
- CŒLOCONUS, Ulrich, Geo. Sur. Ill., vol. 8, p. 402. [Ety. koilos, hollow; konos, cone.] Zoaria simple, hollow, expanding gradually from the striated and sub-acute basal extremity, substance thin; external characters of zocecia as in Rhombopora; primitive portion short; hemisepta well developed. Type C. rhombicus.

granosus, Ulrich, (in press,) Geo. Sur. Ill.,

vol. 8, pl. 72, Kaskaskia Gr. rhombicus, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 72, St. Louis Gr.

19. [Ety. diminutive of Coscinium.] Distinguished from Coscinium by the presence of minute, angular pits between the cell apertures and around the margins of the fenestrules. Type C. elegantula.

CLO.-CRA

- Nicholson, 1875, (Ptilocosciniformis, dictya cosciniformis,) Geo. Mag., vol. 2, 35, and Pal. Prov. Ont., p. 80, Ham. Gr.
- elegantula, Hall, 1887, Pal. N. Y., vol. 7. p. 239, Ham. Gr.
- COSCINIUM, Keyserling, 1846, Geognost. beobacht., p. 192. [Ety. koskinion, a little sieve.] Lobed, leaf-like expansions, cells on each side, quincuncially arranged; perforated as in Adeona cribriformis: intercellular spaces wide, and permeated with capillary tubuli, which fill up with age; the dividing plate has a cancellous structure on either side, from the outer cellules of which the large oblique cells, terminating on the free surface, take their rise. Type C. cyclops. asterium, Prout, 1860, Trans. St. Louis
 - Acad. Sci., vol. 1, p. 574, Keokuk Gr.
 - cribriforme, see Coscinotrypa cribriformis. cyclops, Keyserling, 1846, Geognost. beobacht., p. 192, Up. Held. Gr.
 - elegans, Prout, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 572, St. Louis Gr. escharoides, Prout, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 574, (erromeously written escharense,) Keokuk Gr.
 - keyserlingi, Prout, 1858, Trans. St. Louis
 - Acad. Sci., vol. 1, p. 269, Warsaw Gr. latum, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 76, Burlington Gr.
- nichelini, Prout, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 573, St. Louis Gr. plumosum, Prout, 1860, Trans. St. Louis
- Acad. Sci., vol. 1, p. 572, St. Louis Gr. saganella, Prout, 1860, Trans. St. Louis
- Acad. Sci., vol. 1, p. 573, St. Louis (ir. striatum, Hall, 1887, Pal. N. Y., vol. 6, p. 238, Ham. Gr.
- striaturum, Hall, 1887, Pal. N. Y., vol. 6, p. 88, Up. Held. Gr.
- tuberculatum, Prout, 1860, Trans. St. Louis Acad., vol. 1, p. 573, Keokuk Gr.
- wortheni, Prout, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 571, Keokuk Gr. Coscinotraypa, Hall, 1887, Pal. N. Y., vol. 6, p. 19. [Ety. koskinion, a little sieve; trupa, door.] Explanate, celluliferous on both sides, with fenestrules at varying distances; surface plicated; cells tubular, arising from a mesotheca; apertures trilobate, denticulated; intercellular tissue vesiculose. Type C. cribriformis.
 - carinata, Hall, syn. for C. cribriformis.
 - cribriformis, Prout, 1858, (Coscinium crib-riforme,) Trans. St. Louis Acad. Sci.,
- vol. 1, p. 267, Up. Held. Gr. Crateripora, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 29, C. erecta, C. lineata, and C. lineata var. expansa, rep-

CRE.-CYS.]

resent the b Ptilodictya a entitled to ra CREPIPORA, UNri Ill., vol. 8. poros, pore.] massive, wit the lower s regular holl hibiting, at ulæ of mes nutely porou depressions; the aperture to subpyrifo in perfect e tangential se restricted to present. Ty epidermata, Ul Ill., vol. 8, p

hemispherica, Sur. Ill., vol.



FIG. 468.-Crepipora lans. Tangentia Tangentia

Crisina scrobicul biculata.

CRISINELLA, Hall pl. 26. [Ety solid, cellulil oblique, asce ter to the m stomes promi

with polygo Type C. scro scrobiculata, H

lata,) Bryozo p. 20, and Pa Held Gr.

Cryptopora, Niche

Nat. Hist., Prov. Ont.,

cast from the mirabilis, Niche

CYCLOPORA, Prou

Acad. Sci., vo cle; poros, po or incrusting posed with than broad, of a minute

work, devel marked by less concentr the cells; cel interstitial ce

discoidea, see P

CLO.-CRA.

Y., vol. 6, p. Coscinium.] nium by the lar pits bel around the s. Type C.

875, (Ptilo-Mag., vol. 2,)nt., p. 80,

N. Y., vol. 7,

eognost. beonion. a little ansions, cells ly arranged; cribriformis: id permeated h fill up with has a cancelde, from the large oblique free surface, cyclops.

ns. St. Louis eokuk Gr. cribriformis. eognost. beołr. s. St. Louis St. Louis Gr.

ans. St. Louis (erromeously uk Gr. ans. St. Louis Varsaw Gr.

Jeo. Sur. Ill., ir. ns. St. Louis St. Louis Gr. ins. St. Louis St. Louis Gr.

ns. St. Louis St. Louis (ir. Y., vol. 6, p.

N. Y., vol. 6,

rans. St. Louis kuk Gr. ins. St. Louis , Keokuk Gr. I. N. Y., vol. a little sieve; celluliferous trules at varyolicated; cells a mesotheca; culated; inter-Type C. crib-

ribriformis. oscinium cribis Acad. Sci., Gr. our. Cin. Soc.

), C. erecta, C. expansa, rep-

resent the basal articulating sockets of Ptilodictva and Arthropora, and are not entitled to rank as species.

CREPIFORA, Ulrich, (in press,) Geo. Sur. Ill., vol. 8. [Ety. krepis, horseshoe; poros, pore.] Incrusting, lamellate or massive, with a wrinkled epitheca on the lower side, in one case forming regular hollow branches; surface exhibiting, at subregular intervals, maculæ of mesopores, appearing as minutely porous or subsolid elevations or depressions; zoœcia very little oblique, the apertures varying from rhomboidal to subpyriform; lunarium well marked in perfect examples; best shown in tangential sections; mesopores usually restricted to the maculæ; diaphragms present. Type C. simulans.

epidermata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 40, Hud. Riv. Group.

hemispherica, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 40, Hud. Riv. Gr.

impressa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 40, Hud. Riv.

Gr. simulans, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 39 and 40, Hud. Riv. Gr. solida, Ulrich, (in press,) Geo. Sur.

Ill., vol. 8, pl.

40. Hud. Riv. Gr.

FIG. 468.—Crepipora simu-lans. Tangential section, showing lunarium.

Crisina scrobiculata, see Crisinella scrobiculata.

- CRISINELLA, Hall, 1883, Rep. St. Geol. Def., pl. 26. [Ety. from Crisina.] Ramose, solid, celluliferous on one side; cells in oblique, ascending rows from the center to the margin of the branch; peristomes prominent; interapertural spaces, with polygonal pits or mesopores. Type C. scrobiculata.
- scrobiculata, Hall, 1881, (Crisina scrobiculata,) Bryozoans of the Up. Held. Gr., p. 20, and Pal. N. Y., vol. 6, p. 103, Up. Held Gr.
- Cryptopora, Nicholson, 1874, Ann. and Mag. Nat. Hist., 4th ser., vol. 13, and Pal. Prov. Ont., p. 102. Founded upon a cast from the under side of a Fenestella. mirabilis, Nicholson. Not a species.
- CYCLOPORA, Prout, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 574. [Ety. kuklos, circle; poros, pore.] Discoidal, frondescent or incrusting; plates sometimes superposed with subprismatic cells longer than broad, having their sides formed of a minutely porous interstitial network, developed from an epitheca marked by transverse bands more or less concentric, separating the bases of the cells; cells shallow and expanded; interstitial cells. Type C. fungia.

discoidea, see Proutella discoidea.

MOLLUSCOIDA

- expatiata, Ulrich, (in press,) Geo. Sur. 111., vol. 8, pl. 68, Keokuk Gr. fungia, Prout, 1860, Trans. St. Louis Acad.
- Sci., vol. 1, p. 577, Keokuk Gr. jamesi, Prout, syn. for Pullodictya pavonia.
- polymorpha, Prout, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 578, Kaskaskia Gr.
- CYCLOPORBLLA, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, p. 404. [Ety. dim. of Cy-clopora.] Thin discoidal expansion; zorecia subtubular, with a succession of superior hemisepta in the vestibular portion; irregular mesopores abundant; acanthopores of large size, numerous. Type C. spinifera. perversa, Ulrich, (in press,) Geo. Sur.
- Ill., vol. 8, pl. 69, Keokuk Gr.
- spinifera, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 69, Keokuk Gr.
- CystopictyA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist. vol. 5, p. 152. [Ety. kustis, a bladder; dictyon, net.] Zoarium like Stictopora, but with wide interstitial spaces occupied with vesicular tissue. Type C. ocellata
 - americana, Ulrich, (in press,) Geo. Sur. Ill. vol. 8, pl. 76, Keokuk Gr.
- angusta, Ulrich, 1888, Bull. Denison Univ. p. 81, Waverly Gr.
- hamiltonensis, Ulrich, (in press), Geo. Sur. Ill., vol. 8, pl. 43, Ham Gr.
- lineata, Ulrich, 1884, Jour. Cin. Soc. Nat. Hist. vol. 7, p. 37, Keokuk Gr.



FIG. 469.—Cystodycta ocellata. Natural size and 18 diam.

lineata var. major, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 76, St. Louis Gr.

lineata, var. stludovici, [•] Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 76, St. Louis Gr.

nitida, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 76, Keokuk Gr.

ocellata, Ulrich, 1882, Jour. Cin. Soc. Nat.

Hist., vol. 5, p. 170,

Keokuk Gr. pustulosa, Ulrich, (in press,) Geo. Sur. Ill., ^{FIG.}

vol. 8, pl. 76, Keokuk Gr.

simulans, Ulrich, 1888, Bull. Denison Univ., p. 81, Waverly Gr.

zigzag, Ulrich, 1888, Bull. Denison Univ., p. 81, Cuyahoga Shales.



CRE.-CYS.]



MOLLUSCOIDA.

CYSTOPORA, Hall, 1881, Bryozoans of Up. Held. Gr., p. 19. [Ety. kustis, bladder; poros, pore.] Simple or branching subcylindrical stipes; cells arising from the axis; circular and subcylindrical below, enlarged above the middle and becoming ampullate, turning abruptly outward below the apertures, which are extremely contracted; cell-tubes exposed more than half their length. Type C. geniculata.

300

- geniculata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 20, and Pal. N. Y., vol. 6, p. 103, Up. Held. Gr.
- DIAMESOPORA, Hall, 1852, Pal. N. Y., vol. 2, p. 158, and vol. 6, p. 19. [Ety. diamesos, the part between; poros, opening.] Ramose, hollow, epitheca on inner surface; intercellular space solid; surface like Trematopora. Type D. dichotoma. camerata, Hall, 1883, (Trematopora came
 - rata,) Rep. St. Geol. and Pal. N. Y., vol. 6, p. 72, Up. Held. Gr.
 - communis, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 39 and 41, Utica Slate. constricta, Hall, 1874, (Trematopora con-stricta.) 26th Rep. N. Y. St. Mus. Nat. Hist., p. 104, Low. Held. Gr.
 - dichotoma, Hall, 1852, Pal. N. Y., vol. 2,
 - p. 158, Low. Held. Gr.
 - dispersa, Hall, 1879, (Trematopora dispersa,) 32d Rep. N. Y. St. Mus. Nat. Hist., p. 150, Low. Held. Gr. vaupeli, Ulrich, (in press,) Geo. Sur. Ill.,
 - vol. 8, pl. 39 and 41, Utica Slate.
- DICHOTRYPA, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, p. 386. [Ety. dicha, double; trupa, opening.] Consisting of large bifoliate expansions; the surface with solid maculæ; zoœcial and minute structure as in Cystodictya. Type D. foliata. elegans, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 76, St. Louis Gr.
 - expatiata, Ulrich, (in press,) Geo. Sur.
 - Ill., vol. 8, St. Louis Gr.
 - flabellum, Rominger, 1866, (Fistulipora flabellum,) Proc. Acad. Nat. Sci., Phil., p. 9. St. Louis Gr.
- foliata, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 42, Ham. Gr. grandis, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 42, Niagara Gr.
- intermedia, Ulrich, (in press,) Geo. Sur.
- 111., vol. 8, pl. 76, St. Louis Gr. lyroides, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 77, St. Louis Gr.
- Vol. 3, pl. 17, 5t. Louis Str.
 DICRANOPORA, Ulrich, 1882, Jour. Cin. Soc.
 Nat. Hist., vol. 5, p. 166. [Ety, di-kranos, two-pointed; poros, pore.] Zo-arium like Stictopora, but distinguished by being composed of ligulate joints, the edges being subparallel to near the upper end, when they diverge and bear two segments; cell-mouths between raised longitudinal lines; no interstitial
 - cells. Type D. internodia. emacerata, Nicholson, 1875, (Ptilodictya emacerata,) Pal. Ohio, vol. 2, p. 261, Hud. Riv. Gr.

fragilis, Billings, 1866, (Ptilodictya fragilis,) Catal. Sil. Foss. Antic., p. 9, Hud. Riv. Gr.

CYS.-ENA



FIG. 471.—Dicranópora internodia. Natural size and magnified.

- internodia, Miller & Dyer, 1878, (Ptilodictya internodia,) Cont. to Pal., No. 2,
- p. 7, Hud. Riv. Gr. ta, Ulrich, 1882, Jour. Cin. Soc. Nat. lata, Hist., vol. 5, p. 166, Hud. Riv. Gr.
- nitidula, Billings, 1866, (Ptilodictya nitidula,) Catal. Sil. Foss. Antic., p. 9, Hud. Riv. Gr.
- klema, twig.] Ramose, ovate in cross section; zoœcia tubular, long, apparently moniliform proximally; separated internally by an axial lamina, from which they gradually diverge to open on the two sides of the compressed branches; apertures prominent, isolated, somewhat constricted and circular; external wall thin. Type D. trentonense.
- ternal wait thin. Type D. trentonense, trentonense, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 53, Trenton Gr. DIPLOPORA, Young & Young, 1875, Proc. Nat. Hist. Soc. Glasgow. [Ety. diploss, double; poros, pore.] Very slender straight stems, throwing off a few lat-er and provide the state of the sta eral branches of equal dimensions; obverse or poriferous side, with two ranges of zoœcia apertures, and moderately developed medium keel; reverse striated. Type D. marginalis. bifurcata, Ulrich, (in press.) Geo. Sur.
 - Ill., vol. 8, pl. 62, Kaskaskia Gr.
 - biserialis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 62, Low. Coal Meas.
- DISCOTRYPA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 155. [Ety. diskos, quoit; trupa, opening.] Free, thin, circular expansions; cells rhomboidal or hexagonal; low monticules, with clusters of large cells present; no interstitial cells or spiniform tubuli. Type D. elegans.
 - ? devonica, Ulrich, 1886, Cont. to Am. Pal., p. 25, Up. Held. Gr.
 - elegans, Ulrich, 1879, (Chetetes elegans,) Jour. Cin. Soc. Nat. Hist., vol. 2, p. 130, Hud. Riv. Gr.
- ENALLOPORA, D'Orbigny, 1850, Prodr. d. Pa-léont., t. 1, p. 22. [Ety. enallos, changed ; poros, pore.] Small bifurcating branches, without connecting bars; cell-mouths

ERI.-FAV.]

prominent ally and a tiqua. cinctosa, Ulr tosa,) Jour. p. 159, Trei perantiqua, H tiqua,) Pal.

ton Gr. ERIDOPORA, Uli Nat. Hist., in dispute: incrusting ;

or subtrian nent than angular int form tubes, closed; int Type E. mac prove to h characters. species nov will be refer macrostoma, Nat. Hist., minima, Ulric p. 21, Up. H punctifera, U

Hist., vol. 5 Eschara, Lama Vert. [Ety ican Palæoz ? concentrica, H Sci., vol. 1 recognized.

ovatipora, Tro Tenn. Low. reticulata, Tro Tenn. Low.

? tuberculata, I Acad. Sci.,

Not recogni ESCHAROPORA, H

p. 72. [Éty Cylindrical, panded and inclosed in

oblique line imaginary a angusta, Hall Foss., p. 6, and Nat. Hi

lirata, see Ptile nebulosa, see Pi recta, Hall, 18 Trenton Gr.

recta var. node

vol. 1, p. 73, tenuis, see Pha

EURYDICTYA, Ul Ill., vol. 8, 1 dictyon, a net larly divided out ponpor surface with small, solid zoœcial struc

copora, the

importance,

CYS.-ENA

etya fragilis,) p. 9, Hud.



Natural size 1878, (Ptilo-) Pal., No. 2,

1. Soc. Nat. Riv. Gr. odictya niti-Antic., p. 9,

ur. Cin. Soc. renton (ir. s,) Geo. Sur. ploos, double; ate in cross long, appary; separated amina, from erge to open compressed ient, isolated, circular; extrentonense. s,) Geo. Sur. Gr.

1875, Proc. [Ety. diploos, ery slender ff a few latensions; ob-, with two and moderceel; reverse alis. s,) Geo. Sur.

ia Gr. Geo. Sur. al Meas.

ir. Cin. Soc. [Ety. diskos, ree, thin, ciromboidal or es, with clusno intersti-

ili. Type D. . to Am. Pal.,

etes elegans,) vol. 2, p. 130,

Prodr. d. Palos, changed; ing branches, cell-mouths MOLLUSCOIDA.

prominent on each side, opening laterally and alternately. Type E. perantiqua.

ERI.-FAV.]

- cinctosa, Ulrich, 1882, (Mitoclema cinctosa,) Jour. Cin. Soc. Nat. Hist., vol. 5, p. 159, Trenton Gr.
- perantiqua, Hall, 1847, (Gorgonia peran-tiqua,) Pal. N. Y., vol. 1, p. 76, Trenton Gr.
- ERIDOPORA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 137. [Ety. eridos, in dispute; poros, pore.] Zoarium thin, incrusting; cell-mouths oblique, ovate, or subtriangular, one side more prominent than the other, surrounded by angular interstitial cells, which do not form tubes, and may be either open or closed; intertubular spaces vesicular. Type E. macrostoma. Should this genus prove to be founded upon reliable characters, then many of the parasitic species now placed with Fistulipora will be referred to it.
- macrostoma, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 137, Kaskaskia Gr. minima, Ulrich, 1886, Cont. to Am. Pal.,
- p. 21, Up. Held. Gr. punctifera, Ulrich, 1882, Jour. Cin. Nat. Hist., vol. 5, p. 138, Kaskaskia Gr.
- Eschara, Lamarck, 1801, Syst. An. sans Vert. [Ety. eschara, scar.] Not American Palæozoic.
- ¹ concentrica, Prout, Trans. St. Louis Acad. Sci., vol. 1, p. 234, Coal Meas. Not recognized.
- ovatipora, Troost, 1840, 5th Geo. Rep. Tenn. Low. Sil. Not recognized. reticulata, Troost, 1840, 5th Geo. Rep.
- Tenn. Low. Sil. Not recognized. tuberculata, Prout, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 234. Coal Meas.
- Not recognized. ESCHAROPORA, Hall, 1847, Pal. N. Y., vol. 1,
- p. 72. [Ety. eschara, scar; pore, pore.] Cylindrical, solid, tapering above, ex-panded and root-like below; cells oval, inclosed in a rhomboid, by elevated oblique lines; tubes radiating from an imaginary axis. Type E. recta.
- angusta, Hall, 1879, Desc. New Spec. Foss., p. 6, and 11th Rep. Ind. Geo. and Nat. Hist., p. 245, Niagara Gr.
- lirata, see Ptilodictya lirata.
- nebulosa, see Ptilodictya nebulosa.
- recta, Hall, 1847, Pal. N. Y., vol. 1, p. 73, Trenton Gr.
- recta var. nodosa, Hall, 1847, Pal. N. Y., vol. 1, p. 73, Trenton Gr. tenuis, see Phænopora tenuis.
- EURYDICTYA, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p. 389. [Ety. eurys, broad; dictyon, a net.] Broad, simple, or irregularly divided, bifoliate expansions, without ponporiferous parallel margins; surface with more or less conspicuous, small, solid maculæ or monticules; zoœcial structure very much as in Sulcopora, the differences being of small importance, and due to zoarial habit.

Type E. montifera. Syn. (?) for Phienopora.

- calhounensis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 30, Trenton Gr.
- montifera, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 30, Hud. Riv. Gr.
- sterlingensis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 30, Hud. Riv. Gr.
- EUSPILOPORA, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p. 389. [Ety. euspilos, full of dots; poros, pore.] Small, bifoliate, lobate or irregularly dividing branches; cell apertures subcircular, arranged between longitudinal spinous ridges at the center of the stipe; at intervals several short oblique rows of cells extend outward from the central rows to near the margins of the frond; these alternate with concave nonporiferous but finely granular spaces, which do not extend out as far as the celluliferous lobes, and which cause the edges of the frond to be serrate; internally a vertical row of shallow vesicles behind the vestibular portion of the zoœcia; all the remaining interspaces traversed by numerous minute tubuli. Type E. serrata. Syn. (?) for Stictopora.
- barrisi, Ulrich, (in press,) Geol. Sur. Ill.,
- vol. 8, pl. 43, Ham. Gr. serrata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 43, Ham. Gr.

EVACTINOPORA, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Bhil., p. 165. [Ety. evactinos, with beautiful rays; poros, pore.] Free, consisting of four or more vertical leaves which radiate from an imaginary axis; rays thin, cellulif-

erous on both sides; interstitial spaces occupied by vesicular cells, filled with sclerenchyma, which is traversed by



canals. Type E. radiata. FIG. 472.-Evacgrandis, Meek & Worthen, thopora gran-1868, Geo. Sur. Ill., vol. dis. Pores 2 diam. 3, p. 503, Burlington Gr.

0000

quinqueradiata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 73, Burlington, Gr. radiata, Meek & Worthen,

FIG. 473.-Evactinopora radiata. Pores 2 diam.

1865, Proc. Acad. Nat. Sci. Phil., p. 65, and Geo. Sur. Ill., vol. 3, p. 502, Burlington Gr.

sexradiata, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 502, Burlington Gr.

- FAVICELLA, Hall, 1887, Pal. N. Y., vol. 6, p. 19. [Ety. favus, honey-comb; ellus, diminutive.] Free or incrusting, thin expansion; apertures inclosed in polygonal vestibular areas, similar to Selenopora; intercellular surface occupied by minute mesopores; structure vesiculose. Type F. inclusa.
 - inclusa, Hall, 1881, (Thallostigma inclusa,) Trans. Alb. Inst., vol. 10, p. 188, and Pal. N. Y., vol. 6, p. 234, Ham. Gr.

- FENESTELLA, Lonsdale, 1839, Murch, Sil. Syst. [Ety. fenestella, little window.] Zoarium, flattened or infundibuliform, composed of rays radiating from a base and uniting laterally by dissepiments, so as to form a net-work, the meshes of which are usually oblong; inner surface of rays rounded and striated, and without cells; cells on the outer side of the rays in two rows, one on each side of a median ridge; dissepiments without cells. Type F. antiqua. acaulis, see Unitrypa acaulis. acmea, Hall, 1876, 28th Rep. N. Y. Mus.
- Nat. Hist., p. 124, Niagara Gr. aculeata, see Polypora aculeata.

acuticosta, Roemer, 1860, Sil. Fauna West.

Tenn., p. 30, Niagara Gr. adnata, see Polypora adnata.

302

adornata, Hall, 1887, Pal. N. Y., vol. vi,

- p. 66, Low. Held. Gr, adraste, Hall, 1883, Rep. St. Geol., pl. 20,
- fig. 20-22, Low. Held. Gr.
- Requalis, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 31, and Pal. N. Y., vol. 6, p. 112, Up. Held. Gr.
- esyle, Hall, 1883, Rep. St. Geol., pl. 19, fig. 11-13, and Pal. N. Y., vol. 6, p. 46, Low. Held. Gr.
- albida, Hall, 1887, 6th Ann. Rep. Geo. N. Y., p. 48, Waverly Gr.
- albida var. richfieldensis, Ulrich, 1888, Denison Univ., p. 66, Wa-Bull. verly Gr.
- althæa, Hall, 1883, Rep. St. Geol., pl. 19, fig. 17-19, and Pal. N. Y., vol. 6, p. 48, Low. Held. Gr.

ambigua, see Loculipora ambigua.

angulata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 28, Up. Held. Gr. angustata, Hall, 1884, 36th Rep. N. Y. St.

Mus. Nat. Hist., p. 60, Ham. Gr. anonyma, Hall, 1881, Bryozoans of the

Up. Held. Gr., p. 34, Up. Held. Gr. aperta, Hall. 1887, 6th Ann. Rep. St. Geol. N. Y., p. 58, Waverly Gr. arctica, Salter, 1855, Belcher's Last Arctic

Voyage, vol. 2, p. 385, Carboniferous. arta, see Polypora arta.

- aspectans, Hall, 1884, 36th Rep. N. Y. St. Mus. Nat. Hist., p. 59, Ham. Gr. assita, Hall, 1884, 36th Rep. N. Y. St.
- Mus. Nat. Hist., p. 64, Ham. Gr. banyana, Prout, 1859, Trans. St. Louis Acad. Sci., vol. 1, p. 450, Warsaw Gr.
- bellistriata, Hall, 1879, Desc. New Spec. Foss., p. 7, and 11th Rep. Ind. Geo. and Nat. Hist., p. 252, Niagara Gr.
- bicornis, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 55, Clinton Gr. bifurca, Ulrich, 1886, Cont. to Am. Pal.,

p. 6, Up. Held, Gr.

- bifurcata, Prout, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 411, Ham. Gr. bigeneris, Ulrich, 1886, Cont. to Am. Pal.,
- p. 11, Up. Held. Gr. biimbricata, Hall, 1881, Bryozoans of the
- Up. Held. Gr., p. 31, and Pal. N. Y., vol. 6, p. 122, Up. Held. Gr.

biserialis, see Hemitrypa biserialis.

- biseriata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 25, and Pal. N. Y., vol. 6,
- p. 113, Up. Held. Gr.
- biserrulata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 30, and Pal. N. Y., vol. 6, p. 128, Up. Held. Gr.
- brevilinea, Hall, 1884, 36th Rep. N. Y. St. Mus. Nat. Hist., p. 70, Ham. Gr.
- brevisulcata, see Polypora brevisulcata. burlingtonensis, Ulrich, (in press,) Geo. Sur. 111., vol. 8, pl. 49, Burling-Ulrich, (in
- ton Gr. cavernosa, Ulrich, 1888, Bull. Denison Univ., p. 69, Waverly Gr.
- celsipora, see Polypora celsipora.
- celsipora var. minima, see Polypora celsipora var. minima.
- celsipora var. minor, see Polypora celsipora var. minor.
- cestriensis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 51, Kaskaskia Gr. cinctuta, Hall, 1884, 36th Rep. N. Y. St. Mus. Nat. Hist., p. 62, Ham. Gr.
- india rate, frist, p. 62, fain. 61. cingulata, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 52, Keokuk Gr. clathrata, Hall, 1887, Pal. N. Y., vol. 6, p. 117, Up. Held. Gr.
- cleia, Hall, 1883, Rep. St. Geol., pl. 20,
- fig. 14-15, Low. Held. Gr.
- compacta, see Polypora compacta.
- compressa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 50, Keokuk Gr.
- compressa, var. nododorsalis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 50, Keokuk Gr.
- compressa, see Polypora compressa.
- conferta, Hall, 1879, Desc. New Spec. Foss., p. 7, and 11th Rep. Ind. Geo., and Nat. Hist., p. 252, Niagara Gr. confertipora, Hall, 1887, Pal. N. Y., vol.
- 6, p. 108, Up. Held. Gr.
- conjunctiva, see Isotrypa conjunctiva.
- coronis, Hall, 1883, Rep. St. Geol., pl. 21, fig. 10-13, Low. Held. Gr.
- corticata, Prout, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 231, Coal Meas.
- crebripora, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 25, Low. Held. Gr.
- cribrosa, Hall, 1852, Pal. N. Y., vol. 2, p. 166, Niagara Gr.
- cribrosa, see Hemitrypa cribrosa.
- cultellata, see Polypora cultellata.
- cultrata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 29, and Pal. N. Y., vol. 6, p. 119, Up. Held. Gr.
- curvata, Hall, 1884, 36th Rep. N. Y. St. Mus. Nat. Hist., p. 69, Ham. Gr.
- curvijunctura, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 29, and Pal. N. Y., vol. 6, p. 107, Up. Held. Gr.
- cylindracea, Hall, 1881, Bryozoans of Held. Gr., p. 24, Up. the Up. Held. Gr.
- davidsoni, Nicholson, 1875, Geo. Mag., vol. 2, n. s., p.36, Ham. Gr.

delicata, Me Sci. Phil.,



elegans, Hall

elegantissima

164, Niagar

Rossica, p. elegantissima,

> preoccupie tissima.

elevatipora.

FEN.]

FEN.

Ill., vol. 8, elongata, see emaciata, Ha Mus. Nat. erectipora, H Up. Held. 6, p. 118, U eudora, see P exigua, Ulric vol. 8, pl. 5 eximia, Winc Mich., p. 95 exornata, Ha Mus. Nat. fastigata, see

favosa, see He filiformis, Nicl 1, n. s., p. 1 perficial ne

Unitrypa. filistriata, Ul

Ill., vol. 8, filitexta, Win Mich., p. 92

fistulata, see flabellata, Phi p. 198, Coa

American. flabelliformis, s

flexuosa, Ulri

vol. 8, pl. 51 foliata, Ulrich p. 67, Wave

funicula, Ulri vol. 8, pl. 5

gracilis, see Si granifera, Ha

Up. Held. vol. 6, p. 12 granilinea, see FEN.

FEN.]

rialis. is of the Up N. Y., vol. 6,

zoans of the Pal. N. Y., ł۳ Rep. N. Y. Ham. Gr. visulcata. (in press,) 49, Burling-

ull. Denison

ora. lypora celsi-

ora celsipora

s,) Geo. Sur. ia Gr. ep. N. Y. St. m. Gr. s,) Geo. Sur. Gr. N. Y., vol. 6,

Geol., pl. 20,

acta. s,) Geo. Sur. Gr. s, Ulrich, (in 8, pl. 50, Ke-

pressa. New Spec. p. Ind. Geo., agara Gr. 1. N. Y., vol.

fjunctiva. Geol., pl. 21,

ns. St. Louis 231, Coal

Rep. N. Y. p. 25, Low.

Y., vol. 2, p.

r088.

llata. ins of the Up. N. Y., vol. 6,

tep. N. Y. St. ım. Gr. Bryozoans of nd Pal. N. Y., łr. Bryozoans of p. 24, Up.

Geo. Mag., r.

MOLLUSCOIDA.

delicata, Meek, 1871, Proc. Acad. Nat. Sci. Phil., vol. 23, p. 159, and Ohio Pal., vol. 1, p. 273, Waverly Gr. depressa, Hall,

1881, Bryozoans of the Up. Held. Gr., p. 30, and Pal. N. Y., vol. 6, p. 111, Up. Held. Gr.

dilata, Prout., 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 411, Ham. Gr. dispanda, Hall, 1887, Pal. N. Y., vol. 6, p. 114, Up. Held. Gr.

FIG. 474.—Fenestella del-icata. Part of a frond. distans, see Polypora distans.

- elegans, Hall, 1852, Pal. N. Y., vol. 2, p. 164, Niagara Gr.
- elegantissima, Eichwald, 1860, Lethæa Rossica, p. 364, Up. Coal Meas.
- elegantissima, Hall, 1881. This name was preoccupied, but see Unitrypa elegantissima.
- elevatipora, Ulrich, (in press,) Geo. Sur.
- Ill., vol. 8, pl. 51, Kaskaskia Gr. elongata, see Polypora elongata.
- emaciata, Hall, 1884, 36th Rep. N. Y. St.
- Mus. Nat. Hist., p. 68, Ham. Gr. erectipora, Hall, 1881, Bryozoans of the
- Up. Held. Gr., p. 33, and Pal. N. Y., vol. 6, p. 118, Up. Held. Gr. eudora, see Polypora eudora.
- exigua, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 51, Warsaw Gr. eximia, Winchell, 1866, Rep. Low. Penin.
- Mich., p. 92, Ham. Gr. exornata, Hall, 1884, 36th Rep. N. Y. St.
- Mus. Nat. Hist., p. 67, Ham. Gr. fastigata, see Unitrypa fastigata.
- favosa, see Hemitrypa favosa.
- filiformis, Nicholson, 1874, Geo. Mag., vol. 1, n. s., p. 199, Up. Held. Gr. The superficial network of some species of Unitrypa
- filistriata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 49, Burlington Gr.
- filitexta, Winchell, 1866, Rep. Low. Penin. Mich., p. 92, Ham. Gr.
- fistulata, see Polypora fistulata.
- flabellata, Phillips, 1836, Geo. York, pt. 2, p. 198, Coal Meas., or Permian. Not American. (?)
- flabelliformis, see Polypora flabelliformis.
- flexuosa, Ulrich, (in press,) Geo. Sur. Ill.,
- vol. 8, pl. 51, Kaskaskia Gr. foliata, Ulrich, 1888, Bull. Denison Univ., p. 67, Waverly Gr.
- funicula, Ulrich, (in press,) Geo. Sur. Ill.,
- vol. 8, pl. 51, Keokuk Gr. gracilis, see Subretepora gracilis.
- granifera, Hall, 1881, Bryozoans of the
- Up. Held. Gr., p. 33, and Pal. N. Y., vol. 6, p. 125, Up. Held. Gr. granilinea, see Polypora granilinea.

granulosa, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 68, and Geo. Sur. Wis., vol. 4, p. 252, Hud. Riv. Gr.

hemitrypa, Prout, 1859, Trans. St. Louis *Acad. Sci., vol. 1, p. 444, Warsaw Gr. herrickana, Ulrich, 1888, Bull. Denison

- Univ., p. 63, Waverly Gr. hestia, Hall, 1883, Rep. St. Geol., pl. 20,
- fig. 12-13, Low. Held. Gr.
- hexagonalis, see Polypora hexagonalis. hexagonalis var. foraminulosa, see Polypora hexagonalis var. foraminulosa.
- idalia, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 95, Low. Held. Gr. idothea, see Polypora idothea.
- inæqualis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 52, Coal Meas. inflexa, Hall, 1884, 36th Rep. N. Y. St.
- Mus. Nat. Hist., p. 64, Ham. Gr. intermedia, Prout, 1858, Trans. St. Louis
- Acad. Sci., vol. 1, p. 231, Coal Meas. interrupta, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 32, and Pal. N. Y., vol. 6, p. 123, Up. Held. Gr. junceus, Hall, 1883, Rep. St. Geol., pl. 20, fig. 16-18, Low. Held. Gr.
- lævistriata, see Polypora lævistriata.
- largissima, see Polypora largissima. lata, see Unitrypa lata.
- latijunctura, Hall, 1881, Bryozoans of the
- Up. Held. Gr., p. 31, and Pal. N. Y., vol. 6, p. 128, Up. Held. Gr. latitruncata, Hall, 1884, 36th Rep. N. Y.
- St. Mus. Nat. Hist., p. 58, Ham. Gr. *lævinodata*, see Polypora lævinodata.
- *imbata*, Foerste, 1887, Bull. Denison Univ., vol. 2, p. 83, Low. Coal Meas. lineanoda, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 22, Up. Held. Gr. lunulata, Hall, 1881, Bryozoans of the Up. Hundata, Hall, 1881, Bryozoans of the Up.
- Held. Gr., p. 31, and Pal. N. Y., vol. 6, p. 121, Up. Held. Gr.
- lyelli, Dawson, 1868, Acad. Geol., p. 288, Subcarboniferous.
- magnifica, Nicholson, 1874, Geo. Mag., vol. 1. n. s., p. 197, Up. Held. Gr.
 marcida, Hall, 1884, 36th Rep. N. Y. St.
 Mus. Nat. Hist., p. 57, Ham. Gr.

- marginalis, Nicholson, 1874, Geo. Mag., vol. 1, n. s., p. 197, Up. Held. Gr. marginata, McCoy, 1862, Carb. Foss. of Ireland, p. 206, Up. Coal Meas. Not American. (?)
- meekana, Ulrich, 1888, Bull. Denison Univ., p. 64, Waverly Gr. microtrema, D'Orbigny, 1850, Prodr. d.
- Paléont. Not properly defined.
- mimica, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 52, Low. Coal. Meas.
- modesta, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 52, Low Coal Meas. multiplex, Hall, 1884, 36th Rep. N. Y. St.
- Mus. Nat. Hist., p. 57, Ham. Gr. multiporata var. lodiensis, Meek, 1875, Ohio Pal., vol. 2, p. 274, Waverly Gr. multispinosa, Ulrich, (in press,) Geo. Sur.
- Ill., vol, 8, pl. 50, Keokuk Gr. mutabilis, see Polypora mutabilis.
- nervata, see Ptiloporella nervata.

nervia, see Unitrypa nervia.

nervia var. constricta, see Unitrypa nervia var. constricta.

nexa, see Polypora nexa.

- nodosa, Prout, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 410, Ham. Gr.
- norwoodana, Prout, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 233, Coal Meas. oxfordensis, Ulrich, syn. for F. granulosa.
- papillata, Hall, syn. for Polypora paxillata.
- parallella, Hall, 1881, Bryozoans of the
- paranenia, nan, 1881, Bryozoans of the Up. Held. Gr., p. 26, and Pal., N. Y., vol. 6, p. 107, Up. Held. Gr.
 peculiaris, Hall, 1883, Rep. St. Geol., pl. 33, fig. 19–21, Up. Held. Gr.
 parvulipora, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 123, Niagara Gr.
- patellifera, Ulrich, 1886, Cont. to Pal., p. 8, Up. Held. Gr.
- paxillata, see Polypora paxillata.
- perangulata, see Polypora perangulata.
- perelegans, Meek, 1872, Pal. E. Nebraska, p. 153, Coal Meas.
- perforata, see Loculipora perforata. permarginata, Hall, 1881, Bryozoans of
- the Up. Held. Gr., p. 30, and Pal. N. Y., vol. 6, p. 127, Up. Held. Gr. perminuta, Ulrich, (in press,) Geo. Sur.
- Ill., vol. 8, pl. 52, Low. Coal Meas.
- pernodosa, see Unitrypa pernodosa. perplexa, Hall, 1881, Bryozoans of the
- Up. Held. Gr., p. 33, and Pal. N. Y., vol. 6, p. 130, Up. Held. Gr. pertenuis, Hall, 1879, Desc. New Spec.
- Foss., p. 6, and 11th Rep. Geo. Ind. and Nat. Hist., p. 251, Niagara Gr. pertenuis, Hall, 1881. The name was pre-
- occupied, see F. proutana.
- perundata, see Polypora perundata.
- perundulata, see Reteporina perundulata. philia, Hall, 1883, Rep. St. Geol., pl. 20, fig. 9-11, Low. Held. Gr.
- planiramosa, Hall, 1883, Rep. St. Geol., pl. 18, fig. 14-18, syn. for Polypora compressa.
- planiramosa, Hall, 1884, 36th Rep. N. Y. St. Mus. Nat. Hist., p. 65, Ham. Gr.
- plebeia, McCoy, 1862, syn. Carb. Foss. Ireland, p. 203, Up. Coal Meas.
- plumosa, see Hemitrypa plumosa. popeana, Prout, 1858, Trans. St. Louis
- Acad. Sci., vol. 1, p. 229, Permian Gr. porosa, see Polypora porosa.
- præcursor, see Unitrypa præcursor. prisca, Lonsdale, 1839, Murch. Sil. Syst.,
- p. 178, Clinton Gr. proceritas, Hall, 1887, Pal. N. Y., vol. 6, p. 115, Up. Held. Gr.
- prolixa, Hall, 1879, Desc. New Spec.
- Foss., p. 8, and 11th Rep. Ind. Geo. and Nat. Hist., p. 253, Niagara Gr.
- propria, see Polypora propria. proutana, S. A. Miller, 1882, 2d Ed. Am.
- Pal. Foss., p. 291, Up. Held. Gr. Pro-posed instead of F. pertenuis, Hall, 1881, Bryzoans of the Up. Held. Gr., p. 29, which was preoccupied.

pulchella, Ulrich, 1886, Cont. to Am. Pal., 4 p. 9, Up. Held. Gr.

FEN.

- puncto-striata, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 68, Niagara Gr.
- quadrangula, Hall, 1884, 36th Rep. N. Y. St. Mus. Nat. Hist., p. 68, Ham. Gr. quadrangularis, see Polypora quadran-
- gularis.
- quadrula, Hall, 1883, Rep. St. Geol., pl. 21, fig 19-22, Low. Held. Gr.
- regalis, Ulrich, 1888, Bull. Denison Univ., p. 70, and Geo. Sur. Ill., vol. 8, pl. 50, Keokuk and Waverly Grs. remota, Foerste, 1887, Bull. Denison Univ.,
- vol. 2, p. 84 and 87, Low. Coal Meas.
- rhombifera, see Reteporina rhombifera. rigida, see Polypora rigida.

- robusta, see Polypora robusta. rudis, Ulrich, (in press,) Geo. Sur. III., vol. 8, pl. 49, Keokuk Gr.
- scalaris, see Unitrypä scalaris. sculptilis, Ulrich, 1886, Cont. to Am. Pal., p. 10, Up. Held. Gr.
- semirotunda, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 32, and Pal. N.Y., vol. 6, p. 125, Up. Held Gr.
- separata, see Polypora separata.
- serrata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 28, and Pal. N. Y., vol. 6,
- p. 110, Up. Held. Gr. serratula, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 50, Warsaw, St. Louis, and Kaskaskia Gr.
- sevillensis, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 52, Low. Coal Meas. shumardi, Prout, 1858, Trans. St. Louis
- Acad. Sci., vol. 1, p. 232, Up. Coal Meas. singularitas, Hall, 1881, Bryozoans of the
- Up. Held. Gr., p. 29, and Pal. N. Y., vol. 6, p. 114, Up. Held. Gr. sinuosa, Hall, 1887, Pal. N. Y., vol. 6, p.
- 116, Up. Held. Gr.
- spio, Hall, 1887, Pal. N. Y., vol. 6, p. 47, Low Held. Gr.
- stellata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 29, and Pal. N. Y., vol. 6, p. 109, Up. Held. Gr.
- stipata, see Unitrypa stipata.
- striata, see Reteporina striata. striatopora, see Polypora striatopora.
- subflexuosa, Ulrich, 1888, Bull. Denison
- Univ., p. 68, Waverly Gr. submutans, see Polypora submutans.
- subretiformis, Prout, 1858, Trans. St. Louis
- Acad. Sci., vol. 1, p. 233, Coal Meas. substriata, Hall, 1881, Bryozoans of the
- Up. Held. Gr., p. 35, Up. Held. Gr. subtortilis, Hall, 1884, 36th Rep. N. Y. St.
- Mus. Nat. Hist., p. 71, Ham. Gr. sylvia, Hall, 1874, 26th Rep. N. Y. St.
- Mus. Nat. Hist., p. 96, Low. Held. Gr. tantulus, Hall, 1879, Desc. New Spec.
- Foss., p. 8, and 11th Rep. Ind. Geo. and Nat. Hist., p. 253, Niagara Gr. tegulata, see Unitrypa tegulata.
- tenax, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 51, Keokuk, St. Louis and Kaskaskia Grs.

tenella, Hall 105, Up. H tenuiceps, Hal 165, Niagar tenuis, Hall, Clinton Gr hvene, Hall, fig. 1-5, Lo torta, Hall, Held. Gr., trituberculats Louis Acad Meas. tuberculata, I p. 116, Up. variabilis. Pr Acad. Sci., variopora, H Up. Held. (vera, Ulrich, 8, pl. 44, H verrucosa, Ha 33, fig. 11, a Up. Held. virgosa, Eich p. 358, Up. American. wortheni, Ulr vol. 8, pl. 5 FENESTRALIA, P Acad. Sci., genus Fenes tella, from

FEN.-FIS.]

having two of the med dovici.

stludovici, Louis Acad Louis Gr. stludovici va

press,) Geo. Louis Gr. FENESTRAPORA. _____36. [Ety. fe

Forms of branches cc



475. - Fenes biperforata. Ma

infraporosa, U Pal., p. 14, U occidentalis, U Ill., /vol. 8, p FISTULIPORA, MC Nat. Hist., 2 fistula, pipe; or massive;

thick-walled,

FEN.

o Am. Pal., 4

th Rep. N. 68, Niag-

Rep. N. Y. am. Gr. a quadran-

t. Geol., pl.

ison Univ., ol. 8, pl. 50,

nison Univ.. oal Meas. ombifera.

o. Sur. Ill.,

to Am. Pal.,

zoans of the 1. N.Y., vol.

of the Up. J. Y., vol. 6,

) Geo. Sur. , St. Louis,

) Geo. Sur. 1 Meas. s. St. Louis . Coal Meas. zoans of the Pal. N. Y.,

7., vol. 6, p.

rol. 6, p. 47,

s of the Up. J. Y., vol. 6,

topora. all. Denison

utans. ins. St. Louis al Meas. zoans of the Ield. Gr. ep. N. Y. St. Gr. p. N. Y. St. Held. Gr. New Spec.). Ind. Geo. gara Gr. я. eo. Sur. Ill.,

. Louis and

MOLLUSCOIDA.

tenella, Hall, 1887, Pal. N. Y., vol. 6, p. 105, Up. Held. Gr. tenuiceps, Hall, 1852, Pal. N. Y., vol. 2, p.

FEN.-FIS.]

- 165, Niagara Gr. tenuis, Hall, 1852, Pal. N. Y., vol. 2, p. 51,
- Clinton Gr. thyene, Hall, 1883, Rep. St. Geol., pl. 21,
- fig. 1-5, Low. Held. Gr. torta, Hall, 1881, Bryozoans of the Up.
- Held. Gr., p. 30, Up. Held. Gr. trituberculata, Prout, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 228, Coal Meas.
- tuberculata, Hall, 1887, Pal. N. Y., vol. 6, p. 116, Up. Held. Gr.
- variabilis, Prout, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 231, Coal Meas. variopora, Hall, 1881, Bryozoans of the
- Up. Held. Gr., p. 28, Up. Held Gr. vera, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 44, Ham. Gr.
- verrucosa, Hall, 1883, Rep. St. Geol., pl. 33, fig. 11, and Pal. N. Y., vol. 6, p. 110, Up. Held. Gr.
- virgosa, Eichwald, 1860, Lethaea Rossica. p. 358, Up. Coal Meas. Probably not American.
- wortheni, Ulrich, (in press,) Geo. Sur All., vol. 8, pl. 52, Low. Coal Meas.
- FENESTRALIA, Prout, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 235. [Ety. from genus Fenestella.] Zoarium like Fenestella, from which it is distinguished by having two rows of cells on each side of the median ridge. Type F. stludovici.
- Prout, 1858, Trans. St. stludovici, Louis Acad. Sci., vol. 1, p. 235, St. Louis Gr.
- stludovici var. compacta, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 59, St. Louis Gr.
- FENESTRAPORA, Hall, 1885, Rep. St. Geol., p. 36. [Ety. fenestra, opening; poros, pore.] Forms of Fenestellidæ having the branches connected by dissepiments,

two ranges of cell apertures, separated by a carina bearing pores; noncelluliferous side with conspicu-ous pores. Type

475. - Fenestrapora biperforata. Magn nonporiferous side. Magnified

infraporosa, Ulrich, 1886, Cont. to Amer. Pal., p. 14, Up. Held Gr. occidentalis, Ulrich, (in press), Geo. Sur.

F. biperforata.

biperforata, Hall,

Gr.

1885, Rep. St. Geol., pl. 2, fig. 17, Up. Held.

Ill.,/vol. 8, pl. 44 and 54, Ham. Gr. FISTULIFORA, McCoy, 1849, Ann. and Mag.

Nat. Hist., 2d ser., vol. 3, p. 130. [Ety. fistula, pipe; poros, pore.] Incrusting or massive; corallites long, cylindrical, thick-walled, not in contact; tabulæ numerous; cells circular, smooth-edged; intervals between corallites filled with vesicular plates, tabulated. Type F. minor.

acervulosa, Rominger, 1866, Proc. Acad. Nat. Sci., p. 7, Ham. Gr.

astricta, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl.

47 and 48, Ham. Gr.

canadensis, see Favosites canadensis.

carbonaria, Ulrich, 1884. Jour. Cin. Soc. Nat. Hist.,

vol. 7, p. 45, Up. Coal FIG 476-Fistu-Meas.

- clausa, see Meekopora clausa.
- collina, Ulrich, (in press,)
- Geo. Sur. Ill., vol. 8, pl. 47 and 48, Ham. Gr.

communis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 47 and 48, Ham. Gr.

compressa, Rominger, 1866, Proc. Acad.

- Nat. Sci., p. 10, Keokuk Gr. confertipora, Hall, 1881, (Thallostigma confertipora,) Trans. Alb. Inst., vol. 10, p. 184, and Pal. N. Y., vol. 6, p. 211, Ward Conference of the state of Ham. Gr.
- constricta, Hall, 1881, (Lichenalia con-stricta,) Trans. Alb. Inst., vol. 10, p. 183, and Pal. N. Y., vol. 6, p. 227, Ham. Gr.
- corrugata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 47 and 48, Ham. Gr.
- crassa, Rominger, 1866, Proc. Acad. Nat.
- Sci., p. 8, Ham. Gr. decipiens, Hall, 1881, (Thallostigma de-cipiens,) Trans. Alb. Inst., vol. 10, p. 187, and Pal. N. Y., vol. 6, p. 232,
- Ham. Gr. densa, Hall, 1881, (Thallostigma densa,)
 - Trans. Alb. Inst., vol. 10, p. 186, and Pal. N. Y., vol. 6, p. 231, Ham. Gr. digitata, Hall, 1881, (Thallostigma digitata,)

Trans. Alb. Inst., vol. 10, p. 185, and Pal. N. Y., vol. 6, p. 229, Ham. Gr.

elegans, see Pinacotrypa elegans.

eriensis, Rominger 1866, Proc. Acad. Nat. Sci., p. 8, Ham. Gr.

excellens, Ulrich, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 46, Kaskaskia Gr. flabellata, see Chiloporella flabellata.

flabellum, see Dighotrypa flabellum. foordi, Ulrich,

FIG. 477.-Fistulipora

foordi. Opercular cover x 50.

vol. 8, pl. 47 and 48, Ham. Gr. halli, Rominger, 1866. Proc. Acad. Nat. Sci., p. 6, Niagara Gr. helios, Rominger, 1866,

press,) Geo. Sur. Ill.,

(in

Proc. Acad. Nat. Sci., p. 7, Corniferous Gr. hemi-pherica, Hall.

hemispherica,) Trans. Alb. Inst., vol. 10, p. 183, and Pal. N. Y., vol. 6, p. 226, Ham. Gr.





lipora astricta. Tangential section, show ing lunatium.

incrassata, Nicholson, 1874, (Callopora incrassata,) Geo. Mag. Lond. n. s., vol. 1, p. 13, and Rep. Pal. Ont., p. 61, Ham. Gr.

306

- intercellata, Hall, 1881, (Thallostigma intercellata,) Trans. Alb. Inst., vol. 10, p. 13, and Pal. N. Y., vol. 6, p. 87, Up. Held. Gr.
- involvens, Hall, 1887, Pal. N. Y., vol. 6, p. 221, Ham. Gr.
- labiosa, Winchell, 1866, Rep. Low. Penin. Mich., p. 88, Ham. Gr.
- lamellata, Hall, 1881, (Thallostigma lamel-lata,) Trans. Alb. Inst., vol. 10, p. 13, and Pal. N. Y., vol. 6, p. 87, Up. Held. Gr.
- lens, Whitfield, 1878. Ann. Rep. Geo. Sur. Wis., p. 69, and Geo. Wis., vol. 4, p. 256, Hud. Riv. Gr.
- longimacula, Hall, 1881, (Thallostigma longimacula,) Trans. Alb. Inst., vol. 10, p. 185, and Pal. N. Y., vol. 6, p. 209, Ham. Gr.
- lunata, see Buscopora lunata.
- micropora, Hall, 1884, Thallostigma micropora, Rep. St. Geol., p. 26, Ham. Gr. minuta, Rominger, 1866, Proc. Acad. Nat.
- Sci., p. 7, Ham. Gr. monticulata, Ulrich, Geo. Sur. Ill., vol. 8.
- pl. 47 and 48, Ham. Gr. multiculeata, Hall, 1884, (Thallostigma multiculeata,) Rep. St. Geol., p. 23,
- Ham. Gr. neglecta, Rominger, 1866, Proc. Acad. Nat.
- Sci., p. 6, syn. for Lichenalia concentrica.

nodulifera, Meek, 1872, Pal. E. Neb., p. 143, Up. Coal Meas.

normalis. Ulrich, 1886, Cont. to Am. Pal.,

p. 20, Up. Held. Gr. occidens, Hall & Whitfield, 1873, 23d

oweni, James, 1885, Jour. Cin. Soc. Nat.

Poorly defined.
 parasitica, Hall, 1879, (Callopora parasitica,) 32d Rep. N. Y. St. Mus. Nat.

prolifica, Ulrich, 1884, Jour. Cin. Soc. Nat.

Hist., vol. 7, p. 45, St. Louis Gr. proporoides, Nicholson, 1879, Pal. Tab.

Hist., p. 157, Low. Held Gr.

Corals, p. 310, Ham. Gr.

peculiaris, see Actinotrypa peculiaris.

Chemung Gr.

Rep. N. Y. St. Mus. Nat. Hist., p. 229,

Hist., vol. 7, p. 21, Hud. Riv. Gr.

ponderosa, Hall, 1874, (Callopora pon-derosa,) 26th Rep. N. Y. St. Mus. Nat. Hist, p. 103, Low. Held Gr.

FLU.

- rugosa, see Batostoma rugosa.
- saffordi, Winchell, 1866, Rep. Low. Penin.
- Mich., p. 88, Ham. Gr. scrobiculata, Hall, 1884, (Thallostigma scrobiculata,) Rep. St. Geol., p. 20. Ham. Gr.
- segregata, Hall, 1884, (Thallostigma segre-
- gata,) Rep. St. Geol., p. 27, Ham. Gr. serrulata, Hall, 1884, (Thallostigma serru-
- lata,) Rep. St. Geol., p. 22, Ham. Gr. solidissima, Whitfield,#1878, Ann. Rep. Geo. Sur. Wis., p. 69, and Geo. Wis., vol. 4, p. 255, Hud. Riv. Gr.
- spergenensis, Rominger, 1866, Proc. Acad.
- Nat. Sci., p. 9, Warsaw Gr. spheroidea, Hall, 1884, (Thallostigma spheroidea,) Rep. St. Geol., p. 31,
- Ham. Gr. spinulifera, Rominger, 1866, Proc. Acad.
- Nat. Sci., p. 8, Ham. Gr. stellifera, Rominger, 1866, Proc. Acad. Nat. Sci., p. 7, Ham. Gr.
- subtilis, Hall, 1884, (Thallostigma sub-tilis,) Rep. St. Geol., p. 30, Ham. Gr.
- sulcata, Rominger, 1866, Proc. Acad. Nat. Sci., p. 7, Ham. Gr.
- triangularis, Hall, 1884, (Thallostigma triangularis,) Rep. St. Geol., p. 32, Ham. Gr.
- trifaria, Hall, 1887, Pal. N. Y., vol. 6, p. 222, Ham. Gr. .

trifolia, Rominger, 1866, Proc. Acad. 1866, Proc. Acad. Nat. Sci., p. 9, Keokuk Gr.

triloba, Hall, 1887, Pal. N. Y., vol. 6, p. 29, Low. Held. Gr.

umbilicata, Hall, 1884, (Thallostigma umbilicata,) Rep. St. Geol., p. 23, Ham. Gr.

unilinea, Hall, 1887, Pal. N. Y., vol. 6, p. 217, Ham. Gr. utriculus, Rominger, 1866, Proc. Acad.

Nat. Sci., p. 8, Ham. Gr. Hall, 1884, (Thallostigma variopora, variopora,) Rep. St. Geol., p. Ham. Gr. Flustra, Linnæus, 1745,

Amænitates academicæ. Not Palæozoic.

carbaseoides, Eaton, 1832, Geo. Text Book, p. 44. Not

- recognized. spatulata, see Worth-
- enopora spatulata. FIG. 479.-Flustra (?) tutuberculata, Prout, berculata. Aperture 1859, Trans. / St. x 50. Louis Acad. Sci., vol. 1, p. 447, Warsaw

Gr. Not a flustra.

FIG. 480.-Glau

GLA.-GRA.]

GLAUCONOME, GO

vol. 1, p. 100

in Murch.

mythologica

stem, with 1 of cells sepa

of each bran

ated. Type

nereidis

flexuosa, Ulric vol. 8, pl. 66 intermedia, Ul termedia,) B Cuyahoga Sh minor, Ulrich, Bull. Deniso Shales. nereidis, White p. 18, and (vol. 4, p. 105 nodata, Hall, 1 Held. Gr., p. p. 102, Up. 1 simulatrix, U simulatrix,) Cuyahoga Sl sinuosa, Hall, Held. Gr., p. p. 101, Up. I subangulata, 1 subangulata, 76, Cuyahoga tenuiramosa, tenuiramosa. 79, Cuyahoga tenuistriata, H Up. Held. G vol. 6, p. 102

trilineata, Mee 157, Coal Me vinii, Ulrich, Bull. Univ.,

whitii, Foerste, Bull. Univ., you**ngi**, Ulrie

youngi,) Bul Shales. GLOSSOTRYPA, Ha

p. xvii. [Et opening.] Z ing from the



FIG. 478.-Flustra (?) tuberculata. Sections x

[FLU.

GLA.-GRA.]

lopora pon-St. Mus. Nat.

Low. Penin.

Fhallostigma eol., p. 20,

stigma segre-Ham. Gr. stigma serru-Ham. Gr. Ann. Rep.

eo. Wis., vol. , Proc. Acad.

Thallostigma eol., p. 31,

Proc. Acad.

Proc. Acad.

stigma sub-Ham. Gr. . Acad. Nat.

Fhallostigma eol., p. 32,

Y., vol. 6, p.

Rominger, Proc. Acad. i., p. 9, Keo-

all, 1887, Pal. vol. 6, p. 29, eld. Gr. a, Hall, 1884, stigma um-St. Rep. p. 23, Ham.

Hall, 1887. Y., vol. 6, p. m. Gr. Rominger, Proc. Acad.

Thallostigma eol., p. 18



Flustra (?) tu-Aperture uta.

GLAUCONOME, Goldfuss, 1826, Germ. Petref., vol. 1, p. 100, as emended by Lonsdale in Murch. Sil. Syst., p. 677. [Ety. mythological name.] Narrow central stem, with lateral branches; two rows of cells separated by a keel on the face of each branch, and opposite side striated. Type G. disticha.

bellula, Ulrich, (Pinnatopora bellula,) Geo. Sur. Ill., vol. 8, pl. 66, Low. Coal Meas. carinata, Hall, 1884, Rep. St. Geol., p. 60, Ham. Gr. curvata, rich, 1888, (Pinnatop o ra curvata,) Bull. Deni-Univ., son p. 76, Cuya-

Ul-

hoga Shales.

FIG. 480.-Glauconome nereidis.

- flexuosa, Ulrich, (in press), Geo. Sur. Ill., vol. 8, pl. 66, Keokuk Gr. intermedia, Ulrich, 1888, (Pinnatoporarin-
- termedia,) Bull. Denison Univ., p. 74, Cuyahoga Shales. minor, Ulrich, 1888, (Pinnatopora minor,)
- Bull. Denison Univ., p. 77, Cuyahoga Shales.
- nereidis, White, 1874, Rep. Invert. Foss., p. 18, and Geo. Sur. W. 100th Mer., vol. 4, p. 105, Carboniferous.
- nodata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 18, and Pal. N. Y., vol. 6, p. 102, Up. Held Gr.
- simulatrix, Ulrich, 1888, (Pinnatopora simulatrix,) Bull. Denison Univ., p. 75, Cuyahoga Shales.
- sinuosa, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 18, and Pal. N. Y., vol. 6, p. 101, Up. Held. Gr.
- subangulata, Ulrich, 1888, (Pinnatopora subangulata,) Bull. Denison Univ., p. 76, Cuyahoga Shales.
- tenuiramosa, Ulrich, 1888, (Pinnatopora tenuiramosa,) Bull. Denison Univ., p. 79, Cuyahoga Shales.
- tenuistriata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 19, and Pal. N. Y., vol. 6, p. 102, Up. Held. Gr.
- trilineata, Meek, 1872, Pal. E. Neb., p.
- vinii, Ulrich, 1888, (Pinnatopora vinii,) Bull. Univ., p. 77, Cuyahoga Shales.
 whitii, Foerste, 1887, (Pinnatopora whitii,)
 Bull. Univ., 27, Cuyahoga Shales.
- Bull. Univ., p. 78, Low. Coal Meas.
- youngi, Ulrich, 1888, (Pinnatopora youngi,) Bull. Univ., p. 78, Cuyahoga Shales.
- GLOSSOTRYPA, Hall, 1887, Pal. N. Y., vol. 6, p. xvii. [Ety. glosse, the tongue; trupa, opening.] Zoarium tubular; cells arising from the epitheca lining the cylin-

drical frond, intersected by narrow projections from the cell walls, extending partially across the cell tube; apertures paliform; intercellular structure vesic-

paliformis, Type G. paliformis. paliformis, Hall, 1881, (Lichenalia paliformis,) Trans. Alb. Inst., vol. 10, p. 11,

and Pal. N. Y., vol. 6, p. 85, Up. Held. Gr. Glyptotrypa, Ulrich, syn. (?) for Coscinium.

GONIOTRYPA, Ulrich, (in press), Micropal æontology, p. 14. [Ety. gonia, angle; trupa, opening.] Bifoliate, jointed, segments with



s m a l l, Fig. 481. — Goniotrypa bilater-each face alls. 1, Transverse section; 2, with a transverse section lower down; 3, tangential section of the up central per part. ridge;

cells in longitudinal rows; apertures oval, directed obliquely outward. Type G. bilateralis. Syn. (?) for Dicranopora.

bilateralis, Ulrich, (in press), Micropalæontology, p. 15, Hud. Riv. Gr. (?)

- Gorgonia, Linnæus, 1745, Amænitates Acad. Ety. mythological name.] Not American Palæozoic.
- anticorum, Castelnau, 1843, Syst. Sil., p. 50. Not recognized.
- (?) aspera, see Subretepora aspera.
- dubia, Goldfuss, 1826, Petref. Germ. Permian. Not recognized.
- ehrenbergi, see Phyllopora ehrenbergi.

infundibuliformis, Eaton, 1832, Geo. Text Book, p. 43. Not recognized.

perantiqua, see Enallopora perantiqua. retiformis, see Dictyonema retiforme.

siluriana, Castelnau, 1843, Syst. Sil., p 50. Not recognized.



FIG. 482.-Graptodictya nitida. Natural size and magnified.

GRAPTODICTYA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 165. [Ety. grapho, I write ; dictyon, net.] Zoarium pointed below, branching above, cell apertures circular, and separated by interstitial pits or sulci; distinguished from Ptilodictya by the circular cells and surrounding pits. Type G. perelegans.

nitida, Ulrich, 1882, Jour. Cin. Soc. Nat.

Hist., vol. 5, p. 166, Hud. Riv. Gr. perelegans, Ulrich, 1878, (Ptilodictya perelagans,) Jour. Cin. Soc. Nat. Hist., vol. 1, p. 94, Hud. Riv. Gr.

HEDERELLA, Hall, 1884, Rep. St. Geol., p. 53. [Ety. hedera, ivy.] Bryozoum parasitic, procumbent, attached the entire length; main axis tubular, from which proceed lateral tubular cells. giving it the general appearance of Stomatopora. Type H. canadensis.

F1G 483 -- Hederella canadensis. Magnified.

canadensis, Nicholson, 1873, (Alecto (?) cana-

densis,) Can. Nat. and Geol., vol. 7, p. 144, and Pal. Prov. Ont., p.

124, Up. Held. and Ham. Gr. cirrhosa, Hall, 1884, Rep. St. Geol., p. 53, Ham. Gr.

- conferta, Hall, 1884, (Ptilionella conferta,) Rep. St. Geol., p. 56, Ham. Gr.
- filiformis, Billings, 1858, (Aulopora filiformis,) Can. Jour., vol. 4, p. 119, Ham. Gr.

magna, Hall, 1884, Rep. St. Geol., p. 55, Ham. Gr.

HELICOPORA, Claypole, 1883, Quar. Jour. Geo. Soc., p. 30. [Ety. helix, spiral; poros, pore.] Bryozoum expanded, fenestrate, and spiral; formed of slender, bifurcating rays, poriferous on one face, connected by nonporiferous bars, forming an open net-work; cells arranged in two rows along the rays, one row on each side of a median keel; axis none, or consisting only of the thickened inner border of the bryozoum, not straight, but forming a spiral, rounded, nonporiferous, or slightly poriferous, inner margin. Type H. latispiralis. Regarded by some as a synonym for Fenby the spiral form.

archimediformis, Claypole, syn. for Archimedes laxus.

latispiralis, Claypole, 1883, Quar. Jour. Geo. Sci., p.32, Niagara Gr. ulrichi, Claypole,

Fig. 484.—Heliotrypa bi-folia. Tangential section x 50

1883, Quar. Jour. Geo. Soc., p. 33, Up. Held. Gr. ELIOTRYPA, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 277. [Ety. helios, sun ;

trupa, opening.] Bifoliate, interstitial cells developed from the prostrate por-

tion of the zoœcia; intercommunication by means of radially arranged tubuli, Type H. bifolia.

bifolia, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 278, Kaskaskia Gr. Несорова, Hall, 1852, Pal. N. Y., vol. 2, p.

- 44. [Ety. helos, nail; poros, pore.] Zoarium jointed ; segments small, simple, cylindrical, often swollen at the extremities; cells oval or subangular. and arranged between longitudinal elevated lines or in quincunx. Type H? fragilis.
- armata, Billings, 1866, Catal. Sil. Foss. Antic., p. 38, Anticosti Gr. bellula, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 38, Anticosti Gr. circe, Billings, 1866, Catal. Sil. Foss. Antic., p. 39, Anticosti Gr.



by some as a synonym for ren-estella, and distinguished only Fig. 485.—a-l, Helopora fragilis; f-h, Helopora lindstromi, sections x 50.

- concava, Billings, 1866, Catal. Sil. Foss. Antic., p. 37, Anticosti Gr.
- divaricata, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 59, Trenton Gr. formosa, Billings, 1865, Catal. Sil. Foss.
- Antic., p. 37, Anticosti Gr. fragilis, Hall, 1852, Pal. N. Y., vol. 2, p. 44, Clinton Gr.
- fragilis var. acadiensis, U Hall, 1860, Can. Nat. FIG. 486. Heloand Geo., vol. 5, Antipora f Natural fragilis.
- size costi Gr. and magnified. irregularis, Billings, 1866, Catal. Sil. Foss. Antic., p. 39, Anticosti Gr.
- imbricata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 29, Hud. Riv. Gr.

HEM.-HOM.]

lineata, Billi Antic., p. 3 lineopora, Bi Antic., p. 3 nodosa, Bill Antic., p. 3 spiniformis, spiniforme. vol. 5, p. 1 striatopora, E Antic., p. ? strigosa, Bill Antic., p. 3 tenuis, see Art varipora, Bill Antic., p. 4



FIG. 487. - Hemi trypa biordo.

are elevated and connec midway and carinæ. Tv aspera, Ulrich vol. 8, pl. 57 biordo, Hall, 1 149, Up. He biserialis, Hal Mus. Nat. H biserialis var. vol. 6, p. 57 columellata, H p. 146, Up. cribrosa, Hall, Trans. Alb. Held. Gr. dubia, syn. for favosa, Hall, 1 10, p. 35, and Up. Held. G nodosa, Ulrich vol. 8. pl. 57 prima, Hall, sy pateriformis, U Ill., vol. 8, p. perstriata, Ulr Ill., vol. 8, p plumosa, Prou mosa,) Trans l, p. 236, Kee proutana, Ulri Ill., vol. 8, p Fenestella he and Warsaw proutana var. n Geo. Sur. Ill. proutana var. press,) Geo. Warsaw Gr. tenera, Ulrich, vol. 8, pl. 44,

[HEL.

HEL.

mmunication nged tubuli.

in. Soc. Nat. skia Gr. Y., vol. 2, p.

poros, pore.] s small, simollen at the subangular. longitudinal cunx. Type

al. Sil. Foss.

al. Sil. Foss. . Sil. Foss.



ora lindstromi,

al. Sil. Foss. th Rep. Geo. 1 Gr. al. Sil. Foss.

iG. 486. — Helo-pora fragilis. Natural size

Vatural and magnified.), Anticosti Gr.

is,) Geo. Sur. iv. Gr.

lineata, Billings, 1866, Catal. Sil. Foss. Antic., p. 36, Anticosti Gr. lineopora, Billings, 1866, Catal. Sil. Foss.

HEM.-HOM.]

FIG. 487. - Hemi-

trypa biordo.

Antic., p. 38, Anticosti Gr. nodosa, Billings, 1866, Catal. Sil. Foss.

- Antic., p. 38, Anticosti Gr. spiniformis, Ulrich, 1882, (Arthroclema spiniforme,) Jour. Cin. Soc. Nat. Hist.,
- vol. 5, p. 161, Trenton Gr. striatopora, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 39, Anticosti Gr. strigosa, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 37, Anticosti Gr.

tenuis, see Arthrostylus tenuis. varipora, Billings, 1866, Catal. Sil. Foss.

Antic., p. 40, Anticosti Gr. HEMITRYPA, Phillips, 1841,

Pal. Foss. Cornwall, Devon, and W. Somerset, p. 27. \[Ety. emisos, half; trupa, per-Fenestelforation.] loid; branches connected by dissepi-ments; cell apertures in two ranges, separated by carinæ, which

are elevated, widened at the summit, and connected by scalæ, which meet midway and coalesce, forming pseudocarinæ. Type H. oculata.

- aspera, Ulrich, (in press). Geo. Sur. Ill., vol. 8, pl. 57, Keokuk Gr.
- biordo, Hall, 1887, Pal. N. Y., vol. 6, p. 149, Up. Held. Gr.
- biserialis, Hall, 1879, 32d Rep. N. Y. St. Mus. Nat. Hist., p. 174, Low. Held. Gr. biserialis var. exilis, Hall, 1887, Pal. N. Y., vol. 6, p. 57, Low. Held. Gr.
- columellata, Hall, 1887, Pal. N. Y., vol. 6,
- p. 146, Up. Held. Gr. cribrosa, Hall, 1881, (Fenestella cribrosa,) Trans. Alb. Inst., vol. 10, p. 35, Up.
- Held. Gr. dubia, syn. for Loculipora ambigua.

favosa, Hall, 1881, Trans. Alb. Inst., vol. 10, p. 35, and Pal. N. Y., vol. 6, p. 148, Up. Held. Gr.

- nodosa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8. pl.-57, Keokuk Gr.
- prima, Hall, syn. for Unitrypa nervia.
- prima, Hall, syn. for Unitrypa nervia. pateriformis, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 57, Keokuk Gr. perstriata, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 57, Keokuk Gr. plumosa, Prout, 1858, (Fenestella plu-mora, Drang, et. Louis Acad Sci. rel mosa,) Trans. St. Louis Acad. Sci., vol.
- 1, p. 236, Keokuk and Warsaw Gr. proutana, Ulrich, (in press.) Geo. Sur.
- Ill., vol. 8, pl. 57, proposed instead of Fenestella hemitrypa of Prout, Keokuk and Warsaw Grs.
- proutana var. nodulosa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 57, Keokuk Gr. proutana var. vermifera, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 57, Warsaw Gr.
- tenera, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 44, Hamilton Gr.

21

ulrichi, Foerste, 1887, Bull. Denison Univ., vol. 2, p. 152, Clinton Gr.

309

- HERNODIA, Hall, 1884, Rep. St. Geol., p. 58. [Ety. hernodes, like a young sprout.] Bryozoum parasitic, procumbent, increasing by gemmation like Aulopora: budding lateral, and for some distance in contact and frequently coalescing with the parent cells. Type H. humifusa.
- humifusa, Hall, 1884, Rep. St. Geol., p. 58, Ham. Gr.
- HETERODICTYA, Nicholson, 1875, Geo. Mag., vol. 2, n. s., p. 33, and Pal. Prov. Ont., p. 79. [Ety. heteros, irregular; dictyon, net.] The correct orthography is Heterodictyon, Flattened, two-edged frond, with subparallel sides, consisting Flattened, two-edged of two series of cells upon opposite sides of a central membrane; cells are in longitudinal rows; tabulæ present. Type H. gigantea.

gigantea, Nicholson, 1875, Geo. Mag., vol. 2, p. 34, and Pal. Prov. Ont., p.



iferous. Hippothoa, ouroux, 1821.

Lamgigantea. Magnified. Expos method. Not Palæozoic.

inflata, see Stomatopora inflata.

HOMOTRYPA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 240. [Ety. homos, similar; trupa, perforation.] Ramose or subfrondescent; surface smooth or bearing monticules; cells, circular, ovate or polygonal, thin-walled; groups of larger-sized cells; mesopores absent or restricted to the maculæ; spiniform tubuli, diaphragms and cystiphragms

arbuscula, Ulrich, (in press), Geo. Sur. Ill., vol. 8, pl. 38, Birdseye Gr.

curvata, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 241, Hud. Riv. Gr.



FIG. 489.—Homotrypa obliqua. Natural size and magnified.

exilis, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 80, Trenton Gr. flabellaris, Ulrich, (in press), Geo. Sur.

Ill., vol. 8, pl. 32, Hud. Riv. Gr.

MOLLUSCOIDA.

gelasinosa, Ulrich, (in press), Geo. Sur. Ill., vol. 8, pl. 32, Hud. Riv. Gr.

insignis, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 82, Trenton Gr.

minnesotensis, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 79, Trenton Gr. obliqua, Ulrich, 1882, Jour. Cin. Soc. Nat.

Hist., vol. 5, p. 243, Hud. Riv. Gr.

Subramosa, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 81, Trenton Gr. HOMOTRYPELLA, Ulrich, 1886, 14th Rep. Geo.

- Sur. Minn., p. 83. [Ety. homotrypa, a genus; ellus, diminutive.] Zoarium Zoarium ramose; monticules wanting; interstitial cells present; zoœcia small, moderately thick walls, and cystoid diaphragms straight; spiniform tubuli numerous. Type H. instabilis. contexta, Ulrich, (in press), Geo. Sur. Ill.,
- vol. 8, pl. 32, Hud. Riv. Gr.
- granulifera, Ulrich, 1879, (Chetetes granuliferus,) Jour. Cin. Soc. Nat; Hist., vol.
- 2, p. 128, Trenton Gr. instabilis, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 83, Trenton Gr.
- Hornera, Lamouroux, 1821, Expos. Method. des genres de L'Ordre des Pol. [Ety. proper name.] Not American Palæozoic.

dichotoma, see Subretepora dichotoma.

- ICHTHYORACHIS, McCoy, 1844, Carb. Foss. Ireland, p. 205. [Ety. ichthys, fish; rachis, backbone.] Bryozoum plumose, Ireland, p. 205. consisting of a rachis, with short lateral branches or pinnules; celluliferous on one side; cell apertures in two ranges on the branches, and in three or more on the main stem. Type I. newenhami.
- nereis, Hall, 1874, 26th Rep. N. Y. St. Mus.
- Nat. Hist., vol. 6, p. 272. [Ety. idios, peculiar; *trupa*, opening.] Parasitic, interstitute colle surger by collection of the collection interstitial cells angular, both cells with diaphragms; spiniform tubuli present.

- Type I. parasitica. parasitica, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 273, Niagara Gr. INTBAPORA, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 16. [Ety. intra, within; Description of the content of t poros, pore.] Resembling Stictopora. branches broad; intercellular spaces regularly punctured or pitted, as if by minute cell apertures; cells with rounded mouths and short prostrate portion; intercellular 'space vesiculose. Type I. puteolata.
 - puteolata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 16, and Pal. N. Y., vol. 6, p. 97, Up. Held. Gr.

Intricaria, Defrance, 1823, Diotionnaire des Sciences Naturelles. Not a Palæozoic genus.

clathrata, see Subretepora clathrata. reticulata, see Subretepora reticulata.

Isotrypa, Hall, 1885, Rep. St. Geol., p. 37. [Ety. isos, equal; trupa, perforation.] Fenestelloid, having the branches connected by dissepiments, and with two ranges of cell apertures, separated by carinæ, elevated and much thickened above, connected by distinct lateral processes; the reverse face has on or near the dissepiments conspicuous pores larger than the cell apertures. Type I. conjunctiva.

HOM.-LEL



ig. 490.—Isotrypa conjunctiva. Celluliferous side and noncelluliferous side, with pores on FIG. 490. the dissepiments.

bifaria, syn. for I. conjunctiva.

- conjunctiva, Hall, 1881, (Fenestella conjunctiva,) Trans. Alb. Inst., vol. 10, p. 143, and Pal. N. Y., vol. 6, p. 143, Up. Held. Gr.
- consimilis, Hall, 1885, Rep. St. Geol., pl. 2, fig. 14, Up. Held. Gr. LABECHIA, Edwards & Haime, 1851, Pol Foss. des Terr. Pal., p. 297. [Ety. proper name.] Bryozoum laminar, incrusting, or attached by part of the base, and having the remainder covered by an epitheca; surface covered with rounded or elongated, solid, tubercles, separated by an imperforate calcareous membrane; internally it consists of vertical columns extending from the epitheca below, and terminating above in the surface tubercles, the interspaces between the columns consisting of lenticular vesicles, the uppermost layer of which gives rise to the seemingly imperforate membrane between the tubercles. Type L. conferta. Probably this genus belongs to the Protozoa, and is related to the sponges. montifera, Ulrich, 1886, Cont. to Am. Pal.,
 - p. 33, Hud. Riv. Gr.
- LEIOCLEMA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 141. [Ety. leios, smooth; klema, twig.] Ramose, lamellate, or parasitic; surface even; cellmouths small, rounded, surrounded by interstitial cells; tubes thin-walled; diaphragms, remote; acanthopores abundant. Type L. punctatum.
 - araneum, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 75, Kaskaskia Gr.
 - foliatum, Ulrich, (in press,) Geo. Sur. Ill., vol, 8, p. 301, Warsaw Gr.

LEP.-LIC.]

gracillimum, 1 Ill., vol. 8, p minutissimun pora minut tario, p. 77,



FIG. 491.-Letoclen ness of zoarium. acanthopores; b pores, mesopores x 50, showing its

punctatum, H tata, Geo. S and Warsaw subglobosum, 1 Ill., vol. 8, p wachsmuthi, U Ill., vol. 8, p wilmingtonens Geo. Sur. I Riv. Gr. LEPTOTRYPA, Ulr

Nat. Hist., v thin; trupa, crusting; ce surface, with buli; no dia Type L. mini clavacoidea, Ja coidea,) Int. Nicholson on

p. 182, Hud. clavis, Ulrich, Hist., vol. 6, cortex, Ulrich,

Hist., vol. 6, hexagonalis, Ul

Ill., vol. 8, pl. minima, Ulrich

Hist., vol. 6, ornata, Ulrich, Hist., vol. 6,

semipilaris, Ulr

Ill., vol. 8, pl. stidhami, Ulric

Ill., vol. 8, pl. LICHENALIA, Hall p. 171. [Sig.fr Membranous

circular or fl: ous on one sic an epitheca; from the epit! trilobate, ofte

HOM.-LEL

d with two parated by thickened inct lateral has on or conspicuous apertures.



Celluliferous with pores on

nestella cont., vol. 10, p. , p. 143, Up.

St. Geol., pl.

1851, Pol 97. [Ety. 297. laminar, inpart of the mainder covface covered ed, solid, tuperforate calnally it contending from terminating

rcles, the innmns consisthe uppermost to the seemrane between nferta. Probthe Protozoa, ges. t. to Am. Pal.,

ur. Cin. Soc. . [Ety. leios, amose, lamele even; cellurrounded by thin-walled; acanthopores tatum.

s,) Geo. Sur. kia Gr. Geo. Sur. Ill., gracillimum, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 75, Keokuk Gr.

LEP.-LIC.]

minutissimum, Nicholson, 1875, (Callo-pora minutissima,) Pal. Prov. of Ontario, p. 77, Hamilton Gr.

MOLLUSCOIDA.

tural space smooth; intercellular space vesiculose. Type L. concentrica. alternata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 8, and Pal. N. Y., vol. 6, p. 80, Up. Held. Gr.

alveata, see Odontotrypa alveata.

bistriata, Hall, 1881. Bryozoans of the Up. Held. Gr., p. 8, and Pal. N. Y., vol. 6, p. 79, Up. Held. Gr. bullata, Hall, 1887, Pal. N. Y., vol. 6,

p. 205, Ham. Gr. carinata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 9, Up. Held. Gr. circincta, see Selenopora circincta.

clivulata, see Pileotrypa clivulata. clypeiformis, Hall,

1884,

F10. 491.—Leioclema foliatum. *a*, Vertical section x 28, showing entire thickness of zoarium, tabulation of zoœcia and mesopores, and structure of the acanthopores; **b**, tangential section x 28, showing distribution of acanthopores, mesopores, and zoœcia; **c**, small portion of wall x 50; *d*, acanthopore x 50, showing its structure.

- punctatum, Hall, 1858, Callopora punctata, Geo. Sur. Iowa, p. 653, Keokuk and Warsaw Grs.
- subglobosum, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 75, Kinderhook Gr. wachsmuthi, Ulrich, (in press,) Geo. Sur.
- Ill., vol. 8, pl. 75, Kinderhook Gr. wilmingtonense, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 34, Hud. Riv. Gr.
- LEFTOTRYPA, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 158. [Ety. leptos, thin; trupa, perforation.] Thin, incrusting; cells polygonal, thin-walled; surface, with monticules; spiniform tubuli; no diaphragms or rudimentary. Type L. minima.
- clavacoidea, James, 1875, (Chetetes clavacoidea,) Int. Catal. Cin. Foss., p. 2, and Nicholson on Struct. and Affin. Montic, p. 182, Hud. Riv. Gr.
- clavis, Ulrich, 1883, Jour. Cin. Soc. Nat.
- clavis, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 161, Utica Slate. cortex, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 162, Utica Slate. hexagonalis, Ulrich, in press.) Geo. Sur. Ill., vol. 8, pl. 36, Treaton Gr. minime Ulrich 1983. Lour. Cin. Soc. Nat.
- minima, Ulrich, 1883, Jour. Cin. Soc. Nat.
- Hist., vol. 6, p. 159, Hud. Riv. Gr. ornata, Ulrich, 1883, Jour. Cin. Soc. Nat.
- Hist., vol. 6, p. 160, Hud. Riv. Gr. semipilaris, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 36, Hud. Riv. Gr.
- stidhami, Ulrich, (in press,) Geo. Sur.
- Ill., vol. 8, pl. 36, Hud. Riv. Gr. LICHENALIA, Hall, 1852, Pal. N. Y., vol. 2 p. 171. [Sig.from resemblance to a lichen.] Membranous expansions, growing in circular or flabellate forms, celluliferous on one side, the other covered with an epitheca; cells septate, arising from the epitheca; apertures circular or trilobate, often denticulate; interaper-

Rep. St. Geol., p. 37, Ham. Gr. colliculata, Hall, 1884, Rep. St. Geol., p. 36," Ham. Gr.

complexata, see Selenopora complexata. concentrica, Hall, 1852, Pal. N. Y., vol. 2, p. 171, Niagara Gr.



- FIG. 492.-Lichenalia concentrica. Under surface and upper surface magnified.
- concentrica var. maculata, Hall, 1879, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 117, Niagara Gr.
- concentrica var. parvula, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 117, Niagara Gr.
- confusa, Hall, 1887, Pal. N. Y., vol. 6, p. 204, Ham. Gr.
- constricta, see Fistulipora constricta.
- conulata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 9, and Pal. N. Y., vol. 6, p. 81, Up. Held. Gr.
- cornuta, Hall, 1887, Pal. N. Y., vol. 6, p.
- 203, Ham. Gr. crassa, Hall, 1879, (Trematopora crassa,) 32d Rep. N. Y. St. Mus. Nat. Hist., p. 152, Low Held. Gr.
- crustacea, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 8, Up. Held. Gr. cultellata, Hall, 1884, Rep. St. Geol., p. 35
- Ham, Gr.
- denticulata, see Pileotrypa denticulata.

312

distans, Hall, 1883, Rep. St. Geol., pl. 15, fig. 8-9, Low. Held. Gr.

foliacea, Hall, 1884, Rep. St. Geol., p. 35, Ham. Gr.

geometrica, Hall, 1887, Pal. N. Y., vol. 6, p. 79, Up. Held. Gr.

granifera, see Pileotrypa granifera.

imbricella, Hall, 1884, Rep. St. Geol., p. 35, Ham. Gr.

longispina, see Lichenotrypa longispina.

lunata, see Buscopora lunata. maculosa, Hall, 1884, (Trematopora mac-ulosa,) 26th Rep. N. Y. St. Mus. Nat.

Hist., p. 106, Low. Held. Gr. operculata, Hall, 1887, Pal. N. Y., vol. 6, p. 205, Ham. Gr.

ovata, Hall, 1887, Pal. N. Y., vol. 6, p. 80. Up. Held. Gr.

paliformis, see Glossotrypa paliformis. permarginata, Hall, 1881, Bryozoans of

the Up. Held. Gr., p. 10, and Rep. St. Geol., 1883, pl. 24, fig. 20, Up. Held. Gr. pustulosa, Hall, 1887, Pal. N. Y., vol. 6, p.

206. Ham. Gr. pyriformis, see Pileotrypa pyriformis.

radiata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 10, Up. Held. Gr.

ramosa, Hall, 1887, Pal. N. Y., vol. 6, p. 199, Ham. Gr.

serialis, Hall, 1887, Pal. N. Y., vol. 6, p. 32, Low. Held. Gr.

stellata, Hall, 1884, Rep. St. Geol., p. 33, Ham. Gr.

- subcava, Hall, 1881, Bryozoans of the Up. Held, Gr., p. 8, and Rep. St. Geol., 1883, pl. 24, fig. 23-25, Up. Held. Gr. substellata, Hall, 1881, Bryozoans of the
- Up. Held. Gr., p. 7, and Rep. St. Geo., 1883, pl. 24, fig. 26, Up. Held. Gr. subtrigona, Hall, 1887, Pal. N. Y., vol. 6,

p. 196, Ham. Gr.

tessellata, Hall, 1887, Pal. N. Y., vol. 6. p. 207, Ham. Gr.

torta, Hall, 1883, Rep. St. Geol., pl. 15, fig. 1-7, Low. Held. Gr.

tortuosa, Hall, 1883, Rep. St. Geol., pl. 13, fig. 17-18, Low. Held. Gr.

vesiculata, Hall, 1887, Pal. N. Y., vol. 6. p. 197, Ham. Gr.

LICHENOTRYPA, Ulrich, 1886, Cont. to Am. Pal., p. 23. [Ety. lichen, a tree-moss; trupa, perforation.] Zoarium thin, incrusting, in early growth like Fistuli-pora, with short, tubular zoccia, wide, concave interspaces, subcircular apertures, posterior margin elevated; in later growth peristomes of adjacent cells unite by thin, irregular walls, which traverse the interstitial spaces, and form an irregular net-work, with spine-like elevations; interstitial cells present. Type L. cavernosa. Syn. (?) for Lichenalia.

cavernosa, Ulrich, 1886, Cont. to Am. Pal., p. 24, Up. Held. Gr.

longispina, Hall, 1881, (Lichenalia longispina,) Trans. Alb. Inst., vol. 10, p. 11, and Pal. N. Y., vol. 6, p. 287, Up. Held. Gr.

LOCULIPORA, Hall, 1887, Pal. N. Y., vol. 6, p. xxiii. [Ety. loculus, cell; poros, Fenestelloid; branches conpore.] nected by dissepiments; cell apertures in two ranges, surrounding the fenestrules; branches and dissepiments carinated; carinæ elevated and much thickened above, having the appearance of the branches and dissepiments of the noncelluliferous face of the frond.

Type L. perforata. ambigua, Hall, 1876, (Fenestella ambigua,) 28th Rep. N. Y. St. Mus. Nat. Hist., p. 123, Niagara Gr.

- circumstata, Hall, 1887, Pal. N. Y., vol. 6, p. 144, Up. Held. Gr.
- perforata, Hall, 1884, (Fenestella perfo-rata,) 36th Rep. N. Y. St. Mus. Nat. Hist., p. 65, Ham. Gr.

Lyropora, Hall, 1857, Proc. Am. Ass. Ad. Sci., vol. 10, p. 179. [Ety. lyra, lute; poros, pore.] Zoarium consisting of a reticulated expansion, margined by two strong diverging supports which curve outward and upward; the rays of the expansion carry from two to five rows of cells; but there are none in the dissepiments; fenestrules small, ovate. Type L. lyra.

cinctura, Hall, 1885, Rep. St. Geol., pl. 1, Ham. Gr.

divergens, Ulrich. (in press,) Geo. Sur. Ill. vol. 8, pl. 58. Kaskaskia



tura. 1 ous side. Proc. Am. Ass. Ad. Sci., vol. 10, p. 179, Kaskaskia Gr.

- ovalis, Ulrich, (in press,) Geo. Sur. Ill.,
- vol. 8, pl. 58, Kaskaskia Gr. quincuncialis, Hall, 1857, Proc. Am. Ass. Ad. Sci., vol. 10, p. 179, Kaskaskia Gr.
- ranosculum, Ulrich, (in press,) Geo. Sur.

Ill., vol. 8, pl. 58, Kaskaskia Gr. retrorsa, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 504, Burlington Gr. subquadrans, Hall, 1857, Proc. Am. Ass.

- Ad. Sci., vol. 10, р. 179, Kaskaskia Gr. Мевкорова, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, р. 383. [Ety. proper name.] Bifoliate, sometimes branching; the median laminæ thin, flexuous; cells arranged with their oblique apertures directed toward the distal margin of the expansion; lunarium moderate or obsolete; zocecial tubes oblique, the anterior walls thinnest and flexuous; diaphragms numerous, often recurved; ocecium a large oval cell, showing as a convex space with a small apical perfo-ration. Type M. eximia.
 - (?) aperta, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 76, Keokuk Gr.

NEM.-PAL.]

approximata, Ill., vol. 8, 1



FIG. 494.--Meekopo ra clausa. Aper cular cover x 5(

cinctosa, see E NEMATAXIS, Hal 74. [Ety. 1 Ramose, soli from a filifo parallel rows face marked of cell apert the branch. pearance. fibrosus, Hall, 74, Up. Held simplex, Hall, 193, Ham. G NEMATOPORA, Ul Ill., vol. 8, p poros, pore.] uous above t zoœcia subt a radial ma minute axia subcircular, arranged bet one or two present. Ty alternata, Ulri Ill., vol. 8. pl delicatula, Ulr Ill., vol. 8, pl quadrata, Ulri Ill., vol. 8, pl retrorsa, Ulrich vol. 8, pl. 29 NICHOLSONELLA, 1 Ill., vol. 8, p. Irregularly branches, son tubular, with ture" region granose peri occupied by pores, that zoœcia; walls mesopores th region traver

buli; the int with a calcar the tubuli co mesopore wal mesopores w diaphragms.

cumulata, Ulric vol. 8, pl. 33,

LIC. MEE.

LIC. MEE.

p. 287, Up. **Y.**, vol. 6, cell; poros, anches conell apertures g the fenespiments carand much the appeardissepiments of the frond.

lla ambigua,) Nat. Hist., p.

N. Y., vol.

stella perfot. Mus. Nat.

m. Ass. Ad. y. lyra, lute; nsisting of a gined by two to five rows



opora cinc-Noncellulifer-

leo. Sur. Ill., ir. Proc. Am. 179, Kaskas-

ss,) Geo. Sur. kia Gr. n, 1868, Geo. irlington Gr. roc. Am. Ass. askaskia Gr. es,) Geo. Sur. proper name.] anching; the exuous; cells que apertures tal margin of n moderate or blique, the anflexuous; diaten recurved; showing as a ll apical perfo-

ss,) Geo. Sur. k Gr.

MOLLUSCOIDA.

approximata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 77, Kaskaskia Gr.

clausa, Ulrich, 1884, (Fistulipora? clausa,) Jour. Cin. Soc. Nat. Hist., vol. 7, p. 47, Kaskaskia Gr. eximia, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 77, Kaskaskia Gr.

Mitoclema, Ulrich, 1882, Jour. Cin. Soc. Nat. FIG. 494.-Meekopora clausa. Aper Hist., vol. 5, p. 150. cular cover x 50. Syn. for. Enallopora.

NEM.-PAL.]

cinctosa, see Enallopora cinctosa. NEMATAXIS, Hall, 1887, Pal. N. Y., vol. 6, p.

- 74. [Ety. nema, thread; axon, axis.] Ramose, solid, bifurcating, cells arising from a filiform axis, apertures oval, in parallel rows, separated by ridges; surface marked with monticules, destitute of cell apertures, and extending across the branch, give it an annulated appearance. Type N. fibrosus.
- fibrosus, Hall, 1887, Pal. N. Y., vol. 6, p. 74, Up. Held. Gr. simplex, Hall, 1887, Pal. N. Y., vol. 6, p.
- 193, Ham. Gr.
- NEMATOPORA, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p. 401. [Ety. nema, thread; poros, pore.] Slender, ramose, continuous above the pointed basal extremity : zoœcia subtubular, short, arranged in a radial manner around one or two minute axial tubes; apertures ovate or subcircular, with peristome, generally arranged between longitudinal ridges; one or two diaphragms occasionally present. Type N. quadrata.
- alternata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8. pl. 29, Galena Gr.
- delicatula, Ulrich, (in press,) Geo. Sur-Ill., vol. 8, pl. 29, Galena Gr.
- quadrata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 29, Trenton Gr.
- retrorsa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 29, Galena Gr.
- Nicholsonella, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p. 374. [Ety. proper name.] Irregularly intertwining, flattened branches, sometimes laminated ; zoœcia tubular, with diaphragms in the "mature" region; apertures circular, with a granose peristome; interspaces wide, occupied by numerous angular mesopores, that more or less isolate the zoœcia; walls of both the zoœcia and mesopores thin, and in the mature region traversed longitudinally by tubuli; the interzocecial spaces are filled with a calcareous deposit, into which the tubuli continue, but in which the mesopore walls become unrecognizable; mesopores with thick and numerous diaphragms. Type N. ponderosa.
- cumulata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 33, Hud. Riv. Gr.

ponderosa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 34, Trenton Gr.

- ODONTOTRYPA, Hall, 1887, Pal. N. Y., vol. 6, p. xvii. [Ety. odous, tooth; trupa, opening.] Distinguished from Lichenalia, by the oblique trilobate, closely arranged cell apertures, with strongly elevated, denticulated margins, forming a crescentic projection over the aper-ture. Type O. alveata.
- alveata, Hall, 1881, (Lichenalia alveata,) Trans. Alb. Inst., vol., 10, p. 10, and Pal. N. Y., vol. 6, p. 85, Up. Held. Gr.
- ORTHOPORA, Hall, 1887, Pal. N. Y., vol. 6, p. xiv. [Ety. orthos, straight; poros, pore.] Zoarium ramose, solid; cell apertures arranged in parallel, longitudinal rows; intercellular space solid, or occupied near the surface by minute tubuli; no septa. Type O. regularis.
- bispinulata, Hall, 1884, (Callopora bispinulata,) Rep. St. Geol., p. 14, Ham. Gr. ornata, Hall, 1887, Pal. N. Y., vol. 6, p.
- 184, Ham. Gr.
- regularis, Hall, 1874, (Trematopora regu-laris,) 26th Rep. N. Y. St. Mus. Nat. Hist., p. 105, Up. Held. (ir. reticulata, Hall, 1887, Pal. N. Y., vol. 6,
- p. 179, Ham. Gr.
- rhombifera, Hall, 1874, (Trematopora rhombifera,) 26th Rep. N. Y. St. Mus.
- Nat. Hist., p. 106, Up. Held. Gr. scutulata, Hall, 1881, (Trematopora scutu-lata,) Trans. Alb. Inst., vol. 10, p. 6, and Pal. N. Y., vol. 6, p. 70, Up. Held. Gr.
- PACHYDICTYA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 152. [Ety. pachys, thick; dictyon, net.] Zoarium composed of large, thick, branching fronds; cells ovate, separated by interstitial tubes; diaphragms in both sets of tubes; median epithecal plates perfo-rated by minute foramina. Type P. robüsta.
- conciliatrix, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 76, Trenton Gr.
- everetti, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 33, Trenton Gr.
- fimbriata, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 75, Trenton Gr.
- firma, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 31, Hud. Riv. Gr.
- foliata, Ulrich, 1886, 14th Rep. Geo. Sur.
- Minn., p. 73, Trenton Gr. gigantea, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 31, Hud. Riv Gr.
- vol. 6, pl. 6, 1101, 1896, 14th Rep. Geo.
 Sur. Minn., p. 75, Trenton Gr.
 robusta, Ulrich, 1882, Jour. Cin. Soc. Nat.
 Hist., vol. 5, p. 173, Trenton Gr.
 splendens, Ulrich, (in press,) Geo. Sur.
 Ul. 31, and 32, Hud. Pig. Geo.

- Ill., vol. 8, pl. 31 and 32, Hud. Riv. Gr. PALESCHARA, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 107. [Sig. ancient Eschara.] Incrusting expansions; cells polygonal, oblong, separated by thin solid walls; maculæ present; no spiniform tubuli or diaphragms. Type P. incrustans.

which curve e rays of the e in the dissmall, ovate. amplectans, Hall, 1884, Rep. St. Geol., p. 7, Ham. Gr.

aspera, Hall, 1876, syn. for P. maculata. bifoliata, syn. for Pillodictya nebulosa. bilateralis, Hall, 1883, Rep. St. Geo., pl.

16, fig. 22-25, Low. Held. Gr.

concentrica, Hall, 1887, Pal. N. Y., vol. 6, p. 67, Low. Held. Gr.

foliata, syn. for Ptilodictya nebulosa. incrassata, Hall, 1879, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 121, Niagara Gr. incrustans, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 107, Low. Held. Gr.

intercella, Hall, 1884, Rep. St. Geol., p. 5, Ham. Gr.

maculata, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 121, Niagara Gr.



IG. 495.–Pale-chara offula. Low. Held. Gr. reticulata, Hall, 1884, Rep. St. Geol., p. 6, FIG. 495.-Pale schara offula.

Ham. Gr.

sphaerion, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 121, Niagara Gr. tenuis, Hall, 1887, Pal. N. Y., vol. 6, p.

36, Low. Held. Gr.

variacella, Hall, 1884, Rep. St. Geol., p. 6, Ham. Gr.

PETALOTRYPA, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p. 377. [Ety. petalos, spread out; trupa, an opening.] Bifoliate, consisting of irregular, compressed branches or simple fronds, celluliferous on both sides; zoœcial tubes prismatic, arising from a strongly flexuous mesial line; apertures subcircular or polygonal; mesopore-like interspaces, that do not differ in their tabulation from the zoœcia, may occur; very small acantho-

pores (?) occupy manyoftheangles of junction. Type P. compressa.

compressa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 46, Ham. Gr.

delicata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 46, Ham. Gr. PETIGOPORA, Ulrich,

1882, Journal Cin. Soc. Nat. Hist., vol. 5, p. 155. [Ety. petigo, scab: poros, pore.] Small

patches adhering to foreign objects, with a narrow nonporiferous band or germinating membrane along the outer margin; no interstitial cells; spiniform asperula, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 157, Hud. Riv. Gr.

gregaria, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 155, Hud. Riv. Gr. petechialis, Nicholson, 1875, (Chetetes

petechialis,) Ohio Pal., vol. 2, p. 213, Hud. Riv. Gr.



. 496.—Petigopora petechialis on a Monticu-lipora; also, specimen greatly enlarged. FIG.

- PHACELOPORA, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, p. 368. [Ety. phakelos, bundle; poros, pore.] Zoarium articulated; segments short, obconical, consisting of two or more equal, conical zoœcia, with slightly contracted circular apertures. Type P. pertenuis.
- constricta, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 29, Trenton Gr. pertenuis, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 29, Galena Gr. PHÆNOPORA, Hall, 1852, Pal. N. Y., vol. 2,
 - p. 46. [Ety. phaino, to open or make a window; poros, pore.] Zoarium form-ing thin, broad, or ensiform expansions, celluliferous on both sides; cellules oval and arranged between elevated lines; maculæ often developed; distinguished from Ptilodictya and Stictopora by the absence of a nonporiferous, striated edge. Type P. explanata.



FIG. 497.-Phænopora constellata. Sections x 50.

- constellata, Hall, 1852, Pal. N. Y., vol. 2, p. 47, Clinton Gr.
- ensiformis, Hall, 1852, Pal. N. Y., vol. 2, p. 48, Clinton Gr.
- excellens, Billings, 1866, (Ptilodictya excellens,) Cat. Sil. Foss. Antic., p. 34, Anticosti Gr.

PHR.-POL.]

expansa, H Pal., vol.



FIG. 498. - Pha pora expansa

ous on o elevated prominent out septa ; ulose near P. cristata cristata, Hal 10, p. 12, Up. Held. cristata var. Y., vol. 6, PHYLLODICTYA Soc. Nat. phyllon, le forming s sometimes small, oblique, with the lower margin lipped; interstitial spaces minutely granular or punctate. Type P. frondosa. frondosa, Ul Nat. Hist., PHYLLOPORA, H Nat. Hist., phyllon, lea rium like lules on the of the ray Type P. eh aspera, Ulrich vol. 8, pl. 46 corticosa, see l ehrenbergi, ehrenbergi, Gr. Very America. superba, Ulri vol. 8, pl. 4 variolata, see

PET.-PHAE.

PET.-PHA.

Cin. Soc. Nat. Riv. Gr. 5. (Chetetes ol. 2, p. 213,



on a Monticuy enlarged

ss,) Geo. Sur. ikelos, bundle: ;iculated; segconsisting of l zoœcia, with lar apertures.

ss.) Geo. Sur. Gr. is.) Geo. Sur. Gr.

N. Y., vol. 2, oen or make a loarium formm expansions, ides; cellules veen elevated loped; distinand Stictopora oriferous, striinata.



. N. Y., vol. 2,

. N. Y., vol. 2,

Ptilodictya ex-Antic., p. 34, MOLLUSCOIDA.

expansa, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 114, Niagara Gr.

- explanata, Hall, 1852, Pal. N. Y., vol. 2, p. 46, Clinton Gr. multipora, Hall, 1851, Geo. Lake Supp. Land Dist., vol. 2, p. 206,
- Trenton Gr. tenuis, Hall, 1874. (Escharopora tenuis,) 26th Rep. N. Y. St. Mus. Nat. Hist., p. 99, Low. Held. Gr.
- PHEACTOPORA, Hall, 1881, Trans. Alb. Inst., vol. 10, p. 12. [Ety. phractos, inclosed; poros, pore.] Zoarium explanate, free or in-crusting, frequently contorted, cellulifer-

FIG. 498. - Phænopora expansa

PHR.-POL.]

ous on one or both faces; surface elevated at irregular intervals into prominent crests; cells tubular, without septa; intercellular structure vesiculose near the base, septate above. Type P. cristata.

- cristata, Hall, 1881, Trans. Alb. Inst., vol. 10, p. 12, and Pal. N. Y., vol. 6, p. 99, Up. Held. Gr.
- cristata var. lineata, Hall, 1887, Pal. N.
- Y., vol. 6, p. 99, Up. Held. Gr. PHYLLODICTYA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 153. [Ety. phyllon, leaf; dictyon, net.] Zoarium forming simple, leaf-like expansions, sometimes branched; cell apertures small, ob-

lique, with the lower margin lipped; interstitial spaces minutely granular or



frondosa. frondosa, Ulrich, 1882, Jour. Cin. Soc.

Nat. Hist., vol. 5, p. 174, Trenton Gr. PHYLLOPORA, King, 1849, Ann. and Mag. Nat. Hist., 2d ser., vol. 3, p. 389. [Ety. phyllon, leaf; poros, perforation.] Zoarium like Fenestella, but having cellules on the whole of the under surface of the rays in two or more ranges. Type P. ehrenbergi.

aspera, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 46, Up. Held. Gr.

corticosa, see Subretepora corticosa, ehrenbergi, Geinitz, 1846, (Gorgonia ehrenbergi,) Grundriss, p. 585, Permian Very doubtfully identified in Gr. America.

superba, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 46 and 55, Ham. Gr. variolata, see Subretepora variolata.

Phylloporina, Ulrich, syn. for Subretepora. PILEOTRYPA, Hall, 1887, Pal. N. Y., vol. 6,

- p. xvi. [Ety. pileos, cap; trupa, open-ing.] Distinguished from Lichenalia by having the posterior portions of the peristomes strongly elevated and anched, with distinct denticulations in the aperture, which, in the course of growth, form two longitudinal striations along the interior of the cell wall. Type P. denticulata.
- clivulata, Hall, 1881, (Lichenalia clivulata,) Trans. Alb. Inst., vol. 10, p. 9, and Pal. N. Y., vol. 6, p. 83, Up. Held. Gr. denticulata, Hall, 1881, (Lichenalia den-
- ticulata,) Trans. Alb. Inst., vol. 10, p. 8, and Pal. N. Y., vol. 6, p. 84, Up. Held. Gr.
- granifera, Hall, 1881, (Lichenalia granifera,) era,) Trans. Alb. Inst., vol. 10, p. 11, and Pal. N. Y., vol. 6, p. 84, Up. Held. Gr.
- pyriformis, Hall, 1881, (Lichenalia pyri-formis,) Trans. Alb. Inst., vol. 10, p. 12, and Pal. N. Y., vol. 6, p. 82, Up. Held. Gr.
- PINACOTRYPA, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p, 384. [Ety. pinax, plank; trupa, opening.] Thin, contorted expansions, with a wrinkled epitheca below; zoœcia with subcircular apertures, a well-developed granose peristome, thin walls, and, so far as observed, no lunarium; interspaces wide, occupied by a single series of very large angular mesopores, which never present the appearance of vesicular tissue ; diaphragms horizontal, few in the zoœcial tubes, numerous in the mesopores. Type P. elegans.
 - elegans, Rominger, 1866, (Fistulipora elegans,) Proc. Acad. Nat. Sci. Phil., p. 9, Ham. Gr.
- Pinnatopora, syn. for Glauconome.

curvata, see Glauconome curvata. intermedia, see Glauconome intermedia. minor, see Glauconome minor. simulatrix, see Glauconome simulatrix. subangulata, see Glauconome subangulata.

tenuiramosa, see Glauconome tenuiramosa. vinei, see Glauconome vinii. whitei, see Glauconome whitii.

youngi, see Glauconome youngi.

- POLYPORA, McCoy, 1845, Carb. Foss. Ireland, p. 206. [Ety. polys, many; poros, pore.] Zoarium like that of Fenestella, from which it is distinguished by having no median ridge on the celluliferous side of the rays, and in having from three to ten rows of cell openings. Type P. dendroides
 - aculeata, Hall, 1881, (Fenestella aculeata,) Trans. Alb. Inst., vol. 10, p. 21, and Pal. N. Y., vol. 6, p. 157, Up. Held. Gr. adnata, Hall, 1881, (Fenestella adnata,)
 - Trans. Alb. Inst., vol. 10, p. 25, and Pal. N. Y., vol. 6, p. 152, Up. Held. Gr.
- albionensis, Spencer, 1884, Bull. No. 1, Univ. St. Mo., p. 55, Niagara Gr.



punctate. Type P. approximata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 61, Kaskaskia Gr.

- arkonensis, S. A. Miller, 1883, 2d ed. Am. Pal. Foss., p. 292, Ham. Gr. Proposed instead of P. tuberculata, Nicholson, in Geo. Mag. for April, 1874, and Rep. Pal. Prov. Ont., p. 100, figs. 37, a, b, c. Found at Arkona, township of Bosanquet, Canada.
- arta, Hall, 1879, (Fenestella arta,) 32d Rep. N. Y. St. Mus. Nat. Hist., p. 163, Low. Held. Gr.
- biarmica, Keyserling, 1846, Geognost. Beobacht, p. 191. Geinitz referred a form from the Coal Meas., and Prout referred one from the Kaskaskia Gr. to it. Probably not an American species.

biseriata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 60, Warsaw and St. Louis Gr.

blandida, Ulrich, 1886, Contri. to Amer. Pal., FIG. 500. -Polypora biseriata. Aper-ture having the central perfora-tion of the cover closed, x 50. p. 18, Up. Held. Gr. brevisulcata, Hall, 1881, (Fenestella brevisul-

cata,)Trans. Alb. Inst., vol. 10, p. 26, and Pal. N. Y., vol. 6, p. 168, Up. Held. Gr.

burlingtonensis, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 59, Burlington Gr. carinella, Hall, 1887, Pal. N. Y., vol. 6, p.

153, Up. Held. Gr.

- celsipora, Hall, 1881, (Fenestella celsipora,) Trans. Alb. Inst., vol. 10, p. 24, and Pal. N. Y., vol. 6, p. 150, Up. Held Gr.
- celsipora var. minima, Hall, 1881, (Fenestella celsipora var. minima,) Trans. Alb., Inst., vol. 10, p. 24, and Pal. N. Y., vol. 6, p. 151, Up. Held. Gr.
- celsipora var. minor, Hall, 1881, (Fenestella, celsipora var. minor,) Trans. Alb.
- tena, ceisipora var. minor,) irans. Alb.
 Inst., vol. 10, p. 24, and Pal. N. Y., vol. 6, p. 151, Up. Held. Gr.
 cestriensis, Ulrich, (in press,) Geo. Sur.
 Ill., vol. 8, pl. 60, Kaskaskia Gr.
 compacta, Hall, 1879, (Fenestella compacta,) 32d Rep. N. Y. St. Mus. Nat.
 Hist., p. 163, Low. Held. Gr.
 complete Ulrich (in press.) Geo. Sur.

complanata, Ulrich, (in press.) Geo. Sur.
ill., vol. 8, pl. 60, Kaskaskia Gr.
compressa, Hall, 1879, (Fenestella Compressa,) 32d Rep. N. Y. St. Mus. Nat. Hist., p. 164, Low. Held. Gr.

corticosa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 61, Kaskaskia Gr.

crebescens, Hall, 1887, Pal. N. Y., vol. 6, p. 170, Up. Held. Gr.

crassa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 61, Up. Coal Meas.

cultellata, Hall, 1881, (Fenestella cultellata,) Trans. Alb. Inst., vol. 10, p. 21, and

- Pal. N. Y., vol. 6, p. 160, Up. Held. Gr. distans, Hall, 1881, (Fenestella distans,) Trans. Alb. Inst., vol. 10, p. 24, and Pal.
- N. Y., vol. 6, p. 161, Up. Held. Gr. elegans, Hall, 1974, 26th Rep. N. Y. St.

Mus. Nat. Hist., p. 97, Low. Held. Gr.

- elongata, Hall, 1882, Rep. St. Geol-and Pal. N. Y., vol. 6, p. 153, Up-Held. Gr.
- eudora, Hall, 1887, Pal. N. Y., vol. 6, p. 58, Low. Held. Gr. fistulata, Hall, 1884, (Fenestella fistulata,)
- 36th Rep. N. Y. St. Mus. Nat. Hist., p. 59, Ham. Gr.
- flabelliformis, Hall, 1881, (Fenestella flabelliformis,) Trans. Alb. Inst., vol. 10, p. 23, and Pal. N. Y., vol. 6, p. 161, Up. Held. Gr.
- gracilis, Prout, 1860, Trans. St. Louis Acad. Sci., p. 580, Warsaw Gr.
- grandis, Toula, 1875, N. Jahrbuch, p. 230. Carboniferous.
- granilinea, Hall, 1881, (Fenestella granilinea,) Trans. Alb. Inst., vol. 10, p. 27, and Pal. N. Y., vol. 6, p. 154, Up. Held. Gr.
- hallana, Prout, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 580, Warsaw Gr. hamiltonensis, Prout, 1866, Geo. Sur. III.,
- vol. 2, p. 423, Ham. Gr.
- Applied Trans. Alb. Inst., vol. 10, p. 27, and Pal. N. Y., vol. 6, p. 164, Up. Held. Gr.
- hexagonalis var. foraminulosa, Hall, 1881, Fenestella hexagonalis var. foraminulosa,) Trans. Alb. Inst., vol. 10, p. 27, and Pal. N. Y., vol. 6, p. 165, Up. Held. Gr.
- idothea, Hall, 1879, (Fenestella idothea,) 32d Rep. N. Y. St. Mus. Nat. Hist, p. 97, Low. Held. Gr.
- imbricata, Prout, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 412, Devonian. impressa, Ulrich, 1888, Bull. Denison Univ.,
- vol. 4, p. 72, Cuyaboga Shale. incepta, Hall, 1852, Pal. N. Y., vol. 2, p.
- 167, Niagara Gr.
- intermedia, Prout, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 272, Up. Held Gr.
- lævinodata, Hall, 1881, (Fenestella lævinodata,) Trans. Alb. Inst., vol. 10, p. 28, and Pal. N. Y., vol. 6, p. 169, Up. Held. Gr.
- lævistriata, Hall, 1883, Rep. St. Geol. and Pal. N. Y., vol. 6, p. 159, Up. Held. Gr.
- largissima, Hall, 1881, (Fenestella largissima), Trans. Alb. Inst., vol. 10, p. 22, and Pal. N. Y., vol. 6, p. 156, Up. Held. Gr.
- lilæa, Hall, 1874, 26th Rep. N. Y. St. Mus.
- Nat. Hist., p. 62, Low. Held. Gr. maccoyana, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 59. Keokuk Gr.
- megastoma, DeKoninck, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 5, Carboniferous. mexicana, Prout, 1858, Trans. St. Louis
- Acad. Sci., vol. 1, p. 270, Permian Gr. mutabilis, Hall, 1881/ (Fenestella muta-
- bilis,) Trans. Alb. Inst., vol. 10, p. 25, and Pal. N. Y., vol. 6, p. 166, Up. Held. Gr.
- nexa, Hall, 1881, (Fenestella nexa,) Trans. Alb. Inst., vol. 10, p. 25, and Pal. N. Y., vol. 6, p. 165, Up. Held. Gr.

PR -PRO.]

POL.

nodocarinata, Ill., vol. 8, obliqua, Hall 64, Low. H papillata, Mc land, p. 226 paxillata, Hal 32d Rep. N 164, Low. H perangulata, angulata,) 7 23, and Pal Held, Gr. perundata, H data,) Tran and Pal. M Held. Gr. porosa, Hall. Trans. Alb. N. Y., vol. 6 propria, Hall, Trans. Alb. N. Y., vol. 6 (?) psyche, Bi p. 11, Gaspe pulchella, Ni Lond. n. s., quadrangulari quadrangula 10, p. 21, an Up. Held. (radialis, Ulric. vol. 8, pl. 60 retrorsa, Ulric vol. 8, pl. 59

rigida, Prout,

Sci., vol. 2, j rigida, Hall,

N. Y., vol. 6 robusta, Hall,

Trans. Alb.

169, Up. He separata, Hall Pal. N. Y.

N. Y., vol. 6 rustica, Hall,

FIG. 501.—Polypor shumardi. En larged.

Fenestella

Inst., vol. 10

6, p. 168, Up.

Trans. Alb.



POL

St. Geol p. 153, Up.

7., vol. 6, p.

la fistulata.) lat. Hist., p.

enestella flanst., vol. 10, , p. 161, Up.

St. Louis Gr. ouch, p. 230,

stella grani-

ol. 10, p. 27, p. 154, Up. . St. Louis

arsaw Gr. eo. Sur. Ill., iestella hex-

., vol. 10, p. p. 164, Up.

1, Hall, 1881. r. foraminud. 10, p. 27, 5. 165, Up.

lla idothea.) t. Hist, p. 97,

s. St. Louis evonian. nison Univ.,

Y., vol. 2, p.

ns. St. Louis). Held Gr. estella lævivol. 10, p. 28, p. 169, Up.

St. Geol. and p. Held. Gr. stella largisol. 10, p. 22, p. 156, Up.

Y. St. Mus. d. Gr. ,) Geo. Sur. Gr. Quar. Jour. rboniferous. 18. St. Louis ermian Gr. estella mutaol. 10, p. 25, p. 166, Up.

nexa,) Trans. d Pal. N. Y., MOLLUSCOIDA.

- nodocarinata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 61, Coal Meas. obliqua, Hall, 1887, Pal. N. Y., vol. 6, p.
- 64, Low. Held. Gr. papillata, McCoy, 1862, Carb. Foss. of Ire-
- land, p. 226, Up. Coal Meas. paxillata, Hall, 1879, (Fenestella paxillata,) 32d Rep. N. Y. St. Mus. Nat. Hist., p.
- 164, Low. Held. Gr.
- perangulata, Hall, 1881, (Fenestella per-angulata,) Trans. Alb. Inst., vol. 10, p. 23, and Pal. N. Y., vol. 6, p. 162, Up. Held, Gr.
- perundata, Hall, 1881, (Fenestella perundata,) Trans. Alb. Inst., vol. 10, p. 27, and Pal. N. Y., vol. 6, p. 163, Up. Held. Gr.
- porosa, Hall, 1881, (Fenestella porosa,) Trans. Alb. Inst., vol. 10, p. 26, and Pal.
- N. Y., vol. 6, p. 163, Up. Held. Gr. propria, Hall, 1881, (Fenestella propria,) Trans. Alb. Inst., vol. 10, p. 22, and Pal. N. Y., vol. 6, p. 157, Up. Held. Gr.
- (?) psyche, Billings, 1874, Pal. Fess., vol. 2, p. 11, Gaspe limestone No. 8, Devonian.
- pulchella, Nicholson, 1874, Geo. Mag. Lond. n. s., vol. 1, p. 161, Corniferous Gr. quadrangularis, Hall, 1881, (Fenestella quadrangularis,) Trans. Alb. Inst., vol. 10, p. 21, and Pal. N. Y., vol. 6, p. 158, Up. Held. Gr.
- radialis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 60, Keokuk Gr.
- retrorsa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 59, Keokuk Gr.
- rigida, Prout, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 412, Up. Held. Gr.
- Trans. Alb. Inst., vol. 10, p. 22, and Pal.
 N. Y., vol. 6, p. 155, Up. Held. Gr.
 robusta, Hall, 1881, (Fenestella robusta,)
- Trans. Alb. Inst., vol. 10, p. 22, and Pal. N. Y., vol. 6, p. 156, Up. Held. Gr. rustica, Hall, 1887, Pal. N. Y., vol. 6, p.
- 169, Up. Held. Gr.
- separata, Hall, 1882, Rep. St. Geol. and Pal. N. Y., vol. 6, p. 166, Up. Held. Gr.

shumardi, Prout, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 271, Up. Held. Gr. simulatrix, Ulrich, (in

press,) Geo. Sur. Ill., vol. 8, pl. 59, Keokuk Gr. spinulifera, Ulrich, (in

- press,) Geo. Sur. Ill., vol. 8, pl. 61, Kaskaskia Gr. and Coal Meas.
- stragula, White, 1874, Rep. Invert. Foss., p. 19, and Geo. Sur. W. 100th Mer. vol. 4, p. 108, Coal Meas.

ged. striatopora, Hall, 1881, (Fenestella striatopora,) Trans. Alb. Inst., vol. 10, p. 23, and Pal. N. Y., vol. 6, p. 168, Up. Held. Gr.

- stricta, Hall, 1887, Pal. N. Y., vol. 6, p. 59, Low. Held. Gr.
- submarginata, Meek, 1872, Pal. E. Neb., p. 154, Coal Meas.
- submutans, Hall, 1881, (Fenestella sub-mutans,) Trans. Alb. Inst., vol. 10, p. 21, and Pal. N. Y., vol. 6, p. 167, Up. Held. Gr.
- tenella, Nicholson, 1874, Geo. Mag. Lond. n. s., vol. 1, p. 162, Corniferous Gr.
- transversa, Ulrich, 1886, Cont. to Am. Pal., p. 18, Up. Held. Gr.
- tuberculata, Prout, 1859, Trans. St. Louis Acad. Sci., vol. 1, p. 449, Kaskaskia Gr.
- tuberculata, Nicholson, see P. arkonensis. varsoviensis, Prout, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 237, Warsaw Gr.
- varsoviensis var. spininodata, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 60, Warsaw Gr
- whitii, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 62, Coal Meas.
- whitii var. eximia, Ulrich, (in press,) (ieo. Sur. Ill., vol. 8, pl. 62, Coal Meas.
 PRISMOPORA, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 17. [Ety. prismos, the hole mode in priming indication and the source hole made by a cylindrical saw; poros, pore.] Ramose, branches triangular, dichotomous, each side celluliferous; tubes radiate from the center to each angle, margins noncelluliferous; interstitial spaces smooth, vesicular. Type P. triquetra.
- dilatata, Hall, 1884, Rep. St. Geol., p. 50, Ham. Gr.
- lata, Hall, 1887, Pal. N. Y., vol. 6, p. 266, Ham. Gr.
 - minima, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 78, Coal Meas. paucirama, Hall, 1881, Bryozoans of the
 - Up. Held. Gr., p. 17, and Rep. St. Geol.,
 - 1883, pl. 25, fig. 11, Up. Held. Gr. serrata, Meek, 1875, (Ptilodictya serrata,)
 - Pal. Ohio, vol. 2, p. 327, Coal Meas. serrulata, Ulrich, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 41, Kaskaskia Gr. Perhaps the same as P. serrata.
 - sparsipora, Hall, 1881, (Thallostigma spar-sipora,) Trans. Alb. Inst., vol. 10, p. 13, and Pal. N. Y., vol. 6, p. 288, Up. Held, Gr.
 - triquetra, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 17, and Rep. St. Geol.
- 1883, pl. 25, fig. 8-10, Up. Held. Gr. PROTOCRISINA, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, p. 369. [Ety. protos. first; Crisina, a genus.] Ramose, celluliferous on one side only; cells subtubular, with prominent circular apertures; reverse finely grano-striate; small pores, apparently communicating with the interior of the zoœcia, are rather irregularly distributed over both sides of the branches; axis thin, cruciform in transverse section; external walls thick. Type P. exigua.
- exigua, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 29 and 53, Trenton and Hud. Riv. Gr.



PRI.-PRO.]



Fig. 501.—Polypora shumardi. En-

larged.

PROUTELLA, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p. 403. [Ety. proper name.] Discoid, thin, free, lower surface convex and lined with a concentrically wrinkled epitheca; primary zoœcia subtubular, the succeeding ones shorter, all rather thin-walled; aperture broadelliptical, surrounded by a narrow, sloping area, hexagonal in outline; when perfect, with a depressed delicate calcareous plate, that closes a little less than two-thirds of the opening, the orifice left being subtriangular in form, without thickened margins, and situated at the anterior side; with age, a second, third, and more layers of zocecia are developed directly over the first, so that they gradually form a zoœcial tube seemingly having the cavity intersected by incomplete diaphragms; these appear to spring from the posterior wall, and extend about one-half the distance across. Type Cyclopora discoidea. Syn.? for Cyclopora.

318

- discoidea, Prout, 1860, (Cyclopora discoidea,) Trans. St. Louis Acad. Sci., vol. 1, p. 578, Keokuk Gr. Pteropora duogeneris, Hall, syn. for
- Tæniopora exigua. Ptilionella, Hall, 1884, Rep. St.
 - Geol., p. 56, syn. for Reptaria.
- nodata, see Reptaria nodata. penniformis, see Reptaria penniformis.
- PTILODICTYA, Lonsdale, 1839, Murch. Sil. Syst., p. 676. [Ety. ptilon, feather; dictyon, net.] The correct orthography is Ptilodictyon. Zoarium pointed below, articulating into a spreading base, above a leaf-like expansion, which is sometimes lobed at the distal extremity, celluliferous on both faces, divided by a mesial lamina; margin without cells; apertures circular or subquadrate; no intercellular tissue. Type P. lanceolata.



- FIG. 502. -- Ptilodictya maculata. Vertical section x 35, showing spinous process.
 - acuminata, James, 1876, Int. Catal. Cin. Foss., p. 3, Hud. Riv. Gr. Not well defined.

alcyone, see Pachydictya alcyone. arctipora, see Bythopora arctipora. arguta, see Stictopora arguta.

bipunctata, Van Cleve, 1883, 12th Rep. Ind. Geol. and Nat. Hist., p. 266, Niara Gr.

PRO.-PTI.

- briareus, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 164, Trenton Gr.
- canadensis, Billings, 1866, Catal. Sil. Foss. Antic., p. 9, Hud. Riv. Gr.

carbonaria, see Stictopora carbonaria. cosciniformis, see Coscinella cosciniformis. dictyota, Meek, 1873, Hayden's 6th Rep.

Geo. Sur. Terr., p. 465, Subcarboniferous. emacerata, see Dicranopora emacerata, excellens, see Phænopora excellens.

explicans, Safford, 1869, Geo. of Tenn. Not defined.

falciformis, Nicholson, 1875, Ohio Pal., vol.

2, p. 259, Hud. Riv. Gr. fenestelliformis, Nicholson, 1875, Ohio

Pal., vol. 2, p. 263, Hud. Riv. Gr.



FIG. 503.-Ptilodictya magnifica. Sections x 50.

- flagellum, Nicholson, 1875, Ohio Pal., vol. 2, p. 26?, Hud. Riv. Gr.
- fragilis, see Dicranopora fragilis.
- gladiola, Billings, 1866, Catal. Sil. Foss., Antic., p. 10, Anticosti Gr.
- hilli, James, 1882, (as figured by Ulrich,) Jour. Cin. Soc. Nat. Hist., vol. 5, pl. 7, Trenton Gr.
- internodia, see Dicranopora internodia. libana, Safford, 1869, Geo. of Tenn. p. 286,
- Trenton Gr. lirata, Hall, 1874, (Escharopora lirata,) 26th Rep. N. Y. St. Mus. Nat. Hist., p.
- 100, Low. Held. Gr. maculata, Ulrich, 1882, Jour Cin. Soc. Nat. Hist., vol. 5, p. 163, Hud. Riv. Gr.
- magnifica, S. A. Miller, 1878, Jour Cin. Soc.
- Nat. Hist., vol. 1, p. 100, Hud. Riv. Gr. meeki, Nicholson, 1874, Geo. Mag. n. s.,

vol. 1, p. 123, Corniferous and Ham. Gr.

- multiramis, Safford. Not defined. nebulosa, Hall, 1874, (Escharopora nebu-losa,) 26th Rep. N. Y. St. Mus. Nat. Hist., p. 99, Low. Held. Gr.
- nitidula, see Dicranopora nitidula.
- nodosa, James, 1882, (as figured by Ul-rich), Jour. Cin. Soc. Nat. Hist., vol. 5, pl. 7, Hud. Riv. Gr. The name was preoccupied. See P. variabilis.

PTI.]

obliqua, R obliqua,) Clinton 6 parallela, H 270, Ham



FIG. 504-Ptild

pavonia, I Paleont., perelegans, s plumaria, J rich,) Jou pl. 7, Huc plumea, Ha 271, Ham.

punctata, N Jour., p. 7 ramosa, Ulr

Hist., vol. retiformis, 1 p. 272, Ha

rustica, see scutulata, H lata,) Rep

serrata, see subrecta, U Sur. Minn sulcata, Bil

Antic., p. superba, Bil Antic., p. symmetra, Sa

tarda, Billin 13, Gaspe



FIG. 505.--Ptilod variabilis. verse section showing the portion of th layers of and the character median d 1a Between the there is no ser median tubuli

> Ireland, p poros, pore roots, from

PRO.-PTI.

12th Rep. 33, ., p. 266, Ni-

Cin. Soc. Nat. on Gr. atal. Sil. Foss.

rbonaria. cosciniformis. en's 6th Rep. carboniferous. emacerata. ellens.

of Tenn. Not

Ohio Pal., vol.

1875, Ohio Riv. Gr.



tions x 50

Ohio Pal., vol.

gilis. tal. Sil. Foss.,

ed by Ulrich,) ., vol. 5, pl. 7,

internodia.

f Tenn. p. 286,

ropora lirata,) Nat. Hist., p.

our Cin. Soc. Hud. Riv. Gr. Jour Cin. Soc. Hud. Riv. Gr. eo. Mag. n. s., and Ham. Gr. efined. aropora nebu-St. Mus. Nat. dr. itidula. gured by Ult. Hist., vol. 5, 'he name was iabilis.

Clinton Gr. Not well defined. parallela, Hall, 1887, Pal. N. Y., vol. 6, p. 270, Ham. Gr.

PTI.]



obliqua, Ringueberg, 1884, (Stictopora

obliqua,) Proc. Acad. Nat. Sci., p. 146,

FIG. 504—Ptilodictya pavonia. and magnified. Natural size,

pavonia, D'Orbigny, 1850, Produ Paleont., t. 1, p. 22, Hud. Riv. Gr. Prodr. de perelegans, see Graptodictya perelegans plumaria, James, 1882, (as figured by Ul-

rich,) Jour. Cin. Soc. Nat. Hist., vol. 5, pl. 7, Hud. Riv. Gr. plumea, Hall, 1887, Pal. N. Y., vol. 6, p.

271, Ham. Gr.

punctata, Nicholson & Hinde, 1874, Can.

Jour., p. 7, Clinton Gr. ramosa, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 164, Trenton Gr. retiformis, Hall, 1887, Pal. N. Y., vol. 6,

p. 272, Ham. Gr. rustica, see Stictopora rustica.

scutulata, Hall, 1884, (Stictopora scutulata,) Rep. St. Geol., p. 47, Ham. Gr.

serrata, see Prismopora serrata. subrecta, Ulrich, 1886, 14th Rep. Geo.

Sur. Minn., p. 63, Trenton Gr. sulcata, Billings, 1886, Catal.^{*} Sil. Foss.

Antic., p. 35, Anticosti Gr. superba, Billings, 1866, Catal. Sil. Foss. Antic., p. 35, Anticosti Gr.

symmetra, Safford. Not defined.

tarda, Billings, 1874, Pal. Foss., vol. 2, p. 13, Gaspe Limestone No. 8, Devonian. tenera, see Stictopora

tenera.

tenuis, see

triangulata,

pora tenuis.

1878, Proc. Acad. Nat. Sci., p. 35, and Cont. to Pal. No. 6,

p. 131, Coal Meas.

variabilis, Ulrich, in-

stead of P. nodosa.

James, that was pre-

occupied, Hud. Riv.

whiteavesi, Ulrich, (in

ontology, p. 18 Hud. Riv. Gr. (?)

press,) Micropalæ-

Phaeno-

White,

18,



FIG. 505 .- Ptilodictya variabilis. Trans-verse section x 50, showing the basal portion of the two layers of zoccia, and the duplex character the

of the lamina. median lamina. Between the plates Hud. Kiv. Gr. (1), there is no series of PTILOPORA, McCoy, 1844, median tubuli. Syn. Carb. Foss.

Ireland, p. 200. [Ety. ptilon, plume; poros, pore.] Flabelliform attached by roots, from which a strong midrib

Gr.

MOLLUSCOIDA

arises, giving origin on each side to thin, equidistant rays, connected by regular dissepiments; external face of the rays carinate and bearing two rows of pores. Type P. flustriformis.

acuta, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 65, Burlington and Keokuk Gr.

cylindracea, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 66, Keokuk Gr.

infrequens, Hall, 1887, Pal. N. Y., vol. 6, p. 284, Ham. Gr.

nodosa, Hall, 1884, Rep. St. Geol., p. 59, Ham. Gr.

paupera, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 66, Keokuk Gr.

prouti, Hall, 1858, Geo. Rep. Iowa, p. 653, Warsaw Gr.

striata, Hall, 1884, Rep. St. Geol., p. 58,

Ham. Gr. valida, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 65 and 66, Keokuk Gr.



FIG. 506.-Ptilodictya variabilis. Vertical section x 35, showing hemisepta

PTILOPORELLA, Hall, 1887, Pal. N. Y., vol. 6, p. xxiv. [Ety. from the genus Ptilopora.] Bryozoum growing in the same manner as Ptiloporina, but with only two ranges of cell apertures on the branches. Type P. laticrescens. inæqualis, Hall, 1887, Pal. N. Y., vol. 6, p.

171, Up. Held. Gr.

laticrescens, Hall, 1887, Pal. N. Y., vol. 6,

- p. 171, Up. Held. Gr. nervata, Nicholson, 1875, (Fenestella nervata,) Ohio Pal., vol. 2, p. 264, Niagara Gr.
- PTILOPORINA, Hall, 1887, Pal. N. Y., vol. 6, p. xxiv. [Ety. from the genus Ptilopora.] Resembling Fenestella, some branches larger than others; ordinary branches originate laterally from one or both sides of the primary branches, not bifurcating as in ordinary forms of Fenestella; cell apertures in three or more ranges. Type P. conica. conica, Hall, 1887, Pal. N. Y., vol. 6, p.

172, Up. Held, Gr. disparilis, Hall, 1887, Pal. N. Y., vol. 6, . p. 173, Up. Held, Gr.

pinnata, Hall, 1887, Pal. N. Y., vol. 6, p. 172, Up. Held. Gr.

sinistralis, Hall, 1887, Pal. N. Y., vol. 6, RETEPORINA, D'Orbigny, 1850, Prodr. d. p. 174, Up. Held. Gr. PTILOTRYPA, Ulrich, (in press,) Geo. Sur.

Ill., vol. 8, p. 393. [Ety. ptilon, feather; trupa, an opening.] Bifoliate, forming large ramose expansions. Zoœcial large ramose expansions. tubes and apertures very oblique; at the upper extremity of the acutely ovate aperture there is a small cell which is best seen in tangential sections; surface with irregular, longitudinally channeled spots. Type P. obliquata.

obliquata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 30, Hud. Riv. Gr.

- RAMIPORA, Toula, 1875, Permo-Carbon-Fossilien von der West Küste von poros, pore.] Staff in cross section, rounded, rhombic, with keel on both sides; branches in pairs, one on each side, and these connected in like manner by rays, upward and downward; pores on one side, on each side of the keel. Type R. hochstetteri.
 - hochstetteri, Toula, 1875, Permo-Carbon-Fossilien von der West Küste
- Spitzbergen, p. 6, Carboniferous. REPTARIA, Rolle, 1851, Leonhard & Bronn, Neues Jahrb., p. 810. [Ety. repto, to creep.] Zoarium parasitic, procumbent, attached its entire length; consisting of a rachis, from which proceed laterally, at regular intervals, cylindrical cell tubes, and at irregular distances tubes which have the same manner of growth as the primary rachis; cell-tubes turn abruptly outward at their distal extremities, and open in an aperture parallel with the axis of the branch. Type R. stolonifera.
 - nodata, Hall, 1884, (Ptilionella nodata,) Rep. St. Geol., p. 57, Ham. Gr. penniformis, Hall, 1884, (Ptilionella penni-
- formis,) Rep. St. Geol., p. 56, Ham. Gr. stolonifera, Rolle, 1851, Leonhard &

Bronn, Neues Jahrb., p. 810, Ham. Gr. Retepora, Lamarck, 1801, Syst. An. sans.

Vert. [Ety. rete, net; poros, pore.] Not a Palæozoic genus.

angulata, see Subretepora angulata. antiqua, as identified by d'Archiac & Ver-neuil. Not American.

archimedes, see Archimedes.

asperato-striata, see Subretepora asperatostriata.

clintoni, Vanuxem, 1842, Geo. Rep. 3d Dist. N. Y. Not recognized.

diffusa, see Thamniscus diffusa.

fenestrata, see Subretepora fenestrata.

foliacea, Hall, 1847. This name Prof. Hall says may be erased from the list.

gracilis, see Subretepora gracilis. hamiltonensis, see Reteporina hamiltonensis.

incepta, see Subretepora incepta. phillipsi, see Reteporina phillipsi. prisca, see Reteporina prisca. trentonensis, see Subretepora trentonensis.

Paléont., t. 1., p. 101. Ety, from *Retepora.*] Resembling Retepora, but having on the greater part of the branches only two ranges of cell apertures; branches connected by an astom sis or by dissepiments so short as to be essentially wanting. Type R. prisca. coalescens, Hall, 1887, Pal., N. Y., vol. 6, p. 120, Up. Held. Gr.

[PTI.-RHI.

- hamiltonensis, Prout, 1866, (Retepora hamiltonensis,) Trans. St. Louis, Acad. Sci., vol. 2, p. 412, Ham. Gr. perundulata, Hall, 1884, (Fenestella per-
- undulata,) 36th Rep. N. Y. St. Mus. Nat. Hist., p. 63, Ham. Gr.
- phillipsi, Nicholson, 1874, (Retepora phillipsi,) Geo. Mag. n. s., vol. 1, p. 163, Corniferous Gr.
- prisca, Goldfuss, 1831, (Retepora prisca,)
- Petref. Germ., vol. 1, p. 103, Ham. Gr. rhombifera, Hall, 1881, (Fenestella rhombifera,) Trans. Alb. Inst., vol. 10, p. 32, and Pal. N. Y., vol. 6, p. 120, Up. Held. Gr.
- striata, Hall, 1884, (Fenestella striata,) 36th Rep. N. Y. St. Mus. Nat. Hist., p. 72, Ham. Gr.
- RHINIDICTYA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 152. [Ety. rhine, file; dictyon, net.] Zoarium narrow, branching at long intervals; cells surrounded by a close series of small spiniform tubuli; otherwise like Stic-topora. Type R. nicholsoni. Syn. for Sulcopora probably.

FIG. 507.-Rhinidictya nicholsoni. Nataral size and magnified 18 diam.

granulosa, Hall, 1887, Pal. N. Y., vol. vi, p. 40, Low. Held. Gr.



FIG. 508. - Rhinopora verrucosa. Natural size and enlarged.

nicholsoni, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 170, Trenton Gr.

RHINOPORA, H 48. [Ety. panded or cellulifero in quince and raise surface. curvata, Rin Nat, Sci.,

frondosa, H Pal., vol. 2



F1G, 509.-Rh frondos

St. Mo., p. verrucosa, H 48, Clinton RHOMBOPORA,

Nebraska, poros, por short; se ating oblid on all side mouths r and arrar oblique spi with minu

scopic sect droidea. armata, Ulric Hist., vol. (?) asperrima

Ill., vol. 8, attenuata, U Ill., vol. 8 saw Gr.

confluens, see crassa, Ulrich Hist., vol. decipiens, U Ill., vol. 8,

dichotoma, U Ill., vol. 8, elegantula, U

Nat. Hist., Uh exigua, press,) Geo

vol. 8, pl. 70 ton Gr. gracilis, Uli press,) Geo

vol. 8, pl. 70 ton Gr.

incrassata, Ul Bull. Denis p. /89, Cu shales.

lepidodendroi 1872, Pal. Up. Coal M

PTI.-RIII

Prodr. d. ty. from Rettepora, but part of the of cell aperbyanastom hort as to be R. prisca. N. Y., vol. 6,

5. (Retepora Louis, Acad. nestella per-

Y. St. Mus. etepora phil-

pora prisca,) 3, Ham. Gr. estella rhomvol. 10, p. 32,

d. 1, p. 163,

p. 120, Up. ella striata,) Vat. Hist., p.

ar. Cin. Soc. [Ety. rhine, um narrow, ls; cells surof small **es** se like Sticni. Syn. for



iral size



Natural size

ur. Cin. Soc. Crenton Gr.

MOLLUSCOIDA.

RHINOPORA, Hall, 1852, Pal. N. Y., vol. 2, p. 48. [Ety. rhine, file; poros, pore.] Ex-panded or subcylindrical and hollow; celluliferous on two sides; cells arranged in quincunx order, roundish or oval, and raised in little pustules over the surface. Type R. verrucosa.

curvata, Ringueberg, 1886, Bull. Buf. Soc. Nat, Sci., vol. 5, p. 19, Niagara Gr. frondosa, Hall & Whitfield, 1875, Ohio

Pal., vol. 2, p. 112, Niagara Gr.



frondosa.

RHI.-SCA.]

tuberculosa, Hall, 1852, Pal. N. Y., vol. 2, p. 170, Niagara

Gr. Hall, tubulosa. 1852, Pal. N.Y., vol. 2, p. 49, Clinton Gr.

venosa, Spencer, FIG. 509.-Rhinopora 1884, Bull. No. 1, Mus. Univ.

St. Mo., p. 54, Clinton Gr. verrucosa, Hall, 1852, Pal. N. Y., vol. 2, p. 48, Clinton Gr.

- RHOMBOPORA, Meek, 1872, Pal. Eastern Nebraska, p. 141. [Ety. rhombos, rhomb; poros, pore.] Ramose, tubular, cells short; septa none; corallites radiating obliquely outward and upward on all sides from an imaginary axis; mouths rhombic or rhombic oval, and arranged in longitudinal and oblique spiral rows; interspaces thick, with minute pores visible in micro-scopic sections. Type R. lepidodenscopic sections. droidea.
- armata, Ulrich, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 31, Kaskaskia Gr. (?) asperrima, Ulrich, (in press,) Geo. Sur.
- Ill., vol. 8, pl. 70, Keokuk Gr. attenuata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 70, Keokuk or Warsaw Gr.

confluens, see Acanthoclema confluens. crassa, Ulrich, 1884, Jour. Cin. Soc. Nat.

Hist., vol. 7, p. 25, Up. Coal Meas. decipiens, Ulrich, (in press,) Geo. Sur.

- Ill., vol. 8, pl. 71, St. Louis Gr. dichotoma, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 70, Burlington Gr. elegantula, Ulrich, 1884, Jour. Cin. Soc.
- Nat. Hist., vol. 7, p. 33, Kaskaskia Gr. Ulrich, exigua, (in
 - press.) Geo. Sur. Ill., vol. 8, pl. 70, Burlington Gr.

gracilis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 70, Burlington Gr.

incrassata, Ulrich, 1888, Bull. Denison Univ., p. /89, Cuyahoga Fig. 510.--Rhombo-pora lenidoden pora lepidoden-

shales. droidea. lepidodendroidea, Meek,

1872, Pal. Eastern Nebraska, p. 141, Up. Coal Meas.

ohioensis, Ulrich, 1888, Bull. Denison Univ., p. 90, Cuyahoga Shales.

- persimilis, Ulrich, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 30, Kaskaskia Gr.
- Nat. Hist., vol. 7, p. 30, Kaskaskia Gr.
 pulchella, Ulrich, 1884, Jour. Cin. Soc.
 Nat. Hist., vol. 7, p. 31, Kaskaskia Gr.
 simulatrix, Ulrich, (in press.) Geo. Sur.
 Ill., vol. 8, pl. 71, St. Louis Gr.
 (?) spiralis, Ulrich, (in press.) Geo. Sur.
 Ill., vol. 8, pl. 71, Keokuk Gr.
 subannulata, Ulrich, (in press.) Geo. Sur.
 Ill., vol. 8, pl. 45, Ham. Gr.

- Ill., vol. 8, pl. 45, Ham. Gr.
- sulcifera, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 45, Ham. Gr.
- tabulata, /Ulrich, (in press,) Geo. Sure Ill., vol. 8, pl. 70, Kaskaskia Gr.
- tenuirama, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 70, Kaskaskia Gr.
- transversalis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 71, Keokuk Gr.
- varia, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 71, Keokuk Gr.
- wortheni, Ulrich, 1884, Cin. Soc. Nat.
- Hist., vol. 7, p. 32, Kaskaskia Gr. RHOPALONARIA, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 26. [Ety. ropalon, a club.] Cells slender, fusiform, in single anastomosing series; cell mouths near the middle of the cells. Type R. venosa.

pertenuis, see Stomatopora pertenuis.



F1G. 511.-Rhopalonaria venosa.

venosa, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 26, Hud. Riv. Gr. SAGENELLA, Hall, 1852, Pal. N. Y., vol. 2,

p. 172. [Ety. sagenella, a little dragnet.] Membranous net incrusting other bodies; cells in parallel or diverging series, more or less oblongquadrangular, and separated by a thin ambigua, Walcott, 1879, Utica Slate

and related formations, p. 22, Utica Slate. elegans, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 118, Ni-

agara Gr. membranacea, Hall, 1852, Pal.



N. Y., vol. 2, p. F16 512.—Sagenella 172, Niagara Gr. gans. Magnified. ele-

SCALARIPORA, Hall, 1881, Bryozoans of Up. Held. Gr., p. 17. [Ety., scalare, ladder; porus, pore.] Irregular groups of triangular branches, more or less concave, traversed transversely by sharp, elevated laminæ at regular distances; cel-

Nat.



from the center to each angle of the branch; margins and summit of laminæ noncelluliferous. Type S. scalariformis.

đ

approximata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 43, Ham. Gr.

scalariformis, Hall, 1881, Bryozoans of Up. Held. Gr., p. 18, and Pal. N. Y., vol. 6, p. 100, Up. Held. Gr.

separata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl, 43, Ham. Gr.

subconcava, Hall, 1881, Bryozoans of Up. Held. Gr., p. 18, and Pal. N. Y., vol. 6, p. 100, Up. Held. Gr.

Scenel Lopora, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 150. [Ety. scene, tent; ellus, diminutive; poros. pore.] Zoarium broad, obconical; cell apertures on ridges, which radiate from the subsolid and depressed center of the upper surface. Type S. radiata. radiata, Ulrich, 1882, Jour. Cin. Soc. Nat.

Hist., vol. 5, p. 158, Trenton Gr.

SCEPTROPORA, Ulrich, 1888, Am. Geo., vol. 1, p. 228. [Ety. skeptron, staff; poros,



FIG. 513.—Sceptropora[®] facula, x 18. *a*, Segment; *b*, vertical section; *c*, transverse section; *d*, transverse section of expanded part.

pore.] Zoarium articulated; segments short, numerous, club-shaped, lower half striated, noncelluliferous; upper half expanded, celluliferous, and having one or more articulating sockets; zoœcia subtubular, radially arranged about a central axis; apertures sub-

avoite. Type S. facula.
facula, Ulrich, 1888, Am. Geo., vol. 1, p. 228, Hud. Riv. Gr.

- SELENOPORA, Hall, 1887, Pal. N. Y., vol. 6, p. xvii. [Ety. selene, moon ; poros, pore.] Zoarium explanate, incrusting; apertures subcircular, with an elevated denticulate peristome, and situated within polygonal vestibular areas formed by connecting walls, which traverse the surface; interior structure as in Liche-nalia. Type S. circincta.
- circincta, Hall, 1881, (Lichenalia circincta,) Trans. Alb. Inst., vol. 10, p. 11, and Pal. N. Y., vol. 6, p. 86, Up. Held. Gr.
- complexa, Hall, 1881, (Lichenalia complexata,) Trans. Alb. Inst., vol. 10, p. 11, and Pal. N. Y., vol. 6, p. 87, Up. Held. Gr.

luliferous on each face; cells radiating | SEMICOSCINIUM, Prout, 1859, Trans. St. Louis Acad. Sci., vol. 1, p. 443. [Sig. some-what like Coscinium.] Leaf-like expansion, somewhat penniform, without a shaft; sole formed of longitudinal and horizontal parallel ridges, surmounted by a cellular tissue, divided perpendicularly by thin, longitudinal septa, corresponding to the ridges, and supporting parallel lines of tortuous tubes alternately approximating and receding from each other; covered by a dense, strong crust, divided into a net-work of rays and dissepiments bounding rhomboidal or ovate fenestrules, giving passage to oblique cells; the tortuous tubes give place to quincuncial, oval openings in the fenestrules; each tortuous tube has a line of cells on each side. Type S. rhomboideum.

eriense, Prout, Trans. St. Louis Acad Sci., vol. 1, p. 579, Up. Held. Gr.

obliquatum, Ulrich, 1886, Cont. to A Pal. p. 13, Up. Held. Gr.

planodorsatum, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 45, Up. Held. Gr. rhomboideum, Prout,

1859, Trans. St. Louis Acad. Sci., St. vol. 1, p. 443, Up. Held. Gr.

rhombicum, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 45–54, Ham. Gr.

tuberculatum, Prout, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 579, Up. Held Gr. Sемторова, Hall, 1884, Rep. St. Geol., p. 51.

[Ety. semi, half: poros, pore.] Bryo-

zoum ramose; branches infrequent, bifurcating or tribifurcating; margins parallel; celluliferous on both sides; cells arising from a mesial epitheca; apertures in longitudinal parallel rows, separated by ridges; two minute pits on the transverse space between adjacent apertures; apertures near the margin larger and more oblique than the others; margin striated; noncelluliferous. Type S. bistigmata.

bistigmata, Hall, 1884, Rep. St. Geol., p. 57, Ham. Gr.

- SEPTOPORA, Prout, 1859, Trans. St. Louis Acad. Sci., vol. 1, p. 448. [Ety. septum, partition; porus, pore.] Zoarium like Fenestella, but distinguished by the dissepiments, which have from one to four rows of cells. Type S. cestriensis.
- kia Gr.
 - decipiens, Ulrich, (in press,) Geo. Sur.
 - Ill., vol. 8, pl. 66, Kaskaskia Gr. delicatula, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 64, Low Coal Meas.

SCE.-SEP.

robusta, Ulric vol. 8, pl. 64 subquadrans, Ill., vol. 8, p SPATIOPORA, UI Nat. Hist., p out; poros, surface smo shallow; int tubuli. Typ areolata, Foore ontology, p. aspera, Ulrich Hist., vol. 6, lineata, Ulrich Hist., vol. 6, maculosa, Ulr Nat. Hist., v montifera, Uli

Nat. Hist., v



FIG. 514.

tuberculata, I (Chetetes tu Terr. Pal., p. SPHRAGIOPORA, (i Ill., vol. 8, very small si foreign bodie ertures and in a subrad double rows. parasitica, Ulr Ill., vol. 8, p Coal Meas. STICTOPORA, Hall p# 73. [Ety. pore.] Zoari objects by an branches thi elliptical trai posed of two by epithecal l or circular, s separated by nointerstitial ous and stria acuta, Hall, 184 Trenton Gr. alcyone, Billing one,) Catal. S ticosti Gr.

alternata, Hall, pl. xxiii, A, I angularis, Hall, 252, Ham. Gr arguta, Billings, Catal. Sil. F costi Gr.

SPA.-STI.]

SCE.-SEP.

ns. St. Louis [Sig. somelike expanwithout a tudinal and surmounted perpendicsepta, cornd supportuous tubes nd receding by a dense. net-work of ding rhomgiving pas-'tuous tubes al openings rtuous tube side. Type

is Acad Sci.,

ont. to Am press,) Geo. Held. Gr. eum, Prout, St. Trans. Acad. Sci., p. 443, Up.

n, Ulrich, (in ieo. Sur. Ill., pl. 45-54, r.

r.

um, Prout. ins. St. Louis ci., vol. 1, p. Held Gr. Hall, 1884, Geol., p. 51. half; semi, half; ore.] Bryofrequent, bimargins parsides; cells heca; aperel rows, sepnute pits on en adjacent

the margin than the oncellulifer-

St. Geol., p.

s. St. Louis Ety. septum, oarium like ed by the disn one to four triensis. ns. St. Louis 48, Kaskas-

,) Geo. Sur. ia Gr.) Geo. Sur. Meas.

robusta, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 64, Up. Coal. Meas.

SPA. -STI.]

subquadrans, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 64, Kaskaskia Gr.

- SPATIOPORA, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., p. 155 [Ety. spatium, spread out; poros, pore.] Thin, incrusting; surface smooth or tuberculated; cells shallow; interstitial cells and spiniform tubuli. Type S. aspera.
- areolata, Foord, 1883, Cont. to Micropalæontology, p. 21, Trenton Gr.
- aspera, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 166, Hud. Riv. Gr. lineata, Ulrich, 1883, Jour. Cin. Soc. Nat.
- Hist., vol. 6, p. 167, Hud. Riv. Gr, maculosa, Ulrich, 1883, Jour. Cin. Soc.
- Nat. Hist., vol. 6, p. 167, Hud. Riv. Gr. montifera, Ulrich, 1883, Jour. Cin. Soc.

Nat. Hist., vol. 6, p. 168, Hud. Riv. Gr.



FIG. 514.—Spatiopora tuberculata on an **Orthoceras**

tuberculata, Edwards & Haime, 1851, (Chetetes tuberculatus,) Pol. Foss. d. Terr. Pal., p. 268, Hud. Riv. Gr.

- SPHRAGIOPORA, (in press.) Ulrich, Geo. Sur. Ill., vol. 8, p. 398. Parasitic, forming very small subhemispheric patches on foreign bodies; cells with circular apertures and slight peristome, arranged in a subradial manner, in single or double rows. Type S. parasitica.
- parasitica, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 65, Kaskaskia Gr. and Coal Meas.
- STICTOPORA, Hall, 1847, Pal. N. Y., vol. 1, p. 73. [Ety. stictos, punctured; poros, pore.] Zoarium attached to foreign objects by an expanded base, ramose, branches thin, furnishing an acutely elliptical transverse section, and composed of two layers of cells, separated by epithecal laminæ; cell apertures oval or circular, surrounded by peristome, separated by raised longitudinal lines; no interstitial cells; margins nonporifer-ous and striated. Type S. elegantula. acuta, Hall, 1847, Pal. N. Y., vol. 1, p. 74,
- Trenton Gr. alcyone, Billings, 1865, (Ptilodictya alcy-one,) Catal. Sil. Foss. Antic., p. 36, An-
- ticosti Gr. alternata, Hall, 1887, Pal. N. Y., vol. 6,
- pl. xxiii, A, Low. Held. Gr. angularis, Hall, 1887, Pal. N. Y., vol. 6, p.
- 252, Ham. Gr. arguta, Billings, 1865, (Ptilodictya arguta,)
- Catal. Sil. Foss. Antic., p. 36, Anticosti Gr.

- basalis, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5. p. 169, Trenton Gr.
- bifurcata, VanCleve, 1883, 12th Rep. Ind. Geo. and Nat. Hist., p. 267, Niagara Gr.
- bifurcata, Hall, see S. bristolensis.
- bristolensis, n. sp. Ham. Gr. Proposed instead of S. bifurcata, Hall, 1887, Pal. N. Y., vol. 6, p. 254, which name was preoccupied.

carbonaria, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 160, and

- Ohio Pal., vol. 2, p. 328, Coal. Meas.
- compressa, VanCleve, 1883, 12th Rep. Ind. Geol., and Nat. Hist., p. 267, Niagara Gr.
- crassa, Hall, 1852, Pal. N. Y., vol. 2, p. 45, Clinton Gr.
- crescens, Hall, 1887, Pal. N. Y., vol. 6, p. 91, Up. Held. Gr.
- crenulata, Hall, 1884, Rep. St. Geol., p. 44, Ham. Gr.
- dichotoma, Hall, syn. for FIG. 515.-Sticto-S. subcarinata. pora carbonaria.
- divergens, Hall, 1887, Pal.
- N. Y., vol. 6, p. 257, Ham. Gr. elegantula, Hall, 1847, Pal. N. Y., vol. 1, p. 75, Trenton Gr.
- fenestrata, see Sulcopora fenestrata.
- fidelis, Ulrich. 1886, 14th Rep. Geo. Sur. Minn., p. 68, Trenton Gr.
- fragilis, see Dicranopora fragilis.
- fruticosa, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 14, and Rep. St. Geol., pl. 25, fig. 12, 13, Up. Held. Gr.



ing lunarium.

gilberti, Meek, 1871. Proc. Acad. Nat. Sci. Phil., p. 63, and Ohio Pal., vol. 1, p. 94, Up. Held. Gr.

glomerata, Hall, 1847, Pal. N. Y., vol. 1, p. FIG. 516 .-- Stictopora gilberti. Tangen-tial section, show-17, Chazy Gr.

granatula, Hall, 1887.

- Pal. N. Y., vol. 6, p. 38, Low. Held. Gr. granifera, Hall, 1884, Rep. St. Geol., p. 45, Ham. Gr.
- graminifolia, Ringueberg, 1884, Proc. Acad. Nat. Sci., p. 147, Niagara Gr. Very poorly defined.
- incisurata, Hall, 1884, Rep. St. Geol., p. 38. Ham. Gr.
- incrassata, Hall, 1884, Rep. St. Geol., p. 47, Ham. Gr.
- indenta, Hall, syn. for S. incisurata.
- interstriata, Hall, 1884, Rep. St. Geol., p. 45, Ham. Gr.,
- invertis, Hall, 1881, Bryozoans of the Up. Heidi, Gr., p. 15, and Rep. St. Geol., pl. 25, fig. 24-26, Up. Held. Gr.
 labyrinthica, Hall, 1847, Pal. N. Y., vol.
- 1, p. 50, Birdseye Gr.
- lichenoides, Meek, 1873, Ohio Pal., vol. 1, p. 194, Up. Held. Gr.







limata, Hall, 1887, Pal. N. Y., vol. 6, p. 250, Ham. Gr.

linearis, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 15, and Rep. St. Geol., 1883, pl. 25, fig. 4-5, Up. Held. Gr. lobata, Hall, 1887, Pal. N. Y., vol. 6, p.

256, Ham. Gr.

magna, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 112, Niagara Gr.

multifida, VanCleve, 1883, 12th Rep. Ind. Geol. and Nat. Hist., p. 268, Niagara Gr. multipora, Hall, syn. for S. incisurata.





FIG. 517.-Stictopora mutabilis. Deep tangential section x 50, showing the primitive portion of the zoocia and the median tubuli in their walls; d, tangential section \mathbf{x} 50; e, transverse rotting for the social section \mathbf{x} 50; e, transverse section x 50, showing median tubuli; f transverse section x 50; g, vertical section x 50; h, vertical section x 50.

mutabilis, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 66, Trenton Gr.

nitidula, see Dicranopora nitidula.

obliqua, syn. for S. incisurata. obliqua, Ringueberg, see Ptilodictya ob liqua.

obsoleta, Hall, 1887, Pal. N. Y., vol. 6, p. 37, Low. Held. Gr.



Fig. 518.-Stictopora ovatipora.

orbipora, Hall, 1879, Desc. New Spec. Foss, p. 5, and 11th Rep. Ind. Geo. and Nat. Hist., p. 248, Niagara Gr.

ovata, Hall, 1887, Pal. N. Y., vol. 6, p. 248, Ham. Gr.

ovatipora, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 14, and Rep. St. Geol., pl. 25, fig. 23, 23a, Up. Held. Gr.

palmipes, Hall, 1884, Rep. St. Geol. D. 41, Ham. Gr.

papillosa, Hall, 1883, Rep. St. Geol., pl. 13, fig. 12-13, Low. Held. Gr.

paupera, Ulrich, 1886, 14th Rep. Greg.

Sur. Minn., p. 69, Trenton Gr. perarcta, Hall, 1881, Bryozoans of the Up.

Held. Gr., p. 15, and Pal. N. Y., vol. 6, p. 96, Up. Held. Gr.

permarginata, Hall, 1884. Rep. St. Geol., p. 46, Ham. Gr.

N. Y., vol. 2, p. 157, Ni-

ramosa, Hall, 1847, Pal. N. Y., vol. 1, p. 51,

raripora, Hall, 1852, Pal.

recta, Hall, 1887, Pal. N. Y.,

rectilinea, Hall, 1887, Pal.

rectilatera, Hall, syn. for

recubans, Hall, 1884, Pal. N. Y., vol. 6, p. 260,

rhomboidea, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 15, and Pal. N. Y., vol. 6, p. 95, Up. Held. Gr.

Held. Gr., p. 14, and Rep. St. Geol., 1883, pl. 25, fig. 15-16, Up. Held. Gr.

rustica, Billings, 1865,

(Ptilodictya rustica,) Catal. Sil. Foss. An-36, Antitic., p. costi Gr. scitula, Hall, 1887, Pal.

N. Y., vol. 6, pl. lxi, Niagara Gr. scutulata, see Ptilodictya

scutulata. semistriata, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 14, and

Heid, Gr., p. 1., Rep. St. Geol., 1883, **V** pl. 25, fig. 17–20, Up. Fig. 519.–Stictopora punctipora. Sec Held. Gr. punctipora. tion x 50. serrata, see Prismopora serrata.

shafferi, see Arthropora shafferi.

similis, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 122 Niagara Gr.

sinuosa, Hall, 1884, Rep. St. Geol., p. 42, Ham. Gr.

STI.-STR.]

striata, Hall, 246, Ham. (subcarinata, se subrigida, Ha Ham. Gr. sulcata, Wincl Mich., p. 92 tenera, Billing Catal. Sil. costi Gr. trilineata, Hal 243, Ham. G triserialis, see tumulosa, Hal 246, Ham. G

vanclevei, Hal and Nat. His

variabilis, Pro Acad. Sci., v

vermicula, Ha

p. 93. Up. H STICTOPORELLA, [Nat. Hist., vo

tive of Stictor

Stictopora by the longer d tures. Type

angularis, Ulri

punctipora, Hall, 1852, Pal.

agara Gr.

Birdseye Gr.

N. Y., vol. 2, p. 46, Clinton Gr.

vol. 6, p. 253, Ham. Gr.

N. Y., vol. 6, p. 245, Ham. Gr.

S. linearis.

Ham. Gr.

rigida, Hall, 1881, Bryozoans of the Up.

frondifera, Ulri Sur. Minn., p.



FIG. 521.-Stic interstincta, Ulri Nat. Hist., vol. ? undulata, Ulric Ill., vol. 8, pl. (



FIG. 520.-Stictopo

cribrosa, Ulrich

Minn., p. 69,

size and 1


STI.-STR.]

vol. 6, p. 248, zoans of the

lep. St. Geol., eld. Gr. St. Geol., p.

St. Geol., pl. Gr. h Rep. Geo.

Gh. ins of the Up.

6, p. 96, Up.

Hall, 1884, Geol., p. 46,

[all, 1852, Pal. 2, p. 157, Ni-

1847, Pal. ol. 1, p. 51, 11, 1852, Pal.

2, p. 46, Clin-

87, Pal. N. Y., 3, Ham. Gr. all, 1887, Pal. l. 6, p. 245,

all, syn. for

ull, 1884, Pal. l. 6, p. 260,

Hall, 1881, of the Up. p. 15, and vol. 6, p. 95,

Gr. is of the Up. ep. St. Geol., . Held. Gr.



519 - Stictopora netipora. on x 50.

fferi. N.Y. St. Mus. Gr. t. Geol., p. 42,



FIG. 521.-Stictoporella interstincta. interstincta, Ulrich, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 169, Utica Slate Gr. undulata, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 69, Kaskaskia Gr. 92

MOLLUSCOIDA.

- striata, Hall, 1887, Pal. N. Y., vol. 6, p. | STICTOPORINA, Hall, 1887, Pal. N. Y., vol. 6, 246, Ham. Gr.
- subcarinata, see Tæniopora subcarinata. subrigida, Hall, 1884, Rep. St. Geol., p. 43, Ham. Gr.
- sulcata, Winchell, 1866, Rep. Low. Penin. Mich., p. 92, Ham. Gr.
- tenera, Billings, 1865, (Ptilodictya tenera,) Catal. Sil. Foss. Antic., p. 36, Anticosti Gr.
- trilineata, Hall, 1887, Pal. N. Y., vol. 6, p. 243, Ham. Gr.
- triserialis, see Acanthoclema triseriale. tumulosa, Hall, 1887, Pal. N. Y., vol. 6, p. 246, Ham. Gr.
- vanclevei, Hall, 1883, 12th Rep. Ind. Geol.
- and Nat. Hist., p. 268, Niagara Gr. variabilis, Prout, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 413, Up. Held. Gr. vermicula, Hall, 1887, Pal. N. Y., vol. 6, p. 93. Up. Held. Gr.
- STICTOPORBLLA, Ulrich, 1882, Jour. Cin. Soc.
 Nat. Hist., vol. 5, p. 152. [Ety. diminutive of *Stictopora.*] Distinguished from Stictopora by interstitial pits between the longer diameters of the cell aper-
- tures. Type S. interstincta. angularis, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 71, Trenton Gr.
- basalis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 68, 69, and 75, Keokuk Gr.



FIG. 520.-Stictoporella interstincta. Natural size and magnified 18 diam.

cribrosa, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 69, Trenton Gr. frondifera, Ulrich, 1886, 14th Rep. Geo. Sur. Minn., p. 72, Trenton Gr.



- Hist., vol. 5, p. 39, Hud. Riv. Gr. STREBLOTRYPA, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, p. 403. [Ety. streblos, turned about; trupa, an opening.] Ramose, slender, solid; cells radiating from an imaginary axis, their primitive portion long, tubular; or from a linear axis when they are somewhat shorter; inferior hemisepta best developed, situated rather far down; apertures regularly elliptical, or somewhat truncated at the posterior margin, surrounded by a slight peristome and, within this, sometimes a narrow sloping area; arranged usually in rather regular longitudinal series; back of the aperture, occupying the depressed front of the cell, there are from one to twelve or more small pits, which, when numerous, are arranged in two or three rows; small acanthopores occasionally present. Type S. nicklesi.



Catal. Cin. Foss., p. 3,

topora inflata. Natural

inclosing the apertures in rhomboidal or polygonal areas. Type S. claviformis. claviformis, Hall, 1881, (Trematopora

325

claviformis,) Trans. Alb. Inst., vol. 10, p. 181, and Pal. N. Y., vol. 6, p. 269, Ham. Gr.

p. xx. [Ety. diminutive of Stictopora.]

Zoarium obtusely pointed at the base,

enlarging above and becoming flattened;

bifurcations, few; cells tubular arising

from a mesotheca; apertures oval; in-

terapertural space elevated, angular,

- Stictotrypa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8. Syn. (?) for Stictopora.
- STOMATOPORA, Bronn, 1825, System d. urwetl. Pflanzenthiere. [Ety. stoma, mouth; poros, perforation.] Zoarium adnate; cells in single branching series, mouths elevated, and at the end of the tubular cells. Type S. dichotoma.
 - alternata, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 235, Chemung Gr.
 - auloporoides, Nicholson, 1875, (Alecto auloporoides,) Ohio Pal., vol. 2, p. 267, Hud. Riv. Gr.
- confusa, Nicholson, 1875, (Alecto confusa,) Ohio Pal., vol. 2, p. 267, Hud. Riv. Gr.
- frondosa, Nicholson, 1875, (Alecto frondosa,) Ohio Pal., vol. 2, p. 266, Hud. Riv. Gr.

inflata, Hall, 1847, (Alecot inflata,) Pal. N. Y., vol. 1, p. 77, Trenton and Hud. Riv. Grs. n e xilis, James, 1875, (Alecto nexilis,) Int. to

denticulata, Ulrich, 1888, (in press,) Bull. Denison Univ., vol. 4, p. 85, Cuyahoga shale.

326

distincta, Ulrich, Geo. Sur. Ill., vol. 8, pl. 71, Kaskaskia Gr.

hamiltonensis, Nicholson, 1874, (Ceriopora hamiltonensis,) Geo. Mag., vol. 1, p. 161, Ham. Gr.

hertzeri, Ulrich, 1888, Bull. Denison Univ., vol. 4, p. 85, Cuyahoga shale. major, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 71, Keokuk Gr.

multiporata, Ulrich, 1888, Bull. Denison Univ., vol. 4, p. 87, Waverly Gr. nicklesi, Ulrich, (in press,) Geo. Sur. Ill.,

vol. 8, pl. 71, Kaskaskia Gr.

obliqua, Ulrich, 1888, Bull. Denison Univ., vol. 4, p. 85, Cuyahoga shale.

radialis, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 72, Keokuk Gr. regularis, Ulrich, 1888, Bull. Denison

Univ., vol. 4, p. 88, Waverly Gr. striata, Ulrich, 1888, Bull. Denison Univ., vol. 4, p. 87, Waverly Gr.

subspinosa, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 71, Kaskaskia Gr. STROTOPORA, Ulrich, (in press.) Geo. Sur.

Ill., vol. 8, p. 383. [Ety. strotos, spread; poros, pore.] Ramose, branches large, irregular, solid or hollow; large, abruptly spreading cells, which are supposed to represent occia, are distributed among the ordinary zoœcia; when well-preserved they appear on the zoarial surface as strongly convex nodes, about 0.5 mm. in diameter, with an opening on one side. In all other respects like Fistulipora. Type S. foveolata.

dermata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 77, Keokuk Gr.

III., vol. 8, pl. 77, Keokuk Gr.
foveolata, Ulrich, (in press,) Geo. Sur.
Ill., vol. 8, pl. 77, Keokuk Gr.
perminuta, Ulrich, (in press,) Geo. Sur.
III., vol. 8, pl. 47, Up. Held. Gr.
SUBRETEPORA, D'Orbigny, 1850, Prodr. d.
Paléont., t. 1, p. 22. [Ety. from Rete-Paléone, in discharge her pake in

pora.] Filiform, cylindrical branches, irregularly anastomosing; cells in a single row on the upper side of the branches (Ulrich says from 2 to 8 rows); apertures

(Retepora angulata,) Pal. N. Y., vol. 2, p. 163, Niagara Gr.

aspera, Hall, 1847, (Gorgonia (?) aspera,) Pal. N. Y., vol. 1, p. 16, Chazy Gr.

asperatostriata, Hall, pora angulata. peratostriata,) Pal. N. Y., vol. 2, p. 161,

Niagara Gr. clathrata, Miller & Dyer, 1878, (Intricaria

clathrata,) Cont. to Pal., No. 2, p. 7, Hud. Riv. Gr.

corticosa, Ulrich, 1886, (Phyllopora corticosa,) 14th Rep. Geo. Sur. Minn., p. 61, Trenton Gr.

dawsoni, Ulrich, (in press,) (Phylloporina dawsoni,) Geo. Sur. Ill., vol. 8, pl. 54, Trenton Gr.

STR.-SYN.

dichotoma, Hall, 1852, (Hornera dicho-toma,) Pal. N. Y., vol. 2, p. 163, Njagara Gr.

fenestrata, Hall, 1850, (Retepora fenes-trata,) 3d Rep. N. Y. St. Mus. Nat. Hist., p. 178, Trenton Gr. gracilis, Hall, 1847, (Retopora

gracilis,) Pal. N. Y., vol. 1, p. 15, Chazy Gr. incepta, Hall, 1847, (Retepora incepta,) Pal. N. Y., vol. 1, p. 15, Chazy Gr. reticulata, Hall, 1847, (Intricaria reticulata,)

Pal. N. Y., vol. 1, p. 77, Trenton Gr. trentonensis,

Nicholson, 1875, (Retepora trentonensis,) Geo. Mag., vol. 2, p. 37, Trenton Gr.

variolata, Ulrich, 1882, (Phyllo-

pora variolata,) Jour. Cin. Soc. Fig. 524.—Subretepora re-Nat. Hist., vol. ticulata. Natural size 5, p. 160, Hud. and magnified. Riv. Gr.

SULCOPORA, D'Orbigny, 1850, Prodr. d. Paléont., t. 1, p. 22. [Ety. sulcus, furrow; poros. pore.] Distinguished from Stietopora by the obtuse extremities of the branches, and by the perpendicular rows of apertures separated by elevated ridges and cross bars. Type S. fenestrata.

fenestrata, Hall., 1847, (Stictopora fenestrata,) Pal. N. Y., vol, 1, p. 16, Chazy Gr.

SYNOCLADIA, King, 1849. Ann. and Mag. Nat. Hist., 2d ser., vol. 3, p. 389. [Ety. syn. together; klados, young branch.] Cup-shaped,

with a central root-like base ; reticulated, composed of rounded, narrow, often branched interstices, bearing on the inner face from 3 to 5 alternating, longitudinal rows of prominent edged cells, separated by narrow keels, studded with vesicles; dissepiments thin, spur-shaped, extending' upward, and meeting those from the adjoining interstice, and bearing two rows of cells. Type S. virgulacea.

T.H.N.-THA.]

biserialis, Swa Acad. Sci., p rectistyla, Wi

Acad. Sci., V ENIODICTYA, U Ill., vol. 8. net.] Zoari pansion in narrow bran structure ve of Ptilodict apertures el rounded by ridge-like; 1

Type T. ram

526, Tæniodictya cingulata. Tangential section x 50, show-ing a transverse lining of the cen-tral region of the walls, a character often present among the Ptilodictyonidæ.

subrecta, Ulric vol. 8, pl. 67, TENIOPORA, Nicl Lond. n. s., v ribbon; pore expansion; on both sic Ptilodictya ai longitudinal frond into ty prominent cel exigua, Nichols

n. s., vol. 1, p occidentalis, Ul Ill., vol. 8, pl. 42, Ham. Gr.

penniformis. Nicholson, 1874, Geo. Mag, Lond. n. s., vol. 1, p. 123, Ham. Gr. subcarinata, Hall, 1881, (Stictopora subcarinata.) Trans. Alb.

Inst., vol. 10, p. 191, and Pal. N. Y.,

vol. 6, p. 261, Ham. Gr. Thallistigma, Hall,



circular or oval. Type S. reticulata. angulata, Hall, 1852,

FIG. 525.-Sulcopora fenestrata. Natural size and magnifled.

[STR.-SVN.

Phylloporina vol. 8, pl. 54,

ornera dicho-, p. 163, Ni-

tepora fenesit. Mus. Nat.



Subretepora re-Natural size nified.

Prodr. d. Pasulcus. furrow; hed from Sticremities of the perpendicular ted by elevated Type S. fenes-

a, Hall., 1847, topora fenes-Pal. N. Y., p. 16, Chazy

A, King, 1849. and Mag. Nat. 2d ser., vol. 3, p. [Etv. syn. toklados, young .] Cup-shaped. use ; reticulated, narrow, often ring on the inner ng, longitudinal cells, separated d with vesicles; ur-shaped, exmeeting those stice, and bear-Type S. virguMOLLUSCOIDA.

biserialis, Swallow, 1858, Trans. St. Louis Acad. Sci., p. 179, Up. Coal Meas. rectistyla, Whitfield, 1882, Ann. N. Y.

TAN.-THA.]

FIG. 526. - Tæniodictya-cingulata.

Tangential sec-

tion x 50, show-ing a transverse

lining of the cen-tral region of the

walls, a character

often present among the Ptilo-dictyonidæ.

Acad. Sci., vol. 2, p. 220, Kaskaskia Gr. NIODICTYA, Ulrich, (in press,) Geo. Sur. Ill., vol. 8. [Ety. tainia, ribbon; dictuon, net.] Zoaria growing from a basal expansion into dichotomously divided narrow branches or broad fronds; cell structure very much as in some species of Ptilodictya (P. pavonia, D'Orb.); apertures elliptical or subcircular, surrounded by a sloping area; interspaces ridge-like; both "hemisepta" present. Type T. ramulosa.

cingulata, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 67, Keokuk Gr.

frondosa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 70, Keokuk Gr.

- interpolata, Ulrich, 1888, Bull. Denison Univ., vol. 4, p. 80, Cuyahoga Shale.
- ramulosa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 67, Keokuk Gr.
- ramulosa var. burlingtonensis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 67, Burling-ton Gr.

subrecta, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 67, St. Louis Gr.

TENIOPORA, Nicholson, 1874, Geo. Mag. Lond. n. s., vol. 1, p. 120. [Ety. tainia, ribbon; poros, pore.] Flattened linear expansion; dichotomous; celluliferous Distinguished from on both sides. Ptilodictya and Stictopora by a central, longitudinal keel, which divides the frond into two lateral halves, and by prominent cell-mouths. Type T. exigua. exigua, Nicholson, 1874, Geo. Mag. Lond.

n. s., vol. 1, p. 122, Ham. Gr. occidentalis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl.



Inst., vol. 10, p. 191, and FIG. 527.—Tæniopora penni-pal. N. Y., transverse section envol. 6, p. 261, larged; c, fragment en-larged. Ham. Gr.

Thallistigma, Hall, syn for Fistulipora.

confertipora, see Fistulipora confertipora. decipiens, see Fistulipora decipiens. densa, see Fistulipora densa, digitata, see Fistulipora digitata. inclusa, see Favicella inclusa. intercellatum, see Fistulipora intercellata. lamellatum, see Fistulipora lamellata. longimacula, see Fistulipora longimacula. micropora, see Fistulipora micropora. multaculeata, see Fistulipora multaculeata. plana, see Fistulipora plana. scrobiculata, see Fistulipora scrobiculata. segregata, see Fistulipora segregata. serrulata, see Fistulipora serrulata. sparsipora, see Prismopora sparsipora. spheroidea, see Fistulipora spheroidea. subtilis, see Fistulipora subtilis. triangularis see Fistulipora triangularis. umbilicata, see Fistulipora umbilicata. variopora, see Fistulipora variopora.

- THAMNISCUS, King, 1849, Ann. and Mag. Nat. Hist., 2d ser., vol. 3, p. 389. [Ety. thamniskos, little shrub.] Stems frequently bifurcating more or less on one plane; celluliferous on the side overlooking the imaginary axis; cellules imbricated and arranged in quincunx; gemmuliferous vesicles overlying the cell apertures. Type T. dubius.
 - cisseis, Hall, 1883, Rep. St. Geol., pl. 22, fig. 23-30, Low. Held. Gr.
- diffusus, Hall, 1852, (Retepora diffusa,) Pal. N. Y., vol. 2, p. 160, Niagara Gr.
- fruticella, Hall, 1883, Rep. St. Geol. pl. 22, fig. 33, Low. Held. Gr.
- divaricans, Ulrich, (in press,) Geo. Sur.
- Ill., vol. 8, pl. 62, Keokuk Gr. furcillatus, Ulrich, (in press,) Geo. Sur.
- Ill., vol. 8, pl. 62, Kaskaskia Gr. multiramus, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 19, and Rep. St. Geol.
- 1883, pl. 26, fig. 1-5, Up. Held. Gr. nanus, 141, 1881, Bryozoans of the Up. Held. Gr., p. 19, Up. Held. Gr.

niagarensis, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p.

ara Gr.

Lower



FIG. 528.-Thamniscus niagarensis.

- Held. Gr.
- octonarius, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 62, Up. Coal. Meas.
- pauciramus, Hall, 1884, Rep. St. Geol., p. 60, Ham. Gr.
- ramulosus, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 62, Kaskaskia Gr.
- ramulosus var. sevillensis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 62, Low. Coal Meas.

MOLLUSCOIDA.

variolata, Hall, 1883, Rep. St. Geol., pl. 22, fig. 34-46, Low. Held. Gr.

sculptilis, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 62, Keokuk Gr. Thamnopora, Hall. This name was preoc-cupied. See Thampotrypa.

divaricata, see Thamnotrypa divaricata. THAMNOTRYPA, Hall, 1887, Pal. N. Y., vol. 6,

- p. 101. [Ety. thamnos, bush; trupa, per-foration.] Narrow, branching stipe, foration.] Narrow, branching stipe, celluliferous on both sides; the divisions are not by bifurcation, as in Stictopora, but by lateral and abrupt divergence from the main stipe. Type T. divaricata
- divaricata, Hall, 1881, Trans. Alb. Inst., vol. 10, p. 16, and Pal. N. Y., vol. 6, p. 101, Up. Held. Gr.
- TREMATELLA, Hall, 1886, Rep. St. Geol. and Pal. N. Y., vol. 6, p. xiv. [Ety. trema, hole; ellus, diminutive.] Ramose, solid; cells tubular, in contact below, diverging near the surface, intersected by septa; interapertural surface marked by pseudo-pores. Type T. annulata.
 - annulata, Hall, 1881, (Trematopora annulata,) Bryozoans of the Up. Held Gr., p. 5, and Pal. N. Y., vol. 6, p. 69, Up. Held. Gr.
 - arborea, Hall, 1881, (Trematopora arborea,) Bryozoans of the Up. Held. Gr., p. 5, and

Pal. N. Y., vol. 6, p. 69, Up. Held. Gr. glomerata, Hall, 1887, Pal. N. Y., vol. 6, p. 70, Up. Held. Gr.

- nodosa, Hall, 1887, Pal. N. Y., vol. 6, p. 176, Ham. Gr.
- perspinulata, Hall, 1881, (Trematopora perspinulata,) Trans. Alb. Inst., vol. 10, p. 181, and Pal. N. Y., vol. 6, p. 175, Ham. Gr.
- TREMATOPORA, Hall, 1852, Pal. N. Y., vol. 2, p. 149. [Ety. trema, hole; poros, pore; Ramose, branches solid, tuberculated or smooth; interstitial cells, spiniform tubuli, and diaphragms present. Type T. tuberculosa.

alternata, see Acanthoclema alternatum. americana, S. A. Miller, Jour. Cin. Soc.

Nat. Hist., p. 312, Burlington Gr. annulifera, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 67, and Geo. Wis., vol. 4, p. 254, Hud. Riv. Gr.

annulata, see Trematella annulata. annulata var. pronaspina, Hall, 1881, Bry-

ozoans of the Up. Held. Gr., p. 6, Up. Held. Gr.

arborea, see Trematella arborea.

aspera, Hall, 1852, Pal. N. Y., vol. 2, p. 154, Niagara Gr.

calloporoides, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 38, Galena Gr.

camerata, see Diamesopora camerata.

- canaliculata, Hall, 1883, Rep. St. Geol. pl.
- 11, fig. 12, Low. Held. Gr. carinata, Hall 1887, Pal. N. Y., vol. 6, p. 179, Ham. Gr.

claviformis, see Stictoporina claviformis. coalescens, Hall, 1852, Pal. N. Y., vol. 2, p. 150, Niagara Gr.

constricta see Diamesopora constricta.

corticosa, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 105, and Pal. N. Y., vol. 6, p. 15, Low. Held. Gr. crassa, see Lichenalia crassa.

THA.-TRE.

- crebipora, Hall, 1879, Desc. New Spec.,
- Foss., p. 3, and 11th Rep. Ind., Geol. and Nat. Hist., p. 236, Niagara Gr.
- debilis, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 34, Galeňa Gr. densa, Hall, 1874, 26th Rep. N. Y. St.
- Mus. Nat. Hist., p. 105, Low. Held. Gr. dispersa, see Diamesopora dispersa.

echinata, Hall, 1876, 26th Rep. N. Y. St.

Mus. Nat. Hist., p. 112, Niagara Gr. elongata, Hall, 1887, Pal. N. Y., vol. 6, p.

183, Ham. Gr. fragilis, Winchell, 1863, Proc. Acad. Nat.

Sci., p. 3, Waverly Gr. granifera, Hall, 1887, Pal. N. Y., vol. 6, p.

186, Ham. Gr.

granistriata, see Bactropora granistriata. granulata, Whitfield, 1878, Ann. Rep. Geo.

Sur. Wis., vol. 4, p. 253, Hud. Riv. Gr. granulifera, Hall, 1852, Pal. N. Y., vol. 2, p. 154, Niagara Gr. The same species is marked "n. sp." in 28th Rep. N. Y. St. Mus. Nat. \$ 6.67 6) 6,8,9 (3 Hist., probably by mistake.



- ara Gr. hexagona. Hall, FIG. 529. - Trematopora 1887, Pal. N. Y., infrequens. Much en-vol. 6, p. 178, larged.
- Ham. Gr. immersa, Hall, 1887, Pal. N. Y., vol. 6, p. 185, Ham. Gr.
- infrequens, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 111, Niag-ara Gr.
- interplana, Hall, 1887, Pal. N. Y., vol. 6,
- p. 186, Ham. Gr. lineata, Hall, 1887, Pal. N. Y., vol. 6, p. 181, Ham. Gr.
- macropora, Hall, 1879, Desc. New Spec. Foss., p. 4, and 11th Rep. Ind Geo. and Nat. Hist., p. 236, Niag. Gr. maculosa, see Lichenalia maculosa.
- minuta, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 113, Niagara Gr.
- nitida, Ulrich, (in press.) Geo. Sur. Ill., vol. 8, pl. 34, Hud. Riv. Gr. nodosa, Hall, 1887, Pal. N. Y., vol. 6,
- pl. xxiii, Low. Held, Gr. orbipora, Hall, 1884, Rep. St. Geol., p. 12,
- Ham. Gr. ornata, Ulrich, 1886, 14th Rep. Geo. Sur.

Minn., p. 98, Trenton Gr. osculum, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 110, Niagara Gr.

ostiolata, see Chilotrypa ostiolata.

subquadrata, He 11, Ham. Gr. superba, Billing Antic., p. 93, (

愚

parallela, Hall, fig. 13-14, L perspinulata, p. 11, Ham. polygona, Hall Ham. Gr. ponderosa, Ha

ovatipora, Hal

fig. 13-14, La

Mus. Nat. H punctata, Hall 151, Niagara primigenia, Ul Sur. Minn., 1

FIG. 530.

Arthroe

nified vie

rectilinea, Hall

regularis, see Or

rhombifera, see (

scutulata, see Ac

scutulata, see Or

signata, see Calle

solida, Hall, 18 153, Niagara (sparsa, Hall, 18 155, Niagara (

spiculata, Hall,

Foss., p. 245, spinulosa, Hall,

155, Niagara (

Mus. Nat. His

cupied. See 7

striata, Hall, 18 153, Niagara (

subimbricata, H

Foss., p. 4, an 234, Niagara G

spinulosa, Hall.

nata.

Up. Held. Gi

TRO. - UNI.]

THA.-TRE.

onstricta. Rep. N. Y. St. nd Pal. N. Y., ir.

: New Spec., p. Ind., Geol. agara Gr. Geo. Sur. Ill.,

ep. N. Y. St. ow. Held. Gr. ispersa. Rep. N. Y. St. liagara Gr.

. Y., vol. 6, p.

oc. Acad. Nat.

I. Y., vol. 6, p.

granistriata. Ann. Rep. Geo. Hud. Riv. Gr.



- Trematopora Much enuens.

N. Y., vol. 6, p.

th Rep. N. Y p. 111, Niag-

. N. Y., vol. 6,

I. Y., vol. 6, p.

esc. New Spec. p. Ind Geo. and

Gr. naculosa.

Rep. N. Y. St. Niagara Gr.

) Geo. Sur. Ill., Gr.

N. Y., vol. 6,

St. Geol., p. 12,

Rep. Geo. Sur.

łr. Rep. N. Y. St.

Niagara Gr. stiolata.

MOLLUSCOIDA.

- ovatipora, Hall, 1883, Rep. St. Geo., pl. 11, fig. 13-14, Low. Held. Gr.
- parallela, Hall, 1883, Rep. St. Geol., pl. 11, fig. 13-14, Low. Held. Gr.
- perspinulata, Hall, 1884, Rep. St. Geol., p. 11, Ham. Gr.
- polygona, Hall, 1884, Rep. St. Geol., p. 9, Ham. Gr.
- ponderosa, Hall, 1874, 26th Rep. N. Y. St. Mus. Nat. Hist., p. 106, Low. Held. Gr. punctata, Hall, 1852, Pal. N. Y., vol. 2, p.
- 151, Niagara Gr. primigenia, Ulrich, 1886, 14th Rep. Geo.
- Sur. Minn., p. 97, Trenton Gr.



FIG. 530.—Arthroclema pulchellum. a, Mag-nified view. (See page 293.)

rectilinea, Hall, 1881, Bryozoans of the Up. Held. Gr., p. 6, Up. Held. Gr.

- regularis, see Orthopora regularis. rhombifera, see Orthopora rhombifera. scutulata, see Acanthoclema scutulatum. scutulata, see Orthopora scutulata.
- signata, see Callotrypa macropora var. signata.
- solida, Hall, 1852, Pal. N. Y., vol. 2, p. 153, Niagara Gr.
- sparsa, Hall, 1852, Pal. N. Y., vol. 2, p. 155, Niagara Gr.
- spiculata, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 245, Niagara Gr. spinulosa, Hall, 1852, Pal. N. Y., vol. 2, p.
- 155, Niagara Gr.
- spinulosa, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist. The name was preoccupied. See T. spiculata.
- striata, Hall, 1852, Pal. N. Y., vol. 2, p. 153, Niagara Gr.
- subimbricata, Hall, 1879, Desc. New Spec. Foss., p. 4, and 11th Rep. Ind. Geo., p. 234, Niagara Gr.
- subquadrata, Hall, 1884, Rep. St. Geol., p. 11. Ham. Gr.
- superba, Billings, 1866, Catal. Sil. Foss. Antic., p. 93, Clinton and Niagara Grs.

- tortalinea, Hall, 1884, Rep. St. Geol., p. 10, Ham. Gr.
- transversa, Hall, 1884, Rep. St. Geol., p. 8, Ham. Gr.
- tuberculosa, Hall, 1852, Pal. N. Y., vol. 2, p. 149, Niagara Gr.
- tubulosa, Hall, 1852, Pal. N. Y., vol. 2, p. 151, Niagara Gr.
- varia, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 111, Niagara Gr.
- variolata, Hall, 1876, 28th Rep. N. Y. St.
- Mus. Nat. Hist., p. 113, Niagara Gr. vesiculosa, Winchell, 1863, Proc. Acad.
- Nat. Sci., p. 3, Burlington Gr. whitfieldi, Ulrich, 1883, Jour. Cin. Soc. Nat. Hist., vol. 6, p. 262, Niagara Gr. TROPIDOPORA, Hall, 1887, Pal. N. Y., vol. 6,
- p. 71. [Ety. tropis, keel; poros, pore.] Ramose, solid, cells in irregular longitudinal rows, separated by sinuous ridges; peristomes thin, slightly ele-vated. Type T. nana.
- nana, Hall, 1887, Pal. N. Y., vol. 6, p. 71, Up. Held. Gr.
- Tuberculopora, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 21. Not properly defined.
- inflata, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 21. Not properly defined.
- UNITRYPA, Hall, 1885, Rep. St. Geol., p. 36. [Ety. unus, one; trupa, perforation.] Form like Fenestella, having the branches connected by dissepiments; cell apertures, in two ranges, separated by carinæ, which are elevated, widened at the summit, and connected by thin. lateral processes or scalæ more or less numerous. Type U. lata.

acaulis, Hall, 1881, (Fenestella acaulis,) Bryozoans of Up. Held. Gr., p. 33, and Pal. N. Y., vol. 6, p. 131, Up. Held. Gr. acaulis var. in-clinis, Hall, 1887,



Pal. N. Y., vol, 6, p. 132, Up. FIG. 531.-Unitrypa lata Held. Gr.

- acclivis, Hall, 1887, Pal. N. Y., vol. 6, p. 138, Up. Held. Gr. biserialis, Hall, 1882, (Fenestella bise-
- rialis,) Rep. St. Geol. and Pal. N. Y., vol.
- 6, p. 57, Low. Held. Gr. conferta, Ulrich, 1886, Cont. to Am. Pal., p. 17, Up. Held. Gr.
- consimilis, Hall, 1887, Pal. N. Y., vol. 6, p. 142, Up. Held. Gr.
- elegantissima, Hall, 1881, (Fenestella elegantissima,) Trans. Alb. Inst., vol. 10, p. 36, and Pal. N. Y., vol. 6, p. 140, Up. Held. Gr.
- fastigata, Hall, 1881, (Fenestella fastigata,) Trans. Alb. Inst., vol. 10, p. 36, and
- Pal. N. Y., vol. 6, p. 141, Up. Held. Gr ficticius, Hall, 1887, Pal. N. Y., vol. 6, p 137, Up. Held. Gr.

329



TRO.-UNI.]

BRACHIOPODA.

lata, Hall, 1881, (Fenestella lata,) Trans.
Alb. Inst., vol. 10, p. 34, and Pal. N. Y., vol. 6, p. 136, Up. Held. Gr.
nana, Hall, 1887, Pal. N. Y., vol. 6, p. 133, Up. Held. Gr.

330

- nervia, Hall, 1874, (Fenestella nervia,) 26th Rep. N. Y. St. Mus. Nat. Hist., p. 93, Low. Held. Gr.
- nervia var. constricta, Hall, 1879, (Fenestella nervia var. constricta,) 32d Rep. N. Y. St. Mus. Nat. Hist., p. 174, Low. Held. Gr.
- præcursor, Hall, 1874, (Fenestella præ-cursor,) 26th Rep. N. Y. St. Mus. Nat. Hist., p. 94, Low. Held. Gr.

dosa, J Trans. Alb. Inst., vol. 10, p. 35, Pal. N. Y., vol. 6, p. 139, Up. Held. Gr. projecta, Hall, 1887, Pal. N. Y., vol. 7, p.

132, Up. Held. Gr. retrorsa, Ulrich, 1886, Cont. to Am. Pal., p. 15, Up. Held. Gr.

scalaris, Hall, 1884, (Fenestella scalaris,) 36th Rep. N. Y. St. Mus. Nat. Hist., p. 66. Ham. Gr.

spatiosa, Hall, syn. for U. lata.

stipata, Hall, 1881, (Fenestella stipata,) Trans. Alb. Inst., vol. 10, p. 34, and Pal. N. Y., vol. 6, p. 134, Up. Held. Gr. tegulata, Hall, 1881, (Fenestella tegulata,)

- Trans. Alb. Inst., vol. 10, p. 34, and
- Pal. N. Y., vol. 6, p. 135, Up. Held. Gr. transversa, Hall, 1887, Pal. N. Y., vol. 7, p. 132, Up. Held. Gr.
- WORTHENOPORA, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, p. 403. [Ety. proper Sur. Ill., vol. 8, p. 403. [Ety. proper name.] Bifoliate, branching or palmate; cells regularly arranged, subtubular or elongate rhomboidal, with the aperture semi-elliptical; on the surface the line of junction between the cells is marked by an elevated ridge; the truncated posterior margin of the aperture is raised into a less strong transverse bar; the elongate triangular depressed front appears perfectly plane. Type W. spinosa.
 - spatulata, Prout, 1859, (Flustra spatulata,) Trans. St. Louis Acad. Sci., vol. 1, p. 446, Warsaw Gr.
 - spinosa, Ulrich, (in press,) Geo. Sur. Ill., vol. 8, pl. 68, Keokuk and Warsaw Grs.

SUBKINGDOM MOLLUSCA.

CLASS BRACHIOPODA.

[Ety. brachium, arm; pous, foot.]

THE Brachiopoda are all marine animals, having a bivalve shell and a pair of long, ciliated, and usually spiral arms, with which they produce a current of water that carries the food to the mouth, which is close to the middle of the base of the shell. The values of the shell, instead of being placed on each side of the animal, as in the Lamellibranchiata, are placed above and below it; so they are dorsal and ventral valves, instead of right and left valves. The ventral valve is generally larger than the dorsal, and projects beyond it at the beak. The beak is generally perforated, for the passage of a muscular peduncle, for the attachment of the animal; but in the Lingulidæ, the peduncle projects from the interior of the shell, between the umbones. When there is no peduncle, the shell attaches by the beak, or by the whole surface of the ventral valve. The dorsal valve is always free and imperforate. There is generally a pair of teeth in the ventral valve, developed from the hinge margin, that lock in corresponding cavities in the dorsal valve. Some genera have no teeth or hinge.

The shells of the living Rhychonellidæ and of many fossil genera consist of flattened prisms, parallel with 'each other, and directed obliquely to the surface of the shells, the interior of which is imbricated by their outcrop. The substance of

Craniidæ, Trimerellidæ. FAMILY A Whit FAMILY A Zygos FAMILY C FAMILY D FAMILY L FAMILY N atospi FAMILY O Obolu FAMILY O FAMILY P Penta FAMILY P FAMILY P FAMILY P phalo

WOR.

the shell is tralittle cœcal pro nally by a thick They have

formed by the frequently sup as shown in the dinal muscles, converge towar where there is adductor musc genera there ar

Shells are coils when held and when shell and the sparry seen by holding The class terata-which

These divisions

Athyridæ, Productidæ, Rh

BRACHIOPODA.

331

the shell is traversed by small canals from one surface to the other, through which little cœcal processes of the outer layer of the mantle pass, and are covered externally by a thickening of the epidermis.

They have no special branchial apparatus. The respiratory function is performed by the mantle, which is traversed by numerous blood-vessels. The arms are frequently supported upon a calcareous framework on the interior of the dorsal valve, as shown in the illustration of Waldheimia australis. The valves are opened by cardinal muscles, which originate on each side of the center of the ventral valve, and converge toward the hinge margin of the dorsal valve, behind the dental sockets, where there is usually a prominent cardinal process. The valves are closed by adductor muscles, of which there are four in Crania and Discina. In many fossil genera there are spiral processes, or loops, upon which are founded family distinctions.

Shells are sometimes silicified, and become so transparent that they show the coils when held up to the light. Sometimes the coils are preserved in empty shells; and when shells are found wholly filled with spar, both valves may be removed, and the sparry matrix scraped away on either side until the spirals may be clearly seen by holding the specimen up to the light.

The class was divided by King into two orders—the Clistenterata and Tretenterata—which correspond with the Arthropomata and Lyropomata of other authors. These divisions include the families as follows:

ORDER ARTHROPOMATA.

Athyridæ, Atrypidæ, Orthidæ, Nucleospiridæ, Pentameridæ, Porambonitidæ, Productidæ, Rhynchonellidæ, Spiriferidæ, Strophomenidæ, Terebratulidæ, Triplesiidæ.

ORDER LYOPOMATA.

Craniidæ, Discinidæ, Lingulidæ, Obolidæ, Pholidopidæ, Siphonotretidæ, Trimerellidæ.

- FAMILY ATHYRIDÆ.—Acambona, Athyris, Eumetria, Merista, Meristella, Whitfieldia.
- FAMILY ATRYPIDÆ.—Anazyga, Atrypa, Cœlospira, Glassia, Koninckia, Zygospira.

FAMILY CRANIDE.—Crania, Pseudocrania.

FAMILY DISCINIDÆ. - Discina, Orbiculoidea, Schizocrania, Schizobolus, Trematis.

- FAMILY LINGULIDE. -- Dignomia, Lingula, Lingulella, Lingulasma, Lingulepis.
- FAMILY NUCLEOSPIRIDÆ.—Hindella, Meristina, Nucleospira, Retzia, Trematospira.
 - FAMILY OBOLIDÆ.—Dicellomus, Elkania, Leptobolus, Linnarsonia, Obolella, Obolus.
 - FAMILY ORTHIDÆ.—Meekella, Orthis, Orthisina, Skenidium, Vitulina.
 - FAMILY PENTAMERIDÆ.—Amphigenia, Anastrophia, Gypidula, Pentamerella, Pentamerus, Stenoschisma.
 - FAMILY PHOLIDOPIDÆ.—Pholidops.
 - FAMILY PORAMBONITIDE.—Porambonites.
- FAMILY PRODUCTIDÆ.—Aulosteges, Chonetes, Productella, Productus, Strophalosia.

WOR.

tella stipata,)), p. 34, and Up. Held. Gr. ella tegulata,)), p. 34, and [p. Held. Gr. N. Y., vol. 7,

press,) Geo. [Ety. proper hing or palanged, subtuidal, with the on the surface en the cells is l ridge; the .n of the aperstrong transtriangular deerfectly plane.

stra spatulata,) Sci., vol. 1, p.

Geo. Sur. Ill., Warsaw Grs.

and a pair of irrent of water he base of the of the animal, are dorsal and e is generally k is generally ent of the anior of the shell, is by the beak, lways free and lve, developed e dorsal valve.

nera consist of

the surface of

he substance of

FAMILY RHYNCHONELLIDÆ.-Camarella, Camarophoria, Eatonia, Eichwaldia, Leiorhynchus, Rhynchonella, Rhynchotreta, Stenoschisma.

FAMILY SIPHONOTRETIDE. - Acrothele, Acrotreta, Iphidæ, Kutorgina, Schizambon, Siphonotreta.

- FAMILY SPIRIFERIDÆ. Amboccelia, Cyrtia, Cyrtina, Martinia, Spirifera, Spiriferina, Syntrielasma, Syringothyris, Trigonotreta.
- FAMILY STROPHOMENIDÆ.-Leptæna, Streptorhynchus, Strophodonta, Strophomena, Strophonella.

FAMILY TEREBRATULIDE.—Centronella, Cryptonella, Leptocelia, Rensselaria. Terebratula, Tropidoleptus, Vitulina, Waldheimia.

FAMILY TRIMERELLIDE.—Dinobolus, Lingulops, Monomerella, Trimerella. FAMILY TRIPLESHDÆ.—Triplesia.

ACAMBONA, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 27. [Ety ake, point; ambon, umbo.] Syn. for Eumetria. prima, see Eumetria prima.

ACROTHELE, Linnarsson, 1876, Bihangtill K. Vet. Akad. Handl., p. 20, Swed. Acad. Sci. on the Brachiopoda of the Paradoxides beds. [Ety. akros, pointed; thele, nipple; from the apex of the valve.] Shell thin, corneous, subcircular in outline, depressed, concentrically marked, and sometimes radiated; apex of ventral valve teat-like; subcentral or near the posterior margin, perforated; dorsal valve slightly convex, posterior margin slightly reflexed, and internally a low median longitudinal septum represented by an impression in the cast.

Type A. coriacea. dichotoma, Walcott.

1885, Monogr. U. S. Geo. Sur., vol. 8, p. 14, Up. Taconic. matthewi, Hartt, 1868, (Lingula matthewi,) Acad. Geol., p. 644, St. John Gr.

subsidua, White, 1874, (Acrotreta subdsidua,)

Rep. Invert. Foss., p. 6, and Geo. Sur. W. 100th Mer., vol. 4, p. 34, Up. Taconic. Acrotreta, a

C

Kutorga, 1848, Uber die Siphonotretæ aus den Verhandlunder gen Kaiserlich -

en Mineralogischen FIG. 533. — Acrotreta gemma-Gesellsenft Small outline figures natural Gesellscaft fur Jahr., p. 260, and Davidson's Brachiopoda, vol.

central groove; f, area of an-other specimen having no groove; e, side view.

1, p. 133. [Ety. akros, the top or summit; tretos, perforated.] Shell triangu-

lar, larger valve conical, false area flat. bent back at right angles to the margin of the valve, longitudinally grooved along the center, and perforated at its extremity by a small circular aperture, the lines of growth encircle the shell and pass uninterruptedly over the false area; the smaller valve flat, operculiform, smooth, marked by concentric lines of growth; valves unarticulated. Type A. subconica.

- attenuata, 1873, 6th Rep. Hayden's Geo. Sur. Terr., p. 463, Up. Taconic. baileyi, Matthew, 1885, Trans. Roy. Soc.
- Can., p. 36, St. John Gr. gemma, Billings, 1865, Pal. Foss., vol. 1. p. 216, Quebec Gr.
- gulielma, Matthew, 1885, Trans. Roy. Soc.
- Can., p. 37, St. John Gr. pyxidicula, White, 1874, Rep. Invert. Foss., p. 9, and Geo. Sur. W. 100th Mer., vol. 4, p. 53, Potsdam Gr. subsidua, see Acrothele subsidua.
- *Ægilops*, Hall, 1850, 3d Rep. N. Y. St. Mus. Nat. Hist., p. 179. The name was preoccupied for a genus in botany; beside it was founded on the cast of a Lamellibranch.

subcarinata. Name not to be retained.

AMBOCŒLIA, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 71. [Éty. ambon, umbo; koilos, the belly.] Distinguished from Orthis, Spirifera, etc., by the interior markings in the ventral valve, the thickened margins of the fissure are produced in short, strong teeth, but there is scarcely any extension of the dental plates; in the dorsal valve the bases of the crura continue attached to the inner surface of the valve for more than one-third of its length before becoming free; there is a lateral projection from these crural bases bounding the teeth sockets; the cardinal process is elongate, lying between the crura, and is bifurcated at the outer extremity as in Cyrtina; the muscular impressions are below the middle of the valve, often near the front and quadruple; the dorsal valve being concave, flat or de-

FIG. 585.—Am elonga

on their angular pi angular fi and in its ported on valve with cess border losed to the crura, whic the shell. curta, Meek

landinia el Sur. Ill., vo stone.

elongata, Va elongata,) (



ele subsidua. In-

terior of dorsal

valve enlarged.

FIG. 532 - Acroth-

ACA.-AMB.

Nat. Hist., nucleus, syn fo præumbona, bona,) 10th Hist., p. 1 Y., vol. 4, Gr. subumbona, se umbona. umbonata, (Orthis un Acad. Nat.

pressed con ventral val

Soc., p. 232 gemmula, syr

timbriata, Cla

gregaria, Hal Mus. Nat.

vol. 4, p. 26 inuta, Whi

vexa.

minuta,

264, and Pa cellus Shale unbonata var.



332

ANA.]



size; a and c, dorsal valves; b, ventral valve; d, area of

ventral valve, which shows a

ACA.—AMB.

ANA.]

Eichwaldia,

gina, Schiz-

rifera, Spirif-

donta, Stro-

Rensselæria,

im**er**ella.

alse area flat, to the margin ally grooved forated at its ular aperture, cle the shell over the false flat, operculiy concentric inarticulated.

ayden's Geo. conic. ns. Roy. Soc.

Foss., vol. 1.

ans. Roy. Soc.

Rep. Invert. ur. W. 100th m Gr. sidua. I. Y. St. Mus.

ame was preotany; beside st of a Lamel-

e retained. Rep. N. Y. St. [Éty. ambon, Distinguished c., by the inventral valve, the fissure are g teeth, but ension of the sal valve the ie attached to alve for more before becomrojection from ling the teeth ocess is eloncrura, and is tremity as in pressions are valve, often

uple; the dor-, flat or deBRACHIOPODA.

pressed convex, the spires lie in the ventral valve. Type A. umbonata. fimbriata, Claypole, 1883, Proc. Am. Phil. Soc., p. 232, Portage Gr.

gemmula, syn. for Spirifera planocon-Vexa.

gregaria, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 81, and Pal. N. Y.,

vol. 4, p. 261, Chemung Gr. inuta, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 26, Waverly Gr. minuta. nucleus, syn for Amboccelia umbonata.

præumbona, Hall, 1857, (Orthis præum-bona,) 10th Rep. N. Y. St. Mus. Nat.

Hist., p. 167. and Pal. N. Y., vol. 4, p. 262, Ham. Gr.

subumbona, see Spirifera, subumbona.

Conrad, umbonata, 1842, FIG. 534-Am (Orthis umbonata,) Jour. boccella um-bonata. Acad. Nat. Sci., vol. 8, p. bonata. 264, and Pal. N. Y., vol. 4, p. 259, Marcellus Shale and Ham. Gr. unbonata var. gregaria, see A. gregaria.

AMPHIGENIA

p.

sinus;

conjoined

Hall, 1867, Pal. N. Y., vol. 4, 382. [Ety. amphi, on both sides; genea, growth.]Inequival ve. oval, ovoid, or subtriangular, more or less convex, without mesial fold or valves articulating by teeth and sockets, without area; dental lamellæ, in the ventral valve,

FIG. 535.—Amphigenia elongata.

on their dorsal sides, forming an angular pit, which opens by a triangular fissure beneath the beak, and in its anterior extension is supported on a central septum; dorsal valve with a thickened cardinal process bordered by teeth sockets anchylosed to the bottom and supporting the crura, which extend into the cavity of the shell. Type A. elongata.

curta, Meek & Worthen, 1868, (Stricklandinia elongata var. curta,) Geo. Sur. Ill., vol. 3, p. 402, Oriskany sandstone.

elongata, Vanuxem, 1842, (Pentamerus elongata,) Geo. 3d Dist. N. Y., p. 132, and Pal. N. Y., vol. 4, p. 383, Schoharie grit and Up. Held. Gr.



FIG. 536.—Amphigenia elongata

elongata var. undulata, Hall, 1867, Pal. N. Y., vol. 4, p. 384, Up. Held. Gr.

elongata var. subtrigonalis, Hall, 1857, (Meganteris subtrigonalis,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 123, Up. Held. Gr.

Hall, ANASTROPHIA, 1867, Pal. N. Y., vol. 4, p. 373. [Ety. ana, with ; strophe, a turning round; the relation of the valves is the reverse of that of



Pentamerus,] Gib-FIG. 537.—Amphigebous: ventral valve nia elongata.

the smaller, gibbous in its upper part, depressed or sinuate below, with the V-shaped pit sessile for nearly its entire length; small flattened space on each side of the fissure; dorsal valve ventricose, with prominent umbo; hingeplate extended in gradually converging vertical lamellæ which are joined to the shell throughout their length, while the crura are extended into the cavity, in thin free lamellæ. Type A. verneuili.



FIG. 538.—Anastrophia internascens.

internascens, Hall, 1879, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 168, Niagara Gr.

- interplicata, Hall, 1852, (Atrypa interplicata,) Pal. N. Y., vol. 2, p. 275, Niagara Gr.
- reversa, Billings, 1857, (Pentamerus reversus,) Rep. of Prog. Geo. Sur. Can., p. 215, Mid. Sil.
- verneuili, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist:, p. 104, and Pal. N. Y.,
- vol. 3, p. 260, Low. Held. Gr. ANAZYGA, Davidson, 1883, Supp. to Brit. Brachiopoda, vol. 5, pt. 1, p. 128. [Ety. ana, upward; zygos, a connecting band.] Small, longitudinally oval and striated; position of spiral cones as in Zygospira; about four coils in each spiral cone; stems attach to the hinge plate of the dorsal valve, extend parallel for a short distance, and then, bending at right angles, form two large curves facing the lateral parts of the valve; before reaching their furthest extension in front, they give off a circular band or loop, which is directed upward toward the beak, and is exterior to the spiral cones on their dorsal side. Type A. recurvirostra.
 - recurvirostra, Hall, 1847, (Atrypa recurvirostra,) Pal. N. Y., vol. 1, p. 140, Trenton Gr.
- Anomia, Linnæus, 1767, Syst. Nat., 12th Ed. [Ety. anomios, unequal.] Not Palæozoic.

biloba, see Orthis biloba.

pecten see Strophomena pecten.

reticularis, see Atrypa reticularis. Anomites, Wahlenberg, 1821, Act., Upsal.

exporrectus, see Cyrtia exporrecta. glaber, see Spirifera glabra.

punctatus, see Productus punctatus.

resupinatus, see Orthis resupinatus.

reticularis, see Atrypa reticularis.

rhomboidalis, see Strophomena rhomboidalis.

scabriculus, see Productus scabriculus.

- semireticulatus, see Productus semireticulatus.
- ATHYRIS, McCoy, 1844, Carb. Foss. Ireland, pp. 128 and 146. [Ety. a, without; *thuris, a small door; in allusion to the absence of a deltidium or door. But the name is erroneous.] Nearly orbicular or ovate, both valves convex; no cardinal area, foramen, or hinge-line; spiral appendages attached to the hinge plate of the dorsal valve, very large, nearly filling the shell; a strong mesial septum in rostral part of dorsal valve; dental lamellæ moderate; pallial and ovarian impressions thick, numerous, dichotomous; tissue of shell fibrous. Type A. spiriferoides.
 - americana, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 89, Kaskaskia Gr.
 - angelica, Hall, 1861, 14th Rep. N. Y. St. Mus. Nat. Hist., p. 99, and Pal. N. Y., vol. 4, p. 292, Chemung Gr.
 - argentea, Shepard, 1838, Am. Jour. Sci. and Arts, vol. 34, p. 152, Up. Coal Meas.

biloba, Winchell, 1865, (Spirigera biloba, Proc. Acad. Nat. Sci., p. 118, Kinder-, hook Gr.

ANA.-ATH.

- blancha, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 115, Low. Held. Gr.
- caputserpentis, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 90, Up. Coal Meas.
- charitonensis, Swallow, 1860, (Spirigera charitonensis,) Trans. St. Louis Acad. Sci., vol. 1, p. 651, Coal Meas.
- chloe, Billings, 1860, Can. Jour., vol. 5, p. 282, Ham. Gr.
- clara, Billings, 1860, Can. Jour., vol. 5, p. 274, Up. Held. Gr. claytoni, Hall & Whitfield, 1877, U.S.
- Geo. Expl. 40th parallel, vol. 4, p. 256, Waverly Gr.
- clintonensis, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 89, Kaskaskia Gr.
- clusia, Billings, 1860, Can. Jour., vol. 5, p. 279, Up. Held. Gr.
- cora, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 94, and Pal. N. Y., vol. 4, p. 291, Ham. and Chemung Grs.
- corpulenta, Winchell, 1863, (Spirigera corpulenta,) Proc. Acad. Nat. Sci., p. 6, Waverly Gr.
- raasicardinalis, White, 1860, Bost. Jour. Nat. Hist., vol. 7, p. 229, Waverly Gr. eborea, Winchell, 1866, (Spirigera eborea,)
- Rep. Low. Peninsula Mich., p. 94, Ham. Gr.
- euzona, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 91, Kaskaskia Gr.
- differens, McChesney, 1860, New Pal. Foss., p. 47, syn. for A. subtilita.
- formosa, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 91, Kaskaskia Gr.
- fultonensis, Swallow, 1860, (Spirigera ful-tonensis,) Trans. St. Louis Acad. Sci., vol. 1, p. 650, Ham, Gr.
- hannibalensis, Swallow, 1860, (Spirigera hannibalensis,) Trans. St. Louis Acad. Sci., vol. 1, p. 649, Waverly or Kinderhook Gr.
- hawni, Swallow, 1860, (Spirigera hawnii,) Trans. St. Louis Acad. Sci., vol. 1, p. 652, Coal Meas.

headi, see Zygospira headi.

- headi var. anticostiensis, see Zygospira headi var. anticostiensis.
- headi var. borealis, see Zygospira headi var. borealis.
- harpalyce, Billings, 1863, Proc. Port. Soc.
- Nat. Hist., vol. 1, p. 116, Low. Held. Gr. hirsuta, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 8, and Bull. Am. Mus. Nat. Hist., p. 49, Warsaw Gr.
- incrassata, Hall, 1858, Geo. Rep. Iowa, p. 600, Burlington Gr.
- intervarica, McChesney, 1860, Pal. Foss.,
- p. 78, Burlington Gr. Not recognized. jacksoni, Swallow, 1860, (Spirigera jack-soni,) Trans. St. Louis Acad. Sci., vol. 1,

p. 651, Coal Meas.

julia, see Meristella julia.

ATR.]

junia, Billi Antic., p. lamellosa, lamellosu vol. 2, p. 3 lara, Billing Antic., p. maconensis. maconens Sci. vol. 1 maia, see S minima, Sw ima,) Tra vol. 1, p. missouriens missourie Sci., vol. 1 missouriensis missourie p. 117, L name was monticola, ticola,) F Geo. Sur. Subcarbon naviformis, mis,) Geo Pal. N. Y obmaxima, Pal. Foss. Mer., vol. obvia, McCh Kaskaskia ohioensis. Nat. Sci., orbicularis, Foss., Coa papilionifor Chi. Acad parvirostris, Proc. Ac Keokuk planosulca pectinifera, Louis Ac kuk Gr. perinflata, I Pal. Foss recognized persinuata, 40th para planosulcata vol. 2, p. 1 plattensis, S Acad. Sci. polita, Hall 4th Dist. N. Y., vol prinstana, se prouti, Swal Trans. St. 649, Kind reflexa, Swa Acad. Sci. singletoni, S Acad. Sci Meas. solitaria, Bi Antic., p. ANA.-ATH.

ATR.]

igera biloba. 118, Kinder-.

c. Port. Soc. w. Held. Gr. 3. Trans. St 90, Up. Coal

0, (Spirigera Louis Acad. eas. Jour., vol. 5,

our., vol. 5,

1877, U. S. vol. 4, p. 256,

Trans. St. 89, Kaskas-

ur., vol. 5, p.

I. Y. St. Mus. N. Y., vol. 4, g Grs. (Spirigera at. Sci., p. 6,

Bost. Jour. Vaverly Gr. igera eborea,) lich., p. 94,

is. St. Louis askaskia Gr. New Pal. btilita. ns. St. Louis 91, Kaskas-

Spirigera fuls Acad. Sci.,

0, (Spirigera Louis Acad. y or Kinder-

gera hawnii,) ci., vol. 1, p.

e Zygospira

ospira headi

oc. Port. Soc. ow. Held. Gr. lb. Inst., vol. s. Nat. Hist.,

Rep. Iowa, p.

), Pal. Foss., ot recognized. birigera jackd. Sci., vol. 1, BRACHIOPODA.

vol. 2, p. 39, Waverly Gr. lara, Billings, 1866, Catal. Sil. Foss. Antic., p. 47, Anticosti Gr. maconensis, Swallow, 1860, (Spirigera

maconensis,) Trans. St. Louis Acad. Sci. vol. 1, p. 651, Coal Meas.

maia, see Spirifera maia.

- minima, Swallow, 1860, (Spirigera minima,) Trans. St. Louis Acad. Sci., FIG. 539.-Athyris spiriferoides. Dorsal and ventral vol. 1, p. 649, Ham. Gr.
- missouriensis, Śwallow, 1860, (Spirigera missouriensis,) Trans. St. Louis Acad.
- Sci., vol. 1, p. 650, Coal Meas. missouriensis, Winchell, 1865, (Spirigera missouriensis,) Proc. Acad. Nat. Sci., p. 117, Lithographic limestone. This name was preoccupied.
- monticola, White, 1874, (Spirigera mon-ticola,) Rep. Invert. Foss., p. 16, and Geo. Sur. W. 100th Mer., vol. 4, p. 91, Subcarboniferous.
- naviformis, Hall, 1843, (Atrypa navifor-mis,) Geo. 4th Dist. N. Y., p. 71, and Pal. N. Y., vol. 2, p. 76, Clinton Gr.
- obmaxima, McChesney, 1860, Desc., New Pal. Foss., p. 80, and Geo. Sur. W. 100th Mer., vol. 4, p. 92, Waverly Gr.
- obvia, McChesney, 1860, Pal. Foss, p. 81, Kaskaskia Gr. Not recognized. ohioensis, Winchell, 1865, Proc. Acad.
- Nat. Sci., p. 118, Waverly Gr. orbicularis, McChesney, 1860, New Pal. Foss., Coal Meas. Not recognized.
- papilioniformis, McChesney, 1867, Trans. Chi. Acad. Sci., vol. 1, Kaskaskia Gr. parvirostris, Meek and Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 451, Keokuk Gr. Referred later to A. planosulcata.
- pectinifera, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 88, Keokuk Gr.
- perinflata, McChesney, 1860, Desc. New Pal. Foss., p. 81, Keokuk Gr. Not recognized.
- persinuata, Meek, 1877, U. S. Geo. Sur., 40th parallel, p. 81, Carboniferous. planosulcata, Phillips, 1836, Geo. York.,
- vol. 2, p. 220, Keokuk Gr. plattensis, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 87, Up. Coal. Meas.
- polita, Hall, 1843, (Atrypa polita,) Geo. 4th Dist. N. Y., pl. 65, fig. 5, and Pal. N. Y., vol. 4, p. 293, Chemung Gr. prinstana, see Meristella prinstana.
- prouti, Swallow, 1860, (Spirigera proutii,) Trans. St. Louis Acad. Sci., vol. 1, p.
- 649, Kinderhook or Waverly Gr. reflexa, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2. p. 88, Warsaw Gr.
- singletoni, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 87, Low. Coal Meas.
- solitaria, Billings, 1866, Catal. Sil. Foss. Antic., p. 48, Anticosti Gr.

spiriferoides, Eaton, 1831, (Terebratula spiriferoides,) Am. Jour. Sci., vol. 21, p.



view.

137, and Pal. N. Y., vol. 4, p. 285, Cornif. and Ham. Gr.

- squamosa, Worthen, 1884. Bull. No. 2, 111. St. Mus. Nat. Hist., p. 24, and Geo. Sur. Ill., vol. 8, p. 103, St.
- Louis Gr. sublamellosa, Hall, 1858, Geo. Rep. Iowa, p. 702, Kaskaskia Gr.



- subtilita, Hall, 1852, Stans- Athyris spirif-eroides. Side bury's Exped. to Great view. Salt Lake, p. 409, Coal Meas.
- trinuclea, Hall, 1858, (Terebratula trinu-
- The fossil usually referred to this species is Whitfieldia maria, which Davidson regarded as a synonym for W. tumida.
- tumidula, Billings, 1866, Catal. Sil. Foss. Antic., p. 47, Anticosti Gr. turgida, Shaler, 1865, Bulletin No. 4, M. C.
- Ž., Anticosti Gr. Not defined so as to be recognized.
- ultravarica, McChesney, 1861, Desc. New Pal. Foss., p. 79, Keokuk Gr. Not recognized.
- umbonata, see Hindella umbonata.
- vittata, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 89, and Pal. N. Y., vol. 4, p. 289, Cornif. and Ham. Grs.
- ATRYPA, Dalman, 1827, Vet. Acad. Handl., p. 102. [Ety. a, without; trypa, a hole or perforation. It was supposed the shells had no foramen in the beak. The Suborbicular. name is erroneous.] transverse or elongated; articulating by teeth and sockets; beak of the ventral valve produced and incurved, the apex truncated by a small, round perforation, sometimes separated from the hingeline by a deltidium ; valve more or less convex with or without a defined sinus; a strong tooth on each side at the base of the broad fissure is somewhat bilobed at the summit, with a crenulated groove on the back ; from the base of the teeth a curving ridge extends forward and partially incloses a broad, muscular







scar; dorsal valve convex, with or without a mesial fold; hinge plate divided in the middle with a tooth-like plate on each side, the crura originating outside of these close to the dental sockets, and outside of the latter, close to the shell margins, there is a crenulated fold, which occupied the groove at the base of the tooth; the spires originating from the crura form two hollow cones, directed into the cavity of the dorsal valve, their adjacent sides being flattened and apices brought close together near the center of the bottom of the cavity; the processes at the base of the crura are directed into the cavity of the dorsal valve, and unite to form a loop; surface

smooth, striate, or costate; structure fibrous. Type A. reticularis. acutiplicata, see Leptocelia acutiplicata. acutirostra, see Rhynchonella acutirostra.

equiradiata, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 266, Low. Held. Gr. *æquiradiata*, see Rhynchonella æquiradiata.

affinis, syn. for Atrypa reticularis. altilis, see Rhynchonella altilis. ambigua, see Camarella ambigua. aprinis, see Rhynchonella aprinis. arata, see Pentamerella arata.

aspera, Schlotheim, 1813, (Terebratula aspera,) Petrefaktenkunde, p. 263, Ham. and Chemung Grs.

aspera var. occidentalis, Hall, 1858, Geo. Rep. Iowa, vol. 1, pt. 2, p. 515, Ham. Gr. bidens, see Rhynchonella bidens.

bisulcata, see Camarella bisulcata.

borealis, Schlotheim, as identified by d'Archiac & Verneuil. Not American. brevirostris, as identified by Hall, Pal. N. Y., vol. 2, p. 278. See Pentamerus

brevirostris and Anastrophia verneuili. camura, see Trematospira camura.

capax, see Rhynchonella capax cassidea, as identified by d'Archiac &

Verneuil. Not American.

chemungensis, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 265, Chemung Gr.

circulus see Camarella circulus. concinna, see Nucleospira concinna. comis, see Pentamerus comis. concentrica, syn. for Athyris spiriferoides. congesta, see Triplesia congesta. congregata, see Stenochisma congregatum. contracta, see Stenochisma contractum. corallifera, see Eichwaldia corallifera. crassirostra, Hall, 1852, Pal. N. Y., vol. 2,

p. 269, Niagara Gr. crenulata see Terebratula crenulata.

cuboides, as identified by Hall and others. See Rhynchonella venustula.

cuneata, see Rhynchonella cuneata. cuspidata, see Triplesia cuspidata. cylindrica, see Meristella cylindrica. deflecta, Hall, 1847, Pal. N. Y., vol. 1, p.

140, Trenton Gr. dentata, see Rhynchonella dentata. disparilis, see Cœlospira disparilis. dubia, see Rhynchonella dubia.

dumosa, Hall, 1843, Geo. Rep., 4th Dist. N. Y., p. 272, Chemung Gr.

duplicata, see Stenochisma duplicatum. elongata, syn. for Rensselæria ovoides. emacerata, see Rhynchonella emacerata.

exigua, Hall, 1847, Pal. N. Y., vol. 1, p. 141, Trenton Gr. eximia, see Stenochisma eximium.

extans, see Triplesia extans.

flabella, syn. for Leptocœlia hemispherica. flabellites, see Leptocœlia flabellites. galeata, see Pentamerus galeatus.

gibbosa, Hall, 1852, Pal. N. Y., vol. 2, p. 79, Clinton Gr.

globuliformis, see Leiorhynchus globuliforme.

hemiplicata, see Camarella hemiplicata. hemispherica, see Leptocœlia hemispherica. hirsuta, see Trematospira hirsuta.

hystrix, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 272, and Pal. N. Y., vol. 4, p. 326, Chemung Gr.

impressa, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 122, and Pal. N. Y., vol. 4, p. 315, Schoharie Grit.



FIG. 541.—Atrypa reticularis. a, Dorsal valve; b, ventral valve; c, anterior view

impressa, Shaler. The name was preoccupied.

increbescens, syn. for Rhynchonella capax. inflata, Conrad, 1843, Geo. Rep. 3d Dist. N. Y. Not defined.

intermedia, Hall, 1852, Pal. N. Y., vol. 2, p. 77, Clinton Gr.

interplicata, see Anastrophia interplicata. lævis, see Meristella lævis.

lamellata, see Rhynchonella lamellata. laticosta, Phillips, 1841, (Terebratula laticosta,) Pal. Foss., Chemung Gr. This species is not clearly identified in America.

lentiformis, syn. for Atrypa reticularis.

limitaris, see Leiorhynchus limitare.

- mansoni, Salter, 1852, (Rhynchonella mansoni,) Sutherland's Jour., vol. 2, p. ccxxi, Devonian.
- marginalis, (?) Dalman, 1827, (Terebratula marginalis,) Vet. Acad. Handl., p. 143, Niagara Gr.

medialis, see Eatonia medialis.

mesacostalis, see Leiorhynchus mesacostale. modesta, see Zygospira modesta. nasuta, see Meristella nasuta.

naviformis, see Athyris naviformis.

AUL.]

ATR.

neglecta, see nitida, see M nitida var. ob oblata. nodostriata. p. 272, Nia

nucleolata, F p. 328, Con nucleus, see ' Not recogn oblata, Hall,

Medina Gr



542.-Atryp Interior of ver impression of a cle; c, cardina pedicle muscl sinus; d, deltic

planoconvexa, plebeia, Conr N. Y., Har pleiopleura, s

plena, see Rh plicata, see H plicatella, (?) Hall, in Pa be stricken

> identificati plicatula, see plicifera, see polita, see At prisca, syn. fe pseudomargi

N. Y. St. J Pal. N. Y., quadricostata,

costatum. quadricosta

Hall. 18 seeRhynch nella quad

costata. rectiplica Conrad, 18 Jour. Aca Nat. Sci., v

8, p. 265, Lo Held. Gr.

see Anazy recurvirosti

reticularis, Li

næus, 176 (Anomia r

p. 1132, and

recurvirosti

[ATR

AUL.]

p., 4th Dist

plicatum. ovoides. macerata. 7., vol. 1, p.

ium.

emispherica. ellites. itus. Y., vol. 2, p.

hus globuli-

niplicata. emispherica. uta. ep. 4th Dist. vol. 4, p. 326,

ep. N. Y. St. Pal. N. Y., it.



rsal valve; b view.

was preoc-

nella capax lep. 3d Dist.

N. Y., vol. 2,

interplicata.

imellata. bratula latig Gr. This dentified in

ticularis. mitare. hynchonella ır., vol. 2, p.

(Terebratula andl., p. 143,

mesacostale. a.

prmis.

BRACHIOPODA.

neglecta, see Rhynchonella neglecta. nitida, see Meristina nitida. nitida var. oblata, see Meristina nitida var. oblata.

nodostriata, Hall, 1852, Pal. N. Y., vol. 2, p. 272, Niagara Gr. nucleolata, Hall, 1852, Pal. N. Y., vol. 2,

p. 328, Coralline limestone.

nucleus, see Triplesia nucleus. nustella, Castelnau, 1843, Syst. Sil., p. 39.

Not recognized. oblata, Hall, 1852, Pal. N. Y., vol. 2, p. 9, Medina Gr.

obtusiplicata, see Rhyn-

FIG. 542.—Atrypa reticularis. Interior of ventral valve; a, impression of adductor muscle; c, cardinal muscle; p, pedicle muscle; d, ovarian sinus; d, deltidium.

planoconvexa, see Leptocœlia planoconvexa. plebeia, Conrad, 1843, Geo. Rep. 3d Dist. N. Y., Ham. Gr. Preoccupied name.

pleiopleura, see Rhynchonella pleiopleura. plena, see Rhynchonella plena.

plicata, see Rhynchonella plicata. plicatella, (?) Linnæus, as identified by

Hall, in Pal. N. Y., vol. 2, p. 279. May be stricken from the list as an erroneous identification.

plicatula, see Rhynchonella plicatula. plicifera, see Rhynchonella plicifera. polita, see Athyris polita.

prisca, see Arryns ponta. prisca, syn. for Atryna reticularis. pseudomarginalis, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 84, and Pal. N. Y., vol. 4, p. 327, Up. Held, Gr.

quadricostata, see Leiorhynchus quadricostatum.

quadricostata, Hall, 1852. see Rhynchonella quadricostata. rectiplicata,

Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 265, Low. Held. Gr. recurvirostra.

see Anazyga Fte. 543.—Atrypa reticularis-recurvirostra. Interior of dorsal valve, eticularis, Lin- showing spirals; p, hinge reticularis, Linnæus, 1767,

(Anomia reticularis,) Syst. Nat., ed. 12 p. 1132, and Pal. N. Y., vol. 2, p. 72. It

occurs, with its varieties, in all the Groups of the Upper Silurian and Devonian formations, except the Oriskany sandstone. Some of its varieties or synonyms are, Atrypa affinis, A. lentiformis, A. prisca, A. tribulis, Hipparionyx consimilis, etc.

robusta, see Rhynchonella robusta.

rostrata, see Meristella rostrata.

rugosa, see Rhynchonella rugosa.

scitula, see Meristella scitula.

semiplicata, see Rhynchonella semiplicata. singularis, see Eatonia singularis.

sordida, see Rhynchonella sordida.

spinosa, Hall, 1843, Geo. 4th Dist. N. Y., p. 200, Cornif., Ham., Tully, and Chemung Grs. Equal to Atrypa aspera var. occidentalis.

subcuboides, D'Orbigny, see Rhynchonella venustula.

subtrigonalis, see Rhynchonella subtrigonalis.

sulcata, see Merista sulcata.

tenuilineata, Hall, 1843, Geo. 4th Dist. N. Y., p. 272, Chemung Gr.

tribulis, syn. for Atrypa reticularis.

tumida, see Athyris tumida.

unguiformis, syn. for Orthis proximus.

unisulcata, see Meristella unisculcata. AULOSTEGES, Helmerson, 1847, Bull. de la

Classe Physi. Math. Acad. Sci. St. Petersburg, vol. 6, p. 135. [Ety. aulos, tube; stege, chamber.] Shell subpentagonal; ventral valve most convex,



FIG. 544 - Aulosteges wangenheimi. h, Triangular hinge area; d, convex pseudodeltidium; j, cardinal process; a, adductor impression.

beak produced, twisted, area triangular, interrupted by a pseudodeltidium not reaching the hinge-line, which is straight and toothless; dorsal valve convex at the umbo, depressed or concave laterally; cardinal edge more or less developed; surface of valves with short tubular spires; in the interior of the dorsal valve a trifid cardinal process is made to fill the uncovered portion of the fissure, and serve as the point of attachment to the cardinal muscle; under this process a longitudinal mesial ridge extends nearly to the margin, and on either side are elongated, ramified adductor scars; the reniform impressions, after dividing the above named muscle, extend by an outward oblique curve to near the margin, when, turning backward and inward, termi-

337



chonella ob-

tusiplicata. octocostata, see

Pentame-

rella arata.

Eatonia pe-

chonella

phoca,) Suther-

land's Jour.,

vol. 2, p. ccxxvi, De-

vonian.

peculiaris, see

culiaris. phoca, Salter, 1852,(Rhynnate some distance from their origin; two brachial elevations under the adductor move toward the center of the valve. Type A. wangenheimi.

guadalupensis, Shumard, 1858, Trans. St. Louis Acad. Sci., vol.-1, p. 292, Permian Gr.

spondyliformis, White & St. John, 1868, Trans. Chi. Acad. Sci., p. 118, Up. Coal. Meas.

Billingsia, Ford, 1885. The name being preoccupied, see Elkania.

- Brachymerus, Shaler. The name was preoccupied for a genus of Coleoptera. See Anastrophia.
- Brachyprion, Shaler, syn. for Strophomena. geniculatum, see Strophomena geniculata. leda, see Strophomena leda.

ventricosum, see Strophomena ventricosa.

CAMARELLA, Billings, August, 1858, Can. Nat. and Geol., vol. 4, p. 301. [Ety. kamara, arching chamber; ellus, diminutive.] Shell ovate or subcircular, beaks small, hinge-line short; mesial fold and sinus becoming obsolete in the middle part of the shell, below which the radiating striæ are more or less numerous. while above concentric strize occur. Type C. volborthi.



FIG. 545.-Camarella hemiplicata. Dorsal, ventral, and side views.

ambigua, Hall, 1847, (Atrypa ambigua,) Pal. N. Y., vol. 1, p. 143, Trenton Gr. antiquata, Billings, 1861, Pal. Foss., vol. 1, p. 10, Georgia Gr.

bisulcata, Emmons, 1842, (Orthis bisul-cata,) Geo. Rep. N. Y., p. 395, and Pal.

N. Y., vol. 1, p. 139, Trenton Gr. breviplicata, Billings, 1865, Pal. Foss., vol. 1, p. 304, Quebec Gr.

calcifera, Billings, 1861, Can. Nat. and Geo.,

vol. 6, p. 318, Calcif. Gr. circulus, Hall, 1847, (Atrypa circulus,)

Pal. N. Y., vol. 1, p. 142, Trenton Gr. congesta, see Triplesia congesta. costata, Billings, 1865, Pal. Foss., vol.

1, p. 305, Quebec Gr.

cuspidata, see Triplesia cuspidata. extans, see Triplesia extans.

hemiplicata, Hall, 1847, Atrypa hemi-plicata,) Pal. N. Y., vol. 1., p. 144, Trenton Gr.

Inticularis, Billings, 1866, Catal. Sil. Foss. Antic., p. 45, Anticosti Gr. Sologirostra, Billings, 1858, Can. Nat. and Geo., vol. 4, p. 302, Chazy Gr.

nucleus, see Triplesia nucleus. ops, Billings, 1862, Pal. Foss., vol. 1, p. 148, Mid. Sil.

ortoni, see Triplesia ortoni.

panderi, Billings, 1858, Can. Nat. and Geo., vol. 4, p. 301, Black Riv. Gr.

parva, Billings, 1865, Pal. Foss., vol. 1, p. 219, Quebec Gr.

polita, Billings, 1865, Pal. Foss., vol. 1. p.

305. Quebec Gr. primordialis, see Triplesia primordialis.

reversa, see Anastrophia reversa. varians, Billings,

1859, Can. Nat. and Geo., vol. 4, p. 445,



[BIL.-CAM.

volborthi, Bill-ings, 1859, and side views. Can. Nat. and volventral.

Geo., vol. 4, p. 301, Black Riv. Gr.

waldronensis, see Triplesia waldronensis.

Camarium, Hall, 1859, Pal. N. Y., vol. 3, p. 486, syn. for Merista.

elongatum, see Merista elongata. typum, see Merista typus.

CAMAROPHORIA, King, 1844, Ann. and Mag. Nat. Hist., vol. 14, p. 313. [Ety. kamara, an arched chamber; phoreo, I carry.] Subtrigonal, convex longitudinally; mesial fold and sinus; beak acute, more or less incurved, small fissure beneath: no area or deltidium; plicated, impunctate, articulating by teeth and sockets; dental plates in the ventral valve, conjoined at their dorsal margins, forming a trough-shaped process affixed to a low, medio-longitudinal plate; the space between the sockets in the dorsal valve is occupied by a small, cardinal, muscular protuberance, on either side of which two slender processes curve upward; from beneath the cardinal process a vertical mesial septum, a third or more of the length of the valve, supporting along its upper edge a spatula-shaped process, dilated toward its free extremity, and projected with a curve to near the center of the shell. Type C. schlotheimi.

bisulcata, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 296, Permian Gr. eucharis, Hall, 1867, Pal. N. Y., vol. 4, p. 368, Corniferous Gr.



FIG. 547.—Camarophoria giffordi. a, Dorsal view; b. ventral valve; c, profile view.

giffordi, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 39, and Geo. Sur. Ill., vol. 7, p. 318, Middle Coal Meas. globulina, Phillips, 1844, as identified by

Geinitz, is Rhynchonella uta.

occidentalis, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p, 313, Burlington Gr.

CEN.-CHO.]

schlotheimi, tulites sch Geol., vol. subtrigona, Rhynchol Nat. Sci. P vol. 2, p. 2 swallovana, Louis Aca mian Gr. wortheni, Ha theni,) Tra Bull. Am. saw Gr. CENTRONELLA, Geo., vol. General fo valve with ribbon-like half the curving ou until their an acute a reflected b a thin, fla origin eac side a sing Type C. gl allii, Winche p. 123, Wa alveata, Hal veata,) 101 Hist., p. 12 anna, Hartt Subcarb. billingsana, Sur. Ill., v crassicardina Mus. Nat. saw Gr. flora, Wincl Soc., vol. 1 glansfagea, glansfagea Nat. Hist., p. 399, Sch Oriskany s glaucia, Hall 403, Ham.

FIG. 548.—Cent

hecate, a. Show b, c, and d, views.

102. and

Ham. Gr.

Sci. vol. 14

syn. for C. julia, Wincł

4, p. 419, l ovata, Hall,

Up. Held.

Sci., and A

circe, see Me

doris, see Me

Charionella, Bi



BIL.-CAM.

oss., vol. 1, p.

oss., vol. 1. p.

rimordialis. rsa.



amarella orsal, ve ventral, ws.

Riv. Gr. aldronensis. Y., vol. 3, p.

ata.

nn. and Mag. [Ety. kamara, reo, I carry. ongitudinally; beak acute, all fissure beum; plicated, by teeth and a the ventral dorsal marlaped process o-longitudinal 1 the sockets ccupied by a protuberance,

two slender from beneath ertical mesial of the length long its upper ocess, dilated and projected center of the

ni. rans. St. Louis Permian Gr. Y., vol. 4, p.



Dorsal view; b.

Ill. No. 1, Ill. and Geo. Sur. Coal Meas. identified by uta.

881, Jour. Cin. 313, BurlingBRACHIOPODA.

schlotheimi, Von Buch, 1834, (Terebratulites schlotheimi,) Mem. de la Soc. Geol., vol. 3, p. 138, Permian Gr. subtrigona, Meek & Worthen, 1860,

CEN.—CHO.]

- Rhynchonella subtrigona,) Proc. Acad. Nat. Sci. Phil., p. 451, and Geo. Sur. Ill., vol. 2, p. 251, Keokuk Gr.
- swallovana, Shumard, 1859, Trans. St. Louis Acad. Sci., vol. 1, p. 394, Permian Gr.
- wortheni, Hall, 1858, (Rhynchonella wortheni,) Trans. Alb. Inst., vol. 4, p. 11, and Bull. Am. Mus. Nat. Hist., p. 54, Warsaw Gr.
- CENTRONELLA, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 131. [Ety. a little point.] General form like Terebratula; dorsal valve with a loop consisting of two ribbon-like lamellæ, which extend about half the length of the shell, at first curving outward and then approaching until their lower extremities meet at an acute angle; here they unite and are reflected backward toward the beak in a thin, flat, vertical plate; near their origin each bears upon the ventral side a single triangular crural process. Type C. glansfagea.
- allii, Winchell, 1865, Proc. Acad. Nat. Sci., p. 123, Waverly or Marshall Gr.
- alveata, Hall, 1857, (Rhynchonella alveata,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 124, Onondaga Gr. anna, Hartt, 1868, Acad. Geol., p. 300,
- Subcarb.
- billingsana, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 352, Niagara Gr. crassicardinalis, Whitfield, 1882, Bull. Ann.
- Mus. Nat. Hist., No. 3, p. 55, Warsaw Gr.
- flora, Winchell, 1879, Proc. Am. Phil. Soc., vol. 12, p. 254, Marshall Gr.
- glansfagea, Hall, 1857, (Rhynchonella glansfagea,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 125, and Pal. N. Y., vol. 4, p. 399, Schoharie grit, Cornif. Gr. and Oriskany sandstone.

glaucia, Hall, 1867, Pal. N. Y., vol. 4, p.

hecate, Billings, 1861, Can. Jour. vol. 6, p. 272, Up. FIG. 548.—Centronella

Held. Gr. impressa, Hall,

hecate. a, Showing loop; b, c, and d, different 1861, 14th Rep. N. Y. St. Mus.

- Nat. Hist., p. 102 and Pal. N. Y., vol. 4, p. 402, Ham. Gr. Prof. Billings said this is a syn. for *C. hecale.* lia, Winchell 1999
- julia, Winchell, 1862, Proc. Acad. Nat. Sci. vol. 14, p. 405, and Pal. N. Y., vol. 4, p. 419, Marshall Gr.
- ovata, Hall, 1867, Pal. N. Y., vol. 4, p. 419, Up. Held. Gr.
- Charionella, Billings, 1861, Can. Jour. Ind. Sci., and Art, p. 148, syn. for Meristella. circe, see Meristella circe. doris, see Meristella doris.

(?) hyale, see Meristella hyale.

- CHONETES, Fischer, 1837, Oryckt. Moscou, p. 134. [Ety. chone, a little cup.] Shell thin, semi-cylindrical, transverse section semi-oval, ventral valve convex, dorsal concave hinge-line straight; external margin of the area of ventral valve bearing a row of tubular spines, foramen distinct but partially closed by a pseudo-deltidium ; dorsal valve with a cardinal process, simple at the base, but bifid or grooved at the extremity; valves articulated by teeth, surface radiately striated, often spinous, interior pustulose or papillose. Type C. arcinulatus. acutiradiatus, Hall, 1843, (Strophomena
 - acutiradiata.) Geo. Rep. 4th Dist. N. Y., p. 171, and Pal. N. Y., vol. 4, p. 120, Up. Held. Gr.
 - antiope, Billings, 1874, Pal. Foss., vol. 2. p. 19, Low Devonian.
 - arcuatus, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 116, and Pal. N. Y., vol. 4, p. 119, Up. Held. Gr.
 - armatus, DeKoninck, the specimens referred to this species belong to C. pusillus.
 - canadensis, Billings, 1874, Pal. Foss., vol. 2, p. 17, Lower Devonian.
 - carinatus, Conrad, 1842, (Strophomena carinata,) Jour. Acad. Nat. Sci., vol. 8, 257, and Pal. N. Y., vol. 4, p. 133, Ham. Gr.
 - complanatus, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 56, and Pal. N. Y., vol. 3, p. 418, Oriskany sandstone.
 - cornutus, Hall, 1843, (Strophomena cornuta,) Geo. Rep. 4th Dist. N. Y., and Pal. N. Y., vol. 2, p. 64, Clinton Gr.
- dawsoni, Billings, 1874, Pal. Foss., vol. 2, p. 18, Low. Devonian.
- deflectus, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 149, and Pal. N. Y.,
- vol. 4, p. 126, Ham. Gr. emmetensis, Winchell, 1866, Rep. Low.
- Penin. Mich., p. 92, Ham. Gr. filistriatus, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 127, Devonian.
- fischeri, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, p. 25, Kinderhook Gr.
- flemingi, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, p. 26, Permian Gr.
- geinitzanus, N. Sp., Up. Coal Meas. Proposed instead of C. glabra of Geinitz in Carb. und Dyas in Neb., p. 60, tab. 4, fig. 15 to 18, which name was preoccupied.
- geniculatus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 29, Waverly or Marshall Gr.
- gibbosa, syn. for C. deflectus.
- glaber, Hall, 1857, 10th Rep.N. Y. St. Mus. Nat. Hist., p. 117, Up. Held. Gr.
- glabra, Geinitz, 1866, Carb. und Dyas. The name was preoccupied. See C. geinitzanus.
- granuliferus, Owen, 1852, Geo. Rep. Wis., Iowa, and Minn., p. 583, Coal Me as



- hemisphericus, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 116, and Pal. N. Y., vol. 4, p. 118, Schoharie grit and Cornif. Gr.
- illinoisensis, Worthen, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 571, and Geo. Sur. Ill., vol. 3, p. 505, Kaskaskia Gr.
- iowensis, Owen, 1852, Geo. Rep. Iowa, Wis. and Minn., p. 584, Carb.
- koninckanus, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, 2d ser., p. 30, Devonian.
- lævis, Keyes, 1888, Proc. Acad. Nat. Sci. Phil., pl. xii, figs. 3a, 3b, Coal Meas.
- laticosta, syn. for C. mucronatus. lepidus, Hall, 1857, 10th Rep. N. Y. St.
- Mus. Nat. Hist., p. 148, and Pal. N. Y. vol. 4, p. 132, Marcellus shale and Ham. Gr.
- lineatus, Conrad, 1839, (Strophomena lineata,) Ann. Geo. Rep. N. Y., p. 64, and Pal. N. Y., vol. 4, p. 121, Up. Held. Gr.
- littoni, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, p. 25, Ham. Gr.
- loganensis, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th Parallel, vol. 4, p. 253, Waverly Gr.
- logani, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci. vol. 3, p. 30, Burlington Gr.
- logani var. aurora, Hall, 1867, Pal. N. Y. vol. 4, p. 137, Tully limestone and Ham. Gr.
- maclurii, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, p. 28, Ham. Gr.
- macrostriatus, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 126, Devonian
- martini, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, p. 29. Ham. Gr.
- melonicus, Billings, 1874, Pal. Foss., vol. 2, p.15, Gaspe limestone No. 8, Devonian.

mesolobus, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, p. 27, Coal Meas.

FIG. 549.—Chonetes mesolobus. tral valve. Venmichiganensis, Stevens, 1858, Am. Jour. Sci., vol. 25, p. 262, Marshall Gr.

- millepunctatus, Meek & Worthen, 1870, Proc. Acad. Nat. Sci., p. 35, and Geo. Sur. Ill., vol. 5, p. 566, Coal Meas. innimus, Hall. Being preoccupied by
- minimus, Hall. Sowerby. See C. undulatus.
- mucronatus, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 180, and Pal. N. Y., vol.
- 4, p. 124, Corniferous and Ham. Grs. mucronata, Meek, & Hayden, 1858, Proc.
- Acad. Nat. Sci., p. 262, Coal Meas. This name was preoccupied; moreover it is a syn. for C. granuliferus. multicosta, Winchell, 1863, Proc. Acad.
- Nat. Sci., p. 5, Marshall Gr. muricatus, Hall, 1867, Pal. N. Y., vol. 4,
- p. 143, Chemung Gr.

- novascoticus, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 144, Niagara Gr.
- ornatus, Shumard, 1855, Geo. of Mo. p. 202, Waverly or Kinderhook Gr. parvus, Shumard, 1855, Geo. of Mo. p.
- 201, Coal Meas. permianus, Shumard, 1859, Trans. St.
- Louis Acad. Sci., vol. 1, p. 390, Permian Gr.
- planumbonus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 450, and Geo. Sur. Ill., vol. 2, p. 253, Keokuk Gr. platynotus, White, 1874, Rep. Invert. Foss.,
- p. 19, and Geo. Sur. W. 100 Mer., vol. 4, p. 121, Subcarboniferous.
- pulchellus, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 410, Marshall Gr. pusillus, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 149, and Pal. N. Y., vol. 4, p. 128, Ham. Gr.
- reversus, Whitfield, 1882, Desc. New Spec. Foss., from Ohio, p. 213, Marcellus shale.
- scitulus, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 147, and Pal. N. Y., vol. 4, p. 130, Ham. Gr.
- setigerus, Hall, 1843, (Strophomena setigera,) Geo. Rep. 4th Dist. N. Y., p. 180, and Pal. N. Y., vol. 4, p. 129, Ham. and Chemung Grs.
- shumardanus, DeKoninck, 1847, Recherches sur les Anim. Foss., p. 192, Waverly Gr.
- smithi, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, p. 24, Coal Meas.
- striatellus, Dalman, 1827, (Orthis striatella,) Kongl. Svenska Ak. Handl., p. 111, Up. Sil.
- syrtalis, syn. for C. carinata.
- tenuistriatus, Hall, 1860, Can. Nat. and «Geo., vol. 5, p. 144, Up. Sil.
- tuomeyi, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, 2d ser., p. 28, Ham. Gr.
- undulatus, Hall, 1879, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 155, Niagara Gr.
- variolatus, DeKoninck, 1847, Monogr. du genre Chonetes, p. 206, Coal Meas.
- verneuilanus, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, p. 26, Coal Meas.
- verneuilanus var. utahensis, Meek, 1876, Simpson's Rep. on Gt. Basin of Utah, p. 348, Carboniferous.
- vandellanus, Hall, 1857, 10th Rep. N. Y.St. Mus. Nat. Hist., p. 118, and Pal. N. Y., vol. 4, p. 123, Corniferous Gr.
- CCELOSPIRA, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 146. [Ety. koilos, hollow; speira, spire.] Ovate or suborbicular. concavo-convex, surface finely plicated, usually undefined mesial fold and sinus, beak small, foramen triangular, inter-nal spires forming two flattened coils connected by a strong loop. Type C. concava.

concava, Hal 10th Rep.



FIG. 550.-Coelos

107, and Pa niferous Gi



F16. 551.—Cœlosp parilis. Dor ventral views. Dors

disparilis,) Niagara Gr CRANIA, Retziu Gesellschaf vol. 2, p. 72 part of a ski rate, transv by its vent object; upp less conver or subcent radiated, or not unfrequ of the object is attached ligament, bi four muscle approximat posterior pa and widely

> reous and burgensis.



Fig. 552. - Crania posterior adduct muscle; r, o, reta

acadiensis, Ha vol. 5, p. 144 anna, Spencer Univ. St. Mc aurora, Hall, Mus. Nat. H

COF.L.

COEL.

CRA.]

an. Nat. and ra Gr. eo. of Mo. p. ook Gr. eo. of Mo. p.

9, Trans. St. , p. 390, Per-

'orthen, 1860, 450, and Geo. eokuk Gr. . Invert. Foss.,)0 Mer., vol. 4,

Proc. Acad. Gr. Rep. N. Y. 149, and Pal. Gr. lesc. New Spec.

213, Marcellus lep. N. Y. St. nd Pal. N. Y.,

ohomena seti-N. Y., p. 180, 129, Ham. and

1847, Rechers., p. 192, Wa-

n, 1854, Jour. , p. 24, Coal

(Orthis stri-1k. Handl., p.

Can. Nat. and Sil. en, 1854, Jour. 2d ser., p. 28,

1 Rep. N. Y. p. 155, Niag-

7. Monogr. du oal Meas. Pratten, 1854. . 3, p. 26, Coal

s, Meek, 1876, asin of Utah,

n Rep. N. Y.St. nd Pal. N. Y., Gr.

s. Alb. Inst., coilos, hollow: r suborbicular, finely plicated, fold and sinus, ingular; interflattened coils loop. Type C. concava, Hall, 1857, (Leptocœlia concava,) 10th Rep. N. Y. St. Mus. Nat. Hist., p.



FIG. 550.-Cœlospira concava. Magnified view of spirals.

107, and Pal. N. Y., vol. 3, p. 245, Corniferous Gr. dichotoma, Hall,

parilis.



FIG. 551.—Cœlospira dis-parilis. Dorsal and disparilis, Hall, ventral views. ntral views. 1852, (Atrypa disparilis,) Pal. N. Y., vol. 2, p. 277,

Niagara Gr. CRANIA, Retzius, 1781, Schriften der Berliner Gesellschaft Naturforschende Freund, vol. 2, p. 72. [Ety. kranion, the upper part of a skull.] Shell circular, subquadrate, transverse, or elongated, attached by its ventral valve to some foreign object; upper or dorsal valve more or less convex or conical; apex central or subcentral; surface smooth, spiny, radiated, or concentrically lined, and not unfrequently having the markings of the object to which the lower valve is attached; no articulating hinge or ligament, but valves held in place by four muscles; anterior adductor scars approximate and close to the center; posterior pair near the cardinal edge, and widely separated; structure calca-reous and tubular. Type C. brattenburgensis.



FIG. 552. — Crania anomala, 2 diam. a, Anterior adductors; á posterior adductors; c, protractor sliding muscles; é, cardinal muscle; r, o, retractor sliding muscles.

acadiensis, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 144, Up. Sil.

- anna, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 57, Niagara Gr. aurora, Hall, 1863, 16th Rep. N. Y. St.
- Mus. Nat. Hist., p. 30, Schoharie Grit. 23

BRACHIOPODA.

- bella, Billings, 1874, Pal. Foss., vol. 2, p. 15, passage beds between Up. Sil. and Devonian.
- bordeni, Hall & Whitfield, 1872, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 187, Up. Held. Gr.
- carbonaria, Whitfield, 1882, Desc. New Spec. Foss., from Ohio, p. 229, Coal Meas.
- corrugata, Hall, 1843, (Orbicula corrugatus,) Geo. Rep. N. Y., p. 109, Niagara Gr.
- crenistriata, Hall, 1860, 13th Rep. N. Y St. Mus. Nat. Hist., p. 78, and Pal. N. Y., vol. 4, p. 28, Ham. Gr.
- deformata, Hall, 1847, (Orbicula deform-ata,) Pal. N. Y., vol. 1, p. 23, Chazy Gr. Is it a Crania?
- dentata, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 16, Niagara Gr.
- dyeri, S. A. Miller, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 13, Hud. Riv. Gr.
- eccentrica, Emmons, 1856, (Orbic-Fig. 558 Crania ula eccentrica,) Am. Geol., p. dyeri. 112, Up. Taconic.
- famelica, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 236, Chemung Gr.
- gracilis, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 17, Niagara Gr. granulosa, Winchell, 1880, 8th Rep. Geo.
- Sur. Minn., p. 63, Trenton Gr. gregaria, Hall, 1863, 16th Rep. N. Y. St.
- Mus. Nat. Hist., p. 31, Ham. Gr. hamiltoniæ, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 77, and Pal. N. Y., vol. 4, p. 27, Ham. Gr. lælia, Hall, 1866, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 600, Hud. Bir. Gr.
- Nat. Hist., p. 220, Hud. Riv. Gr. leoni, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 78, and Pal. N. Y., vol. 4,
- p. 30, Chemung Gr. modesta, White & St. John, 1868, Trans. Chi. Acad. Sci., p. 118,
- Up. Coal Meas.
- multipunctata, S. A. Miller,

1875, Cin. Quar. Jour. Sci., vol. 2, p. 13, Hud. Riv. punctata. nia multi-punctata. Gr.

pannosa, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 17, Niagara Gr. parallella, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist., vol.

1, p. 98, Hud. Riv. Gr. percarinata, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist.,

vol. 1, p. 98, Hud. Riv. Gr.

permiana, Shumard, 1859. Trans. St. Louis Acad. Sci.,

vol. 1, p. 395, Permian Gr. prima, Owen, 1852, (Orbicula prima,) Geo. Sur. Iowa, Wis., and Minn., p. 583, Potsdam Gr.

radicans, Winchell, 1866, Rep. Low. Peninsula Mich., p. 92, Ham. Gr.

reposita, White, 1866, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 8, Ham. Gr. reticularis, S. A. Miller, 1875,

Cin. Quar. Jour. Sci., vol. 2, p. 280, Hud. Riv. Gr.

280, Hud. Riv. Gr. FIG. 555.-rowleyi, Gurley, 1883, New Carb. Crania reticu -laris. Foss. Kinderhook Gr. Not defined and published as re-

quired by the rules of nomenclature. scabiosa, Hall, 1866, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 220, Hud. Riv. Gr. setifera, Hall, 1863, Trans. Alb. Inst., vol.

4, p. 209, Niagara Gr.

4, p. 209, Niagara Gr. setigera, Hall, 1866, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 220, Trenton Gr. sheldoni, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 8, Ham. Gr. siluriana, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 208, Niagara Gr. socialis, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist vol 1, p. 99, Hud Riv Gr.

Hist., vol. 1, p. 99, Hud. Riv. Gr. spinigera, Hall, 1879, Desc. New Spec. Foss., p. 13, and 11th Rep. Geo. and

Nat. Hist. Ind., p. 283, Niagara Gr. trentonensis, Hall, 1866, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 219, Trenton Gr.

truncata, Emmons, 1856, (Orbicula trun-

CRYPTONELLA, Hall, 1861, 14th Rep. N. Y. St. Mus. Nat. Hist., p. 102. [Sig. a little cavity.] Equilateral, inequivalve, elongate oval or ovoid; valves unequally convex, no mesial fold or sinus; ventral valve with beak extended or incurved, perforate; foramen terminal; punctate smooth or with concentric striæ; articulating by teeth and sockets; dental lamellæ of the ventral valve extending downward into the cavity of the shell; crura extend in a long recurved loop, with long processes into the ventral valve, between which and the apex they are united by a transverse band. Type C. rectirostra.

calvini, Hall & Whitfield, 1870, 23d Rep. N. Y. St. Mus. Nat. Hist., p. Chemung Gr. rcula, Walcott, circula,

1885,

239,

Monogr.

U. S. Geo. Sur.,

ig. 556. — Cryptonella lincklæni. Dorsal and FIG. profile views.

profile views. p. 163, Devonian. eudora, Hall, 1867, Pal. N. Y., vol. 4, p. 398, Chemung Gr.

iphis, Hall, 1867, Pal. N. Y., vol. 4, p. 396, Up. Held. Gr.

lens, Hall, 1860, (Terebratula lens,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 89,

Up. Held. Gr. lincklæni, Hall, 1860, (Terebratula lincklæni,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 88, Ham. Gr.

pinonensis, Walcott, 1885, Monogr. U. S.

Geo. Sur., p. 163, Devonian. planirostra, Hall, 1860, (Terebratula plan-irostra,) 13th Rep. N. Y. St. Mus. Nat.

Hist., p. 89, and Pal. N. Y., vol. 4, p. 395, Ham. Gr.

rectirostra, Hall, 1860, (Terebratula recti-rostra,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 88, and Pal. N. Y., vol. 4, p. 394, Ham. Gr.

CYRTIA, Dalman, 1827, Kongl. Vet. Acad. Handl., p. 93. [Ety. kyrtia, a fishing basket.] Shell somewhat trigonal, valves convex, hinge-line nearly as long as the width of the shell, articulating by teeth and sockets; ventral valve deep, more or less pyramidal, beak straight or slightly recurved, area wide and triangular, fissure covered by a convex pseudodeltidium, generally perforated close to the beak by a circular foramen, a longitudinal depression in the deltidium sometimes shows, at the extremity a circular aperture for the passage of pedicle muscular fibers; dorsal valve less convex; a mesial longitudinal septum, in the ventral valve. extends from the fissure to near the margin, to the sides of which the dental plates converge, and are united after having formed the fissure walls.

acutirostris, see Cyrtina acutirostris. biplicata, see Cyrtina biplicata. curvilineata, see Cyrtina curvilineata. dalmani, see Cyrtina dalmani.

exporrecta, 1821, Nova. Acta. Regiae. Soc. Sci., vol. 8, p. 64, and 24th Rep. N. Y. St. Mus. Nat. Hist., p. 183, Niagara Gr.

exporrecta var. arrecta, Hall & Whitfield, 1872, 24th tia expor-Rep. N. Y. St. Mus. Nat. recta. Hist., p. 185, Niagara Gr.

hamiltonensis, see Cyrtina hamiltonensis. missouriensis, see Cyrtina missouriensis. myrtea, Billings, 1862, Pal. Foss., vol. 1, p. 165, Mid Sil.

occidentalis, see Cyrtina occidentalis. rostrata, see Cyrtina rostrata. triquetra, see Cyrtina triquetra. umbonata, see Cyrtina umbonata.

CYRTINA, Davidson, 1858, Monog. Brit. Carb. Brach., p. 66. [Ety. the diminu-tive of Cyrtia is Cyrtiatium, but the author said he preferred bad Greek to a long name.] Spirifera-like shells; valves very unequal, ventral being extremely elevated, with high area and narrow fissure, closed by a pseudodeltidium; dental plates converge from the inner margins of the fissure, and, uniting, form a septum to the bottom of the internal cavity, thus dividing it into two parts; shell punctate. Type C. heteroclyta.

acutirostris, Shumard, 1855, (Cyrtia acutirostris,) Geo. Rep. Mo., p. 204, Wa verly or Choteau Gr.

affinis, Billings, 1874, Pal. Foss., vol. 2, p. 49, Gaspe No. 8, Devonian.

vol. 1, p. 647, occidentalis, Sw dentalis,) Tra vol. 1, p. 648, panda, Meek, 1 p. 100, Ham.

pyramidalis, H midalis,) Pal. ara Gr.

rostrata, Hall, 1 Rep. N. Y. St Oriskany sand triquetra, Hall, Geo. Rep. Io

Ham. Gr. umbonata, Hall Geo. Rep. Io

Ham. Gr. Delthyris, Dalman, acanthoptera, sy1 acuminata, Coni

nata. acuminata, Hall, costalis.

acutilirata, see O arenosa, see Spir audacula, see Sp bialveata, see Spi bilobata, see Ort brachynota, see S chemungensis, sy1 congesta, see Spir cuspidata, syn. fe decemplicata, see







CRY.-CYR.

10th Rep. N 165, Schohar

crassa, Hall, 1

267. Up. Hel curvilineata, V

lineata,) Pro

vol. 9, p. 25, 270, Ham. G

dalmani, Hall. 10th Rep. N.

64, Low. He

Geo. Sur., vo euphemia, Bil

Geol., vol. 8,

FIG. 558.-Cyrtina

hamiltonensis,

Ham. Grs.

hamiltonensis

missouriensis,

N. Y., vol. 4,

souriensis.) T

tonensis,) 10t

Hist., p. 166, 268, Schoha

tral.

davidsoni, Wa

DEL. -DIN.]

CRY.-CVR.

DEL. -DIN.]

Y., vol. 4, p.

bratula recti-It. Mus. Nat. Y., vol. 4, p.

d. Vet. Acad. tia, a fishing rigonal, valves as long as the ating by teeth e deep, more straight or eand trianguconvex pseurforated close ir foramen, a n the deltidat the exture for the scular fibers; a mesial lonventral valve to near the f which the nd are united

irostris. ta vilineata.

fissure walls.



FIG 557 -Cvr tia expor recta.

hamiltonensis. issouriensis. Foss., vol. 1,

identalis.

8.

etra. onata. Brit Monog. y. the diminu-1, but the auad Greek to a shells; valves ing extremely and narrow udodeltidium; om the inner and, uniting, bottom of the viding it into ate. Type C.

, (Cyrtia acuti-, p. 204, Wa

Foss., vol. 2, p. ın.

- billingsi, Meek, 1868, Trans. Chi. Acad. Sci., p. 97, Ham. Gr.
- biplicata, Hall, 1857, (Cyrtia biplicata,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 165. Schoharie grit and Cornif. Gr.
- crassa, Hall, 1867, Pal. N. Y., vol. 4, p. 267, Up. Held. Gr. curvilineata, White, 1865, (Cyrtia curvi-
- lineata,) Proc. Bost. Soc. Nat. Hist., vol. 9, p. 25, and Pal. N. Y., vol. 4, p. 270, Ham. Gr.
- dalmani, Hall, 1857, (Cyrtia dalmani,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 64, Low. Held. Gr.
- davidsoni, Walcott, 1885, Monogr. U. S. (ieo. Sur., vol. 8, p. 146, Devonian. euphemia, Billings, 1863, Can. Nat. and (ieol., vol. 8, p. 19, Corniferous Gr.



FIG. 558.-Cyrtina hamiltonensis. Dorsal, ventral, and side views

- hamiltonensis, Hall, 1857, (Cyrtia hamil-tonensis,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 166, and Pal. N. Y., vol. 4, p. Schoharie grit, Cornif. and 268. Ham. Grs.
- hamiltonensis var. recta, Hall, 1867, Pal. N. Y., vol. 4, p. 270, Ham. Gr.
- missouriensis, Swallow, 1860, (Cyrtia missouriensis,) Trans. St. Louis Acad. Sci., vol. 1, p. 647, Ham. Gr.
- occidentalis, Swallow, 1860, (Cyrtia occidentalis,) Trans. St. Louis Acad. Sci., vol. 1, p. 648, Ham. Gr.
- panda, Meek, 1868, Trans. Chi. Acad. Sci., p. 100, Ham. Gr.
- pyramidalis, Hall, 1852, (Spirifer pyra-midalis,) Pal. N. Y., vol. 2, p. 266, Niagara Gr.
- rostrata, Hall, 1857, (Cyrtia rostrata,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 64, Oriskany sandstone.
- triquetra, Hall, 1858, (Cyrtia triquetra,) Geo. Rep. Iowa, vol. 1, pt. 2, p. 513, Ham. Gr.
- umbonata, Hall, 1858, (Cyrtia umbonata,) Geo. Rep. Iowa, vol. 1, pt. 2, p. 512, Ham. Gr.
- Delthyris, Dalman, 1827, syn. for Spirifera. acanthoptera, syn. for Spirifera disjuncta. acuminata, Conrad, see Spirifera acuminata.
- acuminata, Hall, syn. for Spirifera mesacostalis.
- acutilirata, see Orthis acutilirata.
- arenosa, see Spirifera arenosa.
- audacula, see Spirifera audacula.
- bialveata, see Spirifera bialveata.
- bilobata, see Orthis bilobata.
- brachynota, see Spirifera brachynota. chemungensis, syn. for Spirifera disjuncta. congesta, see Spirifera congesta. cuspidata, syn. for Spirifera disjuncta. decemplicata, see Spirifera decemplicata.

deltoidea, syn. for Orthis lynx. disjuncta, see Spirifera disjuncta. duodenaria, see Spirifera duodenaria. dupliplicata, see Spirifera dupliplicata. euruteines, see Spirifera euruteines. expansa, see Pterotheca expansa. fimbriata, see Spirifera fimbriata. granulifera, see Spirifera granulifera. granulosa, see Spirifera granulosa. inermis, see Spirifera disjuncta. lævis, see Spirifera lævis. macronota, see Spirifera macronota. macropleura, see Spirifera macropleura. medialis, see Spirifera medialis. mesacostalis, see Spirifera mesacostalis. mesastrialis, see Spirifera mesastrialis. microptera, syn. for Orthis lynx. mucronata, see Spirifera mucronata. niagarensis, see Spirifera niagarensis. pachyptera, see Spirifera pachyptera. perlata, see Spirifera disjuncta. prolata, see Spirifera prolata. prora, see Spirifera prora. radiata, see Spirifera radiata. raricosta, see Spirifera raricosta. rugatina, see Spirifera rugatina. sculptilis, see Spirifera sculptilis. staminea, see Spirifera staminea. triloba, see Spirifera triloba. undulata, see Spirifera undulata. varica, see Orthis varica. ziczac, see Spirifera ziczac.

- Dicellomus, Hall, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 246. A generic name proposed for the reception of Obolella crassa and O. polita, without distinguishing the generic characters. Dicraniscus, Meek, syn, for Triplesia.
- ortoni, see Triplesia ortoni.
- DIGNOMIA, Hall, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 245. [Ety. di, from ; dis, twice; gnoma, a sign.] Lingula-like shells having a longitudinal septum in one or both valves. Type D. alveata. alveata, Hall, 1873, 23d Rep. N. Y. St.
- Mus. Nat. Hist., p. 245, Ham. Gr. DINOBOLUS, Hall, March, 1871, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 247. [Ety. dis. twice; Obolus, a genus of shells.] Shell subcircular, valves thick; umbo of the ventral valve slightly prominent; area wider than long; platform sin-uated, widely V-shaped; crescent prominently marked in crown and sides; hinge moderately thick, edge rounded. with a pair of subcardinal scars in front of the cardinal facet; umbo of the brachial valve tumid; platform trilobed; outer margins raised; antemedian portion rounded, projecting, and terminating in a median plate; crescent a marked linear scar on the hinge; arching forward in front of the cardinal facet; an indentation on the inner border of its sides near the hinge, another further forward; outer border a fine line; subcardinal scar in the umbonal cavity; rhomboidal, postmedian scar in front of the latter. Type D. conradi.

- canadensis, Billings, 1857, (Obolus cana-densis,) Rep. of Progr. Geo. Sur. of Can., p. 189, and Can. Nat., vol. 6, p. 222, Black Riv. Gr.
- conradi, Hall, 1868, (Obolus conradi,) 20th Rep. N. Y. St. Mus. Nat. Hist., p. 368, Niagara Gr.
- galtensis, see Trimerella galtensis.

344

- magnificus, Billings, 1872, (Obolellina magnifica,) Canadian Naturalist, vol. 6,
- p. 330, Black Riv. Gr. parvus, Whitfield, 1882, Geo. Wis., vol. 4, p. 347, Galena Gr.
- DISCINA, Lamarck, 1819, Hist. Nat. Anim. sans Vert., vol. 6, p. 236. [Ety. discus, a flat, round plate; the termination inus, implying resemblance.] Circular, longitudinally or transversely oval; dorsal valve conical, with apex inclined toward the posterior margin; ventral

FIG. 559.-Discina ostre-

oides.

D. ostreoides.

Chemung Gr.

acadica.

face smooth, striated

from the apex to the

margin, or having con-

centric lines of growth

produced in foliaceous

expansions; structure

horny, and perforated

by minute tubuli. Type

acadica, see Stenotheca

alleghania, Hall, 1860, 13th Rep. N. Y. St. Mus.

valve opercular, flat, or partly convex perforated by a narrow, oval, longitudinal slit, reaching to near the posterior margin, and placed in the middle of an oval depressed disk; surconvexa, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 221, Coal Measdiscus, Hall, 1859, Pal. N. Y., vol. 3, p. 159, Low. Held. Gr.

- doria, Hall, 1863, 16th Rep. N. Y. St. Mus.
- Nat. Hist., p. 26, Ham. Gr.
 elmira, Hall, 1863, 16th Rep. N. Y. St.
 Mus. Nat. Hist., p. 29, Chemung. Gr.
 gallaheri, Winchell, 1865, Proc. Acad.
 Nat. Sci., p. 112, Marshall Gr.
- grandis, Vanuxem, 1842, Geo. Rep. 3d Dist. N. Y., p. 152, and Pal. N. Y., vol. 4, p. 17, Cornif. and Ham. Gr.
- grandis, Hall, 1859, Pal. N. Y., vol. 3. The name was preoccupied. See D. ampla.
- humilis, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 25, Marcellus Slate and Ham. Gr.
- inutilis, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 130, Potsdam Gr.
- lamellosa, Hall, 1847, (Orbicula lamellosa. The name was preoccupied by Broderick in 1833. Billings has described it as D. circe.
- lodensis, Vanuxem, 1842, (Orbicula lo-densis,) Geo. Rep. 3d Dist. N. Y., p. 168, and Pal. N. Y., vol. 4, p. 22, Genesee Slate.
- manhattanensis, Meek and Hayden, 1859, Proc. Acad. Nat. Sci., p. 25, Coal Meas.





ampla, Hall, 1867, Pal. N. Y., vol. 4, p. 17, Oriskany sandstone. Proposed instead of D. ing muscles; r, retractor muscles.

- marginalis, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis., p. 70, and Geo. Wis., vol. 4, p. 325, Ham. Gr. media, Hall, 1863, 16th Rep. N. Y. St. Mure Nat Histon 27, Horn and Cha
- Mus. Nat. Hist., p. 27, Ham. and Chemung Grs.
- meekana, Whitfield, 1882, Desc. New Spec. Foss. from Ohio, p. 228, Coal Meas. microscopica, Shumard, 1861, Am. Jour. Sci. and Arts, vol. 32, p. 213, Pots-
- dam Gr. minuta, Hall, 1843, (Orbicula minuta,)
- Geo. Rep. 4th Dist. N. Y., p. 180, and Pal. N. Y., vol. 4, p. 16, Marcellus Shale. missouriensis, Shumard, 1858, Trans. St.
- Louis Acad. Sci., Coal Meas. Syn. for D. nitida.



DIS.

neglecta, Hal Mus. Nat. I newberryi, Ha Mus. Nat. I

nitida, Phillip Geo. of Yo Sur. Ill., vo patellaris, Wir

Sci., p. 4, V pelopea, Billin p. 52, Trent pleurites, Mee 278, Waverl randalli, Hall. Mus. Nat. F.

saffordi, Win and, in 187 248, Marsha seneca, Hall, Mus. Nat. I

sublamellosa, U Nat. Hist., r a Trematis.

subtrigonalis, M Pal. Foss, C.

tenuilamellata uilamellata, Niagara Gr.

tenuilamellata Can. Nat. and tenuilineata, M Acad. Nat. S

tenuistriata, Ul Nat. Hist., p a Trematis.

trigonalis, syn. truncata, see So tullia, Hall, 18 Nat. Hist., p

vanuxemi, Ha p. 162, Wate: varsoviensis, V Ill. St. Mus.

Sur. Ill., vol EATONIA, Hall, Mus. Nat. H

p. 35. [Ety.] subcircular, valves very fold and sin small, perfor the umbo o teeth in the v sockets in the bifurcating c crural proces tinguish this

eminens, Hall, Hist., p. 92, a



Fig. 562.-Eatonia alis. Anterior vie

peculiaris, Con culiaris,) Ani



- Univ. St. Mo., p. 56, Niagara Gr. connata, Walcott,
- 1885, Monogr. U.S.

Geo. Sur., vol. 8, p. 214, Devonian. conradi, Hall, 1859, Pal. N. Y., vol. 3, p. 161, Low. Held. Gr.

circe.

Nat. Hist., p. 77, and Pal. N. Y., vol. 4, p. 25,

capax, White, 1862, Proc. Bost Soc. Nat. Hist., vol. 9, p. 30, Waverly or Marshall Gr. capuliformis, McChesney, syn. for D. nitida.

circe, Billings, 1862, Pal. Foss, vol. 1, p. 51, Trenton Gr. See remarks on D. lamellosa.

★ clara, Spencer, 1884, Bull. No. 1, Mus.

DIS.

EAT. -EIC.]

rans. St. Louis Coal Meas . Y., vol. 3, p.

N. Y. St. Mus.

ir. Rep. N. Y. St. nemung. Gr. Proc. Acad. il Gr.

Geo. Rep. 3d Pal. N. Y. vol. n. Gr.

N. Y., vol. 3. ipied. See D. Rep. N. Y. St. Marcellus Slate

Rep. N. Y. St. Potsdam Gr. ula lamellosa. ied by Broderas described it

(Orbicula lo-Dist. N. Y., p. 4, p. 22, Gen-

Hayden, 1859, 25, Coal Meas.



oramen ; d, disk , protractor slid-

80, Ann. Rep. and Geo. Wis.,

Rep. N. Y. St. Ham. and Che-

32, Desc. New 228, Coal Meas. 861, Am. Jour. , p. 213, Pots-

bicula minuta, ., p. 180, and Pal. cellus Shale. 858, Trans. St. Meas. Syn. for

OU.IVE, KU

BRACHIOPODA.

neglecta, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 29, Chemung Gr. newberryi, Hall, 1863, 16th Rep. N. Y. St.

- Mus. Nat. Hist., p. 30, Waverly Gr. nitida, Phillips, 1836, (Orbicula nitida,) Geo. of York., vol. 2, p. 221, and Geo. Sur. Ill., vol. 5, p. 572, Coal Meas. patellaris, Winchell, 1863, Proc. Acad. Nat.
- Sci., p. 4, Waverly or Marshall Gr. pelopea, Billings, 1862, Pal. Foss., vol. 1, p. 52, Trenton Gr.
- pleurites, Meek, 1875, Ohio Pal., vol. 2, p. 278, Waverly Gr.
- randalli, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 25, Ham. Gr. saffordi, Winchell, 1869, Geo. of Tenn.,
- and, in 1870, Proc. Am. Phil. Soc., p. 248, Marshall Gr.
- seneca, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 26, Ham. Gr.
- sublamellosa, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist., p. 97. Probably the cast of a Trematis.
- subtrigonalis, McChesney, 1865, Desc. New Pal. Foss, Coal Meas. Not recognized.
- tenuilamellata, Hall, 1852, (Orbicula tenuilamellata,) Pal. N. Y., vol. 2, p. 250, Niagara Gr.
- tenuilamellata var. subplana, Hall, 1860, Can. Nat. and Geol., vol. 5, p. 144, Up. Sil. tenuilineata, Meek & Hayden, 1859, Proc.
- Acad. Nat. Sci., p. 25, Coal Meas. tenuistriata, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist., p. 96. Probably the cast of
- a Trematis. trigonalis, syn. for D. subtrigonalis.

truncata, see Schizobolus truncatus.

- tullia, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 28, Tully limestone. vanuxemi, Hall, 1859, Pal. N. Y., vol. 3,
- p. 162, Water-lime or Low. Held. Gr.

varsoviensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 23, and Geo. Sur. Ill., vol. 8, p. 102, Keokuk Gr. EATONIA, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 90, and 12th Rep., p. 35. [Ety. proper name.] Oval, ovoid,

subcircular, elongate, or transverse; valves very unequally convex; mesial fold and sinus; beak of ventral valve small, perforate, closely incurved over the umbo of the dorsal valve; two teeth in the ventral, with corresponding sockets in the dorsal valve; a prominent bifurcating cardinal process and four crural processes in the dorsal valve distinguish this genus. Type E. medialis. eminens, Hall, 1857, N. Y. St. Mus. Nat. llist., p. 92, and Pal. N. Y., vol. 3, p. 242,

Low. Held. Gr. medialis, Vanux-em, 1842, (Atrypa mediaalis,) Geo. Rep.3d Dist. N. Y., p.121, and Pal. N.Y., vol.3, p. 241,

562.-Eatonia medialis. Anterior view.

Low. Held. Gr. peculiaris, Conrad, 1841, (Atrypa pe-culiaris,) Ann. Rep. N. Y., p. 56, and Pal. N. Y., vol. 3, p. 244, Oriskany and Low. Held. Gr.

pumila, Hall, 1859, Pal. N. Y., vol. 3, p. 437, Oriskany sandstone.

singularis. Vanuxem, 1842, (Atrypa sin-

gularis,) Geo. Rep. 3d Dist. N. Y., p. 120, and Pal. N. Y., vol. 3, p. 243, Low. Held. Gr.



sinuata, Hall, 1857, 10th Rep. N. Y. St. FIG. 563.-Eatonia singularis. Mus. Nat. Hist., p. 91, and Pal. N. Y., vol. 3, Oriskany

sandstone.

- whitfieldi, Hall, 1859, Pal. N. Y., vol. 3, p. 437, Oriskany sandstone.
- EICHWALDIA, Billings, 1858, Rep. of Progr. Geo. Sur. Can., p. 190. [Ety. proper name.] Ovate or subtrigonal, with or without mesial fold and sinus; ventral valve obscurely perforate on the umbo; apex acute and entire; space beneath occupied by an imperforate concave plate; interior of the rostral cavity containing a transverse septum; dorsal valve with a slender cardinal process and a very elevated medio-longitudinal septum; valves articulated in a narrow groove in the dorsal valve; surface of the shell reticulate, solid, and fibrous beneath. Type E. subtrigonalis.

anticostiensis, Billings, 1868, Catal. Sil. Foss. Antic., p. 10, Hud. Riv. Gr.



concinna, Hall, 1868. 20th Rep. N. Y. St. Mus. Nat. Hist., p. 319, Niagara Gr. corallifera, Hall, 1852, (Atrypa corallifera,) Pal. N. Y., vol. 2, p.

281, Niagara Gr.

FIG. 564.-Eichwaldia reticulata.

> regarded this shell as identical with E. capewelli, which was described in 1848, in Bull. Soc. Geol. France, vol. 3.

gibbosa, Hall, 1868. 20th Rep. N. Y. St. Mus. Nat. Hist., p. 319, Niagara Gr. reticulata, Hall, 1863, (Rhvnchonella(?) reticulata,) Trans.

Alb. Inst., FIG. 565.— Echwaldia subtrigo-vol. 4, p. naits. Dorsal, ventral, side, 217, Niag- front. and apex views. ara Gr.

Davidson said a syn. for E. capewelli. subtrigonalis, Billings, 1858, Rep. of Progr. Geo. Sur. Can., p. 192, Black Riv. Gr.

Prof. Davidson



ELKANIA, Ford, 1886, Am. Jour. Sci. and Arts, 3d ser., vol. 32, p. 325. [Ety. proper name.] Shell thin, calcareous, inarticulate, longitudinally ovate or subcircular, convex; ventral valve, with solid beak and minute-grooved area; muscular scars, six in each valve; beneath the rostrum a spoon-shaped pit separates the scars. Type E. desiderata.

346

- desiderata, Billings, 1862, (Obolella desiderata,) Pal. Foss., vol. 1, p. 69, Up. Taconic.
- EUMETRIA, Hall, 1864, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 59. Shell longitudinally suboval; striated, without mesial fold and sinus; structure punctate; beak of the ventral valve incurved; hinge area contracted : foramen large; internal spires as in Athyris; dorsal valve in the form of a pectinoid shell, with diverging lamellæ, which extend beneath the cardinal area of the ventral valve on either side of the center; processes extending into the cavity of the dorsal valve, gradually converge, and are united by a transverse concave septum. Type E. vera. prima, White, 1862, (Acambona prima,) Proc. Bost. Soc. Nat. Hist., vol. 9, p. 27,
 - Burlington Gr.
 - vera, Hall, 1858, (Retzia vera,) Geo. Sur. Iowa, p. 704, Kaskaskia Gr.

F1G. 566.-Eume-

tria verneuil-

vera var. costata, Hall, 1858, (Retzia vera var. costata,) Geo. Sur. Iowa, p. 704, Kaskaskia Gr.

verneuilana, Hall, 1858, (Retzia verneuilana,) Trans. Alb. Inst., vol. 4, p. 19, and Geo. Sur. Iowa, p. 657, Warsaw Gr.

a. GLASSIA, Davidson, Lond. Geo. Mag., vol. 8, p. 11. ana. 1881 [Etv. proper name.] Shell ovate; spiral coils in the dorsal valve for the support of the brachial appendages connected by a loop as in Atrypa; lamellæ converge downward like the letter V, with the extremities turned slightly upward before uniting; principal coils face the 'lateral margins; ends of the spirals meet in the center of the shell; spirals consist of four or five compressed coils.

Type G. obovata. headi, Meek, 1873, (Zygospira headi,) Ohio Pal., vol. 1, p. 127, Hud. Riv. Gr. Goniocælia, Hall, syn. for Pentagonia. GYPIDULA, Hall, 1867, Pal. N. Y., vol. 4, p. 373. [Ety. gyps, vulture; in allusion to the rescaled by the start of the s

the strongly incurved beak.] Short, gibbous or ventricose, ventral valve muchithe larger, with or without mesial fold; a large fissure, and elongate, much incurved, trough-shaped pit; dorsal valve depressed in front; area on both valves, that of the ventral striated as in Spirifera; lamellæ of dorsal valve separate and diverging. Type G. occidentalis.

- læviuscula, Hall, 1867, Pal. N. Y., vol. 4. p. 381, Devonian.
- munda, Calvin, 1878, Bull. U. S. Geo. Sur., vol. 4, No. 3, p. 730, Low. Devonian.
- obsolescens, see Pentamerella obsolescens. occidentalis, Hall, 1858, (Pentamerus oc-cidentalis,) Geo. Rep. Iowa, vol. 1, pt. 2, p. 514, Ham. Gr.
- unguiformis, Ulrich, 1886, Cont. to Am. Pal., p. 28, Niagara Gr.
- Hemipronites, Pander, 1830. This name. not having been defined, has been superseded by Streptorhynchus, if the two names refer to the same form.

americanus, see Streptorhynchus americanum.

- HINDELLA, Davidson, 1882, Monogr. Brit. Foss., Brachiopoda, vol. 5, p. 130. [Etv. proper name.] Shell elongate, ovate; about six coils in each spiral; apices directed laterally; stems attached to the hinge plate, and extending into the interior, they are abruptly bent backward, and then form a broad, rounded curve. facing the bottom of the dorsal valve when they reach the front they give off a semicircular loop, having a spikelike process at the top, directed toward
 - the beak. Type H. umbonata. umbonata, Billings, 1865, (Athyris um-bonata,) Pal. Foss., vol. 1, p. 144, Mid. Sil., Anticosti Div. 1.
- Hipparionyx, Vanuxem, 1842, Geo. 3d Dist. N. Y., p. 124, syn. for Orthis. The genus was founded on a cast.
 - consimilis, syn. for Atrypa reticularis. proximus, see Orthis proximus.
- similaris, Vanuxem, 1842, Geo. Rep. 3d Dist. N. Y., Oriskany sandstone. Not defined.
- IPHIDEA, Billings, 1874, Pal. Foss., vol. 2, p. 76. [Ety. proper name.] Ventral valve conical, elevated at the beak, hinge-line nearly straight, posterior angles rounded, sides and front nearly uniformly rounded ; FIG. 567-1phposterior side with a large idea bella

false area and a convex pseudodeltidium; dorsal valve semicircular, moderately convex, most elevated at the beak ; surface concentrically marked. Type I. bella.

bella, Billings, 1872, Can. Nat., vol. 6, p. 477, and Pal. Foss., vol. 2, p. 76, Up. Taconic.

sculptilis, see Kutorgina sculptilis.

KONINCKIA, Suess, 1853. MS. published by Woodward, 1854, in Manual of Mol-lusca, p. 231. [Ety. proper name.] Shell circular, inequivalve. com-Shell circular, inequivalve, com-pressed; ventral valve convex, with a slight longitudinal depression beak incurved, with auricular expansions; dorsal valve concave; surface smooth; no area or deltidium; valves inarticulated; mesial ridge in dorsal valve: oral appendages supported by a

spiral, cal hardi. americana, Acad. Sci KUTORGINA, B

KUT.-LEP.]



FIG. 568.-Kutorgina pañ-nula. Ennula. En diam.

with lines the margi convex al depressed slightly co beak at a less conve and along concavity gin. Typ cingulata, B p. 8, Up. 1 labradorica, doricus.) Taconic latourensis, Soc. Can., minutissima. Geo. Exp sculptilis. pannula, Wh Rep. Inver 100th Mer prospectensi U. S. Geo. Taconic. pterineoides Soc. Can., sculptilis, M 6th Ann. 1 479, and M vol. 8, p. 2 stissingensis. Sci. and A Up. Taeon whitfieldi, W Geo. Sur. conic.

LEIORHYNCHUS, St. Mus. N smooth; cular or t convex; m are plicate sockets; a rate, two into and jo rostral cavi cupy a nai the dental the dorsal length of t row, strong

KLK.- KON

KLK.- KON

al. N. Y., vol. 4.

Iowa, vol. 1, pt.

36, Cont. to Am.

or less subquadrate in outline: hinge-line straight: sides slightly convex, anterior angles rounded,

FIG. 568.-Kutorgina pañ-nula. Ennula. En-larged 6

KUT.-LEP.]

hardi

front slightly convex ; surface with concentric ridges terminating on the cardinal edges, and the course

spiral, calcified lamella. Type K. leon-

americana, Swallow, 1863, Trans. St. Louis

p. 8. [Ety. proper name.] Shell more

Acad. Sci., vol. 2, p. 94, Kaskaskia Gr. KUTORGINA, Billings, 1861, Pal. Foss., vol. 1,

conforming to the margin diam. of the shell, and sometimes with lines radiating from the beak to

the margin; ventral valve tumid, most convex about the middle, beak slightly depressed; cardinal edges straight or slightly concave and diverging from the beak at an obtuse angle; dorsal valve less convex, most elevated at the beak, and along the middle there is a shallow concavity extending to the front margin. Type K. cingulata.

- cingulata, Billings, 1861, Pal. Foss., vol. 1, p. 8, Up. Taconic.
- labradorica, Billings, 1861, (Obolus labradoricus,) Pal. Foss., vol. 1, p. 6, Up. Taconic.
- latourensis, Matthew, 1885, Trans. Roy. Soc. Can., p. 42, St. John Gr. minutissima, Hall & Whitfield, 1877, U.S.
- Geo. Expl. 40th parallel, syn. for K. sculptilis
- pannula, White, 1874, (Trematis pannulus,) Rep. Invert. Foss., p. 6, and Geo. Sur. W 100th Mer., vol. 4, p. 36, Up. Taconic.
- prospectensis, Walcott, 1885, Monogr. U. S. Geo. Sur. Terr., vol. 8, p. 19, Up. Taconic
- pterineoides, Matthew, 1885, Trans. Roy. Soc. Can., p. 43, St. John Gr.
- sculptilis, Meek, 1873, (Iphidea sculptilis,) 6th Ann. Rep. U. S. Geo. Sur. Terr., p. 479, and Monogr. U. S. Geo. Sur. Terr., vol. 8, p. 20, Potsdam Gr.
- stissingensis, Dwight, 1889, Am. Jour. Sci. and Arts, 3d ser., vol. 38, p. 145, Up. Taeonic.
- whitfieldi, Walcott, 1885, Monogr. U.S. Geo. Sur. Terr., vol. 8, p. 18, Up. Taconic.
- LEIORHYNCHUS, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 75. [Ety. leios, smooth; rhynchos, beak.] Ovate, circular or transverse, valves unequally convex; mesial fold and sinus, which are plicated; articulating by teeth and sockets; apex of ventral valve perforate, two diverging lamellæ extend into and join the sides or bottom of the rostral cavity; muscular impressions occupy a narrow triangular cavity below the dental lamellæ; median septum in the dorsal valve extending half the length of the shell; hinge plates, narrow, strong processes, embraced by the

curving teeth of the opposite valve; substance fibrous. Type L. quadricostatum. dubium, Hall, 1867, Pal. N. Y., vol. 4, p. 364. Marcellus Shale.

- globuliforme, Vanuxem, 1842, (Atrypa globuliformis,) Geo. 3d Dist. N. Y., p. 182, and Pal. N. Y., vol. 4, p. 364, Chemung Gr.
- hecate, Clarke, 1885, Bull. U. S. Geo. Sur. No. 16, p. 31, Genesee Shales.
- huronense, Nicholson, 1874, Geo. Mag. Lond., n. s., vol. 1, p. 120, Ham. Gr. iris, Hall, 1867, Pal. N. Y., vol. 4, p. 360,
- Chemung Gr.
- kelloggi, Hall, 1867, Pal. N. Y., vol. 4, p. 361, Chemung Gr.
- laura, Billings, May, 1860, (Rhynchonella laura,) Can. Jour., vol. 5, p. 273, Ham. Gr. limitare, Vanuxem, 1842,

(Orthis limitaris,) Geo. 3d Dist. N. Y., p. 146, and Pal. N. Y., vol. 4, p. 356, (Atrypa limitaris,) 4th Dist. N. Y., Marcellus Shale.



- mesacostale, Hall, 1843, (Atrypa mesacostalis,) Fig. 569—Leio-Geo. 4th Dist. N. Y., pl. quadricosta-64, and Pal. N. Y., vol. tum. 4, p. 362, Chemung Gr.
- multicosta, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 85, and Pal. N. Y., vol. 4, p. 358, Ham. Gr. mysia, Hall, 1867, Pal. N. Y., vol. 4, p.
- 357, Marcellus Shale.
- nevadense, Walcott, 1885, Monogr. U. S.
- Geo. Sur., vol. 8, p. 157, Devonian. newberryi, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 240, Waverly Gr.
- quadricostatum, Vanuxem, 1842, (Orthis quadricostata,) Geo. 3d Dist. N. Y., p. 168, and Pal. N. Y., vol. 4, p. 357, Genesee Slate.
- sesquiplicatum, Winchell, 1866, Rep. Low. Penin. Mich., p. 95, Ham. Gr.
- sinuatum, Hall, 1867, Pal. N. Y., vol. 4, p. 362, Chemung Gr.
- LEPTÆNA, Dalman, 1827, Kongl. Vet. Acad. Handl., p. 93. [Ety. leptos, thin.] Shell thin, semicircular, transversely elongated, smooth or finely striated; hingeline straight, ventral valve convex, fissure partly covered by a deltidium; beak inconspicuous, sometimes perforated; cardinal area narrow; muscular scars small, not marginal; adductor scars close to a mesial ridge, while the cardinal scars are on either side; vascular impressions radiating; dorsal valve concave; socket ridges large, cardinal process small, multifid, connate with their bases; adductor impressions large, produced, elongated, and bor-dered by ridges; area on both valves. Type L. transversalis.

alternata, see Strophomena alternata.

alternistriata, see Strophomena alternistriata.

.347

ull. U. S. Geo. 730, Low. Devo-

ella obsolescens. (Pentamerus oc-

This name, ined, has been unchus, if the two e form.

hynchus ameri-Monogr. Brit.

. 5, p. 130. [Etv elongate, ovate; h spiral; apices is attached to the ding into the inv bent backward. , rounded curve. he dorsal valve;

front they give having a spikedirected toward nbonata.

5, (Athyris uml. 1, p. 144, Mid.

142, Geo. 3d Dist. for Orthis. The a cast. a reticularis.

imus.

2, Geo. Rep. 3d sandstone. Not

1. Foss., vol. 2, p. Ventral valve .]



ded; F10.567-1ph large idea bella nvex sal valve semi-

convex, most eleace concentrically

- 1. Nat., vol. 6, p. vol. 2, p. 76, Up.
- sculptilis.

MS. published by Manual of Molproper name.]

quivalve, comre convex, with nal depression; auricular expanconcave ; surface leltidium ; valves

ridge in dorsal es supported by a



analoga, see Strophomena analoga.

aspera, James, syn. for L. sericea. barabuensis, Winchell, 1864, (Orthis bara-

buensis,) Am. Jour. Sci. and Arts, 2d ser.,

vol. 37, p. 229, and Geo. Wis., vol. 4, p. 171, Potsdam Gr.:

bipartita, see Strophomena bipartita. camerata, see Strophomena camerata.

concava, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 47, and Pal. N. Y., vol. 3, p. 197, Low. Held. Gr.

decipiens, Billings, 1862, Pal. Foss., vol. 1, p. 74, Quebec Gr.

deflecta, see Streptorhynchus deflectum. deltoidea, see Strophomena deltoidea. depressa, see Strophomena depressa. fasciata, see Strophomena fasciata. filitexta, see Streptorhynchus filitextum. fragaria, syn. for Productella subaculeata. incrassata, see Strophomena incrassata. indenta, see Strophodonta indenta.

laticosta, syn. for Tropidoleptus carinatus. melita, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th parallel, vol. 4, p. 208, Potsdam Gr.

membranacea, see Productella hirsuta. mesacosta, Shumard, 1855, Geo. Rep. Mo., p. 205, Trenton Gr.

nasuta, see Strophomena nasuta. nucleata, Hall, 1857, 10th Rep. N. Y. St.

Mus. Nat. Hist., p. 47, and Pal. N. Y., vol. 3, p. 419, Oriskany sandstone.

obscura, see Strophomena obscura. orthididea, see Strophomena orthididea. planoconvexa, see Streptorhynchus planoconvexum.

planumbona, see Streptorhynchus planumbonum.

plicatella, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 15, Utica Slate Gr. plicifera, see Strophomena plicifera. profunda, see Strophodonta profunda. prolongata, Foerste, 1885, Bull. Sci. Lab. Denison Univ., p. 79, Niagara Gr.

punctulifera, see Strophonella punctulifera. quadrilatera, syn. for Strophomena rhom-

boidalis.

recta, see Streptorhynchus rectum. rugosa, see Strophomena rugosa. semiovalis, syn. for L. sericea. sericea, Sowerby, 1839, Murch. Sil. Syst., p. 636, and Pal. N. Y., vol. 1, p. 110, Trenton to Clinton Gr.



F1G. 570.—Leptæna sericea. Dorsal view, and in-terior of dorsal valve.

sordida, Billings, 1862, Pal. Foss., vol. 1, p. 73, Quebec Gr.

subquadrata, Hall, 1883, Rep. St. Geol, pl. 46, fig. 32, 33, Low. Held. Gr. subtenta; see Streptorhynchus subtentum.

tenuilineata, see Strophomena tenuilineata. tenuistriata, see Strophomena tenuistriata. tranversalis, Wahlenberg, 1821, (Anomites transversalis,) Act. Soc. Upsal., vol. 8, p. 64, and Pal. N. Y., vol. 2, p. p. 256, Anticosti and Clinton Gr.

trilobata, see Strophomena trilobata.

- vicina, Castelnau, 1843, Syst. Sil., p. 39. Not recognized.
- LEPTOBOLUS, Hall, 1871, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 226. [Ety. leptos, minute; Obolus, a genus.] Shell small, ovate. fragile, semiphosphatic, concentrically lined; ventral valve with an area and pedicel groove, muscular scar elevated, subquadrate; dorsal valve with trifid muscular impression's. Type L. lepis.

insignis, Hall, 1871, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 227, Utica Slate. lepis, Hall, 1871, 24th Rep. N. Y. St. Mus.

Nat. Hist., p. 226, Utica Slate. occidentalis, Hall, 1871, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 227, Utica Slate.

LEPTOCIELIA, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 107, and 12th Rep., p. 32. [Ety. leptos, minute; koilia, belly; in allusion to the shallow visceral cavity.] Shell inequivalve, variable in form, plicated, usually-mesial fold and sinus, substance lamellose or fibrous; ventral valve convex, beak extended, and more or less incurved; foramen terminal, the lower side formed by two deltoid pieces; two strong teeth, denticulated; muscular impressions marking a flabelliform area with a thin median septum, adductor imprints small; dorsal valve flat, concave, or depressed convex; on each side of a strong cardinal process are the deep, oblique, dental fossets, from the inner margins of which the crural processes proceed, supported below by thickened plates, extending obliquely on the border of the muscular impression toward the middle of the shell; muscular impression divided by a low median septum; the crura, in their extension, are united, in a flattened disk, which terminates in an acute point; on the center of the cardinal side a slender process extends downward, and near the junction of the crura two slender processes extend into the cavity of the ventral valve. Type L. flabellites.

acutiplicata, Conrad, 1841, (Atrypa acutiplicata,) Ann. Rep. N. Y., p. 54, and Pal. N. Y., vol. 4, p. 365, Up. Held. Gr. concava, see Cœlospira concava.

dichotoma, see Cœlospira dichotoma.

disparilis, see Coelospira disparilis.

fimbriata, Hall, 1859, Pal. N. Y., vol. 3, p. 451, Oriskany sandstone.

flabellites, Conrad, 1841, FIG. 571. - Lepto-(Atrypa flabellites,) coelia flabellites.

Ann. Rep. N. Y., p. 55, and Pal. N. Y., vol. 3, p. 449, Oriskany sandstone.

hemispherica. hemispheri and Pal. N ton Gr. imbricata, see intermedia, H vol. 5, p. 14 planoconvexa convexa,) F ton Gr. propria, Hall, LINGULA, Brug tab. 250. Shell obloi depressed, at each end subtruncate pointed at consisting fibrous, corr bular testa phatic lam convex, hele the action beak of v more pointe nent than surface sm centrically duncle long drical, fleshy there are two impressions and thirte ventral, val anatina. shell is posi this genus i and probabl referred to others to L be, to undef appearance. gula, and for guish intern provisionall

species left acuminata, Co p. 64, Calcif



FIG. 572.-Lingula b, c, and e are f and g are youn acutangula, R

Texas, p. 90, acutirostra, Ha N. Y., p. 77, 56, Clinton (æqualis, Hall, 95, Trenton albapinensis, V Geo. Sur., vo

LEP.

LEP.

LIN.]

1821, (Ano-Soc. Upsal., Y., vol. 2, p. ton Gr. rilobata. st. Sil., p. 39.

Rep. N. Y. St. Ety. leptos, Shell small, hatic, concenalve with an muscular scar dorsal valve ession's. Type

tep. N. Y. St. tica Slate. N. Y. St. Mus. late.

th Rep. N. Y. 7, Utica Slate. Rep. N. Y. St. nd 12th Rep., inute; koilia, shallow visquivalve, variisually mesial e lamellose or ivex, beak ex. ess incurved; er side formed two strong scular impresrm area with a uctor imprints concave, or deide of a strong deep, oblique, inner margins esses proceed. ckened plates, the border of n toward the scular impresedian septum; on, are united. terminates in center of the

rocess extends he junction of ocesses extend ventral valve.

Atrypa acuti-Y., p. 54, and Up. Held. Gr. ava. chotoma



celia flabellites.

3, p. 449, Oris-

BRACHIOPODA.

- hemispherica, Sowerby, 1839, (Atrypa hemispherica,) Murch. Sil. Syst., p. 639, and Pal. N. Y., vol. 2, p. 74, Clinton Gr.
- imbricata, see Trematospira imbricata. intermedia, Hall, 1860, Can. Nat. and Geo.,
- vol. 5, p. 144, Up. Sil. planoconvexa, Hall, 1852, (Atrypa planoconvexa,) Pal. N. Y., vol. 2, p. 75, Clinton Gr.
- propria, Hall, syn. for L. flabellites. LINGULA, Bruguiere, 1792, Encyc. Meth., tab. 250. [Ety. lingula, a little tongue.]

Shell oblong or ovoid, depressed, thin, gaping at each end, rounded or subtruncate in front, pointed at the beaks, consisting of alternate fibrous, corneous, and tubular testaceous, phos-phatic laminæ; valves convex, held together by the action of muscles, beak of ventral valve more pointed and promi-

nent than the other; surface smooth or concentrically lined; Deduncle long, thick, cylindrical, fleshy, and flexible; ventral, valve. Type L. anatina. No Palæozoic

shell is positively known to agree with this genus in its muscular impressions, and probably none belong to it. Many referred to it belong to Lingulella, others to Lingulepis, and others, may be, to undefined genera. The external appearance, however, resembles Lingula, and for want of material to distinguish internal characters, they are left, provisionally, where the authors of the species left them.

acuminata, Conrad, 1839, Ann. Rep. N. Y., p. 64, Calcif. Gr.



FIG. 572.—Lingula acuminata. Various forms; a, b, c, and e are ventral valves; d, dorsal; and f and g are young shells.

- acutangula, Roemer, 1852, Kreid. von Texas, p. 90, Silurian.
- acutirostra, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 77, and Pal. N. Y., vol. 2, p. 56, Clinton Gr.
- æqualis, Hall, 1847, Pal. N. Y., vol. 1, p. 95, Trenton Gr.
- albapinensis, Walcott, 1885, Monogr. U.S. Geo. Sur., vol. 8, p. 108, Devonian.

- alveata, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 23, and Pal. N. Y., vol. 4, p. 12, Ham. Gr.
- ampla, Owen, 1852, Geo. Sur. Wis., Iowa, and Minn., p. 583, Potsdam Gr.
- antiqua, Emmons, 1842, Geo. Rep. N. Y., p. 268, and Pal. N. Y., vol. 1, p. 3, Potsdam Gr.
- antiquata, Emmons, 1856, Am. Geol., p. 202, Potsdam Gr.
- artemis, Billings, 1874, Pal. Foss., vol. 2, p. 14, passage beds between Up. Sil. and Devonian.



there are twelve muscular Fig. 573.—Lingula anatina. aa, Anterior adductors; a, posterior impressions in the dorsal, adductor: pp, external protractors; pf, central protractors; r, and thirteen in the n, visceral sheath: o, resophagus; s, stomach: l, liver: r, vent; h, auricles, etc.

- attenuata, Sowerby. The fossil referred by Hall to this species is described by Billings under the name of L. daphne. aurora, see Lingulella aurora.
- belli, Billings, 1859, Can. Nat. Geo., vol. 4, p. 431, Chazy Gr.
- bicarinata, Ringueberg, 1884, Proc. Acad. Nat. Sci., p. 149, Niagara Gr. Not defined so as to be recognized.
- billingsana, Whiteaves, 1878, Am. Jour. Sci. and Arts, 3d ser., vol. 16, p. 226, St. John's Gr.
- bisulcata, Ulrich, 1889, Am. Geol., vol. 3, p. 380, Utica Slate.
- briseis, Billings, 1862, Pal. Foss., vol. 1, p. 48, Trenton Gr.
- calumet, N. H. Winchell, 1885, 13th Ann. Rep. Geo. Sur. Minn., p. 65, Taconic. Probably an Obolella.
- canadensis, Billings, 1862, Pal. Foss., vol.
- 1, p. 114, Hud. Riv. Gr. carbonaria, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 215, Coal Meas.
- centrilineata, Hall, 1859, Pal. N. Y., vol.
- 3, p. 155, Low. Held. Gr. ceryx, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 19, and Pal. N. Y., vol. 4, p. 5, Schoharie grit.
- clintoni, Vanuxem, 1842, Geo. Rep. N.Y., p. 79, and Pal. N. Y., vol. 2, p. 54, Clinton Gr.
- cobourgensis, Billings, 1862, Pal. Foss., vol. 1, p. 50, Trenton Gr.

- concentrica, Conrad, 1839, Ann. Rep. N. Y., p. 64, and Geo. Rep. 3d Dist. N. Y., p. 168, Genesee Slate.
- covingtonensis, Hall & Whitfield, 1875,
- Ohio Pal., vol. 2, p. 67, Utica Slate. crassa, Hall, 1847, Pal, N. Y., vol. 1, p. 98, Trenton Gr.
- crawfordsvillensis, Gurley, 1883, New Carb. Foss., p. 2, Keokuk Gr. The publication is not such as to entitle it to recognition.

cuneata, see Lingulella cuneata.

- curta, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 266, and Pal. N. Y., vol. 1, p. 97, Utica Slate.
- cuyahoga, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 24, and Pal. N. Y.,
- vol. 4, p. 15, Waverly Gr. cyane, Billings, 1865, Pal. Foss., vol. 1, p. 216, Quebec Gr.
- daphne, Billings, 1862, Pal. Foss., vol. 1, p. 50, Trenton Gr. See L. attenuata.
- dawsoni, Mathew, 1884, Bull. U.S. Geo.
- Sur., vol. 2, p. 283, St. John Gr. delia, Hall, 1863, 16th Rep. N, Y. St. Mus. Nat. Hist., p. 22, and Pal. N. Y., vol. 4, p. 12, Ham. Gr.
- densa, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 22, and Pal. N. Y., vol. 4, p. 11, Ham. Gr.
- desiderata, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 19, and Pal. N. Y., vol. 1, p. 6, Up. Held. Gr.
- elderi, Whitfield, 1880, Am. Jour. Sci. and Arts, 3d ser., vol. 19, p. 472, and Geo. Wis., vol. 4, p. 345, Trenton Gr.
- elegantula, syn. for Lingula quadrata.
- elliptica, Hall, 1843, Geo. Rep. 4th Dist. N. Y. The name was preoccupied by Phillips in 1836. See L. subelliptica.
- elliptica, Emmons, 1856, Am. Geol. The name was preoccupied.
- elongata. Hall, 1847, Pal. N. Y., vol. 1, p. 97, Trenton Gr.
- exilis, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 77. and Pal. N. Y., vol. 4, p. 7, Marcellus Shale.

eva, Billings, 1861, Can. Nat. Geo., vol. 6,

- p. 150, Black Riv. Gr. forbesi, Billings, 1862, Pal. Foss., vol. 1, p. 115, Hud. Riv. and Mid. Sil. Grs.
- gibbosa, Hall, 1879, Desc. New Spec. Foss., p. 13, and 11th Rep. Geo. and Nat.
- Hist. Ind., p. 284, Niagara Gr. halli, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 8, Burlington Gr.
- hurlbuti, Winchell, 1880, Geo. Sur. Minn.,

8th Rep., p. 62, Galena Gr. huronensis, Billings, 1859, Can. Nat. Geo., vol. 4, p. 433, Chazy and Black Riv. Grs.

- ingens, Spencer, 1884, Bull. No. 1, Mus.
- Univ. St. Mo., p. 56, Niagara Gr. insularis, Billings, 1866, Catal. Sil. Foss. Antic., p. 40, Anticosti Gr.
- iole, Billings, 1865, Pal. Foss., vol. 1, p. 215, Quebec Gr.

- iowensis, see Lingulella iowensis. irene, Billings, 1862, Pal. Foss., vol. 1, p.
- 71, Quebec Gr. iris, Billings, 1865, Pal. Foss., vol. 1, p.
- 301, Quebec Gr.
- kingstonensis, Billings, 1862, Pal. Foss., vol. 1, p. 48, Black Riv. Gr.
- lamellata, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 108, and Pal. N. Y., vol. 2, p. 249, Clinton and Niagara Grs.
- leana, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 20, and Pal. N. Y.
- vol. 4, p. 9, Ham. Gr. ligea, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 76, and Pal. N. Y., vol. 4, p. 7, Ham. Gr.
- ligea var. Hall, 1867, Pal. N. Y., vol. 4, p. 8, Portage Gr.
- ligea var. nevadensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 107. Devonian.
- lonensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 108. Devonian.
- lucretia, Billings, 1874, Pal. Foss., vol. 2, p. 14, passage beds between Up. Sil. and Devonian.
- lyelli, Billings, 1859, Can. Nat. Geo., vol. 4, p. 348, Calcif. and Chazy Grs.
- maida, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 20, and Pal. N. Y., vol. 4, p. 9, Ham. Gr.
- manni, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 20, and Pal. N. Y., vol. 4, p. 6, Up. Held. Gr.
- mantelli, Billings, 1859, Can. Nat. Geo.,
- vol. 4, p. 349, Calcif. Gr. manticula, White, 1864, Rep. Invert. Foss. p. 9, and Geo. Sur. W. 100th Mer., vol. 4, p. 52, Up. Taconic.
- matthewi, see Acrothele matthewi.
- melie, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 24. and Pal. N. Y., vol. 4, p. 14, Waverly Gr.
- Winchell, 1863. Proc membranacea, Acad. Nat. Sci. Phil., vol. 15, p. 3, Marshall Gr.
- minuta, Meek, 1868, Trans. Chi. Acad. Sci., p. 87, Devonian.
- mosia, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 126, Potsdam Gr.
- murrayi, Billings, 1874, Pal. Foss., vol. 2, p. 66, Up. Taconic.
- mytiloides, Sowerby, 1812, Min. Conch., p. 55, tab. 19, Coal Meas.
- nebraskensis, Meek, 1872, (L. scotica var. nebraskensis,) Pal. E. Neb., p. 158, Coal Meas.
- norwoodi, James, 1875, Cin. Quar. Jour. Sci., vol. 2, p.
- 10, Utica Slate Gr.
- nuda, Hall, 1863, 16th Rep. Fie. 574.-Lin-N. Y. St. Mus. Nat. Hist., wood). p. 22, Ham, Gr.
- nympha, Billings, 1865, Pal. Foss., vol. 1, p. 214, Quebec Gr.
- oblata, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 77, and Pal. N. Y., vol. 2, p. 54, Clinton Gr.

LIN.]

LIN.

oblonga, Con The name ward it w obtusa, Hal 98, Trente ovata, McCo land, p. 2 America. paliformis, Mus. Nat vol. 4, p. papillosa, I 202, Trent perlata, Ha 156, Low. perovata, H 55, Clinto perplexa, Ha p. 244. H tica, whic bigny had elliptica. perryi, Billi 20, Black philomela, 1, p. 49, T pinniformis, polita, see O prima, see I prima, Emr name was proctori, Ul p. 377, Tre progne, Bill 47, Utica 8 punctata, H Mus. Nat. vol. 4, p. 1 quadrata, E rata,) Zoc and Pal. ton Gr. quebecensis. 1, p. 72, Q rect**ilatera**, p. 156, Lo rectilateralis N. Y., p. 3 riciniformis, p. 95, Trei scotica, Day Carb. Brac scotica var. kensis. spathata, Ha 157, Low. spatiosa, Ha 158, Low. spatulata, V Dist. N. Y 4, p. 13, G stoneana, W 4, p. 344, I striata, Emn Up. Tacon subelliptica, Paleont., t posed inst 1843, Geo.

LIN.

LIN.]

ward it was called L. clintoni.

ovata, McCoy, 1844, Syn. Sil. Foss. Ire-land, p. 24. Not clearly identified in

paliformis, Hall, 1860, 13th Rep. N. Y. St.

papillosa, Emmons, 1856, Am. Geol., p.

perlata, Hall, 1859, Pal. N. Y., vol. 3, p.

perovata, Hall, 1852, Pal. N. Y., vol. 2, p.

perplexa, Hall, 1877, 1st ed. Am. Pal. Foss.,

p. 244. Proposed instead of L. ellip-

tica, which was preoccupied, but D'Or-

bigny had previously proposed L. sub-

perryi, Billings, 1861, Pal. Foss., vol. 1, p.

philomela, Billings, 1862, Pal. Foss., vol.

prima, Emmons, 1856, Am. Geol. This

proctori, Ulrich, 1889, Am. Geol., vol. 3,

p. 377, Trenton Gr. progne, Billings, 1862, Pal. Foss., vol. 1, p.

punctata, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 21, and Pal. N. Y.,

quadrata, Eichwald, 1829, (Crania quad-rata,) Zool. Specialis, vol. 1, p. 273, and Pal. N. Y., vol. 1, p. 96, Tren-

quebecensis, Billings, 1862, Pal. Foss., vol.

rectilatera, Hall, 1859, Pal. N. Y., vol. 3,

rectilateralis, Emmons, 1842, Geo. Rep.

riciniformis, Hall, 1847, Pal. N. Y., vol. 1,

scotica, Davidson, 1860, Monogr. Scot. Carb. Brach., p. 62, Waverly Gr.

scotica var. nebraskensis, see L. nebras-

spathata, Hall, 1859, Pal. N. Y., vol. 3, p.

spatiosa, Hall, 1859, Pal. N. Y., vol. 3, p.

spatulata, Vanuxem, 1842, Geo. Rep. 3d Dist. N. Y., p. 168, and Pal. N. Y., vol/

stoneana, Whitfield, 1882, Geo. Wis, vol.

striata, Emmons, 1856, Am. Geol., p. 112,

subelliptica, D'Orbigny, 1850, Prodr. d. Paleont., t. 1, p. 34, Clinton Gr. Pro-

posed instead of L. elliptica, Hall, in

1843, Geo. Rep. 4th Dist. N. Y., p. 77.

47, Utica Slate and Trenton Grs.

pinniformis, see Lingulepis pinniformis. polita, see Obolella polita.

Mus. Nat. Hist., p. 76, and Pal. N. Y., vol. 4, p. 8, Ham. Gr.

98, Trenton Gr.

202, Trenton Gr.

55, Clinton Gr.

elliptica.

ton Gr.

kensis.

156, Low. Held. Gr.

20. Black Riv. Gr.

1, p. 49, Trenton Gr.

prima, see Lingulepis prima.

name was preoccupied.

vol. 4, p. 10, Ham. Gr.

1, p. 72, Quebec Gr.

p. 95, Trenton Gr.

157, Low. Held. Gr.

158, Low. Held. Gr.

4, p. 13, Genesee slate.

4, p. 344, Potsdam Gr.

Up. Taconic.

p. 156, Low. Held. Gr.

N. Y., p. 399, Utica Slate.

America.

BRACHIOPODA.

- ensis. Foss., vol. 1, p.
- 'oss., vol. 1, p.
- 62, Pal. Foss.,
- Gr. Rep. 4th Dist.
- I. Y., vol. 2, p. Grs. ep. N. Y. St. and Pal. N. Y.,
- N. Y. St. Mus.
- d. N. Y., vol. 4,
- N. Y., vol. 4, p.
- Walcott, 1885, , vol. 8, p. 107,
- nogr. U. S. Geo. nian. 1. Foss., vol. 2,
- en Up. Sil. and Nat. Geo., vol.
- azy Grs. Rep. N. Y. St. and Pal. N. Y.,
- Rep. N. Y. St. and Pal. N. Y.,
- ìr. Jan. Nat. Geo.,
- p. Invert. Foss., 100th Mer., vol.
- atthewi. Rep. N. Y. St. and Pal. N. Y.,
- ír. 1863, Proc.
- ol. 15, p. 3, Mar-
- ns. Chi. Acad.
- Rep. N. Y. St. Potsdam Gr. 'al. Foss., vol. 2,
- 12, Min. Conch., 18.
- , (L. scotica var. . Neb., p. 158,
- in. p
- ep. F16. 574.-Linst., woodi.
- Pal. Foss., vol. 1,
- Rep. 4th Dist. N. Y., vol. 2, p.

- suboblonga, D'Orbigny, syn. for L. clintoni. subspatulata, Meek & Worthen, 1868, Geo. oblonga, Conrad, 1839, Ann. Rep. N. Y. The name was preoccupied, and afterobtusa, Hall, 1847, Pal. N. Y., vol. 1, p.
 - Sur. Ill., vol. 3, p. 437, Ham. Gr. thedfordensis, Whiteaves, 1887, Cont. to Can. Pal., vol. 1, p. 111, Ham. Gr.
 - trentonensis, Conrad, 1842, Jour. Acad.
 - Nat. Sci., vol. 8, p. 266, Trenton Gr. triquetra, Clarke, 1885, Buli. U. S. Geo. Sur., vol. 16, p. 62, Portage Gr.
 - umbonata, Cox, 1857, Geo. Sur. Ky.,vol. 3, p.
 - 576, Coal Meas.
 - vanhorni, S. A. Millér, 1875, Cin. Quar. Jour.
 - Sci., vol. 2, p. 9, Hud.
 - Riv. Gr.



- 24, and Geo. Sur. Ill., vol. 8, p. 104, Warsaw Gr.
- whitii, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 109, Devonian.
- whitfieldi, Ulrich, 1889, Am. Geol., vol. 3, p. 381, Utica Slate.
- winona, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 126, Potsdam Gr.
- LINGULELASMA, Ulrich, 1889, Am. Geol., vol. 3, p. 383. [Ety. Lingula, a genus; elasma, plate.] Form and composition like Lingula; pedicle valve with slightly projecting beak, faintly arched deltidium, no area, small socket on each side of the deltidial borders, and subtriangular scar opposite their anterior ends subtriangular, trilobed platform from base of detidium to middle of valve, with central part produced below in a low median ridge; two muscular scars on the lower lateral sides of the platform; brachial valve, with transverse ridge and swollen ends for sockets on the opposite valve; platform concave, elevated in front, and prolonged in a median plate, subcardinal, umbolateral and postmedian scars. Type L. schucherti

FIG. 576.-Lingulelasma schucherti. a, Posterior transverse ridge; b, subcardinal scars; u, um bolateral scars; p, postmedian scars; l, lateral scars; m, median scars; n, anterior scars; t, transverse scars; s, septum; 5a, ventral valve.

schucherti, Ulrich, 1889, Am. Geol., vol. 3, p. 389, Hud. Riv. Gr.





BRACHIOPODA.

General form like Lingula; nearly equivalve, ventral valve pointed with a pedicle groove; muscular scars as in obolus, but anterior retractors more linear. and sliding muscles small and not quite as much external. Type L. davisi.

? affinis, Billings, 1874, Pal. Foss., vol. 2, p. 67, Up. Taconic.

aurora, Hall, 1861, (Lingula aurora,) Geo.

Rep. Wis., p. 24, Potsdam Gr. cælata, Hall, 1847, (Orbicula cælata,) Pal.

N. Y., vol. 1, p. 290, Georgia Gr. cincinnatiensis, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 67, Hud. Riv. Gr. cuneata, Conrad, 1839,

(lingula cuneata,) Geo. Rep. N. Y., p. 64, and Pal. N. Y., vol. 2, p. 8,

Fig. 577.- Lingulella cincinnationsis.

> Clinton Gr. dawsoni, Matthew, 1885, Trans. Roy. Soc. Can.,

p. 33, St. John Gr. ella, Hall & Whitfield,

1877, (Lingulepis ella.) Geo. Expl. 40th Parallel, vol. 4, p. 232, Up. Taconic.



and Arts., 3d ser., vol. 34, p. 187, Up. Taconic.

inflata, Matthew, 1885, Trans. Roy. Soc. Can., p. 33, St. John Gr.

iowensis, Owen, 1840, (Lingula iowensis,) Rep. Min. Lands, p. 70, Galena Gr. lamborni, Meek, 1871, Proc. Acad. Nat.

Sci., p. 185, Calciferous or Potsdam Gr.
linguloides, Matthew, 1885, Trans. Roy.
Soc. Can., p. 34, St. John Gr.
spissa, Billings, 1874, Pal. Foss., vol. 2, p. 67, Up. Taconic.

- LINGULEPIS, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 126. [Ety. lingula, little tongue; lepis, scale.] Linguloid, inequivalve, equilateral, ovate or spatulate, corneous, phosphatic; visceral impressions in dorsal valve flabelliform, in ventral valve tripartite, the lateral divisions the larger. Type L. pinniformis.
 - cuneolus, Whitfield, 1877, Prelim. Rep. Pal. Black Hills, p. 8, and Geol. Black Hills, p. 336, Potsdam Gr.

dakotensis, Meek & Hayden, 1864, Pal. Up. Mo., p. 3, and Geol. Black Hills, p. 337, Potsdam Gr.

ella, See Lingulella ella.

mæra, Hall & Whitfield, 1877, U. S. Expl. 40th Parallel, vol. 4, p. 206, Potsdam Gr. minima, Whitfield, 1884, Bull. Am. Mas Nat. Hist., vol. 1, p. 139, Up. Taconic minuta, Hall & Whitfield, 1877, U. S.

- Expl. 40th Parallel, vol. 4, p. 206, Porsdam Gr.
- morsii, N. H. Winchell, 1876, (Lingula morsensis,) Geol. Fillmore Co., Minn. p. 31, St. Peters sandstone.
- perattenuata, Whitfield, 1877, Prelin, Rep. Pal. Black Hills, p. 9, and Geol Black Hills, p. 337, Potsdam Gr.

pinniformis, Owen, 1852, (Lingula pinniformis,) Geo. Rep. Iowa, Wis., and Minn., p. 583, Potsdam Gr. prima, Conrad, 1847,

(Lingula prima,) Pal.

N. Y., vol. 1, p. 3, FIG. 579.-Lingulepis pinniformis Potsdam Gr.

LINGULOPS, Hall, 1871, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 245. [Ety. Lingula, a genus; opsis, appearance.] In external appearance like Lingula or Lingulella: the ventral valve presents a small area, with a narrow pedicle groove and a large lobed muscular impression, which, in the cast, extends as a narrow groove toward the base of the shell; the ramifications of the vascular lines originate at nearly the same point as in existing Lingula, but do not extend so far backward toward the beak. Type L. whitfieldi.

- whitfieldi, Hall, 1871, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 245, Low. Sil.
- LINNARSSONIA, Walcott, 1885, Am. Jour. Sci. and Arts, 3d ser., vol. 29, p. 114. [Ety. proper name.] Ovate or subcircular; inarticulate; apex of ventral valve perforated by a minute foramen; no area; cardinal edge thin; two scars in the interior, on each side of the foramen, close to the posterior margin; dorsal valve, with no area; two scars in the interior, close to the posterior margin, separated by a ridge that extends forward between two small divaricator scars. Type L. transversa
 - taconica, Walcott, 1887, Am. Jour. Sci. and Arts, 3d ser., vol. 34, p. 189, Up. Taconic.
 - transversa, Hartt, 1868, (Obolella transversa,) Acad. Geol., p. 644, St. versa,) John Gr.
- MARTINIA, McCoy, 1844, syn. Carb. Foss., Ireland, p. 128. [Ety. proper name.] General characters the same as Spirifera, for which it is usually regarded as a synonym. It is distinguished by its smooth surface without radiating ribs, and by having smaller spiral append-ages. Type M. decora. athyroides, Winchell, 1866, Rep. Low. Penin. Mich., p. 94, Ham. Gr. planoconvexa, see Spirifera planoconvexa.

subumbonata, Hall, 1867, (Spirifera sub-umbonata,) Pal. N. Y., vol. 4, p. 234, Ham. Gr. and Tully limestone.

MEEKELLA, W Chi. Acad proper na than wide shorter th valves; do on the un sial sinus; iug backw deltidium, wing like up at its o gated den more con

median se

mellæ, con

teeth to th

of the su

area and

thence, sli



ward alon about half terior mar backward processes ; chambers shell. Ty striato-costat ato-costata 568, Coal N



FIG. 580.-Meeke

Meganteris æqu

æquiradiata

cumberlandiæ,

elliptica, see 1 elongata, see

lævis, see Ren

mutabilis, see

ovalis, see Rei ovoides, see R

subtrigonalis, s

suessana, see MERISTA, SUESS

subtrigonal

Austalt, vo

part.] Ger

ally mesial

fined; the

spirals atta

cline forws

ward and n

tom of the

verging to a

diverge tow

the shell,

landiæ.

352

MEE.-MER.]

LIN.-MAR

LIN.-MAR

MEE.-MER.]

II. Am. Mas. p. Taconic 1877, U. S. p. 206, Pors-

876, (Ling la e Co., Minn.,

877, Prelin. 9, and Geol. im Gr



-Lingule-579. s pinniformis

Hist., p. 245. opsis, appearpearance like ventral valve rith a narrow re lobed musin the cast ve toward the mifications of nate at nearly sting Lingula, backward towhitfieldi. Rep. N. Y. St. ow. Sil. Am. Jour. Sci. p. 114. [Ety. r subcircular: tral valve pernen; no area;

scars in the inforamen, close dorsal valve, n the interior, gin, separated ward between ars. Type L.

m. Jour. Sci. 34, p. 189, Up.

)bolella transp. 644, St.

. Carb. Foss., proper name.] ne as Spirifera, regarded as a ruished by its radiating ribs, spiral append-

36, Rep. Low. D. Gr. planoconvexa. (Spirifera subvol. 4, p. 234, estone.

BRACHIOPODA.

MEEKELLA, White & St. John, 1868, Trans. Chi. Acad. Sci., vol. 1, p. 120. [Ety. proper name.] Globose, rather longer than wide, plications large, hinge-line shorter than greatest breadth of the valves; dorsal valve most prominent on the umbo, beak incurved, no mesial sinus; cardinal process long, curving backward in front of the pseudodeltidium, and having upon each side a wing like expansion, which is curved up at its outer edge forming an elongated dental fossette; ventral valve more convex, cardinal area high, no median septum; two broad dental lamellæ, continuous from the cardinal teeth to the beak, pass directly in front of the sutures between the cardinal area and the pseudodeltidium, and thence, slightly diverging, extend forward along the bottom of the valve about half-way to the front, the anterior margins of the lamellæ arching backward and upward to the dental processes; a cross section shows three chambers opening anteriorly into the shell. Type M. striato-costata.

striato-costata, Cox, 1857, (Plicatula stri-ato-costata,) Geo. Rep. Ky., vol. 3, p. 568, Coal Meas.



Fig. 580.-Meekella striatocostata. Dorsal and ventral view

Meganteris æquiradiata, see Rensselæria æquiradiata.

- cumberlandiæ, see Rensselæria cumberlandiæ.
- elliptica, see Rensselæria elliptica. elongata, see Amphigenia elongata.
- lævis, see Rensselæria lævis.
- mutabilis, see Rensselæria mutabilis.
- ovalis, see Rensselæria ovalis.
- ovoides, see Rensselæria ovoides.
 - subtrigonalis, see Amphigenia elongata var. subtrigonalis.
- suessana, see Rensselæria suessana.
- MERISTA, Suess, 1851, Jahrb. Geol. Reichs. Austalt, vol. 2, p. 150. [Ety. meros, a part.] General form like Athyris, usually mesial fold and sinus poorly defined; the principal stems forming the spirals attach to the hinge plate, incline forward toward the interior of the shell, then abruptly bend backward and make a curve facing the bottom of the dorsal valve, and, after converging to about half their length, again diverge toward the front and form the

first spiral coil; there are 10 or 12 whorls in each spiral; the genus is distinguished by a shoe-lifter process under, the beak of the ventral valve, consisting of two roof-shaped plates, fixed by their lateral margins to the medio-longitudinal region of the valve, and with their narrow end fitting under the extremity of the beak. Type M. herculea.

arcuata, see Meristella arcuata.



FIG. 581. — Merista bella. Dorsal and anterior view.

- bella, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 92, and Pal. N. Y., vol. 3, p. 248, Low. Held. Gr.
- bisulcata, Vanuxem, 1843, (Atrypa bisulcata,) Geo. Rep. 3d Dist. N. Y., p. 112, and Pal. N. Y., vol. 3, p. 253, Low. Held, Gr.
- elongata, Hall, 1859, (Camarium elonga-tum,) Pal. N. Y., vol. 3, p. 488, Low. Held, Gr.
- houghtoni, Winchell, 1862, Proc. Acad. Nat. Sci., vol. 6, 2d ser., p. 407, Portage Gr.
- lævis, see Meristella lævis.
- lata, Hall, 1859, Pal. N. Y., vol. 3, p. 431, Oriskany sandstone.
- Miskally Salidschift, 1866, Rep. Low. Penin.
 Mich., p. 94, Ham. Gr.
 meeki, Hall, 1857, 10th Rep. N. Y. St.
 Mus. Nat. Hist., p. 97, and Pal. N. Y., vol. 3, p. 252, Low. Held. Gr.
- princeps, see Meristella princeps
- subquadrata. Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 93, and Pal. N. Y., vol. 3, p. 249, Low. Held. Gr. sulcata, Vanuxem, 1842, (Atrypa sulcata,) Geo. Rep. N. Y., p. 112, Water-
- lime Gr.
- typus, Hall, 1859, (Camarium typus,) Pal. N. Y., vol. 3, p. 487, Low. Held. Gr.
- MERISTELLA, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 74. [Ety. di-minutive of Merista.] Shells variable in form, ovoid or transverse; valves unequally convex, with or without a median fold and sinus; beak of ventral valve imperforate, incurved over the beak of the other valve; no area; valves articulating by teeth and sockets; surface smooth or with fine concentric striæ; interior of dorsal valve having a longitudinal septum and the upper part of the ventral valve a deep subtriangular muscular impression, which unites with the rostral cavity; spires are continued from their origin obliquely backward into the cavity of the ventral valve, and then,

BRACHIOPODA.

unisulcata, Conrad, 1841, (Atrypa uni-sulcata,) Ann. Rep. N. Y., p. 56, and Pal. N. Y., vol. 4, p. 309, Up. Held. and Ham. Gr.

MER.-MON

MERISTINA, Hall, 1867, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 186, and Pal. N. Y., vol. 4, p. 299. [Ety. Merista, a genus inus, implying resemblance.] General form like Meristella; apex perforated; lamellæ of the spires united by a simple loop; spirals oval, and each contains about nine convolutions; athe two principal stems attach to the hinge plate and extend into the interior between the spirals, where they bend backward and give forth converging lamellæ, which cross between the spirals to the ventral side, where they unite in an angular point. Type M. nitida.

nitida, Hall, 1843, (Atrypa nitida,) (ieo. Rep. 4th Dist. N. Y., pl. 14, and Pal. N. Y., vol. 2, p. 268, Niagara Gr.

nitida var. oblata. Hall, 1852, (Atrypa nitida var. oblata,) FIG. 584. -Meristina Pal. N. Y., vol. 2, p. nitida. Dorsal 269, Niagara Gr. view

MONOMERELLA, Billings, 1871, Can. Nat. and Geo., vol. 6, p. 220. [Ety. monos, one; meros, a part; ella, diminutive termina-tion.] Shell thick, circular or transversely oval in its marginal outline; umbo of the pedicle; valve large, projecting, double-chambered; area and deltidium large; hinge thick, elevated, ledge-shaped, concave in the middle portion; cardinal facet a wall-like space behind the ledge or flat of the hinge; cardinal buttress strong, lamelliform; platform flat, slightly elevated, widest, highest, and obtusely angulated in front; umbo of the brachial valve rounded; hinge moderately thick; platform trilobed; usually with a thin margin. Type M. prisca.



Pal., vol. 2, p. 131, Niagara Gr. orbicularis, Billings 1871, Can. Nat., vol. 6, p. 220,

FIG. 585.—Monomerella prisca. GuelphGr.

ovata, Whiteaves, 1884, Pal. Foss., vol. 3, p. 5, Guelph Gr.

ovata var. lata, Whiteaves, 1884, ' Pal

Foss., vol. 3, p. 6, Guelph Gr. prisca, Billings, 1871, Can. Nat. and Geol., vol. 6, p. 220, Guelph Gr.

NCC.-OBO.]

NUCLEOSPIRA, H p. 219. **F**E spire.] Sh versely ellip and furnish era; hing tremities ro ticulating b smooth, st ered with ventral va tended, with beneath, on base is a st from beak (spatulate ca upward inte beak; from the brachia support the confined to

N. ventricos

FIG. 586 Nu. cleospira concinna.

pisiformis, H 1852, Pal. N. 3, p. 218, Nia rotundata, W Spec. Foss. Held. Gr.

F16. 587.-Spiral ec

ventricosa, Ha p. .220, Low. was first des Rep., as Spir OBOLELLA, Billing p. 7. [Etv. small Greek lar or subgu convex; vei area, which usually groon peduncle: dc

Meristella FIG. 582. circe. Showing re-mains of spiral ap-pendages in the dorsal valve. the

recurving upon themselves, are re-Type M. lævis. arcuata, Hall, 1857.

Held. Gr. barrisi, Hall, 1860, 13th Rep. N. Y. St.

Mus. Nat. Hist., p. 84, and Pal. N. Y., vol. 4, p. 304, Marcellus shale and Ham. Gr.

circe, Billings, 1861, (Charionella circe,) Can. Jour., vol. 6, p. 273, Up. Held. Gr.

cylindrica, Hall, 1852, (Atrypa cylin-drica,) Pal. N. Y., vol. 2, p. 76, Clinton and Niagara Gr.

doris, *1860, Hall, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 84, and Pal. N. Y., vol. 4, p. 303, Schoharie grit and Corniferous Gr.

elissa, syn. for Meristella nasuta.

haskinsi, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 84, and Pal. N. Y., vol. 4, p. 306, Ham. Gr.

(?) hyale, Billings, 1862, (Charionella (?) hyale,) Pal. Foss., vol. 1, p. 166, Guelph Gr.

julia, Billings, 1862, (Athyris julia,) Pal.

Juna, Dinings, 1002, (Attryns Julia,) Fal. Foss., vol. 1, p. 146, Mid. Sil. lævis, Vanuxem, 1843, (Atrypa lævis,) Geo. Rep. 3d Dist. N. Y., p. 120, and Pal. N. Y., vol. 3, p. 247, Low Held. Gr. lenta, Hall, 1867, Pal. N. Y., vol. 4, p. 420, Originary conditions. Oriskany sandstone. maria, see Whitfieldia maria.

meta, Hall, 1867, Pal. N. Y., vol. 4, p. 308, Ham. Gr.

nasuta, Conrad, 1840, (Atrypa nasuta,) Ann. Rep. N. Y., p. 18, and Pal. N. Y., vol. 4, p. 299, Schoharie grit, Up. Held. and Ham. Gr.

princeps, Hall, 1857, (Merista princeps,) 10th Rep. N. Y. St. Mus. Nat. Ilist., p. 95, and Pal. N. Y., vol. 3, p. 252, Low. Held. Gr.

prinstana, Billings, 1862, (Athyris prins-tana,) Pal. Foss., vol. 1, p. 145, Mid. Sil. rectirostra, Hall, 1879, Desc. New Spec.

Foss., p. 15, and 11th Rep. Geo. and Nat. Hist. Ind., p. 301, Niagara Gr.

rostrata, Hall, 1843, (Atrypa rostrata,) Geo. Rep. 4th

Dist. N. Y., p. 202, and Pal. N. Y., vol. 4, p. 307, Ham. (ir. and Tully limestone.

scitula, Hall, 1843, (Atrypa FIG. 583.-Meris-scitula) (loo 4th Tist tella rostrata. scitula,) Geo. 4th Dist. Side view.

N. Y., p. 171, and Pal. N.Y., vol. 4, p. 302, Corniferous Gr. Hall regards M. circe as a syn. for this species.









354

(Merista arcuata,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 95, and Pal. N. Y., vol. 3, p. 249, Low.

[MER.-MON.

NCC.-OBO.]

(Atrypa uni-., p. 56, and Jp. Held. and

ep. N. Y. St. d Pal. N. Y., sta, a genus; ce.] General x perforated; ted by a simnd each conlutions ; athe 1 to the hinge interior bee they bend h converging en the spirals they unite in I. nitida.

Meristina

Dorsal

FIG

cinna

da

Can. Nat. and . monos, one; ative terminailar or transginal outline: lve large, proed; area and hick, elevated, 1 the middle a wall-like or flat of the is strong, lat, slightly eleand obtusely imbo of the hinge moderobed; usually pe M. prisca. newberryi, Hall

Whitfield. 1875,Ohio, Pal., vol. 2, p. 131. Niagara Gr.

orbicularis, Billings. 1871, Can. Nat., vol. 6, p. 220, GuelphGr. 'al. Foss., vol.

1884, ' Pal 68, h Gr. Nat. and Geol., BRACHIOPODA.

NUCLEOSPIRA, Hall, 1859, Pal. N. Y., vol. 3, p. 219. [Ety. nucleus, kernel; speira, spire.] Shell spheroidal, or transversely elliptical, more or less gibbous, and furnished with spires as in Spirifera; hinge-line short, cardinal extremities rounded, valves subequal, articulating by teeth and sockets; surface smooth, structure punctate and covered with minute hair-like spines; ventral valve having the beak extended, with a triangular depression beneath, on each side of which at the base is a strong tooth, a narrow septum from beak to base; dorsal valve with spatulate cardinal process, which bends upward into the cavity of the opposite beak; from the sides of this process the brachial processes originate, which support the spires; muscular imprints confined to a narrow oval space. Type N. ventricosa.

barrisi, White, 1860, Bost. Jour. Nat. Hist., vol. 7, p. 227, Kinderhook Gr. concentrica, Hall, * 1859, Pal. N. Y., vol. 3, p. 223, Low. Held. Gr. 1843.

concinna, Hall, (Atrypa concinna,) Geo. 4th Dist. N. Y., p. 200, and Pal. N. Y., vol. 4, p. 279, Hamilton Gr.

586. — Nuelegans, Hall, 1859, Pal. cleospira con-N. Y., vol. 3, p. 222, Low. Held. Gr.

pisiformis, Hall, 1859, (Orthis pisum, 1852, Pal. N. Y., vol. 2,) Pal. N. Y., vol. 3, p. 218, Niagara Gr.

rotundata, Whitfield, 1882, Desc. New Spec. Foss. from Ohio, p. 194, Low. Held. Gr.



FIG. 587.-Spiral coils of Nucleospira pisiformis.

ventricosa, Hall, 1859, Pal. N. Y., vol. 3, p. 220, Low. Held. Gr. This species was first described in 1856, in 9th Reg. Rep., as Spirifera ventricosa.

OBOLELLA, Billings, 1861, Pal. Foss., vol. 1, p. 7. [Ety. diminutive of obolus, a small Greek coin.] Shell ovate, circular or subquadrate, convex or planeconvex; ventral valve with a false area, which is sometimes minute and usually grooved for the passage of the peduncle; dorsal valve with or without

an area; muscular impressions in the ventral valve four, one pair in front of the beak near the middle or in the upper half of the shell, and the others situated one on each side near the cardinal edge; shell calcareous; surface concentrically striated. Type O. chromatica.

ambigua, Walcott, 1885, Monogr. U. S.

Geo. Sur., vol. 8, p. 67, Chazy Gr. chromatica, Billings, 1861, Pal. Foss., vol. 1, p. 7, Up. Taconic.

cingulata, Billings, 1861, Pal. Foss., vol. 1, p. 8, Up. Taconic.

circe, Billings, 1871, Can. Nat. and Geol., vol. 6, p. 219, Up. Taconic.

crassa, Hall, 1847, (Orbicula crassa,) Pal. N. Y., vol. 1,

p. 290, Up. Taconic Gr.

siderata.



desiderata, see Elkania de-FIG 588.-Obolella chromat ica c. Show

discoidea, Hall & Whitfield, ing muscular 1877, U. S. Geo. Expl. impressions; 40th parallel, vol. 4, p. d, side view. 205, Potsdam Gr.

Gemma, Billings, 1871, Can. Nat. and Geol., vol. 6, p. 218, Up. Taconic. ida, Billings, 1862, Pal. Foss., vol. 1, p. 71,

Quebec Gr.

misera, Billings, 1874, Pal. Foss., vol. 2, p. 69, Up. Taconic.

nana, Meek & Hayden, 1861, Proc. Acad. Nat. Sci. Phil., p. 435, and Pal. Up. Mo., p. 4, Potsdam Gr.

nitida, Ford, 1873, Am. Jour. Sci. and Arts, 3d ser., vol. 5, p. 213, Up. Taconic.

polita, Hall, 1861, Geo. Rep. Wis., p. 24, and Geol. Black Hills, p. 339, (Lingula polita,) Potsdam Gr.

pretiosa, Billings, 1862, Pal. Foss., vol. 1. p. 68, Quebec Gr.

transversa, see Linnarssonia transversa. Obolellina, Billings, Dec., 1871, Can. Nat., vol. 6, p. 220, syn. for Dinobolus.

canadensis, see Dinobolus canadensis.

galtensis, see Dinobolus galtensis. magnifica, see Dinobolus magnificus.

OBOLUS, Eichwald, 1829, Zoologia Specialis vol. 1, p. 274. [Ety. obolus, a small coin.] Shell orbicular, equilateral coin.] Shell orbicular, equilateral, transverse or elongated, depressed; valves not articulated ; larger valve most convex, beak obtuse or pointed, wide flattened cardinal edge or false area, over which the concentric lines of surface growth pass uninterruptedly; cardinal edge grooved longitudinally by a semicylindrical furrow; smaller valve shorter, slightly convex, without prominent beak ; hinge-line an arch ; cardinal edge flattened, horizontally striated; surface smooth or having minute undulating wrinkles; interior of larger valve with a mesial ridge, on each side of which are two oval muscular scars, one pair near the cardinal angles, the other toward the center of the valve beyond the mesial ridge; structure calcareocorneous. Type O. apollinis.

BRACHIOPODA.

canadensis, see Dinobolus canadensis. conradi, see Dinobolus conradi.



FIG. 589.-Obolus apolli-

s. b, Dorsal valve; interior of ventral

galtensis, see Tri-merella galtensis.

labradoricus, see Kutorgina labradorica.

(?) murrayi, Billings, 1865, Pal. Foss., vol. 1, p.

- 362, Quebec Gr. or Up. Taconic. pectinoides, Whitfield, 1875, Ludlow's Rep. Black Hills of Dakota, p. 103, Up. Taconic.
- Orbicula, Cuvier, 1808, Tabe. Elem. d'Hist. Nat., p. 435, syn. for Crania.

cælata, see Lingulella cælata. cancellata, see Trematis cancellata. corrugata, see Crania corrugata. crassa, see Obolella crassa. deformata, see Crania deformata. eccentrica, see Crania eccentrica. filosa, see Schizocrania filosa grandis, see Discina grandis. lamellosa, see Discina lamellosa. lodensis, see Discina lodensis. minuta, see Discina minuta. nitida, see Discina nitida. prima, see Crania prima. squamiformis, see Pholidops squamiformis. subtruncata, see Pholidops subtruncatus. tenuilamellata, see, Discina tenuilamellata. terminalis, see Trematis terminalis. truncata, see Crania truncata.

- Orbiculoidea, D'Orbigny, 1847, Comptes rendus de l'Académie des Sciences, and Prodr. de Paléont., t. 1, p. 44. [Ety. Orbicula, a genus; oides, like.] Suborbicular, patelliform, longitudinally or transversely oval, upper valve convex, with vertex near the posterior margin; lower valve conical or concave; no pedicle disk; a narrow oval or circular aperture, more or less confined in its shape, is situated in a furrow or depres-sion. Type O. elliptica.
- sion. Type O. elliptica. conica, Dwight, 1880, Am. Jour. Sci. and Arts, 3d ser., vol. 19, p. 452, Trenton Gr.
- ORTHIS, Dalman, 1827, Kongl. Vet. Acad. Handl., p. 93. [Ety. orthos, straight, in allusion to the straight hinge-line.] Shell variable in form, hinge-line straight; valves convex or plano-convex, plicated, with or without mesial fold and sinus; cardinal area notched in the center; ventral valve with two prominent diverging teeth, muscular impression saucer-shaped, divided by a median septum on which the central adductor attached; divaricator and pedicle impressions, lateral, fan-like; dorsal valve with a tooth-like, cardinal process between two curved brachial processes; adductor impression quadruple; vascular impressions numerous, spreading; no coiled spiral arms. Type O. zonata and O. callactis.

acuminata, Billings, 1859, Can. Nat. Geo., vol. 4, p. 440, Chazy Gr.

ORB.-ORT.

- acutilirata, Conrad, 1842, (Delthyris acutilirata,) Jour. Acad. Nat. Sci., vol. 8. p. 260, Hud. Riv. Gr.
- acutiloba, Ringueberg, 1888, Proc. Acad. Nat. Sci. Phil., p. 134, Niagara Gr. æquivalvis, Hall, 1847, Pal. N. Y., vol. 1.
- p. 120, Trenton Gr.
- æquivalva, Shaler. The name was preoccupied.
- æquivalvis, Hall, see Orthis eryna.
- alata, Shaler. The name was preoccupied. alsus, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 33, Schoharie grit.
- alternans, Castelnau, 1843, Syst. Sil., p.
- 38. Not recognized.
- amœna, Winchell, 1880, Geo. Sur. Minn. 8th Rep., p. 65, Hud. Riv. Gr.
- anticostiensis, syn. for Orthis porcata. apicalis, Billings, 1865, Pal. Foss., vol. 1,
- p. 301, Quebec Gr. armanda, Billings, 1865, Pal. Foss., vol. 1,
- p. 303, Quebec Gr. assimilis, Hall, 1859, Pal. N. Y., vol. 3, p.
- 175, Low. Held. Gr. aurelia, Billings, 1874, Pal. Foss., vol. 2, p. 34, Gaspe limestone No. 8, Devonian.
- barabuensis, see Leptana barabuensis.
- battis, Billings, 1865, Pal. Foss., vol. 1, p. 185, Quebec Gr.
- bellarugosa, Conrad, 1843, Proc. Acad.
 Nat. Sci. Phil., vol. 1, p. 333, and Pal.
 N. Y., vol. 1, p. 118, Trenton Gr.
 bellula, Meek, 1873, Ohio Pal., vol. 1, p. 103, Hud. Riv. Gr.
- biforata, Schlotheim, 1820, (Terebratulites biforatus,) Petrefact., p. 265, Trenton and Hud. Riv. Grs.
- billingsi, Hartt, 1868, Acad. Geol., p. 644, St. John Gr.
- biloba, Linnæus, 1767, (Anomia biloba,) Linne. Syst., ed. 12, p. 1154, Niagara Gr.
- bilobata, Conrad, 1838, (Delthyris bilobata,) Ann. Rep. N. Y. The name was preoccupied by Sowerby.
- bisulcata, see Camarella bisulcata.
- vol. 4, p. 436, Chazy and Trenton Grs. carbonaria, Swallow, 1858, syn. for Orthis pecosi.
- carinata, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 267, and Pal. N. Y., vol. 4, p. 58, Portage and Chemung Grs.
- carleyi, Hall, syn. for Orthis retrorsa.
- centrilineata, Hall, 1847, Pal. N. Y., vol. 1, p. 289, Hud. Riv. Gr.
- centrosa, n. sp., Hud. Riv. Gr. Proposed instead of O. crassa, in Cin. Quar. Jour, Sci., vol. 1, p. 20, and Ohio Pal., vol. f. p. 117, pl. 10, fig. 3.
- charlottæ, Winchell, 1880, Geo. Sur. Minn., 8th Rep., p. 67, Hud. Riv. Gr. cincinnationsis, S. A. Miller, 1883, 2d Ed.
- Am. Pal Foss., p. 296, Hud. Riv. Gr., Cincinnati, Ohio. Proposed instead of Orthis costata, Hall, 1845, Am. Jour. Sci. and Arts, vol. 48, p. 294.

N. Y., p. 7 86, Clinton clarkensis, Sy Acad. Sci. cleobis, Hall Mus. Nat. stone, and clytie, Hall,

Mus. Nat.] coloradoensis Louis Acad dam Gr.

coloradoensis, pleura.

concinna, Ha 172, Low.] conradi, Caste

Not recogn conradi, Win 8th Rep., p cooperensis, Louis Acad

saw Gr. corinna, Billi p. 302, Quel costalis, Hall,

20, Chazy (costata, Hall, 1 cupied by

cincinnatier crassa, James, vol. 1, p. 20.

by Lindstro crispata, Emn p. 404, Tren

cumberlandia 3, p. 481, Or

cuneata, Ówe Iowa, and M cyclas, Hall, 18

Nat. Hist., p

p. 52, Ham. cyclus, James, cypha, James.

establish a s dalyana, S. A.

Nat. Hist., v davidsoni, Ver

France, vol. daytonensis, F

Denison Un deflecta, see Str

deformis, Hall Mus. Nat. H

3, p. 174, Lo delicatula, Bil 1, p. 217, Qu

dentata, Pande

tatus,) Bieta Trent. and H

desmopleura, I Rep. of Wy Proposed ins dichotoma, syn. discus, Hall, 1 165, Low. He

circularis, W 8th Rep., p circulus, Hal

ORT.]



nis.

valve

a,

ORB.-ORT.

ORT.]

Can. Nat. Geo.,

Delthyris acuti-Sci., vol. 8. p.

38, Proc. Acad. iagara Gr. . N. Y., vol. 1.

name was pre-

eryna. as preoccupied. lep. N. Y. St. choharie grit. , Syst. Sil. p.

leo. Sur. Minn. v. Gr. s porcata.

d. Foss., vol. 1,

al. Foss., vol. 1,

N. Y., vol. 3, p.

Foss., vol. 2, p. 8, Devonian. parabuensis. Foss., vol. 1, p.

3, Proc. Acad. . 333, and Pal enton Gr. Pal., vol. 1, p.

(Terebratulites). 265, Trenton

1. Geol., p. 644,

nomia biloba, p. 1154, Niag-

thyris bilobata, name was pre-

sulcata. Jan. Nat. Geo. id Trenton Grs. syn. for Orthis

Rep. 4th Dist. N. Y., vol. 4, p. ng Grs. is retrorsa. Pal. N. Y., vol.

Gr. Proposed Jin. Quar. Jour, hio Pal., vol. J.

Geo. Sur. Minn., iv. Gr. ler, 1883, 2d Ed. Hud. Riv. Gr., posed instead of 845, Am. Jour. 294.

- BRACHIOPODA.
- circularis, Winchell, 1880, Geo. Sur. Min. 8th Rep., p. 66, Hud. Riv. Gr. circulus, Hall, 1843, Geo. Rep. 4th Dist.
- N. Y., p. 71, and Pal. N. Y., vol. 2, p. 86. Clinton Gr.
- clarkensis, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 81, Keokuk Gr. cleobis, Hall, 1863, 16th Rep. N. Y. St.
- Mus. Nat. Hist., p. 35, Onondaga lime-stone, and Up. Held. Gr. clytie, Hall, 1861, 14th Rep. N. Y. St.
- Mus. Nat. Hist., p. 90, Trenton Gr.
- coloradoensis, Shumard, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 627, Potsdam Gr.
- coloradoensis, Meek, 1870, see O. desmopleura.
- concinna, Hall, 1859, Pal. N. Y., vol. 3, p. 172, Low. Held. Gr. conradi, Castelnau, 1843, Syst. Sil. p. 37.
- Not recognized. conradi, Winchell, 1880, Geo. Sur. Minn.
- 8th Rep., p. 68, Hud. River. Gr. cooperensis, Swallow, 1863, Trans. St.
- Louis Acad. Sci., vol. 2, p. 82, Warsaw Gr.
- corinna, Billings, 1865, Pal. Foss., vol. 1, p. 302, Quebec Gr.
- costalis, Hall, 1847, Pal. N. Y., vol. 1, p. 20, Chazy Gr. costata, Hall, 1845. This name was preoc-
- cupied by Sowerby in 1839. See O. cincinnatiensis. crassa, James, 1874. Cin. Quar. Jour. Sci.
- vol. 1, p. 20. The name was preoccupied by Lindstrom in 1860. See O. centrosa. crispata, Emmons, 1842, Geo. Rep. N. Y.,
- p. 404, Trenton Gr. cumberlandia, Hall, 1859, Pal. N. Y., vol.
- 3, p. 481, Oriskany sandstone. cuneata, Ówen, 1852, Geo. Sur. Wis.,
- Iowa, and Minn., p. 585, Devonian. cyclas, Hall, 1860, 13th Rep. N. Y. St. Mus.
- Nat. Hist., p. 78, and Pal. N. Y., vol. 4, p. 52, Ham. Gr.
- cyclus, James, syn. for Orthis multisecta. cypha, James. Not characterized so as to
- establish a species. dalyana, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 313, Burlington Gr. davidsoni, Verneuil, 1840, Bull. Geol. Soc.
- France, vol. 5, p. 341, Up. Sil. daytonensis, Foerste, 1885, Bull. Sci., Lab. Denison Univ., p. 87, Niagara Gr.
- deflecta, see Streptorhynchus deflectum.
- deformis, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 44, Pal. N. Y., vol. 3, p. 174, Low. Held. Gr. delicatula, Billings, 1865, Pal. Foss., vol. 1, p. 217, Quebec Gr.
- dentata, Pander, 1830, (Porambonites dentatus,) Bietr. Geogn. Russl., p. 100,
- Trent. and Hud. Riv. Gr. desmopleura, Meek, 1872, Hayden's Geo. Rep. of Wyoming, p. 295, Silurian. Proposed instead of O. coloradoensis.
- dichotoma, syn. for Orthis fissicosta. discus, Hall, 1859, Pal. N. Y., vol. 3, p. 165, Low. Held. Gr.

- disparilis, Conrad, 1843, Proc. Acad. Nat. Sci., vol. 1, p. 333, and Pal. N. Y., vol. 1, p. 119, Black Riv. and Trenton Gr.
- dubia, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 12, and Bull. Am. Mus. Nat. Hist., p. 45, Warsaw Gr.
- p. 40, warsaw Gr. eboracensis, n. sp., Up. Held. Gr. Pro-posed instead of O. lenticularis of Vanuxem in Rep. 3d Dist. N. Y., p. 147, which was preoccupied. It was re-described by Hall in Pal. N. Y., vol. 4, p. 35.
- electra, Billings, 1862, Pal. Foss. vol. 1, p. 79, Quebec Gr.
- elegantula, Dalman, 1827, Kongl. Vet. Acad. Handl., p. 117, and Pal. N. Y., vol. 2, p. 57, and 252, Clinton and Niagara Gr.



FIG. 590.—Orthis elegantula. Dorsal and ventral views.

- ella, Hall, 1861, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 121, Hud. Riv. Gr.
- emacerata, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 121, Hud. Riv. Gr. emarginata, see Orthis oblata var. emargi-
- nata. eminens, Hall, 1857, 10th Rep. N. Y. St.
- Mus. Nat. Hist., p. 42, and Pal. N. Y., vol. 3, p. 167, Low. Held. Gr. erratica, Hall, 1847, Pal. N. Y., vol. 1, p.
- 288, Hud. Riv. Gr.
- eryna, Hall, 1863, (Corrigenda eryna,) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 35, and Pal. N. Y., vol. 4, p. 42, Cor-nif. Gr. Named instead of O. acquival-
- vis in 10th Rep., p. 102. eudocia, Billings, 1862, Pal. Foss., vol. 1, p. 83, Quebec Gr.
- eurekensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 22, Up. Taconic. euryone, Billings, 1862, Pal. Foss., vol. 1,

p. 78, Quebec Gr.

evadne, Billings, 1862, Pal. Foss., vol. 1, p. 81, Quebec Gr.

fasciata, Hall, 1852, Pal. N. Y., vol. 2, p. 255, Niagara Gr.

fausta, Foerste, 1885, Bull. Sci. Lab. Deni-

son Univ., p. 85, Niagara Gr. fissicosta, Hall, 1847, Pal. N. Y., vol. 1, p. 121, Hud. Riv. Gr.

- fissiplica, Roemer, 1860, Sil. Fauna West Tenn., p. 64, Niagara Gr.
- flabellum, Sowerby, 1839, in Murch. Sit. Syst., p. 639, and Pal. N. Y., vol. 2, p. 254, Niagara Gr.

flava, Winchell, 1865, Proc. Acad. Nat. Sci., p. 117, Marshall Gr.

gemmicula, Billings, 1862, Pal. Foss., vol. 1, p. 75, Quebec Gr. gibbosa, Billings, 1857, Rep. of Progr.

Geo. Sur. Can., p. 296, Black Riv. Gr. hamburgensis, Walcott, 1885, Monogr.

U. S. Geo. Sur., vol. 8, p. 73, Chazy Gr.

- highlandensis, Walcott, 1886, Bull. U. S. Geo. Sur., No. 30, p. 119, Upper Taconic.

358

- hipparionyx, syn. for O. proximus. hippolyte, Billings, 1862, Pal. Foss., vol.
- 1, p. 81, Quebec Gr. huronensis, Castelnau, 1843, Syst. Sil., p. 37. Not recognized.
- hybrida, Sowerby, 1839, Murch. Sil. Syst.,
- p. 630, Niagara Gr. idonea, Hall, 1867, Pal. N. Y., vol. 4, p. 52, Ham. Gr.
- imperator, Billings, 1859, Can. Nat. Geo., vol. 4, p. 435, Chazy Gr.
- impressa, Hall, 1843, Geo. Rep. 4th Dist., N. Y., p. 268, and Pal. N. Y., vol. 4, p. 60, Chemung Gr.
- inæqualis, Hall, 1858, Geo. of Iowa, p. 490, Ham. Gr.
- infera, Calvin, 1878, Bull. U. S. Geo. Sur. Terr., vol 4, No. 3, p. 728, Low. Devonian. insculpta, Hall, 1847, Pal. N. Y., vol. 1, p.
- 125, Hud. Riv. Gr.
- insignis, see Skenidium insigne.
- interlineata, Sowerby, see Orthis tioga.
- interstrialis, Phillips, 1841, Pal. Foss., Devonian. This species is probably for-
- eign to America. iowensis, Hall, 1858, Geo. of Iowa, p. 488, Ham. Gr.
- iowensis var. furnarius, Hall, 1858, p. 489, Geo. of Iowa, Ham. Gr.
- iphigenia, Billings, 1862, Pal. Foss., vol. 1, p. 133, Trenton Gr.
- jamesi, Hall, 1861, 14th Rep. N. Y. St.
- Mus. Nat. Hist., p. 89, Hud. Riv. Gr.
- kankakensis, McChesney, 1860, Desc. New Pal. Foss., p. 77, Hud. Riv. Gr. kassubæ, Winchell, 1880, Geo. Sur. Minn.

- 8th Rep., p. 65, Hud. Riv. Gr. kennicotti, McChesney, syn. for O. retrorsa. keokuk, Hall, 1858, Geo. Rep. Iowa, p. 640, Keokuk Gr. This species was referred to Orthis umbraculum of De-Koninck by Owen.
- lasallensis, McChesney, 1860, New Pal. Foss., p. 32, syn. for Streptorhynchus crassum.
- laticosta, Meek, 1873, Pal. Ohio, vol. 1, p. 116, Hud. Riv. Gr.
- laurentina, Billings, 1857, Rep. of Geo. Sur. Can., p. 297, Mid. Sil., Anticosti Gr., Div. 1.
- lenticularis, Vanuxem, 1842, Geo. Rep. 3d Dist. N. Y., p. 139. The name was pre-occupied by Wahlenberg in 1821. See O. eboracensis.
- leonensis, Hall, 1867, Pal. N. Y., vol. 4, p. 62, Chemung Gr.
- beida, Hall, 1860, 13th Rep. N. Y. St.
 Mus. Nat. Hist., p. 78, and Pal. N. Y., vol. 4, p. 46, Ham. Gr.
 lepis, as identified by d'Archiac & Ver-
- neuil. Not American.
- leptænoides, Emmons, 1842, Geo. Rep.
- N. Y., p. 396, Trenton Gr. leucosia, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 80, and Pal. N. Y., vol. 4, p. 48, Ham. Gr.

- limitaris, see Leiorhynchus limitare. livia, Billings, 1860, Can. Jour. Ind., Sci.
- Invia, Billings, 1860, Car. Jour. Ind., Sci. and Art, vol. 5, p. 267, Up. Held. Gr. lonensis, Walcott, 1885, Monogr. U. 8, Geo. Sur., vol. 8, p. 74, Trenton Gr. lucia, Billings, 1874, Pal. Foss., vol. 2, p. 35, Gaspe Limestone No. 8, Devonian.
- lynx, Eichwald, 1830, (Terebratula lynx,) Nat. Skizze von Podol., p. 202, and Pal. N. Y., vol. 1, p. 133, Trenton and Hud. Riv. Grs.
- maria, Billings, 1862, Pal. Foss., vol. 1. p. 137, Anticosti Gr., Div. 1, Mid. Sil.
- macfarlanii, Meek, 1868, Trans. Chi. Acad. Sci., vol. 1, p. 88, Ham. Gr. macleodi, Whitfield, 1889, Bull. Am. Mus.
 - Nat. Hist., vol. 2, p. 43, Calciferous Gr.
- media, Shaler, 1865, Bull. No. 4, M. C. Z., p. 65, Anticosti Gr. This is probably only a variety of O. elegantula. media, Winchell, 1880, Geo. Sur. Minn.
- 8th Rep., p. 64, Hud. Riv. Gr. The name was preoccupied.
- meeki, S. A. Miller, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 20, Hud. Riv. Gr. A variety of O. testudinaria.
- merope, Billings, 1862, Pal. Foss., vol. 1, p. 139, Trenton Gr.
- michelini, (Terebratula michelini,) L'Eveille, 1835, Mem. Soc. Geol. France, michelini,) vol. 2, p. 39, Subcarboniferous.
- michelini var. burlingtonensis, Hall, 1858, Geo. Rep. Iowa, p. 596, Burlington Gr. minna, Billings, 1865, Pal. Foss., vol. 1.
- p. 303, Quebec Gr. minneapolis, Winchell, 1880, Geo. Sur.
- Minn., 8th Rep., p. 63, Hud, Riv. Gr.



- missouriensis, Swallow, 1860, FIG. 591 - ()r
- Trans. St. Louis Acad. Sci. this
- this lynx Small Tren-This name was preocton specicupied. men.
- mitis, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 34, Scho-
- harie grit.
- morrowensis, James, not defined so as to be recognized.
- multisecta, Meek, 1873, Ohio Pal., vol. 1. p. 112, Hud. Riv. Gr.
- multistriata, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 45, and Pal.
- N. Y., vol. 3, p. 176, Low. Held. Gr. musculosa, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 43, Oriskany sandstone.
- mycale, Billings, 1862, Pal. Foss., vol. 1. p. 82, Quebec Gr.
- nisis, Hall & Whitfield, 1872, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 181, Niagara Gr.
- nucleus, Hall, syn. for Amboccelia umbonata
- oblata, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 41, and Pal. N. Y., vol. 3, p. 162, Low. Held. Gr.

ORT.

oblata var. N. Y., vol. occasus, Ha Mus. Nat. occidentalis, p. 127, Tre orbicularis, Sys., p. 61 orthambonit in Esthl., pecosi, Mar p. 48, Coa subsequen under the pecten, as ide neuil. No pectinella, E Dist. N. Y. 1, p. 123, 7 pectinella var N. Y., vol. tinguishab

peduncularis 3, p. 174, 1 peloris, Hall

Mus. Nat. penelope, Ha Mus. Nat.

vol. 4, p. 50 pepina, Hall, Mus. Nat.

perelegans, H Mus. Nat. vol 3, p. 17 perversa, see perveta, Con Sci., vol. 1, l, p. 120, B

pigra, Billing 4, p. 442, C pisum, as ider spira pisifo planoconvexa 3, p. 168, L

platys, Billing 4, p. 438, Ci plicata, Vanux plicatella, Hal

122, Trentor pogonipensis, Geo. Expl.

232, Chazy porcata, McC

land, p. 32 Mid. Sil. porcia, Billing 4, p. 439, Ch præumbona, see

pratteni, McCh Coal Meas.

prava, Hall, 1 Ham. Gr.

propinqua, Ha St. Mus. No N. Y., vol. 4

proximus, Van proximus.) (124, and Pal. kany sandst

ORT.]

limitare. nton and Hud.

Foss., vol. 1, p. Mid. Sil. ans. Chi. Acad. Gr.

43, Calcifer-

is is probably antula. eo. Sur. Minn. Riv. Gr. The

1. Foss., vol. 1,

. Foss., vol. 1.

880, Geo. Sur.



591.-- Or FIG. this lynx Small Trenthis ton specimen

st., p. 34, Scho-

efined so as to

nio Pal., vol. 1.

)th Rep. N. Y 45, and Pal. Held. Gr. Rep. N. Y. St.

Driskany sand-. Foss., vol. 1,

.872, 24th Rep.

t., p. 181, Niag-

mboccelia um-

and Pal. N. Y., I. Gr.

oblata var. emarginata, Hall, 1859, Pal.

occasus, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 111, Waverly Gr. occidentalis, Hall, 1847, Pal. N. Y., vol. 1,

orbicularis, Sowerby, 1839, Murch. Sil. Sys., p. 611, Up. Sil. orthambonites, Eichwald, 1840, Sil. Syst.

in Esthl., p. 150, Quebec Gr. pecosi, Marcou, 1858, Geo. N. America, p. 48, Coal Meas. This species was

under the name of Orthis carbonaria.

pecten, as identified by d'Archiac & Ver-neuil. Not American.

pectinella, Emmons, 1842, Geo. Sur. 2d Dist. N. Y., p. 394, and Pal. N. Y., vol.

pectinella var. semiovalis, Hall, 1847, Pal.

tinguishable from the type species. peduncularis, Hall, 1859, Pal. N. Y., vol.

peloris, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 32, Schoharie grit. penelope, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 79, and Pal. N. Y.,

vol. 4, p. 50, Ham. Gr. pepina, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 135, Potsdam Gr.

perelegans, Hall, 1857, 10th Rep. N. Y. St.

perversa, see Streptorhynchus perversum.

perveta, Conrad, 1843, Proc. Acad. Nat. Sci., vol. 1, p. 333, and Pal. N. Y., vol.

pigra, Billings, 1859, Can. Nat. Geo., vol.

pisum, as identified by Hall, see Nucleo-

planoconvexa, Hall, 1859, Pal. N. Y., vol.

platys, Billings, 1859, Can. Nat. Geo., vol.

plicata, Vanuxem, see Spirifera vanuxemi.

plicatella, Hall, 1847, Pal. N. Y., vol. 1, p.

pogonipensis, Hall & Whitfield, 1877, U.S. Geo. Expl. 40th parallel, vol. 4, p.

porcata, McCoy, 1844, Sil. Foss. of Ire-land, p. 32, Trenton, [Hud. Riv., and

porcia, Billings, 1859, Can. Nat. Geo., vol.

præumbona, see Ambocoelia præumbona. pratteni, McChesney, 1860, New Pal. Foss.,

propingua, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat, Hist., p. 110, and Pal. N. Y., vol. 4, p. 43, Up. Held. Gr.

proximus, Vanuxem, 1842, (Hipparionyx proximus,) Geo. Rep. 3d Dist. N. Y., p.

124, and Pal. N. Y., vol. 3, p. 407, Oris-

Coal Meas. Not recognized. prava, Hall, 1858, Geo. of Iowa, p. 490,

122, Trenton and Hud. Riv. Grs.

4, p. 442, Chazy Gr.

4, p. 438, Chazy Gr.

3, p. 168, Low. Held. Gr.

spira pisiformis.

232, Chazy Gr.

4, p. 439, Chazy Gr.

Mid. Sil

Ham. Gr.

kany sandstone.

1, p. 120, Black Riv. and Trenton Grs.

Mus. Nat. Hist., p. 44, and Pal. N. Y., vol 3, p. 171, Low. Held. Gr.

N. Y., vol. 1, p. 124, Trenton Gr. Not dis-

1, p. 123, Trenton Gr.

3, p. 174, Low. Held. Gr.

subsequently described by Swallow

N. Y., vol. 3, p. 164, Low. Held. Gr.

p. 127, Trenton to Hud. Riv. Gr.

punctostriata, Hall, 1852, Pal. N. Y., vol. 2, p. 254, Niagara Gr.

359

0

- pyramidalis, see Skenidium pyramidale.
- quacoensis, Matthew, 1885, Trans. Roy. Soc. Can., p. 43, St. John Gr.
- quadricostata, see Leiorhynchus quadri-
- costatum. remnicha, Winchell, 1886, 14th Ann. Rep. Geo. Minn., p. 317, Potsdam Gr. resupinata, Martin, 1809, Petref. Derb.,
- tab. 49, figs. 13 and 14, Subcarb.
- resupinoides, Cox, 1857, Geo. Sur. Ky., vol. 3, p. 570, Coal Meas. retrorsa, Salter, 1858, Mem. Geo. Sur. of
 - Gt. Brit., vol. 2, p. 373, Trenton and Hud. Riv. Grs.
- rhynchonelliformis, Shaler, 1865, Bull. No. 4, M. C. Z., p. 66, Anticosti Gr.
- richmondi, McChesney, 1860, New. Pal. Foss., p. 32, syn. for Streptorhynchus crassum.
- robusta, Hall, 1858, Geo. Rep. Iowa, p. 713, syn. for Streptorhynchus crassum.
- rugiplicata, Hall & Whitfield, 1872, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 182, Niagara Gr.
- ruida, Billings, 1866, Catal. Sil. Foss. Antic., p. 42, Anticosti Gr.
- salemensis, Walcott, 1887, Am. Jour. Sci. and Arts, 3d ser., vol. 34, p. 190, Up. Taconic.
- sandbergi, Winchell, 1886, 14th Ann. Rep. Geo. Minn., p. 318, Potsdam Gr. schohariensis, Castelnau, 1843, Syst. Sil., p.
- 36. Not recognized.
- scovillii, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 40, Hud. Riv. Gr. sectostriata, Ulrich, Jour. Cin. Soc. Nat.
- Hist., vol. 2, p. 15, syn. for O. ella. semele, Hall, 1863, 16th Rep. N. Y. St.
 - Mus. Nat. Hist., p. 34, Onondaga and Up. Held. Grs.
- sinuata, Hall, 1847, Pal. N. Y., vol. 1, p. 128, Hud. Riv. Gr.
- sola, Billings, 1866, Catal. Sil. Foss. Antic., p. 12, Hud. Riv. Gr.
- sofitaria, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 80, and Pal. N. Y.,

vol. 4, p. 45, Ham. Gr. stonensis, Safford, 1869, Geo. of Tenn., p. 286, Trenton and Nashville Grs.

striatella, see Chonetes striatellus.

- striatula, Emmons, 1842, Geo. Rep. N. Y. This name was preoccupied by Schlotheim.
- strophomenoides, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 46, and Pal. N. Y., vol. 3, p. 177, Low. Held. Gr.
- subcarinata, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 42, and Pal. N. Y., vol. 3, p. 169, Low. Held. Gr.
- vol. 5, p. 105, 2000, 1164, 017.
 subæquata, Conrad, 1843, Proc. Acad.
 Nat. Sci., vol. 1, p. 333, and Pal. N. Y., vol. 1, p. 118, Chazy to Trenton Gr.
 subelliptica, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p.
 200 Workelly of Kindlached Construction
- 292, Waverly or Kinderhook Gr. subjugata, syn. for Orthis occidentalis.

ORT.

our. Ind., Sci. p. Held. Gr. lonogr. U. S. renton Gr. 'oss., vol. 2, p. 8. Devonian. bratula lynx,) . 202, and Pal.

Bull. Am. Mus. Io. 4, M. C. Z.,

Cin. Quar. Hud. Riv. Gr.

tria.

michelini.) . Geol. France, ferous. isis, Hall, 1858. Burlington Gr.

ORT.]

BRACHIOPODA.

subnodosa, Hall, 1879, Desc. New Spec. Foss., p. 14, and 11th Rep. Geo. and Nat. Hist. Ind., p. 286, Niagara Gr. suborbicularis, Hall, 1858, Geo. of Iowa,

360

FIG. 592.

ural size.

p. 486, Ham. Gr.

subquadrata, Hall, 1847, Pal. N. Y., vol. 1, p. 126, Trenton to Hud. Riv. Gr.

subumbona, see Martinia subumbonata. swallovi, Hall, 1858, Geo. Rep. Iowa, p. 597, Burlington Gr.

tenuidens, Hall, 1852, Pal. N. Y., vol. 2, p. 58, Clinton Gr.

tenuistriata, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 244, Portage Gr. The

name was preoccupied by Sowerby. testudinaria, Dalman, 1827, Vet. Acad. Hand., p. 115, and Pal. N. Y., vol. 1, p.

117, Trenton and Hud. Riv. Grs.

thiemii, White, 1860, Jour. Bost. Soc. Nat. Hist., vol. 7, p. 231, and Cont. to Pal. No. 8, p. 164, Kinderhook Gr.

tioga, Hall, 1867, Pal. N. Y., vol. 4, p. 59, (O. interlineata, Sow.,) Geo. Rep. 4th Dist. N. Y., Portage and Chemung Grs.

tricenaria, Conrad, 1843, Proc. Acad. Nat. Sci., vol. 1, p. 333, and Pal. N. Y., vol. 1, p. 121, Trenton Gr.

trinucleus, Hall, 1852, Pal. N.Y., vol.2, p. 58, Clinton Gr. triplicatella, Meek, 1873, Ohio Pal., vol. 1, p. 109, Hud. Orthis tricenaria. Half nat-Riv. Gr.

tritonia, Billings, 1862, Pal. Foss., vol. 1, p. 76. Quebec Gr.

tubulostriata, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 42, and Pal. N. Y., vol. 3, p. 166, Low. Held. Gr.

tulliensis, Vanuxem, 1843, Geo. Rep. 3d Dist. N. Y., p. 163, and Pal. N. Y., vol. 4, p. 55, Tully limestone.

uberis, Billings, 1866, Catal. Sil. Foss. Antic., p. 42, Anticosti Gr.

umbonata, see Ambocœlia umbonata.

umbraculum, DeKoninck, see Orthis keokuk and Streptorhynchus umbraculum. unguiculus, Phillips, as identified by Hall

in 1843, see Ambocœlia gregaria. unguiformis, Castlenau, 1843, Syst. Sil., p.

37, syn. for Orthis hipparionyx.

vanuxemi, Hall, 1857, 10 Rep. N. Y. St. Mus. Nat. Hist., p. 135, and Pal. N. Y., vol. 4, p. 47, Ham. Gr.

vanuxemi, Winchell, 1862, Proc. Acad. Nat. Sci., vol. 6, 2d ser., p. 409, Portage

Gr. The name was preoccupied. varica, Conrad, 1842, (Delthyris varica,) Jour. Acad. Nat. Sci., vol. 8, p. 262, and Pal. N. Y., vol. 3, p. 179, Low. Held. Gr.

ORTHISINA, D'Orbigny, 1850, Prodr. d. Pal., vol. 1, p. 16. [Ety. Orthis, a genus; inus, implying resemblance to] External characters of Orthis, but the triangular pit in the cardinal area of the ventral valve is closed by a cicatrix with an oval perforation near the apex; interior of ventral valve with two broad, dental lamellæ bordering the cardinal pit, and converging to a

mesial line at the surface of the shell; interior of dorsal



ORT.-PEN.

with a Fig. 593.—Orthisina grand-rostral ava. Dorsal and yea. valve trifid rostral æva. Dor tral valves. tooth. from

which a small mesial septum extends toward the margin; lateral cardinal teeth as in Orthis. Tpye O. verneuili,

alternata, see Streptorhynchus perversum. arctostriata, see Streptorhynchus arctostriatum.

crassa, see Streptorhynchus crassum.

diversa, Shaler, syn. for Orthisina verneuili.

festinata, Billings, 1861, Pal. Foss., vol. 1, p. 10, Georgia Gr.

grandæva, Billings, 1859, Can. Nat. Geo., vol. 4, p. 349, Calcif. Gr.

missouriensis, Swallow, 1858, svn. for Meekella striatocostata.

oceidentalis, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 82, Up. Coal Meas

orientalis, Whitfield, 1884, Bull. Am. Mus. Nat. Hist., vol. 1, p. 139, Georgia Gr.

shumardana, Swallow, 1858, Trans. St. Louis Acad. Sci., p. 183, Permian Gr. transversa, Walcott, 1886, Bull. U. S. Geo.

Sur., No. 30, p. 121, Up. Taconic. verneuili Eichwald, 1842, (Orthis ver-

neuili,) Urwelt Russie, vol. 2, p. 51. Trenton and Anticosti Gr.

Pentagonia, Cozzens, 1846, Ann. N. Y. Ly-ceum, vol. 4, p. 158. [Ety. pente, five; gonia, an angle.] This genus seems to have been founded upon Conrad's Atrypa unisulcata, which is now referred to Meristella. The genus is not recognized by authors.

peersi, Cozzens, 1846, Ann. N. Y. Lyceum, vol. 4, p. 158, syn. for Meristella unisulcata.



FIG, 594 .- Pentamerella arata. Dorsal view

PENTAMERELLA, Hall, 1867, Pal. N. Y., vol. 4, p. 375. [Ety. diminutive of Penta-

PEN.]

merus.] incurved. row, mes elongate, part supp dorsal val conjoined V-shaped valve in i sessile for shell; sur



FIG. 595.—Pen arata. Side

Mus. Nat.

micula, Hal 378, Ham obsolescens, 4, p. 379, papilionensi papilioner pt. 2, p. 5 PENTAMERUS, 1 vol. 1, p. apartment ceiving va tute of me present, t and the si no hingeand having center, un valve, and entering v internally large bipa: of which a proach the walls of t ing, and triangular the wo la valve the subparalle origin, bei casts show diverging the inner e lel slits, th sulting chi rower. Ty
ORT.-PEN.

PEN.]

broad, dental dinal pit, and



orthisina grand-orsal and ven-242

ptum extends eral cardinal O. verneuili. us perversum. nchus areto-

crassum. Orthisina ver-

al. Foss., vol.

an. Nat. Geo.,

58, syn. for

63. Trans. St. p. 82, Up. Coal

Bull. Am. Mus. Georgia Gr. 58, Trans. St. Permian Gr. Bull, U.S. Geo.

Taconic. (Orthis vervol. 2, p. 51,

ir. nn. N. Y. Lyity. pente, five ; genus seems to ipon Conrad's is now referred as is not recog-

n. N. Y. Ly-1. for Meristella



. Dorsal view Pal. N. Y., vol. utive of Penta-

BRACHIOPODA.

Ann.

merus.] Ventral valve gibbous, beak incurved, fissure triangular, area narrow, mesial sinus; in the interior an elongate, spoon-shaped pit, the upper part supported on a central septum; dorsal valve convex, mesial fold; crura conjoined at their bases, making a V-shaped pit, which is attached to the valve in its upper part, and continues sessile for about half the length of the shell; surface plicated. Type P. arata.

arata, Conrad, 1841, (Atrypa arata and Atrypa octo-costata,) Rep. N. Y., p. 55, and Pal. N. Y., vol. 4, p. 375, Schoharie grit and Up. Held. Gr. compressa, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 15, Niag-

ara Gr. dubia, Hall,1860,

bius,)

(Spirifer du-

Rep. N. Y. St.

13th

F16. 595.—Pentamerella arata. Side view.

Mus. Nat. Hist., p. 90, Ham. Gr. micula, Hall, 1867, Pal. N. Y., vol. 4, p. 378, Ham. Gr.

obsolescens, Hall, 1867, Pal. N. Y., vol. 4, p. 379, Devonian.

papilionensis, Hall, 1858, (Pentamerus papilionensis,) Geo, Rep. Iowa, vol. 1, pt. 2, p. 514, Ham. Gr.

PENTAMERUS, Sowerby, 1812, Min. Conch., vol. 1, p. 73. [Ety. penta, five, meros, apartments.] Shell globose, ovate, receiving valve largest; generally destitute of mesial fold and sinus, but when present, the fold is in the receiving, and the sinus in the entering valve; no hinge-line; area large, undefined, and having a deep, triangular pit in the center, under the beak of the dorsal valve, and into which the beak of the entering valve is strongly incurved; internally the receiving valve has one large bipartite central septum, the walls of which suddenly divaricate as they approach the ent-ring valve, forming the walls of the external triangular opening, and inclosing between them a triangular chamber much smaller than the wo lateral ones; in the entering valve the two corresponding plates are subparallel, and separate from their origin, being so curved that internal casts show one of their edges, like the diverging cardinal teeth of Orthis, and the inner edges form the long, subparallel slits, the middle one of the three resulting chambers being much the narrower. Type P. knighti.

aratus, see Pentamerella arata.

- arcuosus, McChesney, 1861, New Pal. Foss., p. 87, Niagara Gr. Not recognized
- barrandi, Billings, 1857, Rep. of Progr., Geo. Sur. Can., p. 296, Mid Sil.
- beaumonti, Castelnau, 1843, Syst. Sil., p. 38. Not recognized.
- bisinuatus, McChesney, 1859, New Pal. Foss., p. 85, and Trans. Chi. Acad. Sci., vol. 1, p. 30. Niagara Gr.
- borealis, Meek, 1868, Trans. Chi. Acad. Sci., p. 95, Ham. Gr. This name was preoccupied by Eichwald in 1840.
- brevirostris, Sowerby, 1839, (Terebratula brevirostris,) Murch. Sil. Syst., p. 631, and Pal. N. Y., vol. 2, p. 278. Niagara Gr.
- chicagoensis, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., p. 94, Niagara Gr.
- comis, Owen, 1852, (Atrypa comis,) Geo. Sur. Wis., Iowa and Minn., p. 583, Ham. Gr.
- coppingeri, Etheridge, 1878, Quar. Jour. Geo. Soc., vol. 34, p. 593, Up. Silurian. crassiradiatus, McChesney, 1861, New Pal.
- Foss., p. 87, Niagara Gr. Not recognized. deshayesi, Castelnau, 1843, Syst. Sil., p.
- 38. Not recognized. Probably syn for Amphigenia elongata.
- elongatus, see Amphigenia elongata.
- fornicatus, Hall, 1852, Pal. N. Y., vol. 2, p. 81, Clinton Gr.
- galeatiformis, Meek & Worthen, syn. for P. galeatus.
- galeatus, Dalman, 1827, (Atrypa galeatus,) Vet. Acad. Handl., p. 130, and Pal. N. Y., vol. 3, p. 257, Low. Held Gr. intralineatus, Winchell, 1866, Rep. Low
- Penin. Mich., p. 94, Ham. Gr. knappi, Hall & Whitfield, 1872, 24th Rep.
- N. Y. St. Mus. Nat. Hist., p. 184, Niagara Gr.

knighti, Sowerby, 1812. Min. Conch., vol. 1, p. 73, Devonian. Conlaqueatus, rad, 1855, Proc. Acad. Nat. Sci.,

p. 441, Niagara Gr. lenticularis, White & Whitfield, 1862, Proc. Bost Soc. Nat. Hist., vol. 8, p. 295, Kinder-



FIG. 596.-Pentamerus knighti.

hook Gr. littoni, Hall, 1859, Pal. N. Y., vol. 3, p. 262, Low. Held. and Niagara Gr.

- lotis, Walcott, 1885, Monogr. U. S. Geo.
- Sur., vol. 8, p. 161, Devonian.
 multicostatus, Hall, 1861, Rep. of Progr.
 Wis. Sur., p. 1, Niagara Gr.
 nucleus, Hall & Whitfield, 1872, 24th
 Rep. N. Y. St. Mus. Nat. Hist., p. 200, Niagara Gr.

nysius, Hall & Whitfield, 1872, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 184, Niagara Gr. There are two varieties, one having coarse and the other finer radii. These are designated P. nysius var. crassicostus and P. nysius var. tenuicostus.

862

oblongus, Sowerby, 1839, Murch. Sil. Syst., p. 641, and Pal. N. Y., vol. 2, p. 79. Clinton and Niagara Gr.

oblongus var. cylindricus, Hall & Whitfield, 1872, 24th Rep. N. Y. St. Mus.

Nat. Hist., p. 183, Niagara Gr. occidentalis, Hall, 1852, Pal. N. Y., vol.

2, p. 341, Guelph Gr. occidentalis, see Gypidula occidentalis. ovalis, Hall, 1852, Pal. N. Y., vol. 2, p.

103, Clinton Gr.

papilionensis, see Pentamerella papilionensis

pergibbosus, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 139, Niagara (ir. pesovis, Whitfield, 1882, Desc. New Spec.

Foss., from Ohio, p. 195, Low. Held. Gr. pseudogaleatus, Hall, 1857, 10th. Rep. N. Y. St. Mus. Nat. Hist., p. 106, and

Pal. N. Y., vol. 3, p. 259, Low. Held. Gr. reversus, see Anastrophia reversa.

salinensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 652, Devonian.

similior, Winchell & Marcy, 1865, (Spirifera similior,) Mem.

Bost. Soc. Nat. Hist.,

p. 93, Niagara Gr. subglobosus, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p.

429, Ham. Gr. trisinuatus, McChes-

new, 1861, Desc. New Fig. 598.—Porambonites ottawensis. a, b, c, d, Different views; c, in-Pal. Foss., p. 86, arms. arms Niagara Gr.

ventricosus, Hall, 1861, Rep. Progr. Wis. Sur., p. 2, and 20th Rep. N. Y. St. Mus. Nat. Hist., p. 374, Niagara Gr.

verneuili, see Anastrophia verneuili. Рноцроря, Hall, 1859, Pal. N. Y., vol. 3, р. 489. [Ety. pholis, pholidos, a scale.] Small, thin, subelliptical, inequivalve; apex excentric, foramen in front of the apex of the ventral valve; surface marked by concentric lamellæ of growth; dorsal valve marked with bilobed muscular impressions. Type P. squamiformis. arenaria, Hall, 1867, Pal. N. Y. vol. 4, p.

413, Oriskany sandstone.

areolata, Hall, 1863, 16th Rep. N. Y. Mus. Nat. Hist., p. 31, Schoharie grit.

bellula, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 113, De-



F10. 597.-Pholidops cin-cinnatiensis.

vonian. cincinnatiensis, Hall, 1872, 24th Rep. N. Y. St. Mus. Nat. Hist., pl. 7, fig. 10,

Hud. Riv. Gr. hamiltoniæ, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat.

Hist., p. 92, and Pal. N. Y., vol. 4, p. 32, Ham. Gr.

linguloides, Hall, 1867, Pal. N. Y., vol. 4. p. 414, Ham. Gr.

- oblata, Hall, 1867, Pal. N. Y., vol. 4, p. 414, Ham. Gr.
- ovalis, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 209, Niagara Gr.
- ovata, Hall, 1859, Pal. N. Y., vol. 3, 6, 490, Low. Held. Gr.
- quadrangularis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 114, Devonian,
- squamiformis, Hall, 1843, (Orbicula squa-miformis,) Geo. Rep. 4th Dist. N. Y., p. 108, and Pal. N. Y., vôl. 2, p. 250, Niagara Gr.
- subtruncata, Hall, 1847, (Orbicula sub-truncata,) Pal. N. Y., vol. 1, p. 290, Hud. Riv. Gr.
- terminalis, Hall, 1859, Pal. N. Y., vol. 3, p. 490, Oriskany sandstone.
- trentonensis, Hall, 1866, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 221, Trenton Gr.
- Platystrophia, King, syn. for Orthis. regularis, syn. for Orthis lynx.
- Plectambonites arca, syn. for Leptæna transversalis.
- glabra, syn. for Leptæna sericea.
- tenera, syn. for Leptæna transversalis.

Plicatula, Lamarck, 1809. Not Palæozoic. striatocostata, see Meekella striatocostata. PORAMBONITES, Pander, 1830, Beitrage zur

Geog. des Russichen Reiches, p. 99.



[Ety. poros, opening; ambon, umbone.] Subglobose, depressed, dorsal valve the larger, beaks obtuse, subequal, separated by a small cardinal area in each

valve; foramen in each valve small, triangular, reaching the hinge-line; two long, slightly diverging dental lamellæ in each valve, those of the ventral valve closer together; surface coarsely punctured in lines. Type P. coarsely punctured in lines. æquirostris.

dentatus, see Orthis dentata.

- obscurus, Hall & Whitfield, 1877, U.S. Geo. Expl. 40th parallel, vol. 4, p. 234, Quebec Gr.
- ottawensis, Billings, 1862, Pal. Foss., vol. 1, p. 140, Black Riv. Gr.
- PRODUCTELLA, Hall, 1867, Pal. N. Y., vol. 4, p. 153. [Sig. diminutive of Productus.] Shells having the general form of Productus, but with a narrow area on each valve, a foramen or callosity on the ventral area, small teeth, and more or less distinct teeth sockets. Type P. subaculeata.
 - arctirostrata, Hall, 1857, (Productus arctirostratus,) 10th Rep. N. Y. St. Mus.

PRO.]

Nat. Hist., 4, p. 182, C bialveata, Ha boydi, Hall, 10th Rep. 179, and Pa mung Gr. concentrica, centricus,) Nat. Hist., costatula, Hal 180, Chemr costatula var N. Y., vol. dissimilis, see dumosa, Hall 14th Rep. N 99, and P Ham. Gr. eriensis, Nich vol. 1, p. 11 exanthemata. anthematus Nat. Hist., 4, p. 163, H hallana, Walc Sur., vol. posed inste which was



hirsuta, Hall, 10th Rep. 1 175, Chemu hirsuta var. N. Y., vol. hystricula, Ha p. 178, Cher lachrymosa, C lachrymosa, 8, p. 256, an Chemung G lachrymosa Strophome Sci., vol. 8, 4, p. 174, Ch lachrymosa ve N. Y., vol. 4

navicella, Hal cella,) 10th Hist., p. 172 156, Cornif. newberryi, H berryi,) 10th

Hist., p. 180 nusta, Hall, onusta, 184, Chemu

pyxidata, Ha datus,) Geo.

183, Chemu

PHO PRO

PHO PRO

N. Y., vol. 4,

- Y., vol. 4, p.
- b. Inst., vol.
- Y., vol. 3, p.
- 885, Monogr. 14. Devonian. rbicula squa-Dist. N. Y., **51.** 2, p. 250,
- Orbicula subol. 1, p. 290,
- N. Y., vol. 3, h Rep. N.Y. I, Trenton Gr. Irthis.
- x. eptæna trans-
- icea. isversalis. ot Palæozoic. striatocostata. Beitrage zur eiches, p. 99.



- g, showing oral
- bon, umbone.] orsal valve the ibequal, sepaarea in each valve small, e hinge-line; ing dental lase of the venther; surface nes. Type P.
- i, 1877, U. S. vol. 4, p. 234,
- Pal. Foss., vol.
- . N. Y., vol. 4 of Productus.] I form of Prow area on each llosity on the , and more or ets. Type P.
- roductus areti-. Y. St. Mus.

BRACHIOPODA.

- Nat. Hist., p. 177, and Pal. N. Y., vol. 4, p. 182, Chemung Gr. bialveata, Hall, 1867, Pal. N. Y., vol. 4, p.
- 183, Chemung Gr.
 boydi, Hall, 1857, (Productus boydii,) i0th Rep. N. Y. St. Mus. Nat. Hist., p. 179, and Pal. N. Y., vol. 4, p. 169, Che-
- mung Gr. concentrica, Hall, 1857, (Productus con-
- centricus,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 180, Kinderhook Gr. costatula, Hall, 1867, Pal. N. Y., vol. 4, p.
- 180, Chemung Gr.
- costatula var. strigata, Hall, 1867, Pal. N. Y., vol. 4, p. 181, Chemung Gr. dissimilis, see P. hallana.
- dumosa, Hall, 1861, (Productus dumosus,) 14th Rep. N. Y. St. Mus. Nat. Hist., p. 99, and Pal. N. Y., vol. 4, p. 162, Ham. Gr.
- eriensis, Nicholson, 1874, Geo. Mag., n. s., vol. 1, p. 118, Cornif. Gr.
- exanthemata, Hall, 1857, (Productus ex-anthematus,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 174, and Pal. N. Y., vol. 4, p. 163, Ham. Gr.
- hallana, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 130, Ham. Gr. Pro-posed instead of P. dissimilis of Hall, which was preoccupied by DeKoninck.

FIG. 599.-Productella hirsuta. hirsuta, Hall, 1857, (Productus hirsutus,) 10th Rep. N. Y. St. Mus. Nat. Hist., p.

hisuta var. rectispina, Hall, 1867, Pal. N. Y., vol. 4, p. 168, Chemung Gr. hystricula, Hall, 1867, Pal. N. Y., vol. 4, p. 178, Chemung Gr.

lachrymosa, Conrad, 1842, (Strophomena lachrymosa,) Jour. Acad. Nat. Sci., vol.

lachrymosa var. lima, Conrad, 1842, (Strophomena lima,) Jour. Acad. Nat.

lachrymosa var. stigmata, Hall, 1867, Pal.

N. Y., vol. 4, p. 174, Chemung Gr. (navicella, Hall, 1857, (Productus navi-cella,) 10th Rep. N. Y. St. Mus. Nat. Hist, p. 172, and Pal. N. Y., vol. 4, p.

newberryi, Hall, 1857, (Productus new-berryi,) 10th Rep. N. Y. St. Mus. Nat.

Hist., p. 180, Chemung Gr. onusta, Hall, 1867, Pal. N. Y., vol. 4, p.

pyxidata, Hall, 1858, (Productus pyxi-

datus,) Geo. of Iowa, p. 498, Ham. Gr.

Sci., vol. 8, p. 256, and Pal. N. Y., vol.

8, p. 256, and Pal. N. Y., vol. 4, p. 174,

175, Chemung Gr.

Chemung Gr.

4, p. 174, Chemung Gr.

156, Cornif. and Ham. Grs.

184, Chemung Gr.

- rarispina, Hall, 1857, (Productus raris-pinus,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 178, and Pal. N. Y., vol. 4, p. 170, Chemung Gr.
- shumardana, Hall, 1858, (Productus shumardanus,) Geo. Rep. of Iowa, vol. 1, pt. 2, p. 499, and Pal. N. Y., vol. 4, p. 157, Up. Held. Gr., Marcellus shale,
- Ham. and Chemung Grs. speciosa, Hall, 1857, (Productus specio-sus,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 176, and Pal. N. Y., vol. 4, p.
- 175, Chemung Gr. spinulicosta, Hall, 1857, (Productus spinulicostus,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 173, and Pal. N. Y., vol. p. 160, Marcellus shales and Ham. Gr.
- striatula, Hall, 1867, Pal. N. Y., vol. 4, p. 177, Chemung Gr.
- subaculeata, Murchi-son, 1840, (Productus subaculeatus,) Bul. Soc. Geo. de France,



- Ham. Gr.
- truncata, Hall, 1857, (Productus trunca-tus,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 171, and Pal. N. Y., vol. 4, p. 160, Marcellus shales and Ham Gr.
- 164, Ham. Gr.
- PRODUCTUS, Sowerby, 1812, Min. Conch., vol. 1, p. 153. [Ety. productus, pro-duced—so named from one valve of the shell being prolonged beyond the other, and often to a great extent.] Shell inequivalve, transverse, or elongated with auricular expansions; ventral valve convex, geniculated, or perpendicularly incurved; hinge-line straight; area narrow, or the cardinal edge thickened; beak incurved; in the interior a narrow mesial ridge separates two elongated, ramified, muscular adductor scars; under and outside these are two deep, longitudinally subquadrate impressions for cardinal muscles, widely separated by a crest, and lower down toward the center of the shell two deep concave subspiral depressions for spiral or labial appendages; dorsal valve concave, following the other valve; cardinal process for the attachment of muscles prominent, trifid, and below it a mesial ridge, upon each side of which are the ramified adductor scars; outside and in front of these are two reniform impressions; a prominence on each side the mesial ridge indicates the origin of spiral arms; surface of shell striated, more or less concentrically





tullia, Hall, 1867, Pal. N. Y., vol. 4, p.

vol. 11, p. 255, and Pal. N. Y., vol. 4, p. 154, Waverly Gr.

PRO.

wrinkled, and bearing tubular spines. Types P. longispinus and P. semireticulatus.

æquicostatus, Shumard, 1855, Geo. Rep. Mo., p. 201, Coal Meas.

864

- alternatus, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., 2d series, vol. 3, p. 20, Keokuk Gr.
- altonensis, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., 2d series, vol. 3, p. 7, Kaskaskia Gr.
- americanus, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 91, Up. Coal Meas.
- arctirostratus, see Productella arctirostrata.
- arcuatus, Hall, 1858; Geo. Rep. Iowa, p. 518, Kinderhook Gr.
- asper, McChesney, syn. for P. nebraskensis.
- auriculatus, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 92, Coal Meas.
- biseriatus, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 12, and Bull. Am. Mus. Nat. Hist., p. 46, Warsaw Gr. boonensis, Swallow, 1858, Trans. St. Louis
- Acad. Sci., vol. 1, p. 217, Coal Meas. boydi, see Productella boydi.
- calhounanus, Swallow, 1858, Trans. St.
- Louis Acad. Sci., vol. 1, p. 215, Coal Meas. Prof. Meek regarded this name as a synonym for P. semireticulatus. callawayensis, Swallow, 1860, Trans. St.
- Louis Acad. Sci., vol. 1, p. 640, Ham. Gr.
- cancrini, as identified by Geinitz, is P. pertenuis of Meek.
- capaci, D'Orbigny, 1843, as identified by early authors, is referred to P. longispinus.
- cestriensis, Worthen, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 570, Kaskaskia Gr.
- clavus, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., 2d series, vol. 3, p. 10, Coal Meas.
- comoides, as identified by d'Archiac & Verneuil. Not American.

concentricus, see Productella concentrica. confragosus, Conrad, 1835, Trans. Geo. Soc.

Penn., vol. 1, p. 2, p. 267, Coal Meas. This species is not recognized.

- cooperensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 640, Waverly or Choteau Gr.
- cora, D'Orbigny, 1842, Paléont. d. l'Am. Merid., p. 48, Coal Meas.
- cora var. mogoyoni, Marcou, 1858, Geo. N. Amer., p. 45, Subcarboniferous.

coriformis, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 94, Kaskaskia Gr.

- costatoides, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 217, Up. Coal Meas.
- costatus, Sowerby, 1827, Min. Conch., vol., 6, p. 115, Coal Meas. It is doubtful whether this species has been identified in America.

curtirostratus, Winchell, 1865, Proc. Acad. Nat. Sci., p. 114, Marshall (ir. delawari, Marcou, 1858, (ieol. N. Amer.,

- p. 45, Subcarb.
- depressus, Sowerby, 1825, see Strophomena depressa.
- depressus, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 93, Keokuk Gr. dissimilis, see Productella dissimilis.
- dolorosus, Winchell, 1865, Proc. Acad. Nat. Sci., p. 114, Marshall Gr.
- dumosus, see Productella dumosa.
- duplicostatus, Winchell, 1865, Proc. Acad. Nat. Sci., p. 113, Marshall Gr.
- elegans, Norwood & Pratten, 1854. This name was preoccupied, and the fossil is now named P. cestriensis.
- exanthematus, see Productella exanthemata fasciculatus, McChesney, 1860, New Pal.
- Foss., Coal Meas. Not recognized. fentonensis, Swallow, 1863, Trans. St.
- Louis Acad. Sci., vol. 2, p. 93, Keokuk Gr.
- flemingi, Sowerby, 1812, Min. Conch., vol. 1, p. 155, Subcarb.
- flemingi var. burlingtonensis, Hall, 1858. Geo. Rep. Iowa, p. 598, Burlington Gr. gracilis, Winchell, 1865, Proc. Acad. Nat.
- Sci., p. 112, Cuyahoga shale. gradatus, Swallow, 1863, Trans. St. Louis
- Acad. Sci., vol. 2, p. 93, Keokuk Gre hepar, Morton, 1836, Am. Jour. Sci. and
- Arts, vol. 29, p. 149, Coal Meas. Not recognized.
- hildrethanus, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., 2d ser., vol. 3, p. 18, Coal Meas.
- hirsutiformis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 133, Up. Devonian.
- hirsutus, see Productella hirsuta.
- horridus, as identified by Geinitz, 1866. Prof. Meek regarded the fossil as P. longispinus.
- incurvatus, Shepard, 1838, Am. Jour. Sci., vol. 34, p. 144. Not recognized. Prob-
- ably a Streptorhynchus or Strophodonta. indianensis, Hall, 1858, Trans. Alb. Inst.,
- vol. 4, p. 13, and Bull. Am. Mus. Nat. Hist., vol. 4, p. 47, Warsaw Gr. inflatus, syn. for P. semireticulatus.
- ivesi, Newberry, 1861, Ives's Col. Ex. Exped., p. 122, Mid. Carb. lasallensis, Worthen, 1873, Geo. Sur. III.,
- vol. 5, p. 569, Up. Coal Meas. lævicostus, White, 1860, Bost. Jour. Nat. Hist., vol. 7, p. 230, Kinderhook Gr.
- latissimus, Sowerby, 1822, Min. Conch., vol. 4, p. 32, Carb.



FIG. 601.-Productus longispinus. Dorsal and ventral views.

longispinus, Sowerby, 1812, Min. Conch., vol. 1, p. 154, Coal Meas.

PRO.]

lobatus, as ide neuil. Not magnicostatus Louis Acad

Meas. magnus, Mee Acad. Nat. Sur. Ill., vo marginicinctu

Louis Acad Louis (ir. mesialis, Hal 636, Keokul mexicanus, 8 Louis Acac

mian Gr. morbillianus. Nat. Sci., p.

multistriatus, Nat. Sei., vo Rep. Gt. B

Meas. muricatus, N Jour. Acad. Coal Meas.

as a syn. for nanus, Meek Acad. Nat. Ill., vol. 2,

naricella, see nebraskensis. Wis., Iowa

Meas. nevadensis, M 40th paralle nodosus, New

Exped., p. 1 norwoodi, Sw Acad. Sci.,

occidentalis, Ex. Exped. orbignyanus,

genre Proc Meas. ovatus, Hall,

674. St. Lou parvulus, Wi Nat. Sci., p

parvus, Meek Acad. Nat.

Sur. Ill.,

kia Gr. pectenoideus,

Sci., vol. 34

Probably a pertenuis, Me 164, Coal M

hillipsi, Nor Acad. Nat. Subcarb.

pileiformis, syr pileolus, Shu Louis Acad

mian Gr. pocillum, Mor and Arts, v Not recognia

popii, Shuma Acad. Sci., 1

PRO.

[FRO

PRO.]

65, Proc. Acad. Il Gr. Feol. N. Amer.

e Strophomena

frans. St. Louis Keokuk Gr. issimilis.

, Proc. Acad. Il Gr. umosa.

865, Proc. A cad. Il Gr. en, 1854. This

and the fossil nsis. aexanthemata

1860, New Pal. recognized. 63, Trans. St. 2, p. 93, Keo-

in. Conch., vol.

sis, Hall, 1858, Burlington Gr. roc. Acad. Nat. nale.

Frans. St. Louis Keokuk Gr. Jour. Sci. and oal Meas. Not

d ser., vol. 3, p.

1885, Monogr. p. 133, Up. De-

nirsuta. 7 Geinitz, 1866. the fossil as P.

Am. Jour. Sci., ognized. Probor Strophodonta. rans. Alb. Inst., Am. Mus. Nat. rsaw Gr. eticulatus. Ives's Col. Ex.

arb. 5, Geo. Sur. Ill., Meas.

Bost. Jour. Nat. nderhook Gr. 2, Min. Conch.,



ñus. Dorsal and 1.

12, Min. Conch., as.

- lobatus, as identified by d'Archiac & Verneuil. Not American. magnicostatus, Swallow, 1860, Trans. St.
- nagnicostatus, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 641, Coal Meas.
- magnus, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 142, and Geo. Sur. Ill., vol. 3, p. 528, Keokuk Gr.
- marginicinctus, Prout, 1857, Trans. St. Louis Acad. Sci., vol. 1, p. 43, St. Louis (ir. mesialis, Hall, 1858, (ieo. Rep. Iowa, p.
- 636, Keokuk Gr.
- mexicanus, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 291, Permian Gr.
- morbillianus, Winchell, 1865, Proc. Acad. Nat. Sci., p. 113, Burlington Gr. multistriatus, Meek, 1860, Proc. Acad.
- multistriatus, Meek, 1860, Proc. Acad. Nat. Sci., vol. 12, p. 309, and Simpson's Rep. Gt. Basin of Utah, p. 350, Coal Meas.
- muricatus, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci. Phil., vol. 3, p. 14, Coal Meas. Prof. Meek regarded this as a syn. for P. longispinus.
- nanus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 450, and Geo. Sur. Ill., vol. 2, p. 320, Coal Meas. *naricella*, see Productella navicella.
- nebraskensis, Owen, 1852, Geo. Rep. Wis., Iowa, and Minn., p. 584, Coal Meas.
- nevadensis, Meek, 1877, U. S. Geo. Sur. 40th parallel, p. 64, Carboniferous.
- nodosus, Newberry, 1861, Ives' Col. Ex. Exped., p. 124, Carb.
- norwoodi, Swallow, 1858, Trans. St. Louis Acad. Sci., p. 182, Permian Gr. occidentalis, Newberry, 1861, Ives' Col.
- occidentalis, Newberry, 1861, Ives' Col. Ex. Exped., p. 122, Up. Carb. orbignyanus, DeKoninck, 1847, Mon.du
- genre Productus, p. 152, Up. Coal Meas.
- ovatus, Hall, 1858, Geo. Rep. Iowa, p. 674. St. Louis Gr.
- parvulus, Winchell, 1863, Proc. Acad. Nat. Sci., p. 4, Marshall Gr. parvus, Meek & Worthen, 1860, Proc.
- parvus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 450, and Geo. Sur. Ill., vol. 2, p. 297, Kaskaskia Gr.
- pectenoideus, Shepard, 1838, Am. Jour. Sci., vol. 34, p. 150. Not recognized. Probably a Streptorhynchus.
- pertenuis, Meek, 1872, Pal. E. Neb., p. 164, Coal Meas.
- phillipsi, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, 2d series, p. 8, Subcarb.
- pileiformis, syn. for Productus cora.
- pileolus, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 291, Permian Gr.
- pocillum, Morton, 1836, Am. Jour. Sci. and Arts, vol. 29, p. 149, Coal Meas. Not recognized.
- popii, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 290, Permian Gr.

- portlockanus, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., 2d series, vol. 3, p. 15, Coal Meas.
- prattenanus, Norwood, 1854, Jour. Acad. Nat. Sci. Phil., 2d series, vol. 3, p. 17, Coal Meas.
- punctatus, Martin, 1809, Petrif. Derb., pl. 37, fig. 6, Low. Carb. and Coal Meas. pyxidatus, see Productella pyxidata.
- pyxidiformis, DeKoninck, 1847, Monographie du genre Productus, p. 220,
- Subcarboniferous. rarispinus, see Productella rarispina.
- rogersi, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, p. 9, Coal Meas. Prof. Meek regarded this as a synonym for P. nebraskensis.
- scabriculus, (Conchyliolithus Anomites scabriculus,) Martin, 1809, Petrif. Derb., p. 8, tab. 36, fig. 5, Carb.
- scitulus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 451, and Geo. Sur. Ill., vol. 2, p. 280, St. Louis Gr.
- semipunctatus, Shepard, 1838, Am. Jour. Sci., vol. 34, p. 153, Coal Meas.
- semipunctatus, Hildreth, 1838, syn. for P. punctatus.

semireticulatus, Martin, 1809, (Conchyliolithus Anomites semireticulatus,) Petrif. Derb., p. 7, Keokuk Gr. semistriatus,

Meek.



Proc. Acad. Nat. Fig. 602 — Productus semi-Sci., vol. 12, p. reticulatus. 309, and Simp-

1860,

son's Rep. Gt. Basin of Utah, p. 349, Coal Meas.

- setigerus, Hall, 1858, Geo. Rep. Iowa, p. 638, Keokuk Gr.
- setigerus var. Keokuk, Hall, 1858, Geo. Rep. Iowa, p. 639, Keokuk Gr.
- shumardanus, see Productella shumardana. speciosus, see Productella speciosa.
- spinulicostus, see Productella spinulicosta. spinulosus, Sowerby, 1812, Min. Conch.,
- vol. 1, p. 155, Carb. splendens, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci. Phil., vol. 3, p.
- 11, Coal Meas. Prof. Meek regarded this as a synonym for P. longispinus. subaculeatus, see Productella subaculeata.
- subalatus, see Productella subalata. subhorridus, Meek, 1877, U. S. Geo. Sur.,
- 40th parallel, p. 75, Carboniferous. sulcatus, Castelnau, 1843, Syst. Sil., p. 39,
- Not recognized,
- symmetricus, McChesney, 1860, Desc. New Pal. Foss., p. 35, and Pal. E. Neb. p. 167, Coal Meas.
- tenuicostus, Hall, 1858, Geo. Rep. Iowa, p. 675, St. Louis Gr.
- tenuistriatus, Verneuil, 1845, Geol. Russia and Ural Mountains, vol. 2, p. 260, Carb.

BRACHIOPOA.

truncatus, see Productella truncata. tubulospinus, McChesney. Syn. for. P. semipunctatus.

- viminalis, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 29, Burlington Gr.
- vittatus, Hall, 1858, Geo. Rep. Iowa, p. 639. Keokuk Gr.
- wabashensis, Norwood & Pratten, 1854. Jour. Acad. Nat. Sci., vol. 3, p. 13, Coal Meas.
- wilberianus, McChesney, syn. for P. nebraskensis.

wortheni, Hall, 1858, Geo. Rep. Iowa, p. 635, Keokuk Ga

PSEUDOCRANIA, McCoy, 1851, Ann. and Mag. Nat. Hist., 2d series, vol. 8, p. 387. [Ety. pseudo, false; Crania, a genus.] Shell slightly inequivalve, free; each valve depressed, subconical; dorsal valve with or without a small cardinal area; internally, margin broad, flat, smooth, or minutely striated concen-trically; anterior pair of muscular impressions much larger than the posterior pair; pallial impressions numerous, linear, not interrupted along the mid-dle. Type P. divaricata. anomala, Winchell, 1866, Rep. Low. Pen.

Mich., p. 92, Ham. Gr.

- RENSSELÆRIA, Hall, 1859, Pal. N. Y., vol. 3, p. 454. [Ety. proper name.] Inequivalve, oval, ovoid, or suborbicular, elongated, rarely transverse, sometimes subtrigonal, gibbous or ventricose; no mesial fold or sinus; beak prominent, incurved, foramen terminal; articulation by two widely separated teeth and sockets; surface striated; structure punctate. Type R. ovoides.
 - æquiradiata, Conrad, 1842, (Atrypa requiradiata,) Jour. Acad. Nat. Sci., vol. 8, p. 266, and Pal. N. Y., vol. 3, p. 255, Low. Held. Gr.

condoni, McChesney, 1861, New Pal. Foss., p. 85, Oriskany sandstone.

cumberlandiæ, Hall, 1857, (Meganteris cumberlandiæ,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 101, and Pal. N. Y., vol. 3, p. 464, Oriskany sandstone.

elliptica, Hall, 1857, (Meganteris elliptica,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 98, Low. Held. Gr.

elongata, see Amphigenia elongata.

intermedia, Hall, 1859, Pal. N. Y., vol. 3,

p. 463, Oriskany sandstone. johanni, Hall, 1867, Pal. N. Y., vol. 4, p.

385, Up. Held. Gr.

lævis, Hall, 1857, (Meganteris lævis,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 99,

Low. Held. Gr. *lævis*, Meek, 1868, Trans. Chi. Acad. Sci., p. 108. This name was preoccupied.

marylandica, Hall, 1859, Pal. N. Y., vol.

3, p. 461, Oriskany sandstone. mutabilis, Hall, 1857, (Meganteris muta-bilis,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 97, Low. Held. Gr.

ovalis, Hall, 1857, (Meganteris ovalis,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 101, and

Pal. N. Y., vol. 3, p. 458, Oriskany sandstone. ovoides, Ea 1832, ton, (Terebratula ovoides,) Geo. Textbook, p. 45, and Pal. N. Y., vol. 3, p. 456, Oris-

kany sandstone. suessana

Hall, 1857,

(Meganteris FIG. 603.-Rensselæria ovoides. suessana,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 100, and Pal. N. Y., vol. 3, p. 459, Oriskany sandstone.

portlandica, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 115, Low.

Held. Gr. RETZIA, King, 1850, Mono-graph of Permian Foss., Fity. proper p. 137. [Ety. proper name.] Longitudinally oval, ribbed, with large punctures; foramen in ventral valve; area triangular; fissure closed. Type R. adrieni. altirostris, White, 1862, Proc.

FIG. 604. Bost. Soc. Nat. Hist., vol. Retzia evax

9, p. 28, Marshall Gr. compressa, Meek, 1864, Pal. California,

- vol. 1, p. 14, Coal Meas. deweyi, Hall, 1857, (Waldheimia deweyi,)
- 10th Rep. N. Y. St. Mus. Nat. Hist., p. 89. Low. Held. Gr.
- dubia, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 113, Low. Held. Gr.

electra, Billings, 1863, Proc. Port. Soc. Nat.

Hist., vol. 1, p. 114, Low. Held. Gr. eugenia, Billings, 1861, Can. Jour., vol. 6, p. 147, Ham. Gr.

- evax, Hall, 1863, (Rhynchospira evax,) Trans. Alb. Inst., vol. 4, p. 213, and Rep. Geol. and Nat. Hist. Ind., Niagara Gr.
- formosa, Hall, 1857, (Waldheimia for-mosa,) 10th Rep. N. Y. St. Mus. Nat. Hist., p. 88, Low. Held. Gr.
- hippolyte, Billings, 1863, Proc. Port. Soc.
- Nat. Hist., vol. 1, p. 112, Low. Held. Gr. lepida, Hall, 1860, (Rhynchospira lepida,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 83, and Pal. N. Y., vol. 4, p. 275,
- Ham. Gr. marcyi, Shumard, 1854, (Terebratula marcyi,) Marcy's Exp. Red Riv., p. 177,
- Kaskaskia Gr.
- maria, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 112, Low. Held. Gr.

meekana, Shu Louis Acad. mian Gr. Ma mormoni,



FIG. 605.-Retzia mormoni.

osagensis, Swal Acad. Sci., v Choteau Gr. papillata, Shu Louis Acad.

mian Gr. popana, Swallo Acad. Sci., v

Choteau Gr. punctilifera, Shu

mormoni. polypleura, Wi Nat. Sci., 2d

age Gr. sexplicata, Whi Bost. Soc. Na derhook Gr.

sinuata, Hall, uata,) Can. Up. Sil.

subglobosa, Ha subglobosa,) Up. Held. Gr

subglobosa, McCh moni. vera, see Eumet vera var. costata

costata. verneuilana, see woosteri, White vol. 5, No. 2,

No. 6, p. 134,

RHYNCHONELLA, Imp. Mosc., chos, beak; e trigonal, sub mesial fold an beak of ven prominent, cu

beak, by the sometimes clo a deltidium, pieces ; two t supported by tend to the sockets in the two, short, fla the hinge pla separated by

scars on the muscles of the shaped cavity plates; shell loxia.

abrupta, Hall, Mus. Nat. Hi vol. 3. p. 228,

PSE.-RET.

RHV

PSE.- RET.

anteris ovalis,) s. Nat. Hist., p.



RHV]

Amer., p. 51, Coal Meas. This species was subsequently, though in the same year, described by FIG. 605.-Retzia Shumard under the mormoni. name R. punctilifera.

Marcou, 1858, (Terebratula

mormonii,) Geo. N.

BRACHIOPODA.

osagensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 653, Waverly or Choteau Gr.

meekana, Shumard, 1858, Trans. St.

Louis Acad. Sci., vol. 1, p. 295, Per-

- papillata, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 294, Permian Gr.
- popana, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 654, Waverly or Choteau Gr.
- punctilifera, Shumard, 1858, syn. for Retzia mormoni.
- polypleura, Winchell, 1862, Proc. Acad. Nat. Sci., 2d ser., vol. 6, p. 406, Portage Gr.
- sexplicata, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 294, Kinderhook Gr.
- sinuata, Hall, 1860, (Rhynchospira sinuata,) Can. Nat. and Geol., vol. 5, Up. Sil.
- subglobosa, Hall, 1867, (Rhynchospira subglobosa,) Pal. N. Y., vol. 4, p. 421, Up. Held. Gr.
- subglobosa, McChesney, syn. for Retzia mormoni.
- vera, see Eumetria vera.
- vera var. costata, see Eumetria vera var. costata.
- verneuilana, see Eumetria verneuilana. woosteri, White, 1879, Bull. U. S. Sur.,
- vol. 5, No. 2, p. 215, and Cont. to Pal., No. 6, p. 134, Coal Meas.
- RHYNCHONELLA, Fischer, 1809, Mem. Soc. Imp. Mosc., vol. 2, p. 35. [Ety. rhyn-chos, beak; ella, little.] Shell oval or trigonal, subglobose, with or without mesial fold and sinus; surface plicated; beak of ventral valve acute, entire, prominent, curved; foramen under the beak, by the incurving of which it is sometimes closed, partly surrounded by a deltidium, which is composed of two pieces; two teeth in the ventral valve. supported by dental plates, which extend to the bottom of the valve; two sockets in the dorsal valve; apophyses two, short, flattened, curved, attached to the hinge plate; adductor scars four, separated by a mesial ridge; pedicle scars on the cardinal plates; pedicle muscles of the ventral valve in a saucershaped cavity at the base of the dental plates; shell impunctate. Type R. loxia.
- abrupta, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 68, and Pal. N. Y., vol. 3. p. 228, Low. Held. Gr.

- acadiensis, Davidson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 172, Low Carb. acinus, Hall, 1863, Trans. Alb. Inst., vol.
- 4, p. 215, Niagara Gr.
- acutiplicata, Hall, 1857, N. Y. St. Mus. Nat. Hist., p. 73, and Pal. N. Y., vol. 3, p. 232, Low Held. Gr.
- acutirostris, Hall, 1847, (Atrypa acuti-rostra,) Pal. N. Y., vol. 1, p. 21, Chazy Gr.
- æquivalvis, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 66, and Pal. N. Y., vol. 3, p. 224, Low. Held. Gr.
- æquiradiata, Hall, 1852, (Atrypa æquira-diata,) Pal. N. Y., vol. 2, p. 70, Clinton Gr.
- ainslæi, Winchell, 1886, 14th Ann. Rep. Geo. Minn., p. 315, Trenton Gr.
- algeri, McChesney, 1860, New Pal. Foss. Carb. Not recognized.
- altilis, Hail, 1847, (Atrypa altilis,) Pal. N. Y., vol. 1, p. 23, Chazy Gr. altiplicata, Hall, 1857, 10th Rep. N. Y.
- St. Mus. Nat. Hist., p. 72, and Pal. N. Y., vol. 3, p. 231, Low Held. Gr.
- alveata, see Centronella alveata.
- ambigua, Calvin, 1878, Bull. U. S. Geo. Sur., vol. 4, No. 3, p. 729, Low. Devonian.
- angulata, Linnæus, as identified by Geinitz, syn. for Syntrielasma hemiplicatum.
- anticostiensis, Billings, 1862, Pal. Foss.,
- vol. 1, p. 142, Hud. Riv. Gr. aprinis, DeVerneuil, 1845, (Terebratula aprinis,) Geo. Russia and Ural Mts., vol. 2, p. 90, and Pal. N. Y., vol. 2, p. 280. Niagara Gr.
- arctirostrata, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 84, Kaskaskia Gr.
- argentea, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 43, Anticosti Gr. argenturbica, White, 1874, Rep. Invert. Foss., p. 14, and Geo. Sur. W. 100th Mer., vol. 4, p. 75, Hud. Riv. Gr.
- aspasia, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 111, Low. Held. Gr. barquensis, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 408, Marshall Gr. barrandi, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 82, and Pal. N. Y.,
- vol. 3, p. 442, Oriskany sandstone. bialveata, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 73, and Pal. N. Y.,
- vol. 3, p. 233, Low. Held. Gr. bidens, Hall, 1852, (Atrypa bidens,) Pal. N. Y., vol. 2, p. 69, Clinton Gr.
- bidentata, Hisinger, 1826, (Terebratula bidentata,) Vet. Acad. Handl., p. 343, and Pal. N. Y., vol. 2, p. 276, Niagara Gr.
- billingsi, see Stenoschisma billingsi.
- boonensis, Shumard, 1855, Geo. Rep. Mo., p. 205, Burlington Gr.
- brevirostris, see Pentamerus brevirostris. campbellana, Hall, 1857, 10th Rep. N. Y.
- St. Mus. Nat. Hist., p. 79, and Pal. N. Y., vol. 3, p. 239, Low. Held. Gr.



sselæria ovoides.

us. Nat. Hist.,

vol. 3, p. 459,

33, Proc. Port. p. 115, Low.

1850, Mono-Permian Foss.,

Ety. proper

Longitudinally

ed, with large

alve; area tri-

fissure closed.

hite, 1862, Proc.

Nat. Hist., vol.

Pal. California,

ieimia deweyi,) s. Nat. Hist., p.

Port. Soc. Nat.

. Port. Soc. Nat.

n. Jour., vol. 6,

chospira evax,) p. 213, and Rep.

d., Niagara Gr.

aldheimia for-

Proc. Port. Soc. Low. Held. Gr.

hospira lepida,)

lus. Nat. Hist.,

vol. 4, p. 275,

erebratula mar-

d Riv., p. 177,

. Port. Soc. Nat.

v. Held. Gr.

Gr.

St. Mus. Nat.

v. Held. Gr.

r. Held. Gr.

[arshall Gr.

drieni.

foramen in

BRACHIOPODA.

camerifera, Winchell, 1862, Proc. Acad. Nat. Sci., p. 408, Marshall Gr.

capax, Conrad, 1842, (Atrypa capax,) Jour. Acad. Nat. Sci., vol. 8, p. 264, Hud. Riv. Gr.





FIG. 606.-Rhynchonella capax.

caput-testudinis, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 23, Burlington (ir.

carica, see Stenoschisma carica.

- carbonaria, McChesney, 1860, New Pal. Foss., Coal Meas. Not recognized.
- carolina, see Stenoschisma carolina.

castanea, Meek, 1868, Trans. Chi. Acad. Sci., p. 93, Devonian.

congregata, see Stenoschisma congregatum. contracta, see Stenoschisma contractum. cooperensis, Shumard, 1855, Geo. Rep.

Mo., p. 204, Waverly or Choteau Gr. corinthia, Billings, 1865, Pal. Foss., vol. 1,

p. 220, Quebec Gr.

cuboides, Sowerby, (Atrypa cuboides,) see R. venustula.

cuneata, see Rhynchotreta cuneata var. Americana.

dawsonana, Davidson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 172, Subcarboniferous.

dentata, Hall, 1847, (Atrypa dentata,) Pal. N. Y., vol. 1, p. 148, Hud. Riv. Gr.

dotis, see Stenoschisma dotis.

dryope, Billings, 1874, Pal. Foss., vol. 2, p. 37, Gaspe limestone No. 8, Devonian.

dubia, Hall, 1847, (Atrypa dubia,) Pal. N. Y., vol. 1, p. 21, Chazy Gr.

duplicata, syn. for Stenoschisma contractum

eatoniiformis, McChesney, 1860, New Pal. Foss., syn. for R. rockymontana.

emacerata, Hall, 1852, (Atrypa ema-cerata,) Pal. N. Y., vol. 2, p. 71, Clinton Gr.

- eminens, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 78, and Pal. N. Y., vol. 3, p. 237, Low. Held. Gr.
- emmonsi, Hall & Whitfield, 1877, U.S. Geo. Expl. 40th Parallel, vol. 4, p. 247, Devonian.
- endlichi, Meek, 1876, U. S. Geo. Sur. of Colorado, p. 47, and White's Cont. to Pal. No. 6, p. 133, Up. Devonian.

eurekensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 223, Subcarboniferous

- eva, Billings, 1866, Catal. Sil. Foss. Antic., p. 44, Anticosti Gr.
- evangelina, Hartt, 1868, Acad. Geol., p. 299, Subcarboniferous.

excellens, Billings, 1874, Pal. Foss. vol. 2, p. 36, Gaspe limestone No. S. Devonian.

eximia, see Stenoschisma eximium. explanata, McChesney, 1860, Desc. New

Pal. Foss., Kaskaskia Gr. Not recognized. fitchana, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 85, and Pal. N. Y., vol. 3, p. 441, Oriskany sandstone. formosa, see Stenoschisma

formosum fringilla, Billings, 1862, Pal.

Foss., vol. 1, p. 141, Anti-costi Gr., Div. 1., Mid. Sil.

glacialis, Billings, 1862, Pal. Foss., vol. 1, p. 143, Anticosti Gr., Div. 1, Mid. Sil.

- glansfagea, see Centronella glansfagea. greenana, Ulrich, 1886, Cont. to Am. Pal.,
- p. 26, Waverly Gr. grosvenori, Hall, 1858, Trans. Alb. Inst. vol. 4, p. 10, and Bull. Am. Mus. Nat.
- Hist., p. 53, Warsaw Gr. guadalupæ, Shumard, 1858, Trans. St.
- Louis Acad. Sci., vol. 1, p. 295, Permian Gr.
- heteropsis, Winchell, 1865, Proc. Acad. Nat. Sci., p. 121, Marshall Gr.

horsfordi, see Stenoschisma horsfordi.

hubbardi, Winchell, 1862, Proc. Acad. Nat. Sci., p. 407, Marshall Gr.

huronensis, Winchell, 1862, Proc. Acad. Nat. Sci., 2d ser., vol. 6, p. 409, Portage Gr.

hydraulica, Whitfield, 1882, Desc. New Spec# Foss. from Ohio, p. 194, Low. Held. Gr.

- ida, Hartt, 1868, Acad. Geol., p. 298, Subcarboniferous.
- illinoisensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 24, and Geo. Sur. Ill., vol. 8, p. 104, Coal Meas.
- increbescens, syn. for Rhynchonella capax. indentata, Shumard, 1859, Trans. St. Louis

Acad. Sci., vol. 1, p. 393, Permian Gr. indianensis, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 215, Niagara Gr.

inæquiplicata, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 126, Up.

- Held. Gr. intermedia, Barris, 1879, Proc. Davenport Acad. Sci., vol. 2, p. 285, Up. Held. Gr. inutilis, Hall, 1857, 10th Rep. N. Y. St.
- Mus. Nat. Hist., p. 74, and Pal. N. Y., vol. 3, p. 233, Low. Held. Gr.
- janea, Billings, 1866, Catal. Sil. Foss. Antic., p. 43, Anticosti Gr.
- lacunosa. Not an American species.
- lamellata, Hall, 1852, (Atrypa lamellata,) Pal. N. Y., vol. 2, p. 329, Coralline Limestone.

laura, see Leiorhynchus laura.

- macra, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 11. and Bull. Am. Mus. Nat. Hist., p. 52, Warsaw Gr.
- mainensis, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 110, Low. Held, Gr.

RH\]

marshallensis, V Nat. Sci., p. 4 medea, Billings p. 271, Corni metallica, Whit

p. 20, and Ge 4, p. 129, Car mica, Billings,

Antic., p. 44, micropleura, W

Nat. Sci., p. missouriensis, Mo., p. 204,

multistriata, H St. Mus. Nat. vol. 3, p. 440

mutabilis, Hall Mus. Nat. H

vol. 3, p. 225 mutata, Hall, 1 4, p. 10, and (

saw Gr. neenab, Whitf Sur. Wis., p.

p. 265, Trent neglecta, Hall, Pal. N. Y., v neglecta var.

Jour. Sci. and and Ohio Pa 2, p. 116, Nia nobilis, Hall,

Mus. Nat. H vol. 3, p. 240

nucleolata, Ha St. Mus. Na N. Y., vol. 3

nucula, Sowe nucula,) M

Up. Sil. nutrix, Billing

Antic., p. 43. oblata, Hall, Mus. Nat. H

vol. 3, p. 439 obsolescens, H

St. Mus. verly Gr. obtusiplicata, 1

plicata,) Pal agara Gr.

occidens, Wal Geo. Sur., vo opposita, Whi

Bost. Soc. Na derhook Gr.

orbicularis, see orientalis, Bill

vol. 4, p. 44

osagensis, Swal chonella uta

ottumwa, Wh Nat. Hist.,

Pal., No. 8, parvini, McCl phoria subtr perlamellosa,

Geo. Sur. W Wis., vol. 4,

RHY.

RHY.

RH\]

Nat. Sci., p. 408, Marshall Gr.

p. 271, Corniferous Limestone.

Nat. Sci., p. 122, Marshall Gr.

4, p. 129, Carb.

saw Gr

Up. Sil

verly Gr.

agara Gr.

derhook Gr.

chonella uta.

phoria subtrigona.

p. 265, Trenton Gr.

2, p. 116, Niagara Gr.

metallica, White, 1874, Rep. Invert. Foss., p. 20, and Geo. Sur. W. 100th Mer., vol.

mica, Billings, 1866, Catal. Sil. Foss. Antic., p. 44, Anticosti Gr.

micropleura, Winchell, 1865, Proc. Acad.

missouriensis, Shumard, 1855, Geo. of

Mo., p. 204, Waverly or Choteau Gr. multistriata, Hall, 1857, 10th Rep. N. Y.

vol. 3, p. 440, Oriskany sandstone. mutabilis, Hall, 1857, 10th Rep. N. Y. St.

St. Mus. Nat. Hist., p. 85, and Pal. N. Y.,

Mus. Nat. Hist., p. 66, and Pal. N. Y.,

vol. 3, p. 225, Low. Held. Gr. mutata, Hall, 1858, Trans. Alb. Inst., vol.

4, p. 10, and Geo. Sur. Iowa, p. 658, War-

neenab, Whitfield, 1880, Ann. Rep. Geo.

neglecta, Hall, 1852, (Atrypa neglecta,)

Pal. N. Y., vol. 2, p. 274, Niagara Gr. neglecta var. scobina, Meek, 1872, Am.

Jour. Sci. and Arts, 3d ser., vol. 4, p. 277,

and Ohio Pal., vol. 1, p. 179, and vol.

nobilis, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 80, and Pal. N. Y., vol. 3, p. 240, Low. Held. Gr.

nucleolata, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 68, and Pal. N. Y., vol. 3, p. 227, Low. Held. Gr.

nucula, Sowerby, 1839. (Terebratula nucula,) Murch. Sil. Syst., p. 611,

nutrix, Billings, 1866, Catal. Sil. Foss.

oblata, Hall, 1857, 10th Rep. N. Y. St.

obsolescens, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 111, Wa-

obtusiplicata, Hall, 1852, (Atrypa obtusi-

occidens, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 152, Devonian. opposita, White & Whitfield, 1862, Proc.

orbicularis, see Stenoschisma orbiculare.

vol. 4, p. 443, Chazy Gr.

orientalis, Billings, 1859, Can. Nat. Geo.,

osagensis, Swallow, 1858, syn. for Rhyn-

ottumwa, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 23, and Cont. to

parvini, McChesney, syn. for Camero-

perlamellosa, Whitfield, 1878, Ann. Rep.

Geo. Sur. Wis., p. 73, and Geo. Sur. Wis., vol. 4, p. 265, Hud. Riv. Gr.

Pal., No. 8, p. 165, St. Louis Gr.

Bost. Soc. Nat. Hist., vol. 8, p. 294, Kin-

plicata,) Pal. N. Y., vol. 2, p. 279, Ni-

vol. 3, p. 439, Oriskany sandstone.

Mus. Nat. Hist., p. 86, and Pal. N. Y.,

Antic., p. 43, Anticosti Gr.

Sur. Wis., p. 62, and Geo. Wis., vol. 4,

Pal. Foss., vol. tone No. S. De-

eximium. 860, Desc. New , Kaskaskia Gr.

nized. all, 1857, 10th Y. St. Mus. Nat.

5, and Pal. N.Y. 441, Oriskany e Stenoschisma

llings, 1862, Pal.

. 1, p. 141, Anti-Sil. Pal. Foss., vol. 1,

iv. 1, Mid. Sil. a glansfagea. ont. to Am. Pal.,

rans. Alb. Inst., Am. Mus. Nat. r.

858, Trans. St. 1, p. 295, Per-

65, Proc. Acad. all Gr. na horsfordi.

Proc. Acad. Nat.

r 862, Proc. Acad. . 409, Portagetir. 882, Desc. New o, p. 194, Low.

eol., p. 298, Sub-

84, Bull. No. 2, Ill. 24, and Geo. Sur. Meas.

nchonella capax. , Trans. St. Louis 3, Permian Gr.

frans. Alb. Inst., Gr. 857, 10th Rep.

list., p. 126, Up. Proc. Davenport 85, Up. Held. Gr.

n Rep. N. Y. St. , and Pal. N. Y., ld. Gr. Catal. Sil. Foss.

i Gr. ican species.

trypa lamellata, 9, Coralline Lime-

laura. Alb. Inst., vol. 4, Ius. Nat. Hist., p.

863, Proc. Port. 1, p. 110, Low.

- marshallensis, Winchell, 1862, Proc. Acad. perrostellata, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 85, Kasmedea, Billings, 1860, Can. Jour., vol. 5, kaskia Gr.
 - persinuata, Winchell, 1865, Proc. Acad. Nat. Sci., p. 121, Marshall Gr.

 - phoca, see Atrypa phoca. pisum, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 135, Niagara Gr.
 - planoconvexa, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 75, and Pal. N. Y., vol. 3, p. 235, Low. Held. Gr.
 - pleiopleura, Conrad, 1841, (Atrypa pleio-pleura,) Ann. Rep. N. Y., p. 55, and Pal. N. Y., vol. 3, p. 440, Oriskany sandstone.
 - Blena, Hall, 1847, (Atrypa plena,) Pal.
 N. Y., vol. 1, p. 21, Chazy Gr.
 plicata, Hall, 1852, (Atrypa plicata,) Pal.

 - N. Y., vol. 2, p. 10, Medina Gr. plicatula, Hall, 1843, (Atrypa plicatula,) Geo. Rep. 4th Dist. N. Y., p. 71, and

 - Pal. N. Y., vol. 2, p. 74, Clinton Gr. plicifera, Hall, 1847, (Atrypa plicifera,) Pal. N. Y., vol. 1, p. 22, Chazy Gr. principalis, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 84, and Pal. N. Y. yol. 3, p. 443, Oriekany sendetare Y., vol. 3, p. 443, Oriskany sandstone.
 - prolifica, see Stenoschisma prolificum.
 - pugnus, Martin, 1809, (Conchiliolithus Anomites pugnus,) Petrif. Derb., pl. 22, figs. 4 and 5, Subcarboniferous.
 - pustulosa, White, 1860, Bost. Jour. Nat. Hist., vol. 7, p. 236, Burlington Gr. pyramidata, Hall, 1857, 10th Rep. N. Y.
 - St. Mus. Nat. Hist, p. 70, and Pal. N. Y.. vol. 3, p. 229, Low. Held Gr. pyrrha, Billings, 1866, Catal. Sil. Foss.
 - Antic., p. 44, Anticosti Gr.
 - quadricostata, Hall, 1852, (Atrypa quadri-costata,) Pal. N. Y., vol. 2, p. 68, Clinton Gr.
 - ramsayi, Hall, 1859, Pal. N. Y., vol. 3, p. 446, Oriskany sandstone.
 - raricosta, Whitfield, 1882, Desc. New Spec. Foss., from Ohio, p. 201, Up. Held. Gr.
 - recurvirostra, see Anazyga recurvirostra.
 - reticulata, see Eichwaldia reticulata.
 - ricinula, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 9, and Bull. Am. Mus. Nat. Hist., p. 53, Warsaw Gr.
 - ringens, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 653, Burlington Gr. robusta, Hall, 1852, Pal. N. Y., vol. 2, p.
 - 71, (Atrypa robusta,) Clinton Gr.
 - rockymontana, Marcou, 1858, (Terebratula rockymontana,) Geo. North America. p. 50, Coal Meas.
 - royana, see Stenoschisma royanum.
 - ridleyana, Safford, 1869, Geo. of Tenn. Not defined.
 - rudis, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 75, and Pal. N. Y., vol. 3, p. 235, Low. Held. Gr.
 - rugosa. Hall, 1852, (Atrypa rugosa,) Pal. N. Y., vol. 2, p. 271, Niagara Gr. saffordi, Hall, 1860, Can. Nat. and Geo.,
 - vol. 5, p. 144, Low. Held. Gr.
 - sagerana, Winchell, 1862, Proc. Acad. Nat. Sci., p. 407, Marshall Gr.

sappho, see Stenoschisma sappho.

semiplicata, Conrad, 1841, (Atrypa semi-plicata,) Ann. Rep. N. Y., p. 56, and Pal. N. Y., vol. 3, p. 224, Low. Held. Gr. septata, Hall, 1859, Pal. N. Y., vol. 3, p. 443, Oriskany sandstone.

sordida, Hall, 1847, (Atrypa sordida,) Pal. N. Y., vol. 1, p. 148, Trenton Gr. speciosa, Hall, 1857, 10th Rep. N. Y. St.

Mus. Nat. Hist., p. 81, and Pal. N. Y., vol. 3, p. 444, Oriskany sandstone.

stephani, see Stenoschisma stephani. stricklandi, Sowerby, 1839, (Terebratula stricklandi,) Murch. Sil. Syst., p. 631, Niagara Gr.

subcircularis, Winchell, 1862, Proc. Acad. Nat. Sci., p. 408, Marshall Gr.

subcuboides. Not an American species. subcuneata, Hall, 1856, Trans. Alb. Inst.,

vol. 4, p. 11, and Geo. Sur. Iowa, p. 658, Warsaw Gr.

subtrigona, see Camerophoria subtrigona. subtrigonalis, Hall, 1847, (Atrypa subtri-gonalis,) Pal. N. Y., vol. 1, p. 145, Tren-

ton Gr. sulcoplicata, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 76, and Pal.

N. Y., vol. 3, p. 236, Low. Held. Gr. tennesseensis, Roemer, 1860, Sil. Fauna

West Tenn., p. 72, Niagara Gr. tethys, see Stenoschisma tethys.

tetraptyx, Winchell, 1865, Proc. Acad.

Nat. Sci., p. 120, Kinderhook Gr. texana, Shumard, 1859, Trans. St. Louis Acad. Sci., vol. 1, p. 393, Permian Gr.

thalia, see Stenoschisma billingsi

thera, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 223, Subcarboniferous.

transversa, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 74, and Pal. N. Y., vol. 3, p. 234, Low. Held. Gr.

tuta, S. A. Miller, 1881, Jour. Cin. Soc.,

Nat. Hist., vol. 4, p. 315, Burlington Gr. unica, Winchell, 1865, Proc. Acad. Nat. Sci., p. 122, Marshall Gr.

unisulcata, see Meristella unisulcata.

uta, Marcou, 1858, (Terebratula uta,) Geo. N. Amer., p. 58, Coal Meas. This was subsequently described by Swallow as R. osagensis.

vellicata, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 71, and Pal. N. Y., vol. 3, p. 230, Low. Held. Gr.

ventricosa, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 78, and Pal. N. Y., vol. 3, p. 238, Low. Held. Gr.

venustula, Hall, 1867, Pal. N. Y., vol. 4, p. 346, Tully limestone. This was identified by Vanuxem, 1842, Geo. 3d Dist. N. Y., as Atrypa cuboides of Sowerby

vicina, Billings, 1866, Catal. Sil. Foss. Antic., p. 44, Anticosti Gr.

warrenensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 653, Ham. Gr.

wasatchensis, White, 1874, Rep. Invert. Foss., p. 19, and Geo. Sur. W. 100th Mer., vol. 4. p. 130, Carb. ;

whitiana, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss., p. 297, Niagara Gr., from Waldron, Indiana. Proposed instead of R. whitii, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 216, and also in 28th Rep. N. Y. St. Mus. Nat. Hist., p. 164, pl. 26, figs. 23-33, and again in the 11th Ann. Rep. Geol. and Nat. Hist. of Indiana, p. 307, pl. 26, figs 23-33. whitii, Winchell, 1862, Proc. Acad. Nat.

Sci., p. 407, Marshall Gr. whitii, Hall, see R. whitiana.

wilsoni, Sowerby, 1816, (Terebratula wilsoni,) Min. Conch., vol. 2. p. 38, Niagara Gr.

wortheni, see Camarophoria wortheni. Rhynchospira, Hall, 1859, Pal. N. Y., vol. 3.

syn, for Retzia.

deweyi, see Retzia deweyi. evax, see Retzia evax.

formosa, see Retzia formosa.

lepida, see Retzia lepida.

nobilis, see Trematospira nobilis.

rectirostra, see Trematospira rectirostra.

subglobosa, see Retzia subglobosa.

sinuata, see Retzia sinuata.

RHYNCHOTRETA, Hall, 1879, 28th, Rep. N. Y. St. Mus. Nat. Hist., p.



Rhyncho -

treta cuneata

americana

167,

166. [Ety. rhynchos, beak tretos, with a hole in it. Distinguished from Rhynchonella by the straight. produced, perforated beak of the ventral valve and divided deltidium, and by the cruræ which rise near the dorsal beak, curve into the ventral cavity, and rethe dorsal side. Type R.

curve to cuneata.

var

cuneata var americana, Hall, 1879, 28th Rep. N. Y. St. Mus. Nat. Hist., p.



Gr. quadriplicata, S. A. Miller, 1875, (Tre-matospira quadriplicata,) Cin. Quar

Jour. Sci., vol. 2, p. 60, Trenton Gr. *Rhynobolus*, Hall, 1871, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 247, syn. for Tri-

merella. galtensis, Hall, see Trimerella galtensis.

SCHIZAMBON, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 69. [Ety. schiza, a cleft; ambon, the boss of a shield.] Inequivalve, ovate ; valves in articulate: no area or deltidium; foramen oblong; structure calcareo-corneous; two scars in each valve. Type S. typicalis.

typicalis, Walcott, 1885, Monogr. U. 8. Geo. Sur., vol. 8, p. 70, Chazy Gr.
Schizobolus, Ulrich, 1886, Cont. to Am. Pal., p. 25. [Ety. schiza, a cleft: Obolus, a genus.] Ventral valve with apex at the terminus of a notch in the posterior margin; two pair of adductor treta unguicu a. Ventral valv interior of same slender hol

FIG.

610. - Sipl

ser., vol. 4,

base. Type scotica, David SKENIDIUM, Hall

Mus. Nat. H little tent.] by its large dinal proces tum throug and may be extremity.

devonicum, W Geo. Sur., v halli, Safford.

defined. insigne, Hall, N. Y., vol. 3 pyramidale, H

alis,) Pal. N ara Gr. SPIRIFERA. Sowe

2, p. 42, an p. 514. [Et]

SCH. - SPI.]

RHV. SCH.

with trunca pairs of mu septum. Ty truncatus, Ha 16th Rep. N 28, and Pal esee slate to SCHIZOCRANIA, H

1875, Ohio [Ety. 73. Crania, a parasitic in articulated, upper valv ated; interi

Type S. filos filosa, Hall, Pal. N. Y., Utica Slate.

SIPHONOTRETA, D **Ural Mount** siphon, sipho Shell oblong hinge-line;

tral valve m thick, perfor back of the

with the in cylindrical 1 sage of the n valve slight forming an ceptibly into

valve has a dinal edge,



RHV. SCH.

383, 2d Ed. Am. agara Gr., from roposed instead 363, Trans. Alb. nd also in 28th at. Hist., p. 164, gain in the 11th Nat. Hist. of Ins. 23-33. Proc. Acad. Nat.

r. ana. Terebratula will. 2. p. 38, Niag-

ia wortheni. al. N. Y., vol. 3.

88.

a.

nobilis. rá rectirostra. globosa.

a 28th, Rep. N.
a Nat. Hist., p.
rhynchos, beak;
a hole in it.]
ed from Rhyny the straight,
perforated beak
ntral valve and
ltidium, and by
which rise near
beak, curve into
cavity, and reside. Type R.



8.—Rhynchotreta adriplicata

iller, 1875, (Treta,) Cin. Quar. , Trenton Gr. I Rep. N. Y. St. 47, syn. for Tri-

rella galtensis. , Monogr. U. S. 9. [Ety. schiza, loss of a shield.] lves inarticulate; foramen oblong; teous; two scars S. typicalis. , Monogr. U. S.

 BRACHIOPODA.

scårs separated by a ridge; dorsal valve with truncated posterior margin; two pairs of muscular scars separated by a septum. Type S. truncatus. truncatus, Hall, 1862, (Discina truncata,)

runcatus, Hall, 1862, (Discina truncata,) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 28, and Pal. N. Y., vol. 4, p. 23, Genesee slate to Chemung Gr.

Schizocrania, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p.

SCH. - SPI.]



73. [Ety. schiza, a cleft; (*rania*, a genus.] Shell parasitic inequivalve, inarticulated, surface of the upper valve finely striated; interior with six muscular scars.

Type S. filosa. filosa, Hall, 1847, (Orbicula (?) filosa,) Pal. N. Y., vol. 1, p. 99, Hud. Riv. and Utica Slate.

SIPHONOTRETA, DeVerneuil, 1845, Russia and Ural Mountains, vol. 2, p. 286. [Ety. siphon, siphon; tretos, with a hole in it.] Shell oblong oval, unarticulated; ventral valve most convex with a straight, thick, perforated, conical beak near the hinge-line; foramen opening on the back of the beak, and communicating with the interior of the shell by a cylindrical tube or siphon for the passage of the muscle of attachment; dorsal valve slightly convex, the hinge-line forming an arch which merges imperceptibly into the lateral margins; each valve has a wide, crescent-shaped cardinal edge, covered by horizontal lines



interior of same.

 tinctly punctured structure arranged in tubular layers; ata. surface smooth, ; b, with numerous lines of growth and

of growth; struc-

ture calcareo-cor-

neous, with a dis-

slender hollow spines dilated at the base. Type S. unguiculata. scotica, Davidson, 1877, Geol. Mag., new

scotica, Davidson, 1877, Geol. Mag., new ser., vol. 4, p. 13, Utica slate. 8KENIDIUM, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. His., p. 70. [Ety. skenidion, a little tent.] Distinguished from Orthis by its large triangular area; the car-

- dinal process extends as a median septum through the length of the shell, and may be simple or divided at the extremity. Type S. insigne. devonicum, Walcott, 1885, Monogr. U. S.
- Geo. Sur., vol. 8, p. 116, Devonian. halli, Safford, 1869, Geo. of Tenn. Not
- defined. insigne, Hall, 1859, (Orthis insignis,) Pal.
- N. Y., vol. 3, p. 173, Low. Held. Gr. pyramidale, Hall, 1852, (Orthis pyramidalis,) Pal. N. Y., vol. 2, p. 251, Niag-
- aris,) rai. N. 1., vol. 2, p. 251, Niagara Gr. Spirifera. Sowerby, 1815, Min. Conch., vol.
- 2. p. 42, and Linnæan Trans., vol. 12, p. 514. [Ety. spira, spire; fero, to bear.]

Triangular semicircular, transversely elongate, subglobose or otherwise variable in form, with or without mesial fold and sinus; structure impunetate; surface smooth, striated or plicated; cardinal line straight, area in each valve; hinge articulated by short teeth and sockets; area of the ventral valve larger than the other, and divided by a triangular foramen more or less closed by a false deltidium; area of the dorsal valve divided in the middle by a fissure occupied by the cardinal muscular process; beak of ventral valve more prominent than that of the other; in the interior of the dorsal valve the spiral supports of the labial arms are attached by their crura to the hinge plates, some distance from which they are nearly or quite connected by a small process extending inward from each ; the cardinal muscles seem to have been attached to the cardinal process, under and in front of which four scars of the adductor muscles occur; on each side of a mesial ridge in the ventral valve occur the scars of the adductors, and outside of these the scars of the cardinal muscles. Type S. striata.

- acanthoptera, Conrad, 1842, (Delthyris acanthoptera,) Jour. Acad. Nat. Sci., vol. 8, p. 264, Chemung Gr. acuminata, Conrad, 1839, (Delthyris
- acuminata, Conrad, 1839, (Delthyris acuminata,) Ann. Rep. N. Y., p. 65, and Pal. N. Y., vol. 4, p. 198, Up. Held. and Ham. Grs.
- acuticostata, DeKoninck, 1843, Desc. Ann. Foss. Terr. Carb. Belg., p. 265, Subcarboniferous.
- agelaia, Meek, 1873, Hayden's Geo. Sur. Terr., p. 470, and White's Cont. to Pal. No. 6, p. 135, Subcarboniferous.
- alata, Castelnau, 1843, Syst. Sil., p. 42. Not recognized.
- albapinensis, Hall & Whitfield, 1877. U. S. Geo. Expl. 40th parallel, vol. 4. p. 255, Waverly Gr.
- aldrichi, Etheridge, 1878, Quar. Jour. Geo. Soc., vol. 34, p. 634, Devonian.
- alta, Hall, 1867, Pal. N. Y., vol. 4. p. 248, Chemung Gr.
- amara, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 642, Waverly or Choteau Gr.
- angusta, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 164, and Pal. N. Y., vol. 4, p. 230, Ham. Gr.
- annæ, Śwallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 641, Ham. Gr. annectans, Walcott, 1885, Monogr. U. S.
- annectans, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 216, Subcarboniferous.

arata, syn. for S. granulifera.

- archiaci, see S. disjuncta.
- arctica, Haughton, 1857, Jour. Roy. Soc. Dub., vol. 1, p. 183, Devonian. arctisegmenta, Hall, 1857, 10th Rep. N. Y.
- arctisegmenta, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 131, and Pal. N. Y., vol. 4, p. 208, Up. Held. Gr.

arenosa, Conrad, 1839, (Delthyris are-nosa,) Ann. Rep. N. Y., p. 65, and Pal. N. Y., vol. 3, p. 425, Oriskany sandstone.

372

- argentaria, Meek, 1877, U. S. Geo. Sur. 40th Parallel, p. 42, Devonian. arrecta, Hall, 1859, Pal. N. Y., vol. 3, p.
 - 422, Oriskany sandstone.
- aspera, Hall, 1858, Geo. Rep. Iowa, p. 508, Ham. Gr.
- asperata, Ringueberg, 1886, Bull. Buf. Soc.
- Nat. Sci., vol. 5, p. 16, Niagara Gr. atwaterana, S. A. Miller, 1878, Proc. Davenport Acad. Sci., vol. 2, p. 221, Ham. Gr. Proposed instead of S. pennata, Owen, which was preoccupied.
- audacula, Conrad, (Delthyris audacula,) 1842, Jour. Acad. Nat. Sci., vol. 8, p. 262, Ham. Gr.
- belphegor, Clarke, 1885, Bull. U. S. Geo.
- Sur, No. 16, p. 30, Genesee shales. bialveata, Conrad, (Delthyris bialveata,) 1842, Jour. Acad. Nat. Sci., vol. 8, p. 261, Niagara Gr. Probably a syn. for S. radiata.
- bicostata, Vanuxem, 1842, (Orthis bicostatus,) Geol. Rep. 3d Dist. N. Y., p. 91,
- and Pal. N. Y., vol. 2, p. 263, Niagara Gr. bicostata var. petila, Hall, 1879, Desc. New Spec. Foss., p. 15, and 11th Rep. Geo. and Nat. Hist. Ind., p. 297, Ni-
- agara Gr. bidorsalis, Winchell, 1866, Rep. Low.
- Penin. Mich., p. 93, Ham. Gr. bifurcata, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 8, and Bull. Am. Mus. Nat. Hist., p. 47, Warsaw Gr.
- billingsana, n. sp., Upper Devonian Gaspe limestone, No. 8. Proposed instead of S. superba, Billings, 1874, Pal. Foss., vol. 2, p. 45, which name was preoccupied.
- biloba, Linnæus, 1768, (Anomia biloba,) Syst. Nat., p. 115, and Pal. N. Y., vol. 2, p. 260, Niagara Gr.
- bimesialis, Hall, 1858, Geo. Rep. Iowa, vol. 1, pt. 2, p. 507, Ham. Gr. biplicata, Hall, 1858, Geo. Rep. Iowa, vol.
- 1, pt. 2, p. 519, Kinderhook Gr.
- boonensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 646, Low Coal Meas.
- brachynota, Hall, 1843, (Delthyris brachynota,) Geo. 4th Dist. N. Y., p. 71, Clinton Gr. Not well defined.
- calcarata, syn. for S. disjuncta.
- camerata, Morton, 1836, Am. Jour. Sci., vol. 29, p. 150, Coal Meas.
- camerata var. kansasensis, Swallow, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 409, Coal Meas.
- camerata var. percrassa, Swallow, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 409, Coal Meas. This name was preoccupied as a species.
- capax, Hall, 1858, Geo. Rep. Iowa, vol.
- 1, pt. 2, p. 520, syn. for S. parryana. carteri, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 170, Waverly Gr.

- cedarensis, Owen, 1852, Geo. Sur. Wis.,
- cedarensis, Owen, 1852, Geo. Bur. Wils., Iowa, and Minn., p. 585, Ham. Gr centronota, Winchell, 1865, Proc. Acad. Nat. Sci., p. 118, and Geo. Sur. W. 100th Mer., vol. 4, p. 87, Cuyahoga Shale. clara, Swallow, 1853, Trans. St. Louis Acad. Sci., wol. 9, w. 96 Kaskaskia Gr.
- Sci., vol. 2, p. 86, Kaskaskia (fr. clavatula, McChesney, 1861, Desc. New Pal. Foss., p. 84, Burlington Gr. Not recognized
- clintoni, syn. for S. granulifera.
- clio, syn;" for S. ziczac.
- compacta, Meek, 1868, Trans. Chi. Acad. Sci., p. 102, Ham. Gr.
- concinna, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 60, Low. Held. Gr.
- congesta, syn. for S. granulifera. conradana, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss., p. 298, Oriskany, Up. Held. and Ham. Grs. Proposed instead of S. fimbriata of Conrad in Jour. Acad. Nat. Sci., vol. 8, p. 263, and Pal. N. Y., vol. 4, p. 214, which was preoccupied.
- consobrina, D'Orbigny, 1850, Prodr. d. Paléont, t. 1, p. 98, Ham. Gr. Pro-posed instead of S. ziczac, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 200, which was preoccupied by Roemer.
- consors, Winchell, 1866, Rep. Low. Pen-insula Mich., p. 93, Ham. Gr. cooperensis, Swallow, 1860, Trans. St.
- Louis Acad. Sci., vol. 1, p. 643, Wa verly or Choteau Gr.
- corticosa, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 160, Ham. Gr. costalis, Castelnau, 1843, Syst. Sil., p. 41.
- Not recognized.
- crenistriata, see Streptorhynchus crenistriatum.
- crispa, Hisinger, 1826, (Terebratula crispa, Act. Acad. Sci., Holm., t. 7, fig. 4, and Pal. N. Y., vol. 2, p. 262, Niagara Gr.
- crispa var. simplex, Hall, 1879, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 157, Ni-
- agara Gr. cumberlandiæ, Hall, 1857, 10th Rep. N. Y St. Mus. Nat. Hist., p. 63, and Pal. N. Y.,
- vol. 3, p. 421, Oriskany sandstone.
- cuspidatiformis, n. sp., Keokuk Gr. Pro-posed instead of S. subcuspidata, Hall, 1858, Geo. Sur. Iowa, p. 646, pl. 20, fig. 5 a, b, which name was preoccupied.
- cycloptera, Hall, 1857, 10th Rep. N. Y
- St. Mus. Nat. Hist., p. 58, and Pal. N. Y., vol. 3, p. 199, Low. Held. Gr. cyrtiniformis, Hall & Whitfield, 1873, 234 Rep. N. Y. St. Mus. Nat. Hist., p. 238. Chemung Gr.
- decemplicata, Hall, 1843, (Delthyris de-cemplicata,) Geo. Rep. 4th Dist. N. Y., p. 106, Niagara Gr.
- desiderata, Walcott, 1885, Monogr. U. S.
- Geo. Sur., vol. 8, p. 217, Subcarb. disjuncta, Sowerby, 1840, Trans. Geo. Soc.. 2d ser., vol. 5, p. 704, and Pal. N. Y., vol.
- 4, p. 243, Chemung Gr. disparilis, Hall, 1857, 10th Rep. N. Y. St. Mus. Nat. Hist., p. 134, and Pal. N. Y., vol. 4, p. 204, Up. Held Gr.

SPI.]

SPI

divaricata, Ha Mus. Nat. 1 vol. 4, p. 21 dubia, see Per duodenaria, denaria,) G and Pal. N. grit and Co dupliplicata, pliplicata,) p. 261, Han eatoni, see S. engelmanni. Sci., p. 308, 398, Oriska eudora, Hall, Sur., p. 25, euruteines, O teines, Rep and Pal. N. euruteines var. exporrecta, see exporrecta var recta var. a

distans, syn. fe

extensa, syn. fe extenuata, Ha 520, Kinder fasciger, Keys Spirifera ca fastigata, Mo and Arts, v fastigata, Mee

Acad. Nat. preoccupied tonana.

filicosta, Wine insula Mich fimbriata, Mo and Arts, v fimbriata, Con occupied. fischeri, Castel Not recogni forbesi, Norw Acad. Nat.

ton Gr. formosa, Hall Nat. Hist. 4, p. 220, H fornacula, H Mus. Hist.,

fornax, Hall, Nat. Hist.,]

franklini, Mee Anklin, Sci, p. 107,

fultonensis, Ill., vol. 5,

gaspensis, Bil 2, p. 4, De gibbosa, Hall,

Sur., p. 25,

gigantea, syn. glabra, Marti Petrif. Derb carboniferou

glabra var. co 1861, Proc. Geo. Sur. Ill

SPL

SPI.]

distans, syn. for S. disjuncta.

p. 261, Ham. Gr.

recta var. arrecta. extensa, syn. for S. disjuncta.

520, Kinderhook Gr.

Spirifera camerata.

dubia, see Pentamerella dubia.

eatoni, see S. medialis var. eatoni.

398, Oriskany sandstone.

divaricata, Hall, 1857, 10th Rep, N. Y. St.

and Pal. N. Y., vol. 4, p. 189, Schoharie grit and Cornif. Gr.

dupliplicata, Conrad, 1842, (Delthyris dupliplicata,) Jour. Acad. Nat. Sci., vol. 8,

engelmanni, Meek, 1860, Proc. Acad. Nat. Sci., p. 308, and Geo. Sur. Ill., vol. 3, p.

eudora, Hall, 1861, Rep. of Prog. Wis. Sur., p. 25, Niagara Gr.

euruteines, Owen, 1844, (Delthyris euru-

teines, Report on Min. Lands, p. 74,

and Pal. N.Y., vol. 4, p. 209, Up. Held. Gr.

euruteines var. fornacula see S. fornacula.

exporrecta var. arrecta, see Cyrtia expor-

extenuata, Hall, 1858, Geo. Rep. Iowa, p.

fasciger, Keyserling in Owen's report, see

exporrecta, see Cyrtia exporrecta.

ieo. Sur. Wis., , Ham. Gr. 35, Proc. Acad. D. Sur. W. 100th hoga Shale

ans. Chi. Acad

- cany, Up. Held. ed instead of S.
- 1850, Prodr. d.
- emer. Rep. Low. Pen-
- 860, Trans. St.
- 1 Rep. N. Y. St.
- hynchus crenis-
- rebratula crispa, t. 7, fig. 4. and 1879, 28th Rep. list., p. 157, Ni-
- 10th Rep. N.Y 3, and Pal. N. Y. sandstone. eokuk Gr. Procuspidata, Hall,). 646, pl. 20, fig. s preoccupied. 10th Rep. N.Y. p. 58, and Pal. ow. Held. Gr. itfield, 1873, 23d at. Hist., p. 238.
- 3, (Delthyris de-4th Dist. N. Y.
- Monogr. U. S. Subcarb. Trans. Geo. Soc., Id Pal. N. Y., vol.
- h Rep. N. Y. St. , and Pal. N. Y., d Gr.

BRACHIOPODA.

- glabra var. nevadensis, Walcott, 1885, Monog. U. S. Geo. Sur., vol. 8, p. 139, Up. Devonian.
- glanscerasi, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 8, Ham. Gr. grandæva, syn. for S. disjuncta.

373

- granulifera, Hall, 1843, (Delthyris granu-lifera,) Geol. 4th Dist. N. Y. p. 207, and
- Pal. N. Y., vol. 4, p. 223, Ham. Gr. granulosa, Conrad, 1839, (Delthyris gran-ulosa,) Ann. Rep. N. Y., p. 65, Low. Held. Gr.



FIG. 611.-Spirifera gregaria.

- gregaria, Clapp, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 127, and Pal. N. Y., vol. 4, p. 195, Up. Held. Gr.
 grieri, Hall, 1857, 10th Rep. N. Y. Mus. Nat. His., p. 127, and Pal. N. Y., vol. 4, p. 194, Schoharie grit and Up. Held. Gr.
- grimesi, Hall, 1858, Geo. Rep. of Iowa, p. 604, Burlington Gr.
- guadalupensis, Shumard, 1859, Trans. St. Louis Acad. Sci., vol. 1, p. 391, Permian Gr.
- hannibalensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 647, Waverly or Choteau Gr.
- hemicycla, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 399, Oriskany sandstone.
- hemiplicata, see Syntrielasma hemiplicatum.
- heteroclitus, syn. for S. granulifera.
- hirtus, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 293, Kinderhook Gr.
- hungerfordi, Hall, 1858, Geo. Rep. Iowa, vol. 1, pt. 2, p. 501, Ham. Gr. huronensis, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 405, Portage Gr. huronensis, Castelnau, 1843, Syst. Sil., p. 41.
- Not recognized.
- imbrex, Hall, 1858, Geo. Rep. Iowa, p. 601, Burlington Gr.
- inæquivalvis, Castelnau, 1843, Syst. Sil., p. 40. Not recognized.
- incerta, Hall, 1858, Geo. Rep. Iowa, p. 602, Burlington Gr.
- inconstans, syn. for Spirifera racinensis. increbescens, Hall, 1858, Geo. Rep. Iowa,
- p. 706, Kaskaskia Gr. increbescens var. americana, Swallow,
- 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 410, Kaskaskia Gr.
- increbescens var. transversalis, Hall, 1858, Geol. Rep. Iowa, p. 708, Kaskaskia Gr.
- inæquicostata, Owen, 1852, Geo. Rep. Wis., Iowa, and Min., p. 586, Carb.
 - inornata, syn. for S. disjuncta. insolita, Winchell, 1862, Proc. Acad. Nat. Sci., p. 405, Portage Gr.

25

. St. Louis Acad. askia Gr. 61, Desc. New ngton Gr. Not ifera.

Rep. N. Y. St. Low. Held. Gr.

lifera 883, 2d Ed. Am.

our. Acad. Nat. Pal. N. Y., vol. eoccupied.

lam. Gr. Pro-zac, Hall, 1843, Y., p. 200, which

m. Gr.

1, p. 643, Wa-

Ham. Gr. Syst. Sil., p. 41

2, Niagara Gr.

fastigata, Morton, 1836, Am. Jour. Sci. and Arts, vol. 29, p. 149, Coal Meas. fastigata, Meek & Worthen, 1870, Proc.

Acad. Nat. Sci., p. 36. The name was preoccupied by Morton. See S. mor-

tonana. filicosta, Winchell, 1866, Rep. Low. Peninsula Mich., p. 94, Ham. Gr.

fimbriata, Morton, 1836, Am. Jour. Sci. and Arts, vol. 29, p. 149, Coal Meas. *fimbriata*, Conrad. The name was preoc-occupied. See S. conradana.

fischeri, Castelnau, 1843, Syst. Sil., p. 42.

- Not recognized. forbesi, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., vol. 3, p. 73, Burling-
- ton Gr. formosa, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 154, and Pal. N. Y., vol.

4, p. 220, Ham. Gr. fornacula, Hall, 1857, 10th Rep. N. Y.

Mus. Hist., p. 154, Ham. Gr. fornax, Hall, 1857, 10th Rep. N. Y. Mus.

Nat. Hist., p. 155, Ham. Gr. franklini, Meek, 1868, Trans. Chi. Acad.

Sci, p. 107, Ham. Gr. fultonensis, Worthen, 1873, Geol. Rep.

Ill., vol. 5, p. 572, Low. Coal Meas.
gaspensis, Billings, 1874, Pal. Foss., vol. 2, p. 14, Devonian. p. 44.
gibbosa, Hall, 1861, Rep. of Progr. Wis. Sur., p. 25, Niagara Gr.
gigantea, syn. for. S. disjuncta.
Johnson, Martin, 1800, (A pomitor glabre).

- glabra, Martin, 1809, (Anomites glabra,) Petrif. Derb., tab. 28, figs. 9 and 10, Subcarboniferous.
- glabra var. contracta, Meek & Worthen, 1861, Proc. Acad. Nat. Sci., p. 143, and Geo. Sur. Ill., vol. 2, p. 298, Kaskaskia Gr.

Mus. Nat. Hist., p. 133, and Pal. N. Y., vol. 4, p. 213, Cornif. and Ham., Grs. duodenaria, Hall, 1843, (Delthyris duo-denaria,) Geol. 4th Dist. N. Y., p. 171, intermedia, Hall, 1859, Pal. N. Y., vol. 3, p. 424, Oriskany sandstone. This name was preoccupied by Brongniart in 1829.

374

inutilis, Hall, 1858, Geo. Rep. Iowa, vol. 1, pt. 2, p. 505, Ham. Gr. iowensis, Owen, 1852, Geo. Sur. Wis.,

- Iowa, and Min., p. 585, Ham. Gr.
- kelloggi, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 86, Keokuk Gr. kennicotti, Meek, 1868, Trans. Chi. Acad.
- Sci., p. 101, Ham. Gr.
- kentuckensis, see Spiriferina kentuckiensis. kentuckensis var. propatula, see Spiriferina
- kentuckiensis var. propatula. keokuk, Hall, 1858, Geo. Rep. Iowa, p. 642, Keokuk Gr.
- keokuk var. shelbyensis, Swallow, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 410, Keokuk Gr.
- lævigata, Swallow, 1853, Trans. St. Louis Acad. Sci., vol. 2, p. 86, Keokuk Gr.
- lævis, Hall, 1843, (Delthyris lævis,) Geol. 4th Dist. N. Y., p. 345, and Pal. N. Y., vol. 4, p. 239, Portage Gr.
- lamellosa, see Athyris lamellosa. laminosus, McCoy, as identified by Geinitz,
- is Spiriferina kentuckiensis.
- lateralis, Hall, 1858, Geo. Rep, Iowa, p. 661, Warsaw Gr.
- latior, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 86, Waverly or Choteau Gr.
- leidvi, Norwood & Pratten, 1855, Jour. Acad. Nat. Sci., 2d series, vol. 3, p. 72, Kaskaskia Gr.
- leidvi var. chesterensis, Swallow, 1866, Trans. St. Louis Acad. Sci., vol. 2, p.
- 409, Kaskaskia Gr. leidyi var. merrimacensis, Swallow, 1866, Trans. St. Louis Acad. Sci., vol. 2, p.
- 410, Warsaw Gr. ligus, Owen, 1852, Rep. Geo. Sur. Wis., Iowa, and Minn., p. 585, Ham. Gr. lineatoides, Swallow, 1860, Trans. St. Louis
- Acad. Sci., vol. 1, p. 645, Burlington Gr.
- lineata, Martin, 1809, (Conchiliolithus An-omites lineatus,) Petrif. Derb., tab. 36, fig. 3, and 13th Rep. Geo. Sur. Ind., p.
 - 133, Coal Meas.
- lineata var. striato-lineata, Swallow, 1866, Trans. St. Louis Acad. Sci., vol. 2, p. 408, Coal Meas.
- littoni, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 646, St. Louis Gr. logani, Hall, 1858, Geo. Rep. Iowa, p. 647,
- Keokuk Gr. lonsdalii, syn. for S. disjuncta.
- macra, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 134, and Pal. N. Y., vol.
- 4, p. 190, Schoharie grit and Up. Held. Gr. macra, Meek. This name was preoccupied. See S. strigosa
- macronota, Hall, 1843, (Delthyris macronota,) Geo. 4th Dist. N. Y., p. 206, and Pal. N. Y., vol. 4, p. 231, Ham. Gr.
- macropleura, Conrad, 1840, (Delthyris macropleura,) Ann. Rep. N. Y., p. 217, and Pal. N. Y., vol. 3, p. 202, Low. Held. Gr.

- macropleura, Castelnau, 1843, Syst. Sil., p. 41. The name was preoccupied
- macroptera, as identified by d'Archiac &
- Verneuil, is S. pennata. macrothyris, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 132, and Pal. N.Y., vol. 4, p. 202, Up. Held. Gr.
- maia, Billings, 1860, (Athyris maia,) Can. Jour. Ind. Sci. and Arts, vol. 5, p. 276, Up. Held. Gr.
- manni, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 128, and Pal. N. Y., vol. 4, p. 211, Up. Held. Gr. marcyi, Hall, 1857, 10th Rep. N. Y. Mus.
- Nat. Hist., p. 158, and Pal., N. Y., vol. 4, p. 226, Ham. Gr.
- marionensis, Shumard, 1855, Geo. Rep.
- Mo., p. 203, Waverly or Choteau Gr. medialis, Hall, 1843, (Delthyris medialis,) Geo. 4th Dist. N. Y., p. 208, and Pal. N. Y., vol. 4, p. 207, Ham. Gr.
- medialis var. eatoni, Hall, 1857, (Spirifer eatoni,) 10th Rep. N. Y. Mus. Nat. Hist., p. 157, and Pal. N. Y., vol. 4, p. 229. Ham. Gr.
- meeki, Swallow, 1860, Trans., St. Louis
- Acad. Sci., vol. 1, p. 645, Burlington Gr. meristoides, Meek, 1868, Trans. Chi. Acad. Sci., p. 106, Ham. Gr.
- mesacostalis, Hall, 1843, (Delthyris mesacostalis and D. acuminata,) Geo. 4th Dist. N. Y., p. 269, and Pal. N. Y., vol. 4, p. 240, Chemung Gr.
- mesastrialis, Hall, 1843, (Delthyris mes-astrialis,) Geo. 4th Dist. N. Y., p. 269, and Pal. N. Y., vol. 4, p. 242, Ham. and Chemung Gr.
- meta, Hall, 1867, 20th Rep. N. Y. Mus. Nat Hist., p. 380, Niagara Gr.
- meusebachianus, syn. for Spirifera camerata.
- mexicana, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 292, Permian Gr.
- missouriensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 643, Waverly or Choteau Gr.
- modesta, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 61, and Pal. N. Y., vol. 3, p. 203, Low Held. Gr. mortonana, S. A. Miller, 1883, 2d Ed., Am.
- p. 298, Pal. Foss. Keokuk Gr. Proposed instead of S. fastigata of Meek and Worthen, 1870, in Proc. Acad. Nat. Sci., p. 36, and afterward in Geo. Sur. Ill., vol. 6, p. 521, pl. 30, fig. 3, from Crawfordsville, Indiana.
- mucronata, Conrad, syn. for S. pennata.
- multicostata, Castelnau, 1843, Syst. Sil., p. 42. Not recognized.
- multigranosa, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 105, Coal Meas.
- multistriata, see Trematospira multistriata. murchisoni, Castelnau, 1843, Syst. Sil., p. 41. Not recognized.
- mysticensis, Meek, 1873, Hayden's Geo. Sur. Terr. 6th Rep., p. 466. Not satisfactorily defined.
- neglecta, Hall, 1858, Geo. Rep. Iowa, p. 642, Keokuk Gr.

SPL.

newberryi, Hall, 188 56, fig. 9, 10, Wave niagarensis, Conrad, Nat. Sci., vol. 8, p. vol. 2, p. 264, Niag niagarensis var. ol

1860, Sil. Fauna Niagara Gr.

nictavensis, Dawson

499, Devonian. norwoodana, Hall, 1 vol. 4, p. 7, and I Hist., p. 48, Warsa norwoodi, Meek, 186 Sci., vol. 12, p. 308

- novamexicana, S. A Cin. Soc. Nat. Hist
- lington Gr.

nympha, Billings, 18 Nat. Hist., vol. Nat. His Held. Gr.

- octocostata, Hall, 18 Mus. Nat. Hist., p.
 - vol. 3, p. 205, Low. opima, Hall, 1858, Ge syn. for S. rockyme orestes, Hall & Whit
- N. Y. Mus. Nat. mung Gr.
- oregoneusis, Shuma Louis Acad. Sci., Meas
- osagensis, Swallow, 1 Acad. Sci., vol. 1, Choteau Gr.
- oweni, Hall, 1857, 10t Nat. Hist., p. 129, U
- pachyptera, Goldfuss, rad in 1839, (Del Not American.

parryana, Hall, 1858, 1, pt. 2, p, 509, Har peculiaris, Shumard,

p. 202, Waverly or

pennata, Atwater, pennata,) Am. Jour

2, p. 242, Ham. Gr.



FIG. 612.-Spirife

pennata, Owen. The pied, see S. atwater percrassa, McCoy, 185 p. 194, Sil. Not sat.

in America. perextensa, Meek & V

Sur Ill., vol. 3, p. 4 (?) perforata, see Tren perlamellosa, Hall, 1 Mus. Nat. Hist., p. l

vol. 3, p. 200, Low. perplexa, McChesney

Foss., syn. for S. lin

SPL.

SPI.

Syst. Sil., p. upied. d'Archiac &

Rep. N.Y. d Pal. N.Y., maia,) Can. ol. 5, p. 276,

N. Y. Mus. N. Y., vol. 4,

. N. Y. Mus. , N. Y., vol.

Geo. Rep. Choteau Gr. ris medialis,) 08, and Pal. Gr.

357, (Spirifer Mus. Nat. Y., vol. 4, p.

s., St. Louis urlington Gr. 1s. Chi. Acad.

lthyris mesa,) Geo. 4th 1. N. Y., vol.

elthyris mes-V. Y., p. 269, 42, Ham. and

N. Y. Mus. Gr. pirifera cam-

ans. St. Louis ermian Gr. 0, Trans. St. 643, Waverly

p. N. Y. Mus. N. Y., vol. 3,

3, 2d Ed., Am. ir. Proposed eek and Wor-Nat. Sci., p. Sur. Ill., vol. n Crawfords-

S. pennata. Syst. Sil., p.

press,) Geo. al Meas. ı multistriata. 3yst. Sil., p. 41.

ayden's Geo. 6. Not satis-

tep. Iowa, p.

BRACHIOPODA.

- newberryi, Hall, 1883, Rep. St. Geol. pl. 56, fig. 9, 10, Waverly Gr. niagarensis, Conrad, 1842, Jour. Acad.
- Nat. Sci., vol. 8, p. 261, and Pal. N. Y., vol. 2, p. 264, Niagara Gr.
- niagarensis var. oligoptycha, Roemer, 1860. Sil. Fauna West Tenn., p. 68, Niagara Gr.
- nictavensis, Dawson, 1868, Acad. Geol., p. 499. Devonian.
- norwoodana, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 7, and Bull. Am. Mus. Nat. Hist., p. 48, Warsaw Gr. norwoodi, Meek, 1860, Proc. Acad. Nat.
- Sci., vol. 12, p. 308, Devonian.
- novamexicana, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 314, Burlington Gr.
- nympha, Billings, 1863, Proc. Port. Soc. Nat., Hist., vol. 1, p. 116, Low. Nat. His Held. Gr.
- octocostata, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 62, and Pal. N. Y., vol. 3, p. 205, Low. Held. Gr.
- opima, Hall, 1858, Geo. Rep. Iowa, p. 711, syn. for S. rockymontana.
- orestes, Hall & Whitfield, 1873, 23d Rep. N. Y. Mus. Nat. Hist., p. 237, Chemung Gr.
- oregoneusis, Shumard, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 108, Coal Meas.
- osagensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 641, Waverly or Choteau Gr.
- oweni, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 129, Up. Held. Gr.
- pachyptera, Goldfuss, as identified by Conrad in 1839, (Delthyris pachyptera). Not American.
- parrvana, Hall, 1858, Geo. Rep. Iowa, vol. 1, pt. 2, p, 509, Ham. Gr. peculiaris, Shumard, 1855, Geo. Rep. Mo.,
- p. 202, Waverly or Choteau Gr.
- pennata, Atwater, 1820, (Terebratula pennata,) Am. Jour. Sci. and Arts, vol. 2, p. 242, Ham. Gr.



FIG. 612.—Spirifera pennata.

- pennata, Owen. The name was preoccupied, see S. atwaterana.
- percrassa, McCoy, 1855, Brit. Pal. Rocks. p. 194, Sil. Not satisfactorily identified in America.
- perextensa, Meek & Worthen, 1868, Geo.
- Sur Ill., vol. 3, p. 414, Ham. Gr. (!) perforata, see Trematospira perforata. perlamellosa, Hall, 1857, 10th Rep. N. Y.
- Mus. Nat. Hist., p. 57, and Pal. N. Y., vol. 3, p. 200, Low. Held. Gr.
- perplexa, McChesney, 1860, New Pal. · Foss., syn. for S. lineata.

- pertenuis, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 163, Ham. Gr.
- pharovicina, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 405, Portage Gr. pinonensis, Meek, 1870, Proc. Acad. Nat. Sci., p. 60, and Expl. 40th Parallel, vol. 4, p. 45, Up. Held. Gr.
- Mo., p. 202, Coal Meas. planoconvexa, Shumard, 1855, Geo. Rep. Mo., p. 202, Coal Meas. plena, Hall, 1858, Geo. Rep. Iowa, p. 603,
- Burlington Gr.
- plicata, Vanuxem, 1843, see S. vanuxemi. pluto, Clarke, 1885, Bull. U. S. Geo. Sur.,
- No. 16, p. 31, Genesee shales. præmatura, Hall, 1867, Pal. N. Y., vol. 4, p. 250, Chemung Gr.
- prolata, Vanuxem, 1842, (Delthyris prolata,) Geo. Rep. N. Y., p. 181, Chemung Gr.
- propingua, Hall, 1858, Geo. Rep. Iowa, p. 647, Keokuk Gr.
- prora, Conrad, 1842, (Delthyris prora,) Jour. Acad. Nat. Sci., vol. 8, p. 263, Ham. Gr.
- protensa, syn. for. S. disjuncta.
- pseudolineata, Hall, 1858, Geo. Rep. Iowa, p. 645, Keokuk Gr. pulchra, Meek, 1860, Proc. Acad. Nat. Sci.,
- p. 310, and Simpson's Gt. Basin of Utah, p. 352, Coal Meas.
- pyramidalis, see Cyrtina pyramidalis.
- pyxidata, Hall, 1859, Pal. N. Y., vol. 3, p. 428, Oriskany sandstone. racinensis, McChesney, 1860, Pal. Foss.,
- p. 84, Niagara Gr.
- radiata, Sowerby, 1839, Murch. Sil. Syst., p. 637, and Pal. N. Y., vol. 2, pp. 66, 265, Niagara Gr.
- raricosta, Conrad, 1842, (Delthyris rari-costa,) Jour. Acad. Nat. Sci., vol. 8, p. 262, and Pal. N. Y., vol. 4, p. 192, Scho-harie grit and Up. Held. Gr.
- resupinata, as identified by d'Archiac & Verneuil. Not American. richardsoni, Meek, 1868, Trans. Chi. Acad.
- Sci., p. 104, Ham. Gr.
- rockymontana, Marcou, 1858, Geo. N. Amer., p. 50, Coal Meas. rostellata, Hall, 1858, Geo. Rep. Iowa, p.
- 641, Keokuk Gr.
- rostellum, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 182, Niagara Gr.
- rostrata, Morton, 1836, Am. Jour. Sci. and Arts, vol. 29, p. 149, Coal Meas. rugicosta, Hall, 1860, Can. Nat. Geo., vol.
- 5, p. 144, Up. Sil.
- rugatina, Conrad, 1842, (Delthyris rugatina,) Jour. Acad. Nat. Sci., vol. 8, p. 261, Niagara Gr.
- saffordi, Hall, 1859, Pal. N. Y., vol. 3, p. 203, Low. Held. Gr.
- scobina, Meek, 1860, Proc. Acad. Nat. Sci., p. 310, and Simpson's Gt. Basin of
- Utah, p. 351, Coal. Meas. sculptilis, Hall, 1843, (Delthyris sculpti-lis,) Geo, Rep. 4th Dist. N. Y., p. 202, and Pal. N. Y., vol. 4, p. 221, Ham. Gr.

- segmenta, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 131, and Pal. N. Y., vol. 4, p. 207, Up. Held. Gr.
- semiplicata, Hall, 1860, 13th Rep. N. Y. Nat. Hist., p. 111, Kinder-Mus. hook Gr.
- setigera, Hall, 1858, Geo. Rep. Iowa, p. 705, Kaskaskia Gr.
- sheppardi, Castelnau, 1843, Syst. Sil., p. 42. Not recognized, but probably a variety of Orthis lynx.
- sillana, Winchell, 1865, Proc. Acad. Nat. Sci., p. 119, Cuyahoga shale.
- similior, see Pentamerus similior.
- solidirostris, White, 1860, Bost. Jour. Nat. Hist., vol. 7, p. 232, Kinderhook Gr.
- sowerbyi, Castelnau, 1843, Syst. Sil., p. 43. Not recognized.
- spinosa, see Spiriferina spinosa.
- staminea, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 105, Niagara Gr.
- striatiformis, Meek, 1875, Ohio Pal., vol. 2, p. 289, Waverly Gr.

striata, Mar-

tin, 1809,

(Anomites

striatus,)

Petrif.

Derb., tab.

triplicata,)

Marcou,

1858, Geol.

23, Carb.

striata var.

FIG. 613.-Spirifera striata. Interior of ventral valve.

North America, p. 49, Subcarboniferous.

substriatul u s as identified by d'Archiac Ver-& neuil. Not American.



- strigosa, FIG. 614.—Spirifera striata. In-Meek, 1860, terior of dorsal valve. Proc.Acad.
 - Nat. Sci., p. 309, and Simpson's Rep. Gt. Basin of Utah, p. 347, Devonian. Proposed instead of S. macra, Meek, which was preoccupied.
- subæqualis, Hall, 1858, Geo. Rep. Iowa, p. 663, Warsaw Gr.
- subattenuata, Hall, 1858, Geø. Rep., Iowa, index, p. 3, Ham. Gr.
- Index, p. 5, Hall, Gr.
 subcardiformis, Hall, 1858, Geo. Rep.
 Iowa, p. 660, Warsaw Gr.
 subcuspidata, Hall, 1858, Geo. Rep. Iowa,
 p. 646, Keokuk Gr. Preoccupied by
 Schnur in 1831. See S. cuspidatiformis. subdecussata, Whiteaves, 1887, Cont. to
 - Can. Pal., vol. 1, p. 114, Ham. Gr.
- subelliptica, McChesney, 1860, New Pal. Foss. Not recognized, Coal Meas.
- sublineata, Meek, 1868, Trans. Chi. Acad. Sci., p. 103, Ham. Gr.
- submucronata, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 62, and Pal. N. Y., vol. 3, p. 419, Oriskany sandstone.

- submucronata, Hall, 1858, Geo. Rep. Iowa, vol. 1, pt. 2, Ham. Gr. This name was preoccupied. See S. subattenuata.
- suborbicularis, Hall, 1858, Geo. Rep. Iowa, p. 644, Keokuk Gr.
- subrotundata, Hall, 1858, Geo. Rep. Iowa,
- vol. 1, pt. 2, p. 521, Kinderhook Gr. subsulcata, Hall, 1860, Can. Nat. and Geol., vol. 5, Up. Sil. This name was preoccupied by Dalman in 1828.
- subumbonata, see Martinia subumbonata. subundifera, Meek & Worthen, 1868 Geo.
- Sur. Ill., vol. 3, p. 434, Ham. Gr. subvaricosa, Hall & Whitfield, 1873, 23d Rep. N. Y. Mus. Nat. Hist., p. 237, Up.
- Held. Gr. subventricosa, McChesney, syn. for S.
- rockymontana.
- sulcata, Hisinger, 1831, (Delthyris sulca-tus,) Anteckn. Physik. Och. Geognosi., p. 119, Pal. N. Y., vol. 2, p. 261, Niagara Gr.
- sulcifera, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 293, Permian Gr.
- superba, Billings, 1874, Pal. Foss., vol. 2, p. 45, Devonian. The name was preoccupied by Eichwald in 1842. See S. billingsana. taneyensis, Swallow, 1860, Trans. St.
- Louis Acad. Sci., vol. 1, p. 645, Kinderhook Gr.
- temeraria, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 314, Burlington Gr.
- tenuicostata, Hall, 1858, Geo. Rep. Iowa, p. 662, Warsaw Gr.
- tenuimarginata, Hall, 1858, Geo. Rep. Iowa, p. 641, Keokuk Gr.
- tenuis, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 162, Ham. Gr. tenuistriata, Hall, 1859, Pal. N. Y., vol. 3,
- p. 204, Low. Held. Gr.
- tenuistriata, Shaler, 1865. The name was preoccupied.
- texana, Meek, 1871, Proc. Acad. Nat. Sci., p. 179, Coal Meas.
- texta, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 169, Waverly Gr.
- translata, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 85, Kaskaskia Gr.
- transversa, McChesney, 1860, New Pal. Foss., Kaskaskia Gr. Not recognized.
- tribulis, Hall, 1859, Pal. N. Y., vol. 3, p. 420, Oriskany sandstone.
- triplicata, Hall, syn. for Spirifera camerata.
- troosti, Castelnau, 1843, Syst. Sil., p. 41. Not recognized.
- tullia, Hall, 1867, Pal. N. Y., vol. 4, p. 218, Ham. Gr.
- undulata, Vanuxem, 1843, (Delthyris undulatus,) Geo. 3d Dist. N. Y., p. 132, Onondaga Gr. The name was preoccupied.
- unica, Hall, 1867, Pal. N. Y., vol. 4, p. 203, Cornif. Gr. utahensis, Meel, 1860, syn. for S. nor-
- woodi.

SPI.

vanuxemi, Hall, 18 p. 198, Low. He Orthis plicata by Rep. 3d Dist. N. preoccupied.

varicosa, Hall, 1857 Nat. Hist., p. 130 4, p. 205, Up. He

ventricosa, see Nucle venusta, syn. for Spi vernonensis, Swal Louis Acad. Sci.

verly or Choteau verneuili, syn. for S 1 waldronensis, see] waverlyensis, Winc

Phil. Soc., vol. 12 whitneyi, Hall, 185

502, Ham. and C wortheni, Hall, 1 Mus. Nat. Hist.,

ziczac, Hall, 1843. cupied by Roeme

SPIRIFERINA, D'Orbig et Geol. Sur. les tes rendus des S des Sciences. [I inus, implying transverse, valv with or without smooth or costa recurved; area by a pseudodel the cardinal edge surface spinous;

> shelly plates, the cupied by the c sial septum wide ing to an acute with dental sock for the support of

the fissure, suj

form of two la cones. Type S.

billingsi, Shumard, Acad. Sci., vol. 1 binacuta, Winche

Nat. Sci., p. 120, clarksvillensis, Wir Nat. Sci., p. 119,

kentuckiensis, Shu kentuckiensis,)

Coal Meas.



FIG. 615.-Spirife

kentuckiensis var 1866, (Spirifera 1 patula,) Trans. vol. 2, p. 409, Co spinosa, Norwood

spinosa,) 1855, vol. 3, 2d series, spinosa var. campe Invert. Foss., p 100th Mer., vol.



SPI.

SPI.-STE.]

o. Rep. Iowa, his name was ttenuata. Geo. Rep.

o. Rep. Iowa, erhook Gr. n. Nat. and is name was n 1828. ubumbonata. en, 1868 Geo. am. Gr. ld, 1873, 23d

t., p. 237, Up. syn. for S.

lthyris sulcah. Geognosi., p. 261, Niag-

ans. St. Louis Permian Gr. Foss., vol. 2, ame was pre-1842. See S.

Trans. St. 645, Kinder-

1, Jour. Cin. 314, Burling-

o. Rep. Iowa,

, Geo. Rep.

N. Y. Mus. ٦r. . N. Y., vol. 3,

he name was

cad. Nat. Sci.,

N. Y. Mus. ly Gr.

ans. St. Louis 85, Kaskas-

60, New Pal. ot recognized. . Y., vol. 3, p.

Spirifera cam-

st. Sil., p. 41.

., vol. 4, p. 218,

(Delthyris un-N. Y., p. 132, ne was preoc-

. Y., vol. 4, p.

. for S. nor-

BRACHIOPODA.

- vanuxemi, Hall, 1859, Pal. N. Y., vol. 3, p. 198, Low. Held. Gr., described as Orthis plicata by Vanuxem in the Geo. Rep. 3d Dist. N. Y., but that name was preoccupied.
- varicosa, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 130, and Pal. N. Y., vol. 4, p. 205, Up. Held. Gr. ventricosa, see Nucleospira ventricosa.
- venusta, syn. for Spirifera divaricata.
- vernonensis, Swallow, 1860, Trans. St.
- Louis Acad. Sci., vol. 1, p. 644, Waverly or Choteau Gr.
- verneuili, syn. for S. disjuncta. *f waldronensis*, see Triplesia waldronensis.
- waverlyensis, Winchell, 1870, Proc. Am. Phil. Soc., vol. 12, p. 251, Marshall Gr. whitneyi, Hall, 1858, Geo. Rep. Iowa, p.
- 502, Ham. and Chemung Gr. wortheni, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 156, Ham. Gr. ziczac, Hall, 1843. The name was preoc-
- cupied by Roemer. See S. consobrina. SPIRIFERINA, D'Orbigny, 1847, Consid. Zool. et Geol. Sur. les Brachiopodes, Comptes rendus des Sciences de l'Académie des Sciences. [Ety. Spirifera, a genus; inus, implying resemblance.] Shell transverse, valves unequally convex; with or without mesial fold and sinus; smooth or costated; beak straight or recurved; area large, and interrupted by a pseudodeltidium, notched near the cardinal edge; structure punctate; surface spinous; tooth on each side of the fissure, supported by vertical, shelly plates, the space intervening occupied by the cardinal muscles; mesial septum wide at the base, and tapering to an acute blade; dorsal valve with dental sockets and shelly lamellæ, for the support of serrated arms in the form of two large spiral, horizontal cones. Type S. rostrata.
 - billingsi, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 294, Permian Gr. binacuta, Winchell, 1865, Proc. Acad.
- Nat. Sci., p. 120, Burlington Gr.
- clarksvillensis, Winchell, 1865, Proc. Acad. Nat. Sci., p. 119, Marshall Gr.
- kentuckiensis, Shumard, 1855, (Spirifera kentuckiensis,) Geo. Rep. Mo., p. 203, Coal Meas.



FIG. 615.-Spirifering kentuckiensis.

- kentuckiensis var. propatula, Swallow, 1866, (Spirifera kentuckiensis var. pro-patula,) Trans. St. Louis Acad. Sci., vol. 2, p. 409, Coal Meas.
- spinosa, Norwood & Pratten. (Spirifera spinosa,) 1855, Jour. Acad. Nat. Sci., vol. 3, 2d series, p. 71, Kaskaskia Gr.
- spinosa var. campestris, White, 1874, Rep. Invert. Foss., p. 21, and Geo. Sur. W. 100th Mer., vol. 4, p. 139, Carb.

subtexta, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 8, Burlington Gr. Spirigera, D'Orbigny in Comptes Rendus, t.

25, p. 268, syn. for Athyris. americana, see A. americana. biloba, see A. biloba. caput-serpentis, see A. caput-serpentis charitonensis, see A. charitonensis. clintonensis, see A. clintonensis. concentrica, syn. for A. spiriferoides. corpulenta, see A. corpulenta. 130 eborea, see A. eborea. euzona, see A. euzona. formosa, see A. formosa. fultonensis, see A. fultonensis. hannibalensis, see A. hannibalensis. hawni, see A. hawni. jacksoni, see A. jacksoni.

maconensis, see A. maconensis. minima, see A. minima.

missouriensis, see A. missouriensis.

monticola, see A. monticola.

obmaxima, see A. obmaxima.

ohioensis, see A. ohioensis.

pectinifera, see A. pectinifera.

- plattensis, see A. plattensis.
- prouti, see A. prouti. reflexa, see A. reflexa.

singletoni, see A. singletoni.

- spiriferoides, see A. spiriferoides.
- STENOSCHISMA, Conrad, 1839, Ann. Rep. N. Y., p. 59. [Ety. stenos, narrow; schisma, fissure.] Writtten Stenocisma by Conrad. Subtriangular, ovoid, or subglobose, hinge-line short; beak of ventral valve extended, attenuate, more or less arcuate, and appressed upon the opposite valve; mesial fold and sinus; surface plicated, valves articulated by teeth and sockets; median septum in dorsal valve, on each side of which the crura are supported. Type S. formo-sum. Conrad mentioned Terebratula schlotheimi as the type which is now the type of Camarophoria; but, as Hall shows, Conrad was mistaken in identifying what is now known as S. formosum, with the European Camarophoria schlotheimi.
 - billingsi, Hall, 1867, Pal. N. Y., vol. 4, p. 336, Cornif. Gr. The same that Bill-ings called Rhynchonella thalia, Can. Jour. 1860, but the name was preoccupied.
 - carica, Hall, 1867, Pal. N. Y., vol. 4, p. 344, V Ham. Gr.
 - carolina, Hall, 1867, Pal. N. Y., vol. 4, p. 337, Cornif. Gr.

 - 337, Cornit. Gr. congregatum, Conrad, 1841, (Atrypa con-gregata,) Ann. Rep. N. Y., p. 55, and Pal. N. Y., vol. 4, p. 341, Ham. Gr. contractum, Hall, 1843, (Atrypa con-tracta,) Geo. 4th Dist. N. Y., pl. 66, fig. 3a, and Pal. N. Y., vol.4, p. 351, Chemung Gr.
- contractum var. saxatile, Hall, 1867, Pal.
- N. Y., vol. 4, p. 417, Chemung Gr. dotis, Hall, 1867, Pal. N. Y., vol. 4, p. 344, Ham. Gr.

- duplicatum, Hall, 1843, (Atrypa dupli-cata,) Geo. 4th Dist. N. Y., pl. 67, fig. 2 and 2a, and Pal. N. Y., vol. 4, p. 350, Chemung Gr.
- eximium, Hall, 1843, (Atrypa eximia,) Geo. 4th Dist. N. Y., pl. 66, and Pal. N. Y., vol. 4, p. 348, Chemung Gr.



FIG. 616-Stenochisma eximium.

- formosum, Hall, 1857, (Rhynchonella formosa,) 10th Rep. N. Y. Mus. Nat. Hist., p. 76, and Pal. N. Y., vol. 3, p. 236, Low. Held. Gr.
- horsfordi, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 87, and Pal. N. Y., vol. 4, p. 339, Cornif. Gr., Marcellus shale and Ham. Gr.
- orbiculare, Hall, 1860, (Rhynchonella orbicularis,) 13th Rep. N. Y. Mus. Nat. Hist., p. 88, and Pal. N. Y., vol. 4, p. 353, Chemung Gr.
- prolificum, Hall, 1867, Pal. N. Y., vol. 4, p. 343, Ham. Gr.
- royanum, Hall, 1860, Pal. N. Y., vol. 4, p. 338, Cornif. Gr.
- sappho, Hall, 1860, (Rhynchonella sappho,) 13th Rep. N. Y. Mus. Nat. Hist., p. 87, and Pal. N. Y., vol. 4, p. sappho, Hall, 340, Marcellus shale and Ham. Gr.
- stephani, Hall, 1867, Pal. N. Y., vol. 4, p. 349, Chemung Gr.
- tethys, Billings, 1860, (Rhynchonella tethys,) Can. Jour., vol. 5, p. 271, Cornif. Gr.
- STREPTORHYNCHUS, King, 1850, Monograph of Permian Fossils, p. 107. [Ety. strepto, I bend or twist; rhynchos, beak. Semicircular or in general form of Strophomena, concavo-convex, planoconvex, or both valves convex and striated: ventral beak small, or prolonged, bent and twisted, fissure beneath, closed or partially closed by a solid deltidium : area wide on the ventral valve and narrow on the dorsal; externally like Strophomena, but internally resembling Orthis. Type S. pelargonatum.
- alternatum, Hall, 1860, (Orthisina alter-nata,) 13th Rep. N. Y. Mus. Nat. Hist., p. 81, Ham. Gr.
- americanum, Whitfield, 1878, (Hemi-pronites americanus,) Ann. Rep. Geo. Sur. Wis., p. 72, and Geo. Wis., vol. 4, p. 243, Hud. Riv. Gr.
- antiquatum, Sowerby, 1839, (Orthis antiquata,) Murch. Sil. Syst., p. 630, Anticosti Gr., Div. 3, Mid. Sil.
- arctostriatum, Hall, 1843, (Strophomena arctostriata,) Geo. Rep. 4th Dist. N. Y.,
- p. 266, Chemung Gr. arctostriatum, Hall, 1860, 13th Rep. N. Y. Mus. Nat Hist., p. 80, (Orthisina arcto-

striata,) Ham. Gr. This name was preoccupied.

- biloba, Hall, 1883, Rep. St. Geol., pl. 41, figs. 4, 5, Coal Meas.
- cardinale, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis., p. 61, and Geo. Wis., vol. 4, p. 261, Hud. Riv. Gr.
- chemungense, Conrad, 1843, (Strophomena chemungensis,) Jour. Acad. Nat. Sci., vol. 8, p. 357, and Pal. N. Y., vol. 4, p. 67, Chemung Gr.

crassum, Meek & Hayden, 1858, (Orthisina crassa,) Proc. Acad. Nat. Sci., Phil., p. 260, and Geo. Sur. Ill., vol. 5, p. 570, Coal Meas. crenistriatum, Phil-



- lips, 1836, (Spi- FIG. 617.-Streptorhynchus crassum. Dorsal rifera crenistria,) view. Geo. York., vol. 2,
- p. 216, Waverly Gr.
- deflectum, Conrad, 1843, (Strophomena deflecta.) Proc. Acad. Nat. Sci. Phil., p. 332, and Pal. N. Y., vol. 1, p. 113, Trenton Gr.
- elongatum, James, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 240, Hud. Riv. Gr. A variety of S. subtentum.
- filitextum, Hall, 1847, (Leptæna filitexta,) Pal. N. Y., vol. 1, p. 111, Trenton and Hud. Riv. Grs.
- flabellum, Whitfield, 1882, Desc. New Spec. Foss., from Ohio, p. 200, Up. Held. Gr.



FIG. 618.-Streptorhynchus hallanum. Exterior and interior of dorsal valve

FIG. 619. -Strepto-

rhynchus hallanum.

Interior of ventral

hallanum, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 148, Hud. Riv. Gr.

hemiaster, syn. for S. subplanum.

Whithydraulicum, field, 1882, Desc. Spec. Foss., New from Ohio, p. 193, Low. Held. Gr. inflatum, White &

- valve Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 293, Kinderhook Gr. lens, White, 1862, Proc. Best. Soc. Nat.
- Hist., vol. 9, p. 28, Chemung Gr.
- minor, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 75, Trenton Gr.
- nutans, Meek, 1873, (Hemipronites nutans, Pal. Ohio, vol. 1, p. 77, Hud. Riv. Gr.
- occidentale, Newberry, syn. for Meekella striatocostata.

STR.]

STR.

pandora, Billings, 1 p. 266, and Pal. Schoharie grit an

pectinaceum, Hall. pectinacea and S.

4th Dist. N. Y., vol. 4, p. 73, Che perversum, Hall, 1 10th Rep. N. Y. and Pal. N. Y.,

alternata, 1860, 1 Ham. Gr. planoconvexum, H

planoconvexa,) 114, Hud. Riv. G

planumbonum, H planumbona,) Pa Trenton and Hud

primordiale, Whitfie Nat. Hist., vol. 1

pyramidale, Newber striatocostata.

radiatum, Vanuxer radiata,) Geo. R 122, and Pal. N.

Held. Gr. rectum, Conrad, recta,) Proc. Act 332, and Pal. N.

Riv. and Trentor sinuatum, Emmon

- 199, Hud. Riv. (G
- subplanum, Conra Nat. Sci., vol. 8, vol. 2, p. 259, (St
- Niagara Gr.
- subtentum, Conra subtenta,) Pal.

Trenton and Hud



FIG. 620.—Strepto-rhynchussulcatum. Interior of dorsal valve.

thalia, Billings, thalia,) Can. Na 39, Trenton Gr. umbraculum, Sch bratulites umbr kunde, p. 256, mian Gr. vetustum, James, Sci., vol. 1, p. 24

of the forms of S woolworthanum, mena woolworth

Mus. Nat. Hist., vol. 3, p. 192, Lo

Stricklandia, Billings, vol. 4. This na viously applied plants, the auth proposed Strickla

STR.

STR.]

ame was pre-

Geol., pl. 41,

nn. Rep. Geo. Wis., vol. 4,

3, (Strophor. Acad. Nat. al. N. Y., vol.



-Streptorhyn. assum. Dorsal

Strophomena Sci. Phil., p. p. 113, Tren-

. Quar. Jour. Riv. Gr. A

ena filitexta,) Trenton and

Desc. New p. 200, Up.



um. Exterior alve. 4, Cin. Quar.

Hud. Riv. Gr. r, syn. for S. inum. icum, Whit-Desc. 1882. Spec. Foss., Ohio, p. 193, Held. Gr. White & ۱. ost. Soc. Nat. erhook Gr. est. Soc. Nat.

ing Gr. gr. U. S. Geo. Gr. ipronites nup. 77, Hud.

for Meekella

BRACHIOPODA.

- pandora, Billings, 1860, Can. Jour., vol. 5, | STRICKLANDINIA, Billings, 1863, Can. Nat. p. 266, and Pal. N. Y., vol. 4, p. 68, Schoharie grit and Cornif. Gr.
- pectinaceum, Hall, 1843, (Strophomena pectinacea and S. bifurcata,) Geo. Rep. 4th Dist. N. Y., p. 266, and Pal. N. Y. vol. 4, p. 73, Chemung Gr.
- perversum, Hall, 1857, (Orthis perversa,) 10th Rep. N. Y. Mus. Nat. Hist., p. 137, and Pal. N. Y., vol. 4, p. 72, (Orthisina alternata, 1860, 13th Rep.,) Cornif. and Ham. Gr.
- planoconvexum, Hall, 1847, (Leptæna planoconvexa,) Pal. N. Y., vol. 1, p. 114, Hud. Riv. Gr.
- planumbonum, Hall, 1847, (Leptæna planumbona,) Pal. N. Y., vol. 1, p. 112, Trenton and Hud. Riv. Gr.
- primordiale, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 301, Birdseye Gr. pyramidale, Newberry, syn. for Meekella
- striatocostata. radiatum, Vanuxem, 1843, (Strophomena radiata,) Geo. Rep. 3d Dist. N. Y., p. 122, and Pal. N. Y., vol. 3, p. 193, Low. Held. Gr.
- rectum, Conrad, 1843, (Strophomena recta,) Proc. Acad. Nat. Sci., vol. 1, p. 332, and Pal. N. Y., vol. 1, p. 113, Black Riv. and Trenton Grs.
- sinuatum, Emmons, 1855, Am. Geol., p. 199, Hud. Riv./Gr.
- subplanum, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 258, and Pal. N. Y., vol. 2, p. 259, (Strophomena subplana,) Niagara Gr.
- subtentum, Conrad, 1847, (Strophomena subtenta,) Pal. N. Y., vol. 1, p. 115, Trenton and Hud. Riv. Gr. Verneuil.

sulcatum, Verneuil, 1848, (Leptæna sul-cata,) Bull. Geol. Soc. France, vol. 5, p. 350, and Ohio Pal., vol. 1, p. 85, Hud. Riv. Gr.

1863

Inst.,

- Riv. Gr. tenue, Hall, ig. 620.—Strepto-rhynchussufcatum. FIG Trans. Alb. Interior of dorsal vol. 4, p. 210, Niagvalve. ara Gr.
- thalia, Billings, 1860, (Strophomena thalia,) Can. Nat. and Geol., vol. 5, p. 39, Trenton Gr.
- umbraculum, Schlotheim, 1820, (Tere-bratulites umbraculum,) Petrefaktenkunde, p. 256, Devonian to the Permian Gr.
- vetustum, James, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 241, Hud. Riv. Gr. One of the forms of S. subtentum. woolworthanum, Hall, 1857, (Stropho-
- mena woolworthiana,) 10th Rep. N. Y. Mus. Nat. Hist., p. 48, and Pal. N. Y., vol. 3, p. 192, Low. Held Gr.
- Stricklandia, Billings, 1859, Can. Nat. Geo., vol. 4. This name having been pre-viously applied to a genus of fossil plants, the author abandoned it and proposed Stricklandinia.

- and Geo., vol. 8, p. 370. [Ety. proper name.] Large, elongate-oval, transversely subcircular, sometimes compressed, valves subequal; short mesial septum in the interior of the ventral valve, supporting a small triangular chamber, beneath the beak, as in Pentamerus; in the dorsal valve no longitudinal septum, spires, or loop; two short, rudimental plates, bearing processes. Type S. gaspensis.
- anticostiensis, Billings, 1863, Can. Nat. Geo., vol. 8, p. 370, Anticosti Gr.
- (?) arachne. Billings, 1862, Pal. Foss., vol. 1, p. 85, Quebec Gr.
- (?) arethusa, Billings, 1862, Pal. Foss., vol. 1, p. 85, Quebec Gr.
- brevis, Billings, 1859, Can. Nat. Geo., vol. 4, p. 135, Mid. Sil.
- canadensis, Billings, 1859, Can. Nat. Geo., vol. 4, p. 135, Clinton Gr.
- castellana, White, 1876, Proc. Acad. Nat.
- castellana, White, 1970, 1970, Acad. Mat. Sci., p. 30, Niagara Gr.
 davidsoni, Billings, 1868, Lond. Geo.
 Mag., vol. 5, p. 59, Up. Sil.
 deformis, Meek & Worthen, 1870, Proc.
 Acad. Nat. Sci., Phil., p. 37, and Geo.
 Sur. Ill., vol. 6, p. 502, Niagara Gr.
- elongata, see Amphigenia elongata.
- elongata var. curta, see Amphigenia curta. gaspensis, Billings, 1859, Can. Nat. Geo.,
- vol. 4, p. 134, Mid. Sil. melissa, Billings, 1874, Pal. Foss., vol. 2, p. 89, Mid. Sil.
- multilirata, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 81, and Geo. Wis., vol. 4, p. 315, Niagara Gr.
- salteri, Billings, 1874, Pal. Foss., vol. 2, p. 87, Anticosti Gr., Mid. Sil.
- STROPHALOSIA, King, 1844, Ann. and Mag. Nat. Hist., vol. 14, p. 313. [Ety. strophe, a bending; alos, a disk.] Having the
- general form and muscular impressions of Leptæna, with the tubuliferous or spinous surface of Productus; possessed of a well-developed condyloid hinge, area, and deltidium. Type S. excavata.
- horrescens, Geinitz, 1866, Carb. und Dyas in Neb., p. 49. Prof. Meek regarded this name as a syn. for Productus nebraskensis.
- numularis, Winchell, 1863, Proc. Acad. Nat. Sci., p. 4, Marshall Gr.
- STROPHODONTA, Hall, 1852, Pal. N. Y., vol. 2, p. 63. [Ety. strophos, bent; odous, tooth.] General form and characters as in Strophomena, one valve convex and the other concave, and following nearly the same curve as the convex one, leaving only a thin space for the animal, and the surface radiated; distinguished, however, by a crenulated hinge-line; the absence of a foramen in the area of the ventral valve; dental lamellæ ab-sent, or nearly so; the divaricator muscular impressions spreading, flabelliform, without limitation, by an elevated

ridge; cardinal process in the dorsal valve bifurcated from its origin, and directed backward beneath the area of the ventral valve; on the lower side of the ventral area a bilobed process is embraced by the divisions of the cardinal process of the dorsal valve. Type S. demissa.

- æquicostata, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 639, Ham. Gr.
- v altidorsata, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 637, Ham. Gr.
 - alveata, Hall, 1863, 16th Rep. N. Y. Mus. Nat. Hist., p. 36, and Pal. N. Y., vol. 4, p. 81, Schoharie grit.
 - ampla, see Strophonella ampla.
 - arcuata, Hall, 1858, Geo. of Iowa, p. 492, Ham. Gr.
 - becki, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 52, and Pal. N. Y., vol. 3, p. 191, Low. Held. Gr.
 - boonensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 638, Ham. Gr. cælata, see Strophonella cælata.
 - callawayensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 638, Ham. Gr. callosa, Hall, 1863, 16th Rep. N. Y. Mus.
- Nat. Hist., p. 36, and Pal. N. Y., vol. 4, p. 82, Schoharie grit.
- calvini, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss, p. 298, Upper Helderberg Gr. Proposed instead of S. quadrata, Cal-vin, 1878, in Bull. U. S. Geo. Sur. Terr., vol 4, No. 3, p. 728, which was preoc-cupred.
- canace, Hall & Whitfield, 1873, 23d Rep. N. Y. Mus. Nat. Hist., p. 236, Chemung Gr.
- cavumbona, see Strophonella cavumbona. cayuta, Hall, 1867, Pal. N. Y., vol. 4, p. 110, Chemung Gr.
- cincta, Winchell, 1866, Rep. Low. Penin.
- Mich., p. 93, Ham. Gr. concava, Hall, 1857, (Strophomena con-cava,) 10th Rep. N. Y. Mus. Nat. Hist., p. 115, and Pal. N. Y., vol. 4, p. 96, Cornif. and Ham. Grs.
- costata, Owen, 1852, Geo. Sur. Wis., Iowa, and Minn., p. 585, Devonian. crebristriata, Conrad, 1842, (Strophomena
- crebristriata,) Jour. Acad. Nat. Sci., vol. 8, p. 254, and Pal. N. Y., vol. 4, p. 86, Schoharie grit.
- cymbiformis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 635, Ham. Gr.
- demissa, Conrad, 1842, (Strophomena demissa,) Jour. Acad. Nat. Sci., vol. 8, p. 258, and Pal. N. Y., vol. 4, p. 81, Scho-harie grit, Cornif., Ham., and Chemung Grs.
- erratica, Winchell, 1866, Rep. Low. Peninsula Mich., p. 93, Ham. Gr.
- feildeni, Etheridge, 1878, Quar. Jour. Geo. Soc., vol. 34, p. 598, Up. Sil.
- fragilis, Hall, syn. for Strophodonta perplana.

Ł

- .geniculata, Hall, 1859, Pal. N. Y., vol. 3. p. 483, Low. Held. Gr.
- headleyana, Hall, 1857, N. Y. Mus. Nat. Hist, p. 49, and Pal. N. Y., vol. 3, p. 185, Low. Held. Gr.
- hemispherica, Hall, 1857, (Strophomena Memispherica,) 10th Rep. N. Y. Mus. Nat. Hist., p. 113, and Pal. N. Y., vol. 4, p. 90, Schoharie grit and Cor. nif. Gr.
- hybrida, Hall & Whitfield, 1873, 23d Rep. N. Y. Mus. Nat. Hist., p. 239, Chemung Gr.
- imitata, Winchell, 1866, Rep. Low. Penin. Mich., p. 93, Ham. Gr., inæquiradiata, Hall, 1857, 10th Rep. N. Y.
- Mus. Nat. Hist., p. 113, and Pal. N. Y., vol. 4, p. 87, Schoharie grit and Cornif. Gr.

Conrad, 184.2 (Strophomena inæquistriata,) Jour. Acad. Nat. Sci., vol. 8,



Nat. Sci., vol. 6, p. 254, and Pal. N. Y., vol. 4, p. 93, Cornif. and Fig. 621.—Strophodonta inæquistriata. Ham. Grs., Mos-

cow shales.

- indenta, Conrad, 1838, (Leptæna indenta,) Ann. Rep., N. Y. p. 117, Low Held. Gr. Not properly defined.
- inflexa, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 637, Ham. Gr. intermedia, Hall, 1859, Pal. N. Y., vol. 3,
- p. 482, Oriskany sandstone.
- iowensis, Owen, 1852, Geo. Sur. Wis.,
- Iowa, and Minn., p. 585, Devonian. junia, Hall, 1867, Pal. N. Y., vol. 4, p. 108, Cornif., Ham. and Tully Grs. (Changed from textilis, in the corrigenda and index.
- kemperi, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 636, Ham. Gr.
- leavenworthana, see Strophonella leavenworthana.
- lepida, Hall, syn. for S. nacrea. lincklæni, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 55, and Pal. N. Y.,
- vol. 3, p. 415, Oriskany sandstone. magnifica, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 54, and Pal. N. Y., vol. 3, p. 414, Oriskany sandstone. magniventra, Hall, 1857, 10th Rep. N. Y.
- Mus. Nat. Hist., p. 54, and Pal. N. Y., vol. 3, p. 411, Oriskany sandstone.
- mucronata, Conrad, 1842, (Strophomena mucronata,) Jour. Acad. Nat. Sci., vol. 8, p. 257, and Pal. N. Y., vol. 4, p. 111,
- Chemung Gr. nacrea, Hall, 1857, (Strophomena nacrea,) 10th Rep. N. Y. Mus. Nat. Hist., p. 144, and Pal. N. Y., vol. 4, p. 104, Cornif. and Ham. Grs.
- navalis, Swallow, 1860, Trans. St. Louis
- Acad. Sci., vol. 1, p. 635, Ham. Gr. parva, Owen, 1852, Geo. Sur. Wis., Iowa, and Minn., p. 584, Ham. Gr.

parva, Hall, 1863, 1 Nat. Hist., p. 37 name was preocc patersoni, Hall, 18

ersoni,) 10th Rep p. 114, and Pal. N

harie grit and Co perplana, Conrad, perplana,) Jour.

p. 257, and Pal. Onondaga, Scho and Ghemung. G perplana var. nerv

phomena nervos N. Y., p. 266, an 113, Chemung Gi

planulata, Hall, 18 p. 184, Low. Hel plicata, Hall, 1860,

Nat. Hist., p. 90, prisca, Hall, 1852, 1

Clinton Gr. profunda, Hall, 185 Pal. N. Y., vol.

Niagara Grs. punctulifera, see

lifera. quadrata, Swallow

Acad. Sci., vol. 1 quadrata, Calvin, Sur. Terr., vol.

name was preoc reversa, see Strophe semifasciata, see Str

striata, Hall, 1843, Geo. Rep. 4th I agara Gr.

subcymbiformis, St. Louis Acad Ham. Gr.

subdemissa, Hall, Mus. Nat. Hist., textilis, Hall, 1852 327, Coralline Li variabilis, Calvin,

Sur., vol. 4, Held. Gr.

varistriata, Conra varistriata,) Jou

8, p. 255, and Pa Low. Held. Gr.

varistriata var. a N. Y., vol. 3, p. vascularia, Hall, 1

p. 412, Oriskany STROPHOMENA, Rafin

Malacologie of E strophos, bent; n somewhat semi semioval, thoug thin; one valve cave, with a thin the animal; surf hinge-line strai than the width anterior end of flected or bent valve; ventral v

umbo; beak sm

STR.



STR.

STR.]

N. Y., vol. 3,

Y. Mus. Nat. Y., vol. 3, p.

Strophomena N. Y. Mus. I. N. Y., vol. t and Cor.

373, 23d Rep. p. 239, Che-

Low. Penin.

h Rep. N. Y. d Pal. N. Y., rit and Cor-



Strophodonta istriata.

ena indenta,) ow Held. Gr.

ns. St. Louis Iam. Gr. N. Y., vol. 3,

Sur. Wis., evonian. Tully Grs. n the corri-

ns. St. Louis Iam. Gr. iella leaven-

Pa. Rep. N. Y. 1 Pal. N. Y., ndstone. Rep. N. Y. d Pal. N. Y.,

dstone. n Rep. N. Y. 1 Pal. N. Y., dstone. **Strophomena** lat. Sci., vol. ol. 4, p. 111,

iena nacrea,) Hist., p. 144, 104, Cornif.

is. St. Louis Iam. Gr. Sur. Wis., lam. Gr.

BRACHIOPODA.

- parva, Hall, 1863, 16th Rep. N. Y. Mus. Nat. Hist., p. 37, Schoharie grit. This name was preoccupied.
- patersoni, Hall, 1857, (Strophomena pat-ersoni,) 10th Rep. N. Y. Mus. Nat. Hist., p. 114, and Pal. N. Y., vol. 4, p. 89, Schoharie grit and Cornif. Gr.
- perplana, Conrad, 1842, (Strophomena perplana,) Jour. Acad. Nat. Sci., vol. 8, p. 257, and Pal. N. Y., vol. 4, p. 92, Onondaga, Schoharie, Cornif., Ham., and Chemung. Grs.
- perplana var. nervosa, Hall, 1843, (Strophomena nervosa,) Geo. Rep. 4th Dist. N. Y., p. 266, and Pal. N. Y., vol. 4, p.
- 113, Chemung Gr. planulata, Hall, 1859, Pal. N. Y., vol. 3, p. 184, Low. Held. Gr.
- plicata, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 90, Ham. Gr. prisca, Hall, 1852, Pal. N. Y., vol. 2, p. 63,
- Clinton Gr.
- profunda, Hall, 1852, (Leptæna profunda,) Pal. N. Y., vol. 2, p. 61, Clinton and Niagara Grs.
- punctulifera, see Strophonella punctulifera.
- quadrata, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 639, Ham. Gr.
- quadrata, Calvin, 1878, Bull. U. S. Geo. Sur. Terr., vol. 4, No. 3, p. 728. The name was preoccupied. See S. calvini. The
- reversa, see Strophonella reversa. semifasciata, see Strophonella semifasciata. striata, Hall, 1843, (Strophomena striata,
- Geo. Rep. 4th Dist. N. Y., p. 104, Niagara Gr. subcymbiformis, Swallow, 1860, Trans.
- St. Louis Acad. Sci., vol. 1, p. 636, Ham. Gr.
- subdemissa, Hall, 1857, 10th Rep. N. Y. Mus. Nat. Hist., p. 145, Ham. Gr. textilis, Hall, 1852, Pal. N. Y., vol. 2, p.
- 327, Coralline Limestone variabilis, Calvin, 1878, Bull. U. S. Geo. Sur., vol. 4, No. 3, p. 727, Up.
- Held. Gr. varistriata, Conrad, 1842, (Strophomena varistriata,) Jour. Acad. Nat. Sci., vol.
- 8, p. 255, and Pal. N. Y., vol. 3, p. 180, Low. Held. Gr.
- varistriata var. arata, Hall, 1859, Pal. N. Y., vol. 3, p. 183, Low. Held. Gr. vascularia, Hall, 1859, Pal. N. Y., vol. 3.
- p. 412, Oriskany sandstone. STROPHOMENA, Rafinesque, 1825, Manuel de Malacologie of Blainville, p. 513. [Ety.
- strophos, bent; mene, a crescent.] Shell somewhat semicircular, or somewhat semioval, though variable in outline; thin; one valve convex, the other con cave, with a thin space between them for the animal; surface with radiating striæ; hinge-line straight, longer or shorter than the width of the shell below; anterior end of the shell usually deflected or bent over toward the dorsal valve; ventral valve convex, flat on the umbo; beak small, and minutely per-

forated; cardinal area nearly cut in two parts by an angular notch, which is closed, or nearly closed, by the bifid cardinal process of the dorsal valve; two divergent teeth, two adductor scars, and two cardinal muscular impressions; dorsal valve having a linear area, two cardinal processes close together at the middle of the hinge-line, directed forward; sockets for the reception of the teeth of the ventral valve; two muscular scars in front of the cardinal processes. Type S. rugosa, which is generally regarded as synonymous with S. rhomboidalis.

acutiradiata, see Chonetes acutiradiatus.

- alternata, Conrad, 1838, (Leptæna alternata,) Ann. Rep. N. Y., p. 115, and Pal. N. Y., vol. 1, pp. 102, 286, Trenton and Hud. Riv. Grs.
- alterniradiata, Shaler, 1865, Bulletin No. 4, M. C. Z., Anticosti Gr. Not defined so as to be recognized.
- alternistriata, Hall, 1847, Pal. N. Y., vol. 1, p. 109, Trenton and Hud. Riv. Grs.

alternata var.

loxorhytis, Meek, 1873, Ohio Pal., vol. 1, p. 91, Hud.

Riv. Gr. ampla, see Strophonella

ampla. analoga, Phillips,

- alternata 1836, Geol. Yorkshire, vol. 2, pl. 7, fig. 10, Sub-
- carb. anticostiensis, syn. for Strophomena alternata.
- antiquata, see Streptorhynchus antiquatum.
- arctostriata, see Streptorhynchus arctostriatum.
- arcuata, Shaler, 1865. This name was preoccupied.
- arethusa, Billings, 1862, Pal. Foss., vol. 1, p. 132, Hud. Riv. Gr.
- aurora, Billings, 1865, Pal. Foss., vol. 1, p. 218, Quebec. Gr.
- bifurcata, syn. for Streptorhynchus pectinaceum.
- bipartita, Hall, 1852, (Leptæna bipartita,) Pal. N. Y., vol. 2, p. 326, Coralline Limestone
- blainvillii, Billings, 1874, Pal. Foss., vol. 2, p. 28, Up. Sil.
- camerata, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 254, and Pal. N. Y., vol. 1, p. 106, Trenton Gr.
- carinata, Conrad, 1838, see Tropidoleptus carinatus.
- carinata, Conrad, 1842, see Chonetes carinatus.
- ceres, Billings, 1860, Can. Nat. and Geo. vol. 5, p. 54, Hud. Riv. Gr. and Mid. Sil.
- chemungensis, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 257, Chemung Gr.







FIG. 622. -Strophomena

- conradi, Hall, 1859, Pal. N. Y., vol. 3, p. 194, Low. Held. Gr.
- convexa, Owen, 1840, Rep. on Mineral Lands, p. 70, Calcif. Gr.
- cornuta, see Chonetes cornutus.
- corrugata, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 3, p. 256, and Pal. N. Y., vol. 2, p. 59, Clinton Gr.
- crebristriata, see Strophodonta crebristriata.
- . crenistria, syn. for Strophodonta perplana. declivis, James, syn. for Strophomena alternata.
 - deflecta, see Streptorhynchus deflectum.
 - deltoidea, Conrad, 1839, Ann. Rep. N. Y. 64, and Pal. N. Y., vol. 4, p. 106, Trenton Gr.
- delthyris, syn. for Strophodonta perplana. demissa, see Strophodonta demissa.
- depressa, Sowerby, 1825, (Producta de
 - pressa,) Min. Conchology, vol. 5, p. 86, and Pal, N./Y., vol. 2, p. 257, Up. Sil. Generally regarded as a synonym for S. rhomboidalis.
- depressa var. ventricosa, see Strophomena rugosa var. ventricosa.
- √ donneti, Salter, 1852, Sutherland's Jour.,
 - vol. 2, App., p. 218, Devonian. elegantula, Hall, 1843, Geo. Rep., 4th Dist. N. Y., p. 73, Clinton Gr.
 - elongata, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 259, Low. Held. Gr.
- elliptica, Conrad, 1839, Ann. Rep. N. Y., p. 64, Niagara Gr.
- fasciata, Hall, 1847, (Leptæna fasciata,) Pal. N. Y., vol. 1, p. 20, Chazy Gr. filitexta, see Streptorhynchus filitextum.
- fluctuosa, Billings, 1860, Can. Nat. Geo., vol. 5, p. 57, Trenton and Hud. Riv. Grs.
- fontinalis, White, 1874, Rep. Invert. Foss., p. 10, and Geo. Sur. W. 100th Mer., vol. 4, p. 54, Quebec Gr. fracta, Meek, 1873, (S. alternata var.
- fracta,) Pal. Ohio, vol. 1, p. 91, Hud. Riv. Gr.
- fragilis, syn. for Strophodonta perplana.
- galatea, Billings, 1874, Pal. Foss., vol. 2, p. 20, Gaspe limestone No. 8, Devonian.
- geniculata, Shaler, (Brachyprion genicula-tum.) The name was preoccupied. gibbosa, Conrad, 1841, Ann. Geo. Rep.
- N. Y., p. 25, Onondaga Gr. hecuba, Billings, 1860, Can. Nat. Geo., vol. 5, p. 60, Hud. Riv. Gr.
- hemispherica, see Strophodonta hemispherica.
- imbecilis, Billings, 1865, Pal. Foss., vol. 1, p. 219, Quebec Gr.
- imbrex, Pander, 1845, in Russia and Ural Mountains, Hud. Riv. Gr. The identi-
- fication very doubtful in America. impressa, syn. for Strophodonta varistriata.
- incrassata, Hall, 1847, (Leptæna incras-sata,) Pal. N., vol. 1, p. 19, Chazy to Hud. Riv. Gr.

inæquiradiata, see Strophodonta inæqui-/radiata.

- inæquistriata, see Strophodonta inæquistriata.
- interstrialis, Phillips, in Geo. 4th Dist. N. Y., see Strophodonta cayuta.
- irene, Billings, 1874, Pal. Foss., vol. 2, p. 27, Devonian.
- ithacensis, Vanuxem, 1842, Geo. Rep.
- N. Y., p. 174, Portage Gr. julia, Billings, 1862, Pal. Foss, vol. 1, p. 127, Anticosti Gr., Div. 4, Mid. Sil.
- kingi, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 72, and Geo. Wis., vol. 4, p. 261, Hud. Riv. Gr.
- lachrymosa, see Productella lachrymosa.
- lævis, Emmons, 1842, Geo. Rep. N. Y., p. 385, Birdsøye Gr.
- leda, Billings, 1860, Can Nat. Geo., vol. 5, p. 55, Mid. Sil.
- lepida, syn. for Strophodonta nacrea.
- lima, see Productella lachrymosa var. lima.
- lineata, see Chonetes lineatus.
- macra, syn. for Strophodonta semifasciata. magniventra, see Strophodonta magniventra.
- membranacea, of Phillips, as identified by Vanuxem, 1842, Geo. 3d Dist. N. Y., see Productella hirsuta.
- modesta, Conrad, 1839, Ann. Rep. N. Y., p. 64, Niagara Gr.
- mucronata, see Strophodonta mucronata.
- nacrea, see Strophodonta nacrea.
- nasuta, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 260, Trenton and Hud. Riv. Grs.
- nassula, Conrad, 1846, Proc. Acad. Nat. Sci., vol. 3, p. 23. Not defined so as to be recognized.
- nemea, Hall & Whitfield, 1877, U. S. Geo. Sur. 40th parallel, vol. 4, p. 233, Quebec Gr.
- nervosa, see Strophodonta perplana var. nervosa,
- niagarensis, Winchell & Marcy, syn. for Strophodonta profunda.
- nitens, Billings, 1860, Can. Nat. Geo., vol. 5, p. 53, Hud. Riv. Gr.
- nutans, see Streptorhynchus nutans.
- obscura, Hall, 1852, (Leptæna obscura,)
- Pal. N. Y., vol. 2, p. 62, Clinton Gr.
 orthididea, Hall, 1852, (Leptena orthididea,) Pal. N. Y., vol. 1, p. 62, Clinton Gr.
- patenta, Hall, 1852, (Leptæna patenta,) Pal. N. Y., vol. 2, p. 60, Clinton Gr.
- patersoni, see Strophodonta patersoni.
- pecten, Linnæus, 1758, (Anomia pecten,) Syst. Nat., Niagara Gr. Not American. pectinacea, see Streptorhynchus pectinaceum.
- perplana, see Strophodonta perplana.
- philomela, Billings, 1860, Gan. Nat. Geo., vol. 5, p. 56, Mid. Sil.
- planoconvexa, see Streptorhynchus planoconvexum.
- planumbona, see Streptorhynchus planumbonum.

plicata, syn. for § tentum. plicifera, Hall, 184

Pal. N. Y., vol. 1 pluristriata, syn. fe plana.

profunda, see Strop punctulifera, see Stro pustulosa, syn. for I radiata, see Strepto recta, see Streptorh rectilateris, syn. fo striata.

reticulata, Shaler, M. C. Z., Antic

so as to be recogn rhomboidalis, Wild

rhomboidalis,) 1 Verst., p. 77. TI the Trenton Gr. 1 ing S. tenuistria rugosa as varie however, is the l



FIG. 623.-Strophom rugosa

Held. Gr. This the type of Rafir mena. The spec as merely a vari rugosa var. ventric

pressa var. ventr Mus. Nat. Hist., vol. 3, p. 417, Or

setigera, see Chone semiovalis, Conrad sericea.

semiovalis, Shaler. twice preoccupi

squamula, James, Sci., vol. 1, p. 33 striata, see Strophe subdemissa, syn. for

subplana, see Strept subtenta, see Strept syrtalis, syn. for Cl tenuilineata, Conr Nat. Sci., vol. 8,

vol. 1, p. 115, Tr

tenuistriata, Sow tenuistriata,) M

and Pal. N. Y., textilis, see Stropho thalia, see Strepton transversalis, see Le trilobata, Owen, 18

Geo. Sur. Wis., Trenton Gr.

tullia, Billings, 18 29, Low. Devon undulata, syn. for

STR.

STR.-SYN.]

onta inæqui-

STR.

inta inæquio. 4th Dist.

wuta. ss., vol. 2, p.

Geo. Rep.

ss, vol. 1, p. Mid. Sil. . Rep. Geo. Wis., vol. 4,

ichrymosa. **lep.** N. Y., p.

Geo., vol. 5,

nacrea. rymosa var.

semifasciata. onta magni-

identified by ist. N. Y., see

Rep. N. Y.,

mucronata. rea. Acad. Nat. n and Hud.

Acad. Nat. ined so as to

7, U. S. Geo. p. 233, Que-

erplana var.

rcy, syn. for

at. Geo., vol.

nutans. na obscura,) nton Gr. ptæna orthip. 62, Clin-

na patenta,) inton Gr. atersoni. mia pecten,) ot American. chus pectin-

erplana. n. Nat. Geo.,

nchus plano-

hus planum-

BRACHIOPODA.

Dal

man, 1827.

(Leptæna rugosa,)

Vet. Acad.

Handlinger,

p. 106, and Pal. N. Y.,

195, Niagara

vol.

3, p.

- plicata, syn. for Streptorhynchus subtentum.
- plicifera, Hall, 1847, (Leptæna plicifera,) Pal. N. Y., vol. 1, p. 19, Chazy Gr. pluristriata, syn. for Strophodonta per-
- plana. profunda, see Strophodonta profunda.

punctulifera, see Strophonella punctulifera. pustulosa, syn. for Productella truncata. radiata, see Streptorhynchus radiatum. recta, see Streptorhynchus rectum.

- rectilateris, syn. for Strophodonta varistriata.
- reticulata, Shaler, 1865, Bulletin No. 4, M. C. Z., Anticosti Gr. Not defined so as to be recognized.
- rhomboidalis, Wilckins, 1769, (Conchites rhomboidalis,) Nachrict von Seltenen Verst., p. 77. This species ranges from the Trenton Gr. to the Keokuk, regarding S. tenuistriata, S. depressa, and S. rugosa as varieties only. The type, however, is the Devonian form.

rugosa,

FIG. 623.—Strophomena rugosa

and Low. Held. Gr. This form is supposed to be the type of Rafinesque's genus Strophomena. The species is usually regarded as merely a variety of S. rhomboidalis. rugosa var. ventricosa, Hall, 1857, (S. depressa var. ventricosa,) 10th Rep. N. Y.

Mus. Nat. Hist., p. 53, and Pal. N. Y., vol. 3, p. 417, Oriskany sandstone.

- setigera, see Chonetes setigerus. semiovalis, Conrad, syn. for Leptæna sericea.
- semiovalis, Shaler. The name had been twice preoccupied.
- squamula, James, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 335, Hud. Riv. Gr.

striata, see Strophodonta striata. subdemissa, syn. for Strophodonta demissa. subplana, see Streptorhynchus subplanum. subtenta, see Streptorhynchus subtentum. syrtalis, syn. for Chonetes carinatus.

- tenuilineata, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 259, and Pal. N. Y.,
- vol. 1, p. 115, Trenton Gr. tenuistriata, Sowerby, 1839, (Leptæna tenuistriata,) Murch. Sil. Syst., p. 636, and Pal. N. Y., vol. 1, p. 108, Low. Sil. *textilis*, see Strophodonta junia.
- thalia, see Streptorhynchus thalia. transversalis, see Leptæna transversalis.
- trilobata, Owen, 1852, (Leptæna trilobata,) Geo. Sur. Wis., Iowa, and Minn., p. 584,
- Trenton Gr. tullia, Billings, 1874, Pal. Foss., vol. 2, p.
- 29, Low. Devonian. undulata, syn. for S. rhomboidalis.

- undulosa, Conrad, 1841, Ann. Rep. N. Y., p. 54, Low. Held. Gr.
- unicostata, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 335, Hud. Riv. Gr.
- varistriata, see Strophodonta varistriata. ventricosa, Shaler, (Brachyprion ventrico-sum.) The name was preoccupied.
- wisconsinensis, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis., p. 61, and Geo. Wis., vol. 4, p. 263, Hud. Riv. Gr.
- woolworthana, see Streptorhynchus woolworthanum.
- STROPHONELLA, Hall, 1879, 28th Rep. N. Y., Mus. Nat. Hist., p. 153. [Ety. diminutive of *strophos*, twisted.] Distinguished from Strophodonta by the resupinate character, the strong and more restricted muscular impression of the ventral valve and strong median septum of the dorsal valve; and from .Streptorhynchus by the cardinal process, the crenulations on the inner margins of the cardinal area, and the solid area, with sometimes a triangular deltidium. Type S. semifasciata.
- ampla, Hall, 1857, (Strophomena ampla,) 10th Rep. N. Y., Mus. Nat. Hist., p. 111, and Pal. N. Y., vol. 4, p. 93, Up. Held. Gr.
- cælata, Hall, 1867, (Strophodonta cælata,)
 Pal. N. Y., vol. 4, p. 112, Chemung Gr.
 cavumbona, Hall, 1857, (Strophodonta cavumbona,) 10th Rep. N. Y. Mus. Nat.
 Hist., p. 51, and Pal. N. Y., vol. 3, p. 187, Low. Held. Gr.
- leavenworthana, Hall, 1857, (Strophodonta leavenworthana,) 10th Rep. N. Y. Mus. Nat. Hist., p. 53, and Pal. N. Y., (vol. 3, p. 189, Low. Held. Gr.
- punctulifera, Conrad, 1838, (Leptæna punctulifera,) Ann. Rep. N. Y., p. 117, and Pal. N. Y., vol. 3, p. 188, Low. Held. Gr.



FIG. 624.—Strophonella punctulifera

- reversa, Hall, 1858, (Strophodonta reversa,) Geo. Rep. Iowa, p. 494, Ham. Gr. semifasciata, Hall, 1863, (Strophodonta semifasciata,) Trans. Alb. Inst., vol. 4, p. 210, Niagara Gr.
- SYNTRIELASMA, Meek & Worthen, 1865, Proc. Acad. Nat. Sci., p. 277. [Ety. syn, together; treis, three; elasma, plate.] Shell thin, gibbous; valves articulated by teeth and sockets; hinge-line short; area higher in the ventral valve than

BRACHIOPODA.



FIG. 625.-Syntrielasma hemiplicatum. 1, Dental laminæ; m, mesial septum

hemiplicatum, Hall, 1852, (Spirifera hemiplicata,) Stan.'s Ex. to Great Salt Lake, p. 409, Coal Meas.

SYRINGOTHYRIS, Winchell, 1863, Proc. Acad. Nat. Sci., p. 6. [Ety. syrinx, a tube; thyris, a window.] General aspect like Spirifera; shell substance fibrous and impunctate; beak extremely elevated; area of ventral valve large, with a narrow triangular fissure closed toward the apex by an external, convex pseudodeltidium, beneath which, and di-verging from it, is another transverse plate, connecting the vertical dental lamellæ, arched above, and beneath giving off a couple of median parallel lamellæ, which are incurved so as to nearly join their inferior edges, thus forming a slit-bearing tube, which projects into the interior of the shell. Type S. typus.

halli, Winchell, 1863, Proc. Acad. Nat.

Sci., p. 8, Marshall Gr. typus, Winchell, 1863, Proc. Acad. Nat. Sci. Phil., p. 7, Marshall Gr. TEREBRATULA; Llhwyd, 1699,



FIG. 626. - Terebratula maxillata.

Lith. Brit. Ichn. [Ety. diminutive of terebratus, perforated.] Shell variable in form, oval, elongated or transverse; smooth or plicated; valves unequally convex; hinge-

line curved; beak short, truncated by a foramen; deltidium in one or two pieces; loop short; confined to the posterior portion of the shell, not more than one-third the length of the valve, simply attached to a hinge plate; two ribbon-shaped lamellæ are united by a transverse lamella bent upward in the middle; the cirrated arms are supported by the crura, and project in front of the loop; no median septum in the socket valve. Type T. vitrea and T. maxillata.

acuminatissima, Castelnau, 1843, Syst. Sil., p. 40. Not recognized.

affinis, syn. for Atrypa reticularis.

aprinis, see Rhynchonella aprinis.

arcuata, Swallow, 1863, Trans. St. Louis Acad. Sci. The name was preoccupied by Roemer in 1840. See T. Shumardana.

argentea, see Athyris argentea. aspera, see Atrypa aspera.

bidentata, see Rhynchonella bidentata.

bisacula, McChesney, 1860, New Pal. Foss., p. 82, Kaskaskia Gr. Not recognized.

borealis, Castelnau, 1843, Syst. Sil., p. 40. Not recognized.

bovidens, Morton, 1836, Am. Jour. Sci., vol. 29, p. 150, Coal Meas.

brevirostris, see Rhynchonella brevirostris. brevilobata, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 84, Kaskaskia Gr.

burlingtonensis, White, 1860, Bost. Jour. Nat. Hist., p. 228, and Geo. Sur. W. 100th Mer., vol. 4, p. 93, Kinderhook Gr. concentrica, syn. for Athyris spiriferoides.

cooperensis, n. sp., Keokuk Gr. Proposed instead of T. parva, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 83, which name was preoccupied.



FIG. 627.-Terebratula bovidens.

- crenulata, Sowerby, 1840, (Atrypa crenulata,) Geo. Trans., 2d series, vol. 5, p. 704, Devonian.
- cuneata, see Rhynchonella cuneata. elia, Hall, 1867, Pal. N. Y., vol. 4, p. 390, Up. Held. Gr.
- formosa, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 6, and Bull. Am. Mus. Nat. Hist.,

p. 55. Warsaw Gr. geniculosa, syn. for Terebratula bovidens.

gracilis, Swallow, 1863, Trans. St. Louis

Acad. Sci. The name was preoccupied by Von Buch in 1834. See T. swallovana.

harmonia, Hall, 1867, Pal. N. Y., vol. 4, p.

388, Up. Held. Gr. inornata, McChesney, 1860, New. Pal. Foss. Carb.

insperata, Phillips, 1841, Pal. Foss., Devonian.

interplicata, see Anastrophia interplicata. jucunda, Hall, 1867, Pal. N. Y., vol. 4, p.

390, Up. Held Gr. lacunosa. Not American. lapillus, Morton, 1836, Am. Jour. Sci. and Arts, vol. 29, p. 149, Coal Meas.

lens, see Cryptonella lens.

laticosta, see Atrypa laticosta. lincklæni, see Cryptonella lincklæni.

lynx, see Orthis lynx.

marcyi, see Retzia marcyi.

TER.-TRE.]

marginalis, see A michelini, see Ortl millepunctata, syn mormoni, see Ret navicella, Hall, 1 391, Ham. Gr. nuciformis, Mort and Arts, vol. nucula, see Rhyn ontario, Hall, 18 418, Ham. Gr.

ovoides, see Renss parva, Swallow,

Acad. Sci., p. occupied by

Terebratula co pennata, see Spiri perinflata, Shum

Acad. Sci., vol. planirostra, see C rectirostra, see Cr reticularis, see A rockymontana, se montana.

roemingeri, Hall Mus. Nat. His

vol. 4, p. 389, 1 rowleyi, Worthe St. Mus. Nat. ton Gr.

sacculus, Martin Carb.

schlotheimi, see C shumardana, S. Am. Pal. Fos

Proposed inste 1863, Trans. St p. 83, which w

simulator, Hall, 391, Ham. Gr. spiriferoides, see

stricklandi, see I subretziaforma, Foss., p. 82, K

nized. subtilita, see Ath

p. 387, Up. He

swallovana, S. A Pal. Foss., p. posed instead

1863, Trans. St p. 83, which w

traversensis, W Penin. Mich.,

trinuclea, see At.

turgida, Hall, 18 4, p. 6, and B p. 54, Warsaw

uta, see Rhynch utah, Hall & W

Expl. 40th pa

verly Gr. valenciennei, Cas 39. Not recor

wilsoni, see Rhy Terebratulites, Sch ifera.

biforatus, see Or



[SYR.-TER.

TER.-TRE.]

michelini, see Orthis michelini.

mormoni, see Retzia mormoni.

ovoides, see Rensselæria ovoides.

Terebratula cooperensis.

pennata, see Spirifera pennata.

perinflata, Shumard, 1859, Trans St. Louis Acad. Sci., vol. 1, p. 392, Permian Gr.

roemingeri, Hall, 1863, 16th Rep. N. Y. Mus. Nat. Hist., p. 48, and Pal. N. Y.,

vol. 4, p. 389, Ham. Gr. rowleyi, Worthen, 1884, Bull. No. 2, Ill.

sacculus, Martin, 1809, Pethif. Derb., Low.

schlotheimi, see Camerophoria schlotheimi.

shumardana, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss., p. 299, Kaskaskia Gr. Proposed instead of T. arcuata, Swallow,

1863, Trans. St. Louis Acad. Sci., vol. 2,

sullivanti, Hall, 1867, Pal. N. Y., vol. 4,

swallovana, S. A. Miller, 1883, 2d Ed. Am.

Pal. Foss., p. 299, Kaskaskia Gr. Pro-

posed instead of T. gracilis, Swallow,

1863, Trans. St. Louis Acad. Sci., vol. 2,

traversensis, Winchell, 1866, Rep. Low.

turgida, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 6, and Bull. Am. Mus. Nat. Hist., p. 54, Warsaw Gr.

utah, Hall & Whitfield, 1877, U.S. Geo. Expl. 40th parallel, vol. 4, p. 258, Wa-

valenciennei, Castelnau, 1843, Syst. Sil., p.

Terebratulites, Schlotheim, syn. for Spir-

wilsoni, see Rhynchonella wilsoni.

p. 83, which was preoccupied. simulator, Hall, 1867, Pal. N. Y., vol. 4, p.

subtilita, see Athyris subtilita.

p. 83, which was preoccupied.

Penin. Mich., p. 95, Ham. Gr. trinuclea, see Athyris trinuclea.

uta, see Rhynchonella uta.

39. Not recognized.

biforatus, see Orthis biforata.

verly Gr.

ifera.

p. 387, Up. Held. Gr.

St. Mus. Nat. Hist., p. 23, Burling-

planirostra, see Cryptonella planirostra.

rectirostra, see Cryptonella rectirostra. feticularis, see Atrypa reticularis. rockymontana, see Rhynchonella rocky-

391, Ham. Gr.

418, Ham. Gr.

montana.

ton Gr.

Carb.

nized.

391, Ham. Gr.

43, Syst. Sil.,

laris. preoccupied a.

pidentata. w Pal. Foss., recognized.

brevirostris. Trans. St. 84, Kaskas-

eo. Sur. W.



idens.

trypa crenues, vol. 5, p.

neata. rol. 4, p. 390,

lb. Inst., vol. s. Nat. Hist.,

ila bovidens. ns. St. Louis preoccupied See T. swal-

Y., vol. 4, p.

- , New. Pal.
- I. Foss., De-

interplicata. Y., vol. 4, p.

our. Sci. and Meas.

cklæni.

BRACHIOPODA.

TREMATIS, Sharpe, 1848, Quar. Jour. Geo. Soc., vol. 13, p. 66. [Ety. trema, an opening.] Shell suborbicular or transversely oval, lenticular; valves unequally convex; umbo of the upper or dorsal valve submarginal, slightly projecting; lower or ventral valve with a subcentral umbo, behind which a nar-row, oblong, oval slit reaches to near the posterior margin, and afforded passage to the pedicle fibers of attachment; shell punctate in the outer layers, and parva, Swallow, 1863, Trans. St. Louis Acad. Sci., p. 83. The name was pre-occupied by d'Archiac in 1846. See fibrous and of a pearly luster within. Type T. terminalis.

cælata, see Obolella cælata.

cancellata, Sowerby, 1825, (Orbicula cancellata,) Zool. Jour., vol. 2, Trenton Gr. crassa, see Obolella crassa.

crassipuncta, Ulrich, 1889, Am. Geo., vol. 4, p. 22, Hud. Riv. Gr. dyeri, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol.

1, p. 347, Hud. Riv. Gr.

filosa, see Schizocrania filosa.

- fragilis, Ulrich, 1889, Am. Geo., vol. 4, p. 21, Utica Slate.
- huronensis, Billings, 1862, FIG. 628.-Tre-Pal. Foss., vol. 1, p. 53, matis dyeri. Black Riv. Gr.

montrealensis, Billings, 1862, Pal. Foss., vol. 1, p. 52, Trenton Gr.

millepunctata, Hall, 1866, 24th Rep. N. Y. Mus.

Nat. Hist., p. 221, Hud. Riv. Gr. oblata, Ulrich, 1889, Am.

Geo., vol. 4, p. 23, Hud. Riv. Gr.

pannulus, see Kutorgina pannulus.

- punctostriata, Hall & Whitfield, 1873, 23d Rep. N. Y. Mus. Nat. Hist., p. 243, Trenton and Hud. Riv. Gr.
- (?) pustulosa, Hall, 1866, 24th Rep. N. Y. Mus. Nat. Hist., p. 222, Hud. Riv. Gr. quincuncialis, Miller & Dyer, 1878, Cont.
- to Pal. No. 2, p. 8, Hud. Riv. Gr. rudis, Hall & Whitfield, 1873, 23d Rep. N. Y. Mus. Nat. Hist., p. 243, Tren-
- ton Gr.
- terminalis, Emmons, 1842, (Orbicula terminalis,) Geo. Rep. N. Y., p. 395, and Pal. N. Y., vol. 1, p. 100, Trenton Gr. umbonata, Ulrich, 1889, Am. Geo., vol. 4,
- p. 23, Hud. Riv. Gr. TREMATOSPIRA, Hall, 1859, 12th Rep. N. Y.
- Mus. Nat. Hist., p. 27. [Ety. trema, foramen; spira, a spire; in allusion to the perforation in the beak of the ventral valve.] Transverse, elliptical or subrhomboidal, inequivalve; mesial fold and sinus; surface plicated; internal spires, as in Spirifera; hinge-line short; cardinal angles rounded; valves articulated by teeth and sockets; beak of ventral valve produced or incurved.

spiriferoides, see Athyris spiriferoides. stricklandi, see Rhynchonella stricklandi. subretziaforma, McChesney, 1860, Pal. tata. subretziaforma, McChesney, 1860, Pal. Foss., p. 82, Kaskaskia Gr. Not recog-

ottawensis, Billings, FIG. 629. - Tremamillepunc-1862, Pal. Foss., vol. 1, p. 53, Trenton Gr.



rinis. ns. St. Louis Shumardana.

t. Sil., p. 40,

a. Jour. Sei.,

Bost. Jour.

aderhook Gr. spiriferoides. r. Proposed allow, 1863, , vol. 2, p. 83, ied.



marginalis, see Atrypa marginalis. millepunctata, syn. for T. bovidens. navicella, Hall, 1867, Pal. N.Y., vol. 4, p. nuciformis, Morton, 1836, Am. Jour. Sci. and Arts, vol. 29, p. 149, Coal Meas. nucula, see Rhynchonella nucula. ontario, Hall, 1867, Pal. N. Y., vol. 4, p.

BRACHIOPODA.

and truncated by a small, round perforation, separated from the hinge-line by a deltidium; deep, triangular pit beneath the beak of the ventral valve, which is filled by the closely incurved beak of the dorsal valve; structure punctate. Type T. costata and T. multistriata.



FIG. 630.-Trematospira acadiæ. acadiæ, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 144, Up. Sil. Hall, 1852. camura,

(Atrypa camura,) Pal. N. Y., vol. 2, p. 273, Low. Held. Gr.

costata, Hall, 1859, Pal. N. Y., vol. 3, p.

210, Low. Held. Gr. deweyi, see Rhynchospira deweyi.

- formosa, see Rhynchospira formosa.
- gibbosa, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 82, and Pal. N. Y., vol. 4, p. 272, Ham. Gr.
- globosa, Hall, 1857, 10th Rep. N.Y. Mus. Nat. Hist., p. 87, and Pal. N. Y., vol. 3, p. 215,(Waldheimiaglobosa,)Low.Held.Gr.
- granulifera, Meek, 1872, Proc. Acad. Nat. Sci. Phil., p. 318, and Ohio Pal., vol. 1, p. 128, Hud. Riv. Gr.
- hirsuta, Hall, 1857, (Atrypa hirsuta,) 10th Rep. N. Y. Mus. Nat. Hist., p. 168, and Pal. N. Y., vol. 4, p. 274, Up. Held. and Ham. Gr.
- imbricata, Hall, 1857, (Leptocœlia imbri-cata,) 10th Rep. N. Y. Mus. Nat. Hist., p. 108, and Pal. N. Y., vol. 3, p. 246, Low. Held. Gr.

infrequens, Walcott, 1885, Mongr. U. S. Geo. Sur., vol. 8, p. 151, Lower Devonian. mathewsoni, McChesney, 1861, New Pal.

Foss., p. 71, Niagara Gr. multistriata, Hall, 1857, (Spirifer multi-striatus,) 10th Rep. N. Y. Mus. Nat.

Hist., p. 59, Low. Held. Gr.

Iniuscula, Winchell, 1866, Rep. Low.
Peninsula Mich., p. 94, Ham. Gr.
(?) nobilis, Hall, 1860, (Rhynchospira nobilis,) 13th Rep. N. Y. Mus. Nat. Hist., p. 83, Ham. Gr. perforata, Hall, 1857, (Spirifera perforata,)

- 10th Rep. N. Y. Mus. Nat. Hist., p. 60, Low. Held. Gr.
- (f) quadriplicata, see Rhynchotreta quadriplicata.
- tirostris, Hall, 1856, (Waldheimia rec-tirostra,) 10th Rep. N. Y. Mus. Nat. Hist., p. 49, and Pal. N. Y., vol. 3, p. 217, Low. Held. Gr.

simplex, Hall, 1856, Pal. N. Y., vol. 3, p. 211, Low. Held. Gr.

Trigonotreta, Konig, 1825, Icon. Foss. Sect., p. 3. [Ety. trigonos, a triangle; tretos, perforated.] Syn. for Spirifera. Meek, concluding that S. cuspidatus men-tioned by Sowerby in Minn. Conch., vol. 2, p. 42, should be considered as the type of Spirifera, proposed to retain Trigonotreta for shells of the type of S. striata, contrary to the views of most authors. See Pal. Up. Mo., p. 18. TRIMERELLA, Billings, 1862, Pal. Foss., vol. 1, p. 166. [Ety. treis, three; meros, part; ella, diminutive.] Large subovate or subcircular; valves convex;



FIG. 631.-Trimerella grandis. Cast of dorsal valve.

shell thick, and surface concentrically striated; area of pedicle valve longer than wide; deltidium large; hinge thick, elevated, rudely or slightly dentary; cardinal facet large; crescent well defined; platforms elevated and doubly vaulted, occasionally solid and slightly raised; median plate in both valves, longest in the brachial one. Type T. grandis.



FIG. 632.—Trimerella grandis. Cast of ventral valve.

acuminata, Billings, 1862, Pal. Foss., vol. 1, p. 167, Guelph Gr. billingsi, Dall, 1871, Am. Jour. Conch.,

ol. 7, p. 82, Guelph Gr.

TRI.-WAL.]

TRI.

dalli, Davidson d Meeting Brit. A Geo. Soc., 1874,



FIG. 633. Trimere galtensis.

vol. 1, p. 315, a 183, Niagara G TRIPLESIA, Hall,



Mus. Nat. Hist thrice; in all character of the verse or elonga lobate; ventral and dorsal, has fold; hinge-line foramen triang trically striated strong tooth on e muscular impr valve with a p cardinal proce which there is rected obliquel Type T. extans congesta, Conrad,

Jour. Acad. Na Pal. N. Y., vol. cuspidata, Hall, 1 Pal. N. Y., vol.



extans, Emmons, Geo. Rep. 2d I Pal. N. Y., vol. lateralis, Whitfiel Nat. Hist., vol.

TRI.-WAL.]

FIG. 633.

galtensis.

. Foss., vol. iree; meros, Large suboves convex; ely striated :

TRI.



st of dorsal

mcentrically valve longer arge; hinge slightly dene: crescent levated and ly solid and ate in both achial one.



st of ventral l. Foss., vel. our. Conch., BRACHIOPODA.

dalli, Davidson & King, 1872, Brighton Meeting Brit. Assoc., and Quar. Jour. Geo. Soc., 1874, p. 154, Guelph Gr.

galtensis, Billings, 1862.(Obolus galtensis,) Pal. Foss., vol. 1, p. 168, Guelph Gr. grandis, Billings, 1862, Pal. Foss., vol. 1, p. 166, Guelph Gr. minor, Dall, syn. for

T. galtensis. ohioensis, Meek,

- Trimerella 1871, Am. Jour. Sci., 2d series,

vol. 1, p. 315, and Ohio Pal., vol. 1, p. 183, Niagara Gr. TRIPLESIA, Hall, 1858, 12th Rep. N. Y.



FIG. 634.-Triplesia extans.

Mus. Nat. Hist., p. 44. [Ety. triplasios, thrice; in allusion to the trilobate character of the shell.] Shell transverse or elongate, trilobate or subtrilobate; ventral valve deeply sinuous and dorsal, having a corresponding fold; hinge-line straight; area small; foramen triangular; surface concentrically striated; ventral valve with a strong tooth on each side of the fissure; muscular impressions small; dorsal valve with a prominent bifurcating cardinal process, on each side of which there is a brachial process directed obliquely inward and laterally. Type T. extans.

congesta, Conrad, 1842, (Atrypa congesta,) Jour. Acad. Nat. Sci., vol. 8, p. 265, and Pal. N. Y., vol. 2, p. 67, Clinton Gr. cuspidata, Hall, 1847, (Atrypa cuspidata,)

Pal. N. Y., vol. 1, p. 138, Trenton Gr.



FIG. 635.-Triplesia ortoni.

extans, Emmons, 1842, (Atrypa extans,) Geo. Rep. 2d Dist. N. Y., p. 395, and Pal. N. Y., vol. 1, p. 137, Trenton Gr. lateralis, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 303, Birdseye Gr.

nucleus, Hall, 1847, (Atrypa nucleus,) Pal. N. Y., vol. 1, p. 138, Trenton Gr. ortoni, Meek, 1872, (Dicraniscus ortoni,)

- Am. Jour. Sci. and Arts, 3d ser., vol. 4, p. 280, and Ohio Pal., vol. 1, p. 178, Niagara Gr.
- Geo. Sur. Wis., p. 51, and Geo. Wis., vol. 4, p. 172, Potsdam Gr. putillus, Hall, syn. for T. waldronensis.
- radiata, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 43, Calciferous Gr. waldronensis, Miller & Dyer, 1878, (Spirifera ? waldronensis,) Jour. Cin. Soc.
- Nat. Hist., vol. 1, p. 37, Niagara Gr. TROPIDOLEPTUS, Hall, 1857, proposed in 10th Rep., but described in 1859 in 12th Rep. N. Y. Mus. Nat. Hist., p. 31. [Ety. tropis, the keel or bottom of a ship; leptos, slender.] General form of Strophomena; surface plicated; structure punctate; ventral valve convex, with an area and wide fissure beneath the beak; dental lamellæ distinct from the margin of the fissure, crenulate; dorsal valve concave, with crenulate dental fossets; a strong, cardinal process, with diverging lobes in the interior, which support slender crura that converge to and unite with the median crest. Type T. carinatus.



FIG. 636.-Tropidoleptus carinatus.

carinatus, Conrad, 1839, (Strophomena carinata,) Ann. Geo. Rep. N. Y., p. 64, and Pal. N. Y., vol. 4, p. 407, Ham. Gr. occidens, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 91, and Pal. N. Y.,

vol. 4, p. 408, Ham. Gr. VITULINA, Hall, 1860, 13th Rep. N. Y. Mus.

Nat. Hist., p. 72. [Ety. mythological name.] Externally it is like Leptocœlia, but distinguished by its strong dental lamellæ and processes. Type V. pustulosa. pustulosa, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 72, and Pal. N. Y., vol. 4, p. 410, Tully limestone.

WALDHEIMIA, King, 1849, Mon-ograph of Permian Fossils, p. 145. [Ety. proper name.] Shell circular, subquadrate, transverse or

elongated; valves unequally convex. smooth, or plicated; beak truncated, perforated; deltidium in one or two pieces; loop long, formed of lamellæ attached by the crura to the hinge

BRACHIOPODA.



FIG. 637.—Waldheimia australis. Dorsal valve; *f*, cardinal process; *t*, dental sockets; *p*, hinge plate; *s*, septum; *c*, crura of the loop; *l*, re-flected portion of the loop; *m*, quadruple adductor impression. Ventral valve; *f*, fora-men; *d*, deltidium; *l*, teeth; *a*, single adductor impression: *x*, cardinal muscle; *x*, accessory muscles; *p*, pedicle muscles; *v*, position of the vent; *z*, attachment of pedicle sheath.

compacta, White & St. John, 1868, Trans.

Chi. Acad, Sci., p. 119, Up. Coal Meas. deweyi, see Retzia deweyi. formosa, see Retzia formosa. dobosa, see Trematospira globosa.

rectirostra, see Trematospira rectirostra.

WHITFIELDIA, Davidson, 1881, Lond. Geo. Mag., vol. 8, p. 289. [Ety. proper name.] While Meris-

Wald-FIG. 638 heimia australis.

tella is distinguished from Merista by having no shoe-lifter process; Whitfieldia is distinguished from both by the absence of those peculiar ring-shaped processes attached to the loop, and has instead only a short, bifurcating process, where in Merista and Meristella the rings are formed. These internal differences in the spirals seem to distinguish the genera. Type W. tumida.

maria, Hall, 1863, (Meristella maria,) Trans. Alb. Inst., vol. 4, p. 212, Niagara Gr.

WHI.-ZYG.



FIG. 639.—Whitfielda maria. Internal casts.

- ZYGOSPIEA, Hall, 1862, 15th Rep. N. Y. Mus. spira, spire.] General form of Atrypa with internal spires having a broad loop passing from the outer limbs of the spiral band entirely across from side to side, near to or above the center, and close to the inner side of the dorsal valve. Type Z. modesta. concentrica, Ulrich, 1879, Jour. Cin. Soc.
 - Nat. Hist., vol. 2, p. 14, Hud Riv. Gr. headi, Billings, 1862, (Athyris headi,) Pal. Foss., vol. 1, p. 147, Hud. Riv. Gr.
 - headi var. anticostiensis, Billings, 1862, (Athyris headi var. anticostiensis,) Pal. Foss., vol. 1, p. 147, Hud. Riv. Gr.
- headi var. borealis, Billings, 1862, (Athyris
- headi var. borealis,) Pal. Foss., vol. 1, p. 147, Hud. Riv. Gr. headi, Meek, see Glassia headi.
- minima, Hell, 1879, Desc. New Spec. Foss., p. 14, and 11th Rep. Geo. and Nat. Hist. Ind., p. 305, Niagara Gr. modesta, Say, 1847, (Atrypa modesta,) Pal. N. Y., vol. 1, p. 141, Trenton and Hund Pig. Ce.
- Hud. Riv. Gr.
- modesta var. cincinnatiensis, Meek, 1872, Pal. Ohio, vol. 1, p. 126, Hud. Riv. Gr.
- pauper, Billings, 1866, Catal. Sil. Foss. Antic., p. 46, An- rospira mo-
- ospira mo-desta. ticosti Gr. subconcava, Meek & Wor-then, 1868, Geo. Sur. Ill., vol. 3, p. 380,
- Low. Held. Gr.

THE Class Pt with a pair of fins open sea. The li Thecosomata. Т numbers that they have either straig very beautiful. I belong to this orde

> FAMILY ASPI FAMILY CLAT FAMILY CONT FAMILY HY Hvolithes FAMILY MAT: FAMILY PTER FAMILY SCEN FAMILY TENT

ASPIDELLA, Billings,

3ď

Foss

aspi

Sma

narr

it is

ther



groo ig. 641. — Aspidella terranovi-FIG. bord vica. terrand

Am. Jour. Sci., : Foss., wol. 2, p. Camerotheca, Matthew vol. 1, p. 149, sy gracilis, see Hyolitl CLATHROCCELIA, Hall 5, pt. 2, p. 203. koilia, belly.] A expanding more than the other unsymmetrical, a longitudinal one cellated aspect ; lamellose. Type eborica, Hall, 1879 2, p. 204, Ham. (Clioderma, Hall, syn.

attenuata, see Pterc expansa, see Pterot!



388

ASP. COL.

WHI.-ZYG

ASP. COL.]

naria,) Trans.



ternal casts.

p. N. Y. Mus. zygos, yoke; m of Atrypa ing a broad iter limbs of across from ve the center, of the dorsal

ur. Cin. Soc. Iud Riv. Gr. s headi,) Pal. Riv. Gr. illings, 1862, stiensis,) Pal. Riv. Gr. 1862, (Athyris Foss., vol. 1,

di. New Spec. p. Geo. and agara Gr. a modesta,) Trenton and



FIG. 640.-Zvg ospira desta.

vol. 3, p. 380,

PTEROPODA.

CLASS PTEROPODA.

THE Class Pteropoda consists wholly of marine animals of small size, furnished with a pair of fins at the sides of the head, by means of which they swim in the open sea. The living forms are divided into two orders: the Gymnosomata and Thecosomata. The Gymnosomata have no shells, and occur in such prodigious numbers that they furnish food for whales and many sea-birds. The Thecosomata have either straight or coiled shells, some of which are glassy in their texture and very beautiful. It may well be doubted whether or not any of the Palæozoic fossils belong to this order. They are referred to the following families:

FAMILY ASPIDELLIDÆ.—Aspidella.

FAMILY CLATHROCCELIIDÆ-Clathroccelia.

FAMILY CONULARIIDÆ. -Conularia.

Coleoprion, Diplotheca, Hyolithellus, FAMILY HYOLITHIDÆ.—Coleolus, Hyolithes, Pharetrella, Stenotheca.

tudinally

FAMILY MATTHEVIDÆ.—Matthevia.

FAMILY PTEROTHECIDÆ.—Pterotheca,

FAMILY SCENELLIDÆ.—Scenella.

FAMILY TENTACULITIDÆ.—Styliola, Tentaculites.

Aspidella, Billings, 1872, Am. Jour. Sci., | Coleolus, Hall, 1879, Pal. N. Y., vol. 5, pt.



IG. 641. — Aspidella FIG.

3d ser., vol. 3, and Pal. Foss., vol. 2, p. 76. [Ety. aspidella, little shield.] aspidella, shield.] Small, ovate, bordered by a narrow ring within which it is concave; in the middle there is a ridge, from which grooves radiate to the border. Type A. terrano-

terranovivica. terranovica, Billings, 1872, Am. Jour. Sci., 3d ser., vol. 3, and Pal. Foss., vol. 2, p. 77, Taconic.

Camerotheca, Matthew, 1885, Can. Rec. Sci., vol. 1, p. 149, syn. for Hyolithes. gracilis, see Hyolithes gracilis.

- CLATHROCCELIA, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 203. [Etv. clathro, latticed; koilia, b-lly.] An oblique conical tube, expanding more rapidly on one side than the other; interior crossed by unsymmetrical, arching, septal lines and longitudinal ones, which give it a can-cellated aspect; shell thin, translucent,
- lamellose. Type C. eborica. eborica, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 204, Ham. Gr.

Clioderma, Hall, syn. for Pterotheca. attenuata, see Pterotheca attenuata. expansa, see Pterotheca expansa.

2, p. 184. [Ety. koleos, sheath.] Tubuliform, elongate-conical, straight or slightly curved, annulated, sometimes obliquely,

FIG 642.-Coleolus sometimes longiacicula. stri-

ated, interior smooth. Type C. tenuicinctus.

- acicula, Hall, 1843, (Orthoceras acicula.) Geo. Sur. 4th Dist. N. Y., p. 243, and Pal. N. Y., vol. 5, pt. 2, p. 187, Genesee Slate.
- aciculatus, Hall, 1860, (Dentalium acicula-tum,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 107, Marcellus Shale and Portage Grs
- crenatocinctus, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 188, Up. Held. Gr. gracilis, Hall, 1879, Pal. N. Y., vol. 5,
- pt. 2, p. 190, Chemung Gr. herzeri, Hall, 1888, Pal. N. Y., vol. 7, p.
- 7. Waverly Gr.
- lævis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 199, Devonian. mohri, Hall, 1879, Pal. N. Y., vol. 5, pt.
- 2, p. 189, Up. Held. Gr. spinulus, Hall, 1879, Desc. New Spec. Foss., p. 18, and 11th Rep. Geo. and Nat. Hist. Ind., p. 322, Niagara Gr.

tenuicinctus, Hall, 1876, (Coleoprion tenuicinctum,) Illust. Devon. Foss., pl. 27, Ham. Gr.

- COLEOPRION, Sandberger, 1847, Leonhardt & Bronn, Jahrbuch, vol. 1, p. 25. [Ety. koleos, sheath; prion, saw.] Tubuliform, appearing as an elongate cone, encircled by oblique annulations, which are interrupted along a longitudinal line, and attenuate at their extremities; internal
 - walls smooth. Type C. gracilis. minutum, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 85, Trenton Gr. tenue, Hall, 1879, Pal. of N. Y., vol. 5, pt.

2, p, 184, Ham. Gr.

- tenuicinctum, see Coleolus tenuicinctus. CONULARIA, Miller, 1821, in Sowerby's Minn.
- Conch., vol. 3, p. 107. [Ety. conulus, little cone.] Elongate pyramidal; transverse section varying from quadrangular to octagonal; angles indented by longitudinal grooves; septum near the apex ; surface reticulated and ornamented. Type C. quadrisulcata. asperata, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 21, Hud. Riv. Gr. bifurca, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 18. Not properly defined.
- byblis, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 22, Waverly Gr.
- cayuga, Hall, 1876, Illust. Devonian Foss pl. 28, and Pal. N. Y., vol. 5, pt. 2, p. 211, Ham. Gr. chesterensis, Worthen, 1883, Geo. Sur.
- Ill., vol. 7, p. 325, Kaskaskia Gr. congregata, Hall, 1876, Illust. Devonian Foss., pl. 28, and Pal. N. Y., vol. 5, pt.
- 2, p. 214, Portage Gr. continens, Hall, 1876, Illust. Devonian Foss., pl. 28, and Pal. N. Y., vol. 5, pt. 2, p. 212, Marcellus Shale.
- continens var. rudis Hall, 1879, Pal. N. Y., vol. 5, pt. 2, pl. 28, Ham. Gr. crawfordsvillensis, Owen, 1862, Geo. Sur.
- Ind., p. 362, Keokuk Gr.
- crebristriata, Hall, 1876, Illust. Devonian Foss., pl. 29, and Pal. N. Y., vol. 5, pt. 2, p. 210, Ham. Gr.
- crustula, White, 1880, 12th Rep. U. S. Geo. Sur. Terr., p. 170, Coal Meas.
- elegantula, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 85, and Ohio Pal., vol. 1, p. 288, Up. Held. Gr.
- formosa, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 38, Hud. Riv. Gr.
- gattingeri, Safford, 1869, Geo. of Tenn., p. 289, Trenton Gr. gracilis, Hall, 1847, Pal. N. Y., vol. 1, p.
- 224, Trenton Gr.
- granulata, Hall, 1847, Pal. N. Y., vol. 1, p. 223, Trenton Gr.
- hudsoni, Emmons, 1856, Am. Geo., vol. 1, p. 208, Hud. Riv. Gr.
- huntana, Hall, 1859, Pal. N. Y., vol. 3, p. 348, Low. Held. Gr.
- indentata, Conrad, 1854, Proc. Acad. Nat. Sci., vol. 7, p. 31, Trenton Gr.

[COL.-CON.

- infrequens, Hall, 1879, Desc. New Spec. Foss., p. 17, and 11th Rep. Geo. and Nat. Hist. Ind., p. 321, Niagara Gr.
 laqueata, Conrad, 1841, Ann. Rep. N. Y., p. 57, Niagara Gr.
- V lata, Hall, 1859, Pal. N. Y., vol. 3, p. 479. Oriskany sandstone. longa, Hall, 1852, Pal. N. Y., vol. 2, p.
 - 295, Niagara Gr.
- magnifica, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 58, Niagara Gr.
- marionensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 656, Ham. Gr. micronema, Meek, 1871,

Proc. Acad. Nat. Sci.

Phil., p. 84, and Ohio Pal., vol. 2, p. 316, Waverly Gr. missouriensis, Swallow, 1860, Trans. St. Louis

Acad. Sci., vol. 1, p. 657, and Geo. Sur. Ill., vol. 5, p. 541, St. Louis Gr. White, 1876,

- molaris, White, 1876, Proc. Acad. Nat. Sci., p. 33, Devonian.
- multicostata, Meek & Wall Worthen, 1865, Proc. FIG. 643.—Conula-Acad. Nat Sci., p. 252, ria micronema. Waverly Gr.
- multipuncta, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 18. Not properly defined.
 - newberryi, Winchell, 1865. Proc. Acad. Nat. Sci., p. 130, Waverly Gr.
 - niagarensis, Hall, 1852, Pal. N. Y., vol. 2, p. 294, Niagara Gr.
 - osagensis, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 98, Kaskaskia Gr.
 - papillata, Hall, 1847, Pal. N.Y., vol. 1, p. 223, Trenton Gr. planocostata, Dawson, 1868,
- Acad. Geol., p. 307, Carb. pyramidalis, Hall, 1859, Pal. N. Y., vol. 3, p. 347, Low. Held. Gr. FIG. 644. Conularia quadri-
- quadrata, Walcott, 1876, 28th Y. St. Mus. Nat. Hist., p. 93, sulcata. Rep. N. Trenton Gr.
- quadrisulcata, (?) Miller, 1821, Min. Conch., vol. 3, p. 107, Niagara Gr. rugosa, Spencer, 1884, Bull. No. 1, Mus.
- Univ. St. Mo., p. 59, Niagara Gr.
- splendida, Billings, 1866, Catal. Sil. Foss. Antic., p. 21, Hud. Riv. Gr.
- Subcarbonaria, Meek & Worthen, 1865, Proc. Acad. Nat. Sci., p. 253, and Geo. Sur. Ill., vol. 5, p. 520, Keokuk Gr. subulata, Hall, 1858, Trans. Alb. Inst.
- vol. 4, p. 32. and Bull. Am. Mus. Nat. Hist., p. 91, Warsaw Gr.
- transversa, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 19, Niag-ara Gr.

DIP.-HYO.]

trentonensis, Hal 1, p. 222, Tren triplicata, Swallo Acad. Sci., vol undulata, Conrad

p. 57, and Pal. 208, Ham. Gr. verneuilana, Emi Jour. Agr. and

carboniferous. victa, White, 186 Hist., vol. 9, p whitii, Meek &

Acad. Nat. Sci. wilkinsi, Spencer

Univ. St. Mo., DIPLOTHECA, Matth and Arts, 3d se diploos, double der, conical, sec

septa dividing cavity separate thin partition, transverse sep Hyolithes by ing, and by a where it has th septa. Type D acadica, Matthew

and Arts, 3d John Gr.

and Arts, 3d s John Gr.

hyattana var. ca Am. Jour. Sci. 30, p. 294, St. J HYOLITHELLUS, Bil and Geol, vol. (Sci. and Arts, [Ety. diminuti tinguished fron slender form an

mi



FIG. 645.-Hyolithellus micans. Terminal portion enlarged.

the base to an i side usually mo tral, and often aperture usually on the ventral s having 'arching Type H. acutus



COL.-CON.

. New Spec. p. Geo. and gara Gr. , Rep. N. Y.,

701. 3, p. 479,

7., vol. 2, p.

Bull. No. 1. 58, Niag-

Trans. St. 56, Ham. Gr.



G.'643.-Conulaa micronema

36, Bull. Buf. 3. Not prop-

ichell, 1865, t. Sci., p. 130,

l, 1852, Pal. p. 294, Niag-

v, 1863, Trans. . Sci., vol. 2, ia Gr. 147, Pal. N. Y., Trenton Gr. awson, 1868, 307, Carb. ll, 1859, Pal. p. 347, Low.

tt, 1876, 28th . Hist., p. 93,

1821, Min. gara Gr. . No. 1, Mus. ıgara' Gr. atal. Sil. Foss. Gr. Vorthen, 1865, 253, and Geo. Keokuk Gr. 18. Alb. Inst. m. Mus. Nat.

386, Bull. Buf. p. 19, NiagPTEROPODA.

trentonensis, Hall, 1847, Pal. N. Y., vol. 1, p. 222, Trenton and Hud. Riv. Grs. triplicata, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 657, Ham. Gr. undulata, Conrad, 1841, Ann. Rep. N. Y.,

DIP.-HYO.]

- p. 57, and Pal. N. Y., vol. 5, pt. 2, p. 208, Ham. Gr.
- verneuilana, Emmons, 1846, Am. Quar. Jour. Agr. and Sci., vol. 4, p. 330. Subcarboniferous.
- victa, White, 1862, Proc. Bost. Soc. Nat.
- Hist., vol. 9, p. 22, Burlington Gr. whitii, Meek & Worthen, 1865, Proc. Acad. Nat. Sci., p. 253, Waverly Gr. wilkinsi, Spencer, 1884, Bull. No. 1, Mus.
- Univ. St. Mo., p. 59, Niagara Gr.
- DIPLOTHECA, Matthew, 1885, Am. Jour. Sci. and Arts, 3d ser., vol. 30, p. 293. [Ety. diploos, double; Theca, a genus.] Slender, conical, section triangular; internal septa dividing it in segments; body cavity separated from one side by a thin partition, supported by delicate transverse septa; distinguished from Hyolithes by more rapidly expanding, and by a firmer, rounder side, where it has the support of the lateral septa. Type D. acadica. acadica, Matthew, 1885, Am. Jour. Sci.
- and Arts, 3d ser., vol. 30, p. 294, St. John Gr.
- hyattana, Matthew, 1885, Am. Jour. Sci. and Arts, 3d ser., vol. 30, p. 294, St. John Gr.
- hyattana var. caudata, Matthew, 1885, Am. Jour. Sci. and Arts, 3d ser., vol. 30, p. 294, St. John Gr.
- HYOLITHELLUS, Billings, 1871, Can. Nat. and Geol, vol. 6, p. 240, and Am. Jour. Sci. and Arts, 3d ser., vol. 3, p. 360. [Ety. diminutive of Hyolithes.] Distinguished from Hyolithes by its long, slender form and structure of the operculum. Type H. micans.

micans, Billings, 1871, Can. Nat. and Geol., vol. 6, p. 240, and Am. Jour. Sci. and Arts., 3d ser., vol. 3, p. 354, Up. Taconic.

micans var. rugosa, Walcott, 1887, Am. Jour. Sci. and Arts, 3d ser., vol. 34,

p. 191, Up. Taconic. HyoLITHES, Eichwald, 1840, Sil. Schicht. Syst. in Ehstl., p. 97. Appar-ently the internal casts of tubes forming an elongate, subtriangular pyramid; lateral margins

acute and tapering from the base to an acute extremity; dorsal side usually more convex than the ventral, and often longitudinally sinuate; aperture usually oblique and extended on the ventral side; surface smooth, or having arching or transverse striæ. Type H. acutus.

FIG. 645.-Hyoli-

thellus micans.

Terminal por-tion enlarged.

- aclis, Hall, 1876, Illust. Devonian Foss. pl. 27, and Pal. N. Y., vol. 5, pt. 2, p. 197. Ham. Gr.
- aculeatus, Hall, 1860, (Theca aculeata,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 107, Kinderhook Gr.
- americanus, Billings, 1871, (Theca trian-gularis,) Hall, Can. Nat. and Geol., vol. 6, p. 213, Up. Taconic.
- baconi, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 77, and Geo. Wis., vol. 4, p. 225, Trenton Gr.
- carbonaria, Walcott, Monogr. U. S. Geo.
- Sur., vol. 8, p. 264, Subcarboniferous. centennialis, Barrett, 1877, Ann. Lyc. Nat. Hist., vol. 11, p. 299, Low. Held. Gr.
- communis, Billings, 1871, Can. Nat. and Geol., vol. 6, p. 213, Up. Taconic. danianus, Matthew, 1884, Bull. U. S. Geo.
- Sur., vol. 2, p. 283, St. John Gr.
- emmonsi, Ford, 1873, Am. Jour. Sci., 3d ser., vol. 5, p. 214, Up. Taconic. excellens, Billings, 1874, Pal. Foss., vol.
- 2, p. 70, Up. Taconic.
- gibbosus, Hall & Whitfield, 1873, 23d Rep. N. Y. St. Mus. Nat. Hist., p. 242, Potsdam Gr.
- gracilis, Matthew, 1885, (Camerotheca gracilis,) Can. Rec. Sci., vol. 1, p. 149, St. John Gr.
- gregarius, Meek & Hayden, 1861. Proc. Acad. Nat. Sci. Phil, p. 436, and Pal. Up. Mo., p. 5, Potsdam Gr. heros, Hall, 1888, Pal. N. Y., vol. 7, p. 7,
- Low. Held. Gr.
- impar, Ford, 1872, Am. Jour. Sci., 3d ser., vol. 3, p. 419, Up. Taconic.
- ligea, Hall, 1863, (Theca ligea,) 15th Rep. N. Y. St. Mus. Nat. Hist., p. 62, and Pal. N. Y., vol. 5, pt. 2, p. 195, Up. Held. Gr.
- micans, see Hyolithellus micans.
- micmac, Matthew, 1884, Bull. U. S. Geo. Sur., vol. 2, p. 283, St. John Gr.
- neapolis, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 56, Portage Gr. parviusculus, Hall, 1862, (Theca parvius-
- cula,) Geo. Rep. Wis., p. 425, Hud. Riv. Gr.

primordialis, Hall, 1861, (Theca primordialis,) Geo. Rep. Wis.,

- p. 48, and Geo. Wis., vol. 4, p. 175, Potsdam Gr. princeps, Billings, 1871,
- Can. Nat. and Geol., vol. 6, p. 213, and Am. Jour.
- Sci. and Arts, 3d ser., vol. 3, p. 355, Up. Ta-
- conic. principalis, Hall, 1876, Il-
- Inst. Devonian Foss., pl.
 27, and Pal. N. Y., vol.
 5, pt. 2, p. 196, Scho-litthes primor-dialis.
 shaleri, Walcott, 1885, Bull.
 U.S. Construction of the second scheme and sch
- U. S. Geo. Sur., p. 283, Up. Taconic. singulus, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 202, Ham. Gr.





392

subimbricatus, Ringueberg, 1888, Proc. Acad. Nat. Sci. Phil., p. 135, Niagara Gr.

triliratus, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 201, Ham. Gr.

vanuxemi, Walcott, 1885, Monogr. U. S.

Geo. Sur., vol. 8, p. 85, Chazy Gr. MATTHEVIA, Walcott, 1885, Am. Jour. Sci. and Arts, 3d ser., vol. 30, p. 17. [Ety. proper name.] Shell conical; aperture sinuous, transverse section, ovate, elliptical or rounded subquadrate; two elongate interior chambers, diverging from the apex, open into the terminal chamber, and are crossed by "a single

imperforate septum; surface papillose; operculum calcareous. nucleus excentric, lines of growth concentric. Type M. variabilis. variabilis, Walcott,

1885, Am. Jour. Sci. and Arts, 3d

ser., vol. 30, p 18, Calciferous Gr. PHARETRELLA, Hall, 1888, Pal. N. Y., vol. 7, p. 7. Shell large, elongate, Hyolitheslike in outline; apex acute; surface or-namented with transverse, undulating

FIG. 647.-Matthevia

variabilis.

striæ. Type P. tenebrosa. tenebrosa, Hall, 1888, Pal. N. Y., vol. 7, p.

7, Genesee Slate.

- PTEROTHECA, Salter, 1852, Rep. Brit. Ass'n, p. 61. [Ety. pteron, wing; Theca, a genus.] Shells arcuate, somewhat calyptræform, subtriangular, or oval; apex marginal and incurved on the same plane, carinate upon the back, abruptly and broadly expanding, with the anterior margin sinuate; interior concave, shallow; a concave, shelly partition covers the posterior half of the cavity. Type P. transversa
 - anatiformis, Hall, 1847, (Tellinomya anatiformis,) Pal. N. Y., vol. 1, p. 154, Trenton Gr.
 - attenuata, Hall, 1861, (Clioderma attenu-ata,) 14th Rep. N. Y. St. Mus. Nat. Hist., p. 98, Trenton Gr.
 - canaliculata, Hall, 1861, (Cleioderma ca-naliculata,) 14th Rep. N. Y. St. Mus. Nat. Hist., p. 97, Trenton Gr.
 - expansa, Emmons, 1842, (Delthyris expansus,) Geo. Rep. N. Y., p. 397, Black Riv. and Trenton Grs.
- saffordi, Hall, 1861, (Cleioderma saffordi,) 14th Rep. N. Y. St. Mus. Nat. Hist., p. 96, Trenton Gr.
- transversa, Salter, 1852, Rep. Brit. Ass'n, p. 61, Hud. Riv. Gr.
- undulata, Hall, 1861, (Cleioderma undulata,) 14th Rep. N. Y. St. Mus. Nat. Hist., p. 97, Trenton Gr.

Pugiunculus aculeatus, see Hyolithes aculeatus.

SCENELLA, Billings, 1872, Can. Nat. and Geol., vol. 6, p. 479, and Pal. Foss., vol. 2, p. 77. [Ety. scene, tent; ella, diminutive.] Shell small, depressed, conical; apex central, an obscure carina extending from the apex to the margin; apex slightly incurved opposite the carina; aperture nearly circular; surface finely reticulated. Type S. reticulata.

Whiteaves, conica, Pal. Foss., 1884, vol. 3, p. 32,



MAT.-STY.

- Guelph Gr. conula, Walcott, 1885, FIG. 648.—Scenella con-Monogr U. S. Geo. ica. Side view. Monogr. U. S. Geo.
- Sur., vol. 8, p. 15, Up. Taconic. reticulata, Billings, 1872, Can. Nat. and Geo., vol. 6, p. 479, and Pal. Foss., vol. 2, p. 77, Up. Taconic. retusa, Ford, 1873, Am. Jour. Sci. and
- Arts, 3d series, vol. 5, p. 213, Up. Taconic.
- varians, Walcott, 1886, Bull. U. S. Geo. Sur., vol. 30, p. 127, Up. Taconic.
- STENOTHECA, Hicks, 1872, Quar. Jour. Geo. Soc., vol. 28, p. 180. [Ety. stenos, narrow; Theca, genus.] Shell small, curved : lines of growth strongly marked transversely. Type S. cornucopia. acadica, Hartt, 1868, (Discina acadica,)
 - Acad. Geol., p. 644, St. John Gr. concentrica, Matthew, 1885, Trans. Roy.

 - Soc. Can., p. 57, St. John Gr. elongata, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 23, Up. Taconic. hicksana, Matthew, 1885, Trans. Roy. Soc.
 - Can., p. 56, St. John Gr. nasuta, Matthew, 1885, Trans. Roy. Soc.
 - Can., p. 58, and Can. Nat. and Geo., vol. 6, p. 479, St. John Gr.
 - pauper, Billings, 1872, Pal. Foss., vol. 2, p. 77, Up. Taconic.
 - radiata, Matthew, 1885, Trans. Roy. Soc. Can., p. 57, St. John

Gr.



rugosa, Hall, 1847, (Metoptoma rugosa, Pal. N. Y., vol. 1, p. 306, Up. Taconic.

FIG 649.-Stenotheca rugosa.

triangularis, Matthew, 1885, Trans. Roy. Soc. Can., p. 58, St. John Gr.

- STYLIOLA, Lesueur, 1826. [Ety. stylos, pillar.] Small, conical, without annulations which distinguishes it from Tentaculites.
- fissurella, Hall, 1843, (Tentaculites fissurellus,) Geo. 4th Dist. N. Y., p. 180, and Pal. N. Y., vol. 5, pt. 2, p. 178, Marcellus Shale and Genesee Slate.
- fissurella var. intermittens, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 181, Genesee Slate.

fissurella var. obsolescens, HaH, 1879, Pal. N. Y., vol. 5, pt. 2, p. 180, Ham. Gr. fissurella var. strigata, Hall, 1879, Pal. N.Y.,

vol. 5, pt. 2, p. 180, Marcellus Shale.

TEN.-THE.]

obtusa, Hall, 187 Ham. Gr.

TENTACULITES, Schle p. 377. [Ety. Straig stone.] conical tubes, elevated rings apex, and mo with the incr and distance

marked by fin

arenosus, Hall,

166, Oriskany attenuatus, Hall Foss., pl. 26, a

2, p. 170, Ham bellulus, Hall,

Foss., pl. 26, a 2, p. 169, Ham dexithea, Hall, 1

6, Schoharie gr distans, see Corn elongatus, Hall,

p. 136, Low. H fissurella, see Styl flexuosa, see Conc gracilistriatus. H

5, pt. 2, p. 173, hoyti, White, 187 p. 34, Devonia gyracanthus, Ea

racanthus,) Ge Held. Gr.

p. 195, Trentor irregularis, Hall, syn. for T. gyra minutus, Hall, 1

N. Y., p. 72, a 183, Clinton G

2, p. 182, Ham spica, Hall, 1888

by longitudina acula, Hall, 1888

Low. Held. Gr

pl. 26, and Pa

[MAT.—STY.

volithes acu-

n. Nat. and d. Foss., vol. ella, diminu-sed, conical; rina extendargin; apex the carina; urface finely lata.



-Scenella con-Side view.

onic. an. Nat. and al. Foss., vol.

ur. Sci. and p. 213, Up.

U. S. Geo. aconic. r. Jour. Geo.

7. stenos, narmall, curved ; narked transbia.

na acadica,) hn Gr. Trans. Roy.

Gr. onogr. U. S.). Taconic. ns. Roy. Soc.

ns. Roy. Soc. and Geo., vol.

Foss., vol. 2,

ns. Roy. Soc. 57, St. John

all, 1847, (Mea rugosa, Pal. vol. 1, p. 306, conic. ris, Matthew,

an., p. 58, St. stylos, pillar.] annulations from Tentac-

ulites fissurel-., p. 180, and). 178, Marcelite. s, Hall, 1879,

HaH, 1879, 180, Ham. Gr. 1879, Pal. N.Y., ellus Shale.

p. 181, Gen-

obtusa, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 182, Ham. Gr.

TEN.-THE.]

- spica, Hall, 1888, Pal. N. Y., vol. 7, p. 7, Ham. Gr.
- TENTACULITES, Schlotheim, 1820, Petrefakten., p. 377. [Ety. tentaculum, feeler; lithos, Straight, elongate, attenuately stone.] conical tubes, annulated by abruptly elevated rings closely arranged near the apex, and more distant and stronger with the increasing size of the shell and distance from the apex; surface marked by fine transverse striæ, rarely by longitudinal striæ. Type T. scalaris. acula, Hall, 1888, Pal. N. Y., vol. 7, p. 6,
 - Low. Held. Gr. arenosus, Hall, 1876, Illust. Devon. Foss., pl. 26, and Pal. N. Y., vol. 5, pt. 2, p. 166, Oriskany sandstone.
 - attenuatus, Hall, 1876, Illust. Devonian Foss., pl. 26, and Pal. N. Y., vol. 5, pt. 2, p. 170, Ham. Gr.
- bellulus, Hall, 1876, Illust. Devonian Foss., pl. 26, and Pal. N. Y., vol. 5, pt. 2, p. 169, Ham. Gr.
- dexithea, Hall, 1888, Pal. N. Y., vol. 7, p. 6, Schoharie grit.
- distans, see Cornulites distans.
- elongatus, Hall, 1859, Pal. N. Y., vol. 3, p. 136, Low. Held. Gr.
- fissurella, see Styliola fissurella.
- flexuosa, see Conchicolites flexuosus.
- gracilistriatus, Hall, 1879, Pal. N. Y., vol.
- 5, pt. 2. p. 173, Marcellus Shale. hoyti, White, 1876, Proc. Acad. Nat. Sci.,
- p. 34, Devonian.
- gyracanthus, Eaton, 1832, (Echinus gyracanthus,) Geo. Text-book, p. 128, Low. Held. Gr.
- incurvus, Shumard, 1856, Geo. Rep. Mo., p. 195, Trenton Gr.
- irregularis, Hall, 1859, Pal. N. Y., vol. 3, syn. for T. gyracanthus.
- minutus, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 72, and Pal. N. Y., vol. 2, p. 183, Clinton Gr.

- neglectus, Nicholson & Hinde, 1874, Can. Jour., p. 9, Clinton Gr.
- niagarensis

PTEROPODA.

- Hall, 1852,
- Pal. N. Y., vol. 2, p. Fig. 650.—Tentaculites FIG. 650.—Tentaculites rich-352, Niagmondensis ara Gr.
- niagarensis var. cumberlandiæ, Hall, 1888,
- Pal. N. Y., vol. 7, p. 5, Niagara Gr. oswegoensis, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 254, and Geo. Sur. Ill., vol. 3, p. 342, Hud. Riv. Gr.
- richmondensis, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 234, Hud. Riv. Gr.
- scalariformis, Hall, 1876, Illust. Devonian Foss., pl. 26, and Pal. N. Y., vol. 5, pt. 2, p. 167, Up. Held. Gr.
- scalaris, Schlotheim, 1820, Petref. Not an American species.
- sicula, Hall, 1876, Illust. Devonian Foss., pl. 26, Up. Held. Gr. spicula, Hall, 1876, Illust. Devonian
- Foss., pl. 26, and Pal. N. Y., vol. 5, pt. 2, p. 172, Chemung Gr. sterlingensis, Meek & Worthen, 1865,
- Proc. Acad. Nat. Sci. Phil., p. 255, and Geo. Sur. Ill., vol. 3, p. 342, Hud. Riv. Gr.
- subtilis, Winchell, 1866, Rep. Low. Peninsula Mich., p. 92, Ham. Gr. tenuistriatus, Meek & Worthen, 1865,
- Proc. Acad. Nat. Sci. Phil., p. 255, and Geo. Sur. Ill., vol. 3, p. 343, Hud. Riv. Gr.
- Theca, Sowerby, 1845, syn. for Hyolithes. aculeata, see Hyolithes aculeatus.
- gregaria, see Hyolithes gregarius.
 - ligea, see Hyolithes ligea.
 - parviuscula, see Hyolithes parviusculus,
 - primordialis, see Hyolithes primordialis.
 - triangularis, Hall, 1847, Pal. N. Y., vol. 1, p. 313. This name was preoccupied by Portlock in 1843. Billings described it as Hyolithes americanus.

GASTEROPODA.

CLASS GASTEROPODA.

[Ety. gaster, under side of body; pous, foot.]

THE locomotive organ in the Gasteropoda consists of a broad, muscular undersurface, or foot, upon which the animal creeps with a gliding motion. The expansion and contraction of the muscles may be seen when a snail is moving over glass. This form of the foot is the most important characteristic of the Gasteropoda. The head is distinct, and usually furnished with tentacles and eyes. The mouth is on the lower surface, and is often furnished with one or two teeth, or jaws, in the upper part, and a ribbon-like tongue, with minute silicious teeth on its upper surface, which are used with the upper teeth in separating the food. The teeth on the tongue are called the lingual teeth.

The body is generally much larger on one side than on the other, which produces a spiral shell in the growth of the animal, because the shell is secreted at the edge of the mantel. The shell nearly always consists of one piece (univalve), forming a conical tube, twisted spirally; but the tube is not perfect, because the inner wall of each whorl is formed of the preceding whorl with only a thin coating of shelly Sometimes the tube is rolled in a plane, producing a discoid shell; and matter. there are all grades of form, from the discoid to the upright. The right side of the animal is usually the larger, and the shell produced is dextral; but in some species and in some abnormal specimens of dextral species, the spire is turned in the opposite direction, and the shell is therefore called sinistral. The winding of the tube in the spiral shells as the animal grows, produces a central axis, which is called the columella. It extends from the apex to the base, and forms the inner margin of The columella is usually hollow, and terminates at the base of the the aperture. shell with a small opening, called the umbilicus. The margins of the aperture are called the lips. When the columella forms the inner lip, it is called the columellar lip. The outer lip forms the convexity of the shell. Sometimes the lips are continuous, and sometimes the outer lip is more or less deeply notched; and both lips may be furnished with teeth or denticulated edges. The last whorl of the shell is called the body whorl, from its receiving the body of the animal, and the remaining whorls constitute the spire. The line which separates the whorls is the suture. Many Gasteropoda have a calcareous plate attached to the hinder part of the foot, which closes the aperture when the animal retracts itself within the shell; this covering is called an operculum.

The Gasteropoda are divided into two subclasses: the Heteropoda and Gasteropoda proper. The Heteropoda, also called the Nucleobranchiata, are all inhabitants of the ocean, and usually have a shell covering only the essential organs of the body. They swim rapidly near the surface of the water with the back downward, and when the foot is present it is used to attach the animal to floating sea-weeds.

The Gasteropoda proper are divided into-two orders: one breathing air, the Pulmonifera; and the other water, the Branchifera. The Pulmonifera' include the

ACL.-ACR.]

land snails and the nearly all Palæozi

FAMILY BEL

toma. Po FAMILY BULI FAMILY CAL FAMILY CHIT FAMILY CLIS FAMILY CODE FAMILY CYCI schisma. FAMILY CYC FAMILY CYF Microcer FAMILY DEN FAMILY EUO trochus, FAMILY FUSI FAMILY HEL Zonites. FAMILY LITT FAMILY MAC FAMILY NAT FAMILY PAT FAMILY PL stylus. FAMILY PLEI sonia, Pl FAMILY PSEI FAMILY PYR FAMILY ROTI FAMILY SUBI FAMILY TROP FAMILY TURE

Aclis Loven, 1846 Scandin. occid American Pala manuta, see Aclisi robusta, see Aclisi stevensoni, see Acl swallovana, see A ACLISINA, DeKonir caire Carbonife Mus. Roy. d'H diminutive of banded, conica guished from aperture, and spiral bands. minuta, Stevens Am. Jour. Sci.,

ACL.-ACR.]

cular under-

The expan-

g over glass. opoda. The

mouth is on

in the upper

irface, which

e tongue are

ich produces

at the edge

), forming a

inner wall of

ng of shelly

d shell; and

nt side of the

some species

d in the op-

g of the tube

is called the

er margin of

e base of the

aperture are ne columellar

lips are con-

and both lips the shell is

he remaining

the suture.

t of the foot,

l; this cover-

and Gaster-

ll inhabitants

s of the body.

wnward, and

hing air, the

a' include the

weeds.

GASTEROPODA

land snails and their allies; the Branchifera are furnished with gills, and include nearly all Palæozic shells of this Class.

- FAMILY BELLEROPHONTIDE.—Bellerophon, Bucanella, Bucania, Phragmostoma, Porcellia, Tremanotus.
- FAMILY BULIMORPHIDÆ.—Bulimorpha.
- FAMILY CALYPTRÆIDÆ.—Capulus, Conchopeltis, Metoptoma, Platyceras.
- FAMILY CHITONIDÆ.—Chiton.
- FAMILY CLISOSPIRIDÆ.—Billingsia, Clisospira.
- FAMILY CODONOCHILIDÆ.—Codonochilus.
- FAMILY CYCLONEMIDÆ.—Cyclonema, Eunema, Holopea, Holopella, Platyschisma, Orthonema, Palæacmæa, Trochonema.
- FAMILY CYCLORIDÆ.—Cyclora.
- FAMILY CYRTOLITIDE.—Carinaropsis, Conchopeltis, Cyrtolites, Cyrtonella, Microceras.
- FAMILY DENTALIDE.—Dentalium.
- FAMILY EUOMPHALIDÆ.—Calaurops, Eccyliomphalus, Euomphalus, Omphalotrochus, Ophileta, Pleuronotus, Straparollina, Straparollus.
- FAMILY FUSISPIRIDÆ.—Fusispira.
- FAMILY HELICIDE. Anthracopupa, Dawsonella, Pupa, Streptaxis, Strophites, Zonites.
- FAMILY LITTORINIDÆ.—Xenophora.
- FAMILY MACLURIIDÆ.—Maclurea.
- FAMILY NATACOPSIDÆ.—Callonema, Isonema, Naticopsis, Trachydomia.
- FAMILY PATELLIDÆ.—Lepetopsis, Tryblidium.
- FAMILY PLATYSTOMIDE.—Orthostoma, Platystoma, Scævogyra, Strophostylus.
- FAMILY PLEUROTOMARIIDÆ.—Helicotoma, Lophospira, Microdoma, Murchisonia, Pleurotomaria, Raphistoma, Scalites.
- FAMILY PSEUDOPHORIDÆ.—Pseudophorus.
- FAMILY PYRAMIDELLIDÆ.-Loxonema, Macrochilina, Soleniscus, Zaptychius.
- FAMILY ROTELLIDÆ.—Anomphalus, Rotella.
- FAMILY SUBULITIDÆ.—Polyphemopsis, Subulites.
- FAMILY TROCHIDÆ.—Eotrochus, Palæotrochus.
- FAMILY TURRITELLIDÆ.—Aclisina, Turritella.

Aclis Loven, 1846, Index, Mollusc. litora Scandin. occid. habit., p. 16. Not an American Palæozoic genus. mauta, see Aclisina minuta. robusta, see Aclisina robusta. stevenani, see Aclisina stevensoni. swallovana, see Aclisina swallovana. ACLISINA, DeKoninck, 1881, Faune du Cal-

ACLISINA, BeKoninck, 1881, Faune du Calcaire Carbonifere de la Belgique Ann. d. Mus. Roy. d'Hist. Nat., t. 6, p. 86. [Lty. diminutive of Aclis.] An elongated, banded, conical, spiral shell: distinguished from Muchisonia by its oval aperture, and from Loxonema by its spiral bands. Type A. strictula. minuta, Stevens, 1858, (Aclis minuta,) Am. Jour. Sci., vol. 26, p. 559, Coal Meas. robusta, Stevens, 1858, (Aclis robusta,) Am. Jour. Sci., vol. 25, p. 259, and Geo. Sur. Ill., vol.

5, p. 596, Coal Meas. stevensoni, White, 1882, (Aclis stevensoni,) Rep. Invert. Foss. New. Mex. p. xxxv,

Coal Meas. swallovana, Geinitz, 1866, (Turbonilla swallovana,) Carb. und Dyas in Neb., p. 5, Coal Meas.

Acroculia, Phillips, 1841, Pal. Foss. Cornwall, Devon, and W. Somerset, p. 93, syn. Aclisina for Platyceras. swallovana angulata, see Platyceras angulatum. niagarensis, see Platyceras niagarense. trigonalis, see Platyceras trigonale.

Ampullaria, Lamarck, 1801, Syst. An. sans Vert. [Ety. ampulla, a flask.] Not a Palæozoic genus.

helicoides, see Soleniscus helicoides. powelli, Walcott, 1883, Science, vol. 2, p. 808, and Monogr. U. S. Geo. Sur., vol.

- 8, p. 261, Subcarboniferous.
- ANOMPHALUS, Meek & Worthen, 1866, Proc. Acad. Nat. Sci., p. 268. [Ety. anomphalos, without an umbilicus.] A helicoid shell of three or more volutions, and having an aperture transversely suboval. Type A rotulus. meeki, see Dawsonella meeki.

rotulus, Meek & Worthen, 1866, Proc.

- Acad. Nat. Sci. Phil., p. 268, and Geo. Sur. Ill., vol. 5, p. 597, Coal Meas. ANTHRACOPUPA, Whitfield, 1881, Am. Jour, Sci. and Arts, 3d ser., vol. 21, p. 126. [Ety. anthrax, coal; Pupa, a genus.] Shell minute, pupiform, iew volutions, last unsymmetrical; axis imperforate; aperture large, nearly vertical; peri-stome thickened, united above by a thin callus, on which may occur one or more palatal teeth; other tooth-like projections on the inner margin of lip; circular notch, as in Pupina, on inner edge of outer limb, near body whorl; surface vertically lined. Type A. ohioensis.
- ohioensis, Whitfield, 1881, Am. Jour. Sci. and Arts, 3d ser., vol. 21, p. 126, Coal Meas.
- BELLEROPHON, Montfort, 1808, Conch. Syst., vol. 1, p. 50. [Ety. mythological name.] Shell thick, symmetrical, globose, involute; sinus in the middle of the outer lip, from which a band extends backward along the outer surface of the volution; inner lip thickened, expanded on the inrolled spire. Type B. vasulites. acutilira, Hall, 1862, 15th Rep. N. Y. Mus.

Nat. Hist., p. 56, Ham. Gr. acutus, Sowerby, 1839, Murch. Sil. Syst., p. 643, Low. Silurian.

- allegoricus, White, 1874, Rep. Invert. Foss., p. 10, and Geo. Sur. W. 100th Mer., vol. 4, p. 55, Quebec Gr. alternodosus, Whitfield, 1882, Ann. N. Y.
- Acad. Sci., vol. 2, p. 225, Kaskaskia Gr. angustata, see Bucania angustata.
- antiquatus, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 52, and Geo. Wis.,
 - vol. 4, p. 176, Potsdam Gr.

apertus, Sowerby, 1825, Min. Conch., vol. 5, p. 108, Subcarboniferous.

- argo, Billings, 1860, Can. Nat. and Geol., vol. 5, p. 167, Black Riv. and Trenton Gr.
- auriculatus, Hall, 1852, Pal. N. Y., vol. 2, p. 334, Coralline limestone.

barquensis, Winchell, 1862, Proc. Acad. Nat. Sci., p. 425, Marshall Gr

bidorsatus, see Bucania bidorsata

bilabiatus, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 304, Kinderhook Gr.

bilobatus, Sowerby, 1839, Murch. Sil. Syst., p. 643, and Pal. N. Y., vol. 1, p. 184, Black Riv. to Mid.

Sil.



[AMP.-BEL.

bilobatus var. acutus, Hall, 1847, Pal. N. Y., vol. 1, p. 185, Trenton Gr.

bilobatus var corrugatus, Hall, 1847, Pal. N. Y., vol. 1, p. 185, Trenton Gr.

- blaneyanus, syn. for B. carbonarius. bowmani, White, 1876, Proc. Acad. Nat. Sci., p. 32, Devonian.
- brevilineatus, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 269, and Pal. N. Y., vol. 5, p. 2, p. 107, Ham. Gr.
- canadensis, Billings, 1866, Catal. Sil. Foss. Antic., p. 18, Hud. Riv. Gr.
- cancellatus, Hall, 1847, Pal. N. Y., vol. 1, p. 307, Hud. Riv. Gr.

cancellatus, Hall, 1858, Trans. Alb. Inst., vol. 4. The name was preoccupied. See B. textilis.

- carbonarius, Cox, 1857, Geo. Rep. Ky., vol. 3, p. 562, Coal Meas.
- carbonarius var. subpapillosus, White, 1876, Geo. Uinta Mountains, p. 92, Up. Aubrey Gr.
- carinatus, Sowerby, 1839, Murch. Sil. Syst., p. 634, Devonian.
- cassinensis, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 318, Birdseye Gr.
- charon, Billings, 1860, Can. Nat. and Geol. vol. 5, p. 169, Black Riv. and Trenton Grs.
- combsi, Wolcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 193, Devonian.
- convolutus, Eaton, 1832, Geo. Text-book, p. 28, Up. Sil.
- crassus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 458, and Geo. Sur. Ill., vol. 2, p. 385, Coal Meas.
- crenistria, Hall, 1876, Illust. Devonian Foss., pl. 25, and Pal. N. Y., vol. 5, pt. 2, p. 116, Ham. Gr.
- curvilineatus, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 269, Onondaga, Schoharie and Up. Held. Gr.
- cyrtolites, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 107, Kinderhook Gr.
- declivis, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 269, Trenton Gr. disculus, Billings, 1860, Can. Nat. and
- Geo., vol. 5, p. 168, Black River and Trenton Gr.
- ellipticus, McChesney, 1860, Desc. New Pal. Foss., p. 58, Coal Meas. expansus, see Bucania expansa. explanatos, Hall, 1879, Pal. N. Y., vol. 5,

pt. 2, p. 109, Chemung Gr.

fiscellostriatus, Fo Lab. Denison U fraternus, Billings. Antic., p. 19, Hu galericulatus. Win Nat. Sci., p. 426, gibsoni, White, 18 Nat. Hist. India

giganteus, Worth

Ill. St. Mus. Na Sur. Ill., vol. 8, globosus, Stevens, vol. 25, p. 258, C

harrodi, Gurley, 1 p. 5. Publication a species.

helena, Hall, 1879 2, p. 114, Ham. hiulcus, Sowerby,

American. hyalina, Hall, 1879

2, p. 99, Up. He incisus, Clarke, 1 Sur., vol. 16, p. inspeciosus, Whit Foss. New Mex. interlineatus, Port donderry, p. 402

not American. kansasensis, Shur Louis Acad. Sci

Meas. leda, Hall, 1862,

Nat. Hist., p. 58 pt. 2, p. 110, Ha

lineolatus, Hall, Mus. Nat. Hist Kinderhook Gr.

lindsleyi, Safford, 289, Nashville G

lyra, Hall, 1862, Nat. Hist., p. 59

pt. 2, p. 113, Hai macer, Billings, 18 347, Calciferous

mæra, Hall, 1876, pl. 22, and Pal.

119, Chemung G



FIG. 653.—Bel majusculus, Walco

Geo. Sur., vol. 8 marcouanus. Gei Dyas in Neb., I p. 226, Coal Mea

meekanus, Swall Louis Acad. Sc Meas.

BEL.]


[AMP.-BEL.

BEL.]

d, 1862, Proc. , p. 304, Kin-



atus.

- Y., vol. 1, p.
- ill, 1847, Pal. on Gr. narius.

. Acad. Nat.

Jour. Acad. d Pal. N. Y.,

tal. Sil. Foss. N. Y., vol. 1,

. Alb. Inst.,

- preoccupied.
- o. Rep. Ky.,
- osus, White, ns, p. 92, Up.

Murch. Sil.

Bull. Am.). 318, Birds-

at. and Geol. '. and Tren-

gr. U. S. Geo. an.). Text-book,

1860, Proc.

nd Geo. Sur. Pas. st. Devonian Y., vol. 5, pt.

Jour. Acad. Onondaga, Gr. Rep. N. Y. 07, Kinder-

. Acad. Nat. ı Gr. n. Nat. and ck Riv and

, Desc. New 18. ы. N. Y., vol. 5, GASTEROPODA.

- fiscellostriatus, Foerste, 1885, Bull. Sci., Lab. Denison Univ., p. 99, Niagara Gr. fraternus, Billings, 1866, Catal. Sil. Foss., Antic., p. 19, Hud. Riv. Gr.
- galericulatus, Winchell, 1862, Proc. Acad.
- galericulatus, Winchell, 1802, 1100, Acad. Nat. Sci., p. 426, Marshall Gr. gibsoni, White, 1882, 11th Rep. Geol. and Nat. Hist. Indiana, p. 360, St. Louis Gr. giganteus, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 8, and Geo.
- Sur. Ill., vol. 8, p. 143, Low. Coal Meas. globosus, Stevens, 1858, Am. Jour. Sci.,
- vol. 25, p. 258, Coal Meas. harrodi, Gurley, 1883, New Carb. Foss.,
- p.5. Publication not such as to establish a species.
- helena, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 114, Ham. Gr.
- hiulcus, Sowerby, Min. Conch. Not American.
- hvalina, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 99, Up. Held. Gr. incisus, Clarke, 1885, Bull. U. S. Geo.
- Sur., vol. 16, p. 53, Portage Gr. inspeciosus, White, 1882, Rep. Invert.
- Foss. New Mex., p. xxx, Coal Meas.
- interlineatus, Portlock, 1843, Geo. of Londonderry, p. 402, Coal Meas. Probably not American.
- kansasensis, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 204, Coal Meas.
- leda, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 58, and Pal. N. Y., vol. 5, pt. 2, p. 110, Ham. Gr.
- lineolatus, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 107, Waverly or Kinderhook Gr.
- lindsleyi, Safford, 1869, Geo. of Tenn., p. 289, Nashville Gr.
- lyra, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 59, and Pal. N. Y., vol. 5, pt. 2, p. 113, Ham. Gr.
- macer, Billings, 1865, Pal. Foss., vol. 1, p. 347, Calciferous Gr.
- mæra, Hall, 1876, Illust. Devonian Foss., pl. 22, and Pal. N. Y., vol. 5, pt. 2, p. 119, Chemung Gr.



FIG. 653.-Bellerophon mohri.

- majusculus, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 256, Subcarb. marcouanus. Geinitz, 1866, Carb. und Dyas in Neb., p. 7, and Pal. E. Neb., p. 226, Coal Meas.
- meekanus, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 204, Coal Meas.

- michiganensis, Winchell, 1862, Proc. Acad. Nat. Sci., p. 427, Marshall Gr.
- miser, Billings, 1866, Catal. Sil. Foss. Antic., p. 20, Hud. Riv. Gr. missouriensis, Swallow, 1863, Trans. St.
- Louis Acad. Sci., vol. 2, p. 100, Kaskaskia Gr.
- mohri, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 306, Hud. Riv. Gr.
- montfortanus, Norwood & Pratten, 1855, Jour. Acad. Nat. Sci., vol. 3, p. 74, Coal Meas.



FIG. 654.-Bellerophon palinurus.

- morrowensis, Miller & Dyer, 1878, Contto Pal., No. 2, p. 8, Hud. Riv. Gr.
- nactus, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 121, Chemung Gr.
- nashvillensis, Troost, 1840, 5th Geo. Rep.
- Tenn., p. 54, Trenton Gr. natator, Hall, 1862, (Phragmostoma na-tator,) 15th Rep. N. Y. Mus. Nat. Hist., p. 60, and Pal. N. Y., vol. 5, pt. 2, p. 108, Ham. Gr.
- nautiloides, Winchell, 1862, Proc. Acad. Nat. Sci., p. 427, Marshall Gr.
- neleus, Hall & Whitfield, 1876, Illust. Devonian Foss., pl. 22, and U. S. Geo. 40th Parallel, p. 250, Chemung Gr.
- newberryi, Meek, 1871, Proc. Acad. Nat. Sci., p. 77, and Ohio Pal., vol. 1, p. 222, Up. Held. Gr.
- nodocarinatus, Hall, 1858, Geo. Rep. Iowa. p. 723, Coal Meas.
- obsoletus, Hall, 1876, Illust. Devonian Foss., pl. 22, Chemung Gr.
- otsego, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 60, and Pal. N. Y., vol. 5, pt. 2, p. 104, Ham. Gr.
- palinurus, Billings, 1865, Pal. Foss., vol. 1, p.º311, Quebec Gr.
- panneus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 21, Marshall Gr. patersoni, Hall, 1862, Geo. Rep. Wis., p.
- 55, Hud. Riv. Gr.
- patulus, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 196, and Pal. N. Y., vol. 5, pt. 2, p. 100, Ham. Gr.
- pelops, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 56, and Pal. N. Y., vol. 5,
- pt. 2, p. 95, Schoharie and Up. Held. Gr.
- pelops var. exponens, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 96, Up. Held. Gr. percarinatus, Conrad, 1842, Jour. Acad.
- Nat. Sci., vol. 8, p. 268, Coal Meas. perelegans, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 304,
- Kinderhook Gr.
- perforatus, Winchell & Marcy, 1866, syn. for Tremanotus chicagoensis.

398

- perplexus, Walcott, 1885, Monogr. U.S. Geo. Sur., vol. 8, p. 193, Devonian. perlatus, Conrad, 1842, Jour. Acad. Nat.
- Sci., vol. 8, p. 270, Coal Meas. platystoma, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 312, Galena Gr.
- plenus, Billings, 1874, Pal. Foss., vol. 2, p. 62 Gaspe limestone No. 8, Devonian. profundus, Emmons, Geo. Rep., M Dist.
 - N. Y., p. 393, Trenton Gr. propinquus, Meek, 1871, Proc. Acad. Nat.
- Sci., p. 78, and Ohio Pal., vol. 1, p. 226, Up. Held. Gr.
- punctifrons, see Bucania punctifrons. repertus, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 128, Ham. Gr.
 - rotalinea, Hall, 1879, Pal. N. Y., vol. 5, pt.
 - 2, p. 115, Ham. Gr. rudis, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 57, and Pal. N. Y., vol. 5, pt. 2, p. 103, Ham. Gr.
 - rugosiusculus, Winchell, 1862, Proc. Acad. Nat. Sci., p. 425, Marshall Gr.
 - rugosus, Emmons, 1856, Am. Geol., p. 166, Hud. Riv. Gr.
 - scriptiferus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 21, Marshall Gr.
 - scissile, Conrad, 1844, Proc. Acad. Nat. Sci., vol. 2, p. 175, Kaskaskia Gr. Very poorly defined.
 - solitarius, Billings, 1866, Catal. Sil. Foss. Antic., p. 20, Hud. Riv. Gr.
 - stamineus, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 269, Marshall Gr. stevensanus, McChesney, 1860, Desc. New
 - Pal. Foss., p. 61, Coal Meas. sublævis, Hall, 1858, Trans. Alb. Inst.,
 - vol. 4, p. 32, and Geo. Sur. Iowa, p. 666, Warsaw Gr.
 - Bubpapillosus, White, 1879, Bull. U. S. Geo. Sur. Ter., vol. 5, p. 218, and Cont. to Pal. No. 6, p. 138, Carboniferous. sulcatinus, see Bucania sulcatina.
 - textiliformis, Gurley, 1883, New Carb.
 - Foss., p. 6. Publication not valid. textilis, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 243, Warsaw Gr. Proposed instead of B. cancellatus, Hall, 1858, which was preoccupied.
 - thalia, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 60, and Pal. N. Y., vol. 5, pt. 2, p. 105, Ham. Gr. tricarinatus, Shumard, 1858, Trans. St.
 - Louis Acad. Sci., vol. 1, p. 204, Coal Meas.
 - tricarinata, Hall, 1876, Illust. Devonian Foss. The name was preoccupied. See B. triliratus.
 - triliratus, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 243, and Pal. N. Y., vol. 5, pt. 2, p. 117, Chemung Gr. Proposed instead of B. tricarinatus, Hall, 1876, which was preoccupied.
 - troosti, D'Orbigny, 1840, Cephal., p. 206, and Geo. of Tenn., p. 289, Trenton Gr. tuber, Hall, 1876, 28th Rep. N. Y. Mus.
 - Nat. Hist., p. 177, Niagara Gr. urii, Fleming, 1828, British Animals, p. 338, Devonian. American species. (?)

- vinculatus, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 304, Kinderhook Gr.
- vittatus, syn. for B. carbonarius.

GASTEROPODA.

2

- volutus, Eaton, 1832, Geol. Text-book, p. 28, Up. Sil.
- whittleseyi, Winchell, 1865, Proc. Acad. Nat. Sci., p. 130, Cuyahoga shale.
- wisconsinensis, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 76, and Geo. Wis.,
- vol. 4, p. 223, Trenton Gr. Billingsia, Walcott, 1888, Bull. No. 30, U. S. Geo. Sur., p.
 - 61. [Ety. proper name.] Syn. (?) for Clisospira. Turbinate, whorls, subcircular. Type B. saratogensis. Preoccupied.

BIL.-BUC.



- Sur., p. 61, Up. Taconic. ingsia sar-atogensis. BUCANELLA, Meek, 1870, Proc. Am. Phil. Soc., vol. 11, p. 426. [Ety. diminutive of Bucania.] Type B. nana. Phil. Soc. nana, Meek, 1870, Proc. Am. Phil. Soc., vol. 11, p. 426, Silurian.
- BUCANIA, Hall, 1847, Pal. N. Y., vol. 1, p. 32 [Ety. bukane, trumpet.] Convolute, spire equally concave on either side; volutions in the same plane, all visible, outer one ventricose, inner one usually angulated on the edge, concave on the ventral side; aperture rounded oval, somewhat compressed on the inner side by contact with the next volution, laterally and dorsally abruptly expanded. Type B. sulcatina.
 - angustata, Hall, 1852, Pal. N. Y., vol. 2, p. 349, Niagara and Guelph Gr.
 - bellipuncta, Hall, 1852, Pal. N. Y., vol. 2, p. 93, Clinton Gr.
 - bidorsata, Hall, 1847, (Bellerophon bidor-satus,) Pal. N. Y., vol. 1, p. 186, Trenton Gr.
 - buelli, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 76, and Geo. Wis., vol. 4,
 - p./24, Trenton Gr. chicagoensis, see Tremanotus chicagoensis.
 - costata, James, 1872, (Cyrtolites costatus.) Am. Jour. Sci., 3d ser., vol. 3, p. 26, and Ohio Pal., vol. 1, p. 150, Hud. Riv. Gr.
 - crassolaris, McChesney, 1861, New Pal.
- Foss, p. 91, Niagara Gr. devonica, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 195, Up. Held. Gr.
- euomphaloides, Owen, 1862, Geo. Sur. Ind., p. 362. Not very satisfactorily defined.
- exigua, Foerste, 1885, Bull. Sci. Lab. Deni-son Univ., p. 99. Not properly defined. expansa, Hall, 1847, Pal. N. Y., vol. 1, p.
- 186, Trenton Gr. intexta, Hall, 1847, Pal. N. Y., vol. 1, p.
- 317, Trenton Gr. lirata, Hall, 1862, Geo. Rep. Wis., p. 55, Trenton Gr.

BUL -CAR.]

pervoluta, McChe Foss., p. 91, Nia profunda, Conrad, fundus,) Ann. Pal. N. Y., vol.



FIG.

punctifrons, Emm punctifrons,) G p. 392, and Pa Black River and rotundata, Hall, p. 33, Chazy Gi stigmosa, Hall, 18 92, Clinton Gr. sulcatina, Emmon

sulcatinus,) Ge p. 312, Pal. N. Black Riv., and

trilobata, Conrad lobatus,) Ann.

Pal. N. Y., vol. dina sandstone tripla, Whitfield, Nat. Hist., vo

ous Gr. Bulimella, Hall, 185

This name 4. Pfeiffer in 1852. bulimiformis, see B

canaliculata, see B elongata, see Bulin BULIMORPHA, Whit

Mus. Nat. His Bulimus, a gen siform, volutio

> bent, truncated fror



FIG. 657-Bu-Gr. limor p h a bulimifor canali Bul mis. Tra

29, and Bull.

74, Warsaw Gr

[BIL.-BUC.

ield, 1862, Proc. . 8, p. 304, Kin-

rius. Text-book, p.

5, Proc. Acad. **za s**hale. 878, Ann. Rep. nd Geo. Wis.,



38, eo. FIG. 655 - Bill. ingsia saratogensis. DC.

p. 426. [Ety. **Type** B. nana. m. Phil. Soc.,

Y., vol. 1, p. 32. Convolute. .] n either side; ane, all visible, ier one usually oncave on the rounded oval, on the inner next volution, abruptly ex-

ina. N. Y., vol. 2, p. Gr.

I. N. Y., vol. 2,

erophon bidor-1, p. 186, Tren-

nn. Rep. Geo. eo. Wis., vol. 4,

iotus chicago-

olites costatus,) vol. 3, p. 26, p. 150, Hud.

1861, New Pal.

eld, 1872, 24th

ist., p. 195, Up. 862, Geo. Sur. y satisfactorily

Sci. Lab. Denicoperly defined. N. Y., vol. 1, p.

V. Y., vol. 1, p.

tep. Wis., p. 55,

GASTEROPODA.

pervoluta, McChesney, 1861, New Pal. Foss., p. 91, Niagara Gr.

BUL -CAR.]

profunda, Conrad, 1841, (Euomphalus pro-fundus,) Ann. Rep. N. Y., p. 37, and Pal. N. Y., vol. 3, p. 341, Up. Held. Gr.



FIG. 656.-Bucania sulcatina

- punctifrons, Emmons, 1842, (Bellerophon punctifrons), Geo. Rep. 2d Dist., N. Y., p. 392, and Pal. N. Y., vol. 1, p. 187, Black River and Trenton Grs.
- rotundata, Hall, 1847, Pal. N. Y., vol. 1, p. 33, Chazy Gr.
- stigmosa, Hall, 1852, Pal. N. Y., vol. 2, p. 92, Clinton Gr.
- sulcatina, Emmons, 1842, (Bellerophon sulcatinus,) Geo. Rep. 2d Dist. N. Y., p. 312, Pal. N. Y., vol. 1, p. 32, Chazy, Black Riv., and Trenton Grs.
- trilobata, Conrad, 1839, (Planorbis tri-lobatus,) Ann. Rep. N. Y., p. 65, and Pal. N. Y., vol. 2, pp. 13 and 93, Medina sandstone and Clinton Gr.
- tripla, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 55, Calciferous Gr.
- Bulimella, Hall, 1858, Trans. Alb. Inst., vol. 4. This name was preoccupied by Pfeiffer in 1852. See Bulimorpha.
- bulimiformis, see Bulimorpha bulimiformis. canaliculata, see Bulimorpha canaliculata. elongata, see Bulimorpha elongata.

BULIMORPHA, Whitfield, 1882, Bull. Am. Mus. Nat. Hist., No. 3, p. 74. [Ety. Bulimus, a genus; morphe, form.] Fusiform, volutions convex; columella bent, truncated at the base, separated from the outer lip by a notch,

(Bulimella

as in Achatina; outer lip slightly notched near the

upper end; surface smooth.

bulimiformis,)

Type B. bulimiformis.

bulimiformis, Hall, 1858,



Trans. Alb. Inst., vol. 4, p. 29, and Bull Am. Mus. Nat. Hist., p. 74, Warsaw FIG. 657-Bu-limorpha bulimifor-Gr.

canaliculata, Hall, 1858, Bulimella canaliculata,) mis. Trans. Alb. Inst., vol. 4, p. 29, and Bull. Am. Mus. Nat. Hist., p. 74, Warsaw Gr.

elongata, Hall, 1858, Bulimella elongata,) Trans. Alb. Inst., vol. 4, p. 30, and Bull. Am. Mus. Nat. Hist., p. 75, Warsaw Gr. CALLONEMA, Hall, 1879, Pal. N. Y., vol. 5,

pt. 2, p. 50. [Ety. kallos, beautiful; nema, thread.] Subglobose, turbinate or ovoid-conical; volutions rounded or subangular above and below; outer lip thin; columnar lip thickened, spreading over the volution above and extended below; axis umbilicate; surface marked by striæ extending backward from the sutures over the volutions. Type C. bellatulum.

- bellatulum, Hall, 1861, (Loxonema bellatulum,) 14th Rep. N. Y. Mus. Nat. bellatulum,) Hist., p. 104, and Pal. N. Y., vol. 5, pt. 2, p. 51,
- Up. Held. Gr. imitator, Hall & Whitfield,
 - 1872, (Pleurotomaria imitator,) 24th Rep. N. Y Mus. Nat. Hist., p. 195, Ham. Gr.



- Coccidentale, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 189, Devonian. CALAUROPS, Whitfield, 1886, Bull. Am. Mus.
 - Nat. Hist., vol. 1, p. 314. [Ety. kalaurops, a shepherd's crook.] Univalve, discoidal, convolute, inner volutions closely coiled, outer one disunited and projected in a straight line. Type C. lituiformis. It seems to be distinguished from Eccyliomphalus only by having the last whorl straightened, which may or may not be of generic importance.

lituiformis, Whitfield, 1886, Bull. Am.

Mus. Nat. Hist., vol. 1, p. 315, Chazy Gr. CAPULUS, Montfort, 1810, Conch. Syst., vol. 2, p. 55. [Ety. capulus, a head-piece or cap.] Shell wide, cap-shaped, apex obliquely inclined backward and inrolled toward the left side; aperture broad, oval, edge irregularly sinuated; muscular scar horseshoe-shaped, open in front. Type C. hungaricus. The horseshoe-shaped, muscular impression has never been observed in any American Palæozoic fossil, and hence the species referred to this genus do not belong to it. Those named have been so poorly defined, their generic relations can not be determined, and they may as well be struck from the list of names.

acutirostris, see Platyceras acutirostrum. auriformis, Hall, 1847, Pal. N. Y., vol. 1, p. 31, Chazy Gr.

parvus, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 205, Coal Meas.



659 Carinaropsis patel-liformis.

CARINAROPSIS, Hall, 1847, Pal. N. Y., vol. 1, p. 183. [Ety. from its resemblance to Carinaria] Shell subconical, patelliform; apex incurved or convolute, subcentral; aperture oval, expanded, narrowed pos-

teriorly. Type C. carinata. carinata, Hall, 1847, Pal. N. Y., vol. 1, p. 183, Trenton Gr.

orbiculata, Hall, 1847, Pal. N.Y., vol. 1, p. 306, Hud. Riv. Gr.

patelliformis, Hall, 1847, Pal. N. Y., vol. 1, p. 183, Trenton and Hud. Riv. Grs.

Chemnitzia, D'Orbigny, 1837, Mollusques, Echinodermes, Foraminiferes et Polypiers, etc. Slender, elongated, many whorled, plaited; apex sinistral; aperture simple, ovate; peristome incom-plete; operculum horny; subspiral. Type C. elegantissima. Not an American Palæozoic genus.

attenuata, see Loxonema attenuatum. parva, see Loxonema parvum. swallovana, see Loxonema swallovanum.

tenuilineata, see Loxonema tenuilineatum. Chiton, Linnæus, 1758, Syst. Nat., ed. 10, p. 667. [Ety. chiton, a

coat of mail.] Shell

composed of eight

transverse imbricat-

ing plates, lodged

in a coriaceous mantle, which forms an

round the body. Type C. squamosus.

Not an American

Palæozoic genus.

canadensis, see Metop-

margin

lix.

expanded



660. — Chiton FIG. squamosus.

toma canadense. carbonarius, Stevens, 1859, Am. Jour. Sci., vol. 25, p. 264, and Geo. Sur. Ill., vol. 5, p. 608. Probably a crustacean, Coal Meas.

parvus, Stevens, 1859, Am. Jour. Sci., vol. 25, p. 264, Coal Meas.

CLISOSPIRA, Billings, 1865, Pal. Foss., vol. 1, p. 186 and 420.

Ety. kleio, to lock : spira, Shell whorl.] conical; aperture widely expanded all round in a

133 FIG. 661.-Clisospira curiosa.

plane at a right angle to the longitudinal axis of the conical spire; suture in the spire, but

obsolete below. Type C. curiosa. curiosa, Billings, 1865, Pal. Foss., vol. 1, pp. 186 and 420, Up. Taconic. lirata, Whitfield, 1886, Bull. Am. Mus.

Nat. Hist., vol. 1, p. 308, Birdseye Gr.

occidentalis, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 75, and Geo. Wis., vol. 4, p. 222, Trenton Gr.

CODONOCHILUS, Whiteaves, 1884, Pal. Foss., vol. 3, p. 17. [Ety. kodon, a trumpet; cheilos, lip.] Turreted, subfusiform; volutions numerous, compressed, closely inrolled; outer half of body whorl produced obliquely outward and downward; lip thin, expanded; aperture Type C. FIG. 662nearly circular.

- striatum. Codo n ostriatum, Whiteaves, 1884, Pal. Conton o-Foss., vol. 3, p. 17, Guelph Gr. striatum. chopelris, Walcott, 1876, 28th Rep.
- CONCHOPELTIS, N. Y., Mus. Nat. Hist., p. 93. [Etv. conche, shell; pelle, shield.] Patellitorm, more or less conical, apex central or subcentral, vertically striated, older specimens lined concentrically. Type C. alternata.
 - alternata, Walcott, 1876, 28th Rep. N. Y.

Mus. Nat. Hist., p. 93, Trenton Gr. minnesotensis, Walcott, 1876, 28th Rep. N. Y. Mus. Nat. Hist., p. 94, Trenton Gr. CYCLONEMA, Hall, 1852, Pal. N. Y., vol. 2

p. 89. [Ety. kuklos, circle; nema, thread.] Turbinate, thin, whorls ventricose, striæ concentric and crossed by oblique lines of growth; no umbilicus; mouth

rounded and with an imperfect peritreme; inner lip thin, closely reflected, and a little concave. Type C. bilix.

bellulum, Billings, 1866, Catal. Sil. Foss. Antic., p. Billings, 55, Anticosti Gr.

bilix, Conrad, 1842, (Pleuro-FIG. 663.-Cy tomaria bilix,) Jour. Acad. clonema bi-Nat. Sci., vol. 8, p. 271, and

Pal. N. Y., vol. 1, p. 305, Trenton and Hud. Riv. Grs.

- bilix var. conicum, S. A. Miller, 1874. Cin. Quar. Jour. Sci., vol. 1, p. 320, Hud. Riv. Gr.
- bilix var. fluctuatum, James, 1874, (Cyclonema fluctuata,) Cin. Quar. Jour. Sci., vol. 1, p. 152, Hud. Riv, Gr. cancellatum, Hall, 1843, (Littorina cancel-
- lata,) Geo. Rep. 4th Dist. N. Y., p. 72, and Pal. N. Y., vol. 2, p. 90, Clinton Gr. cincinnatiense, S. A. Miller, 1882, Jour.
- Cin. Soc. Nat. Hist., vol. 5, p. 230, Utica Slate Gr.
- commune, Billings, 1866, Catal. Sil. Foss. Antic., p. 55, Anticosti Gr.
- concinnum, Hall, 1876, Illust. Devonian Foss., pl. 12, and Pal. N. Y., vol. 5, pt.
- 2, p. 38, Chemung Gr. crenistria, Hall, 1876, Illust. Devonian Foss., pl. 12, Schoharie grit.
- crenulatum, Meek, 1871, Proc. Acad. Nat. Sci., p. 79, and Ohio Pal., vol. 1, p. 213, Up. Held. Gr.
- decorum, Billings, 1866, Catal. Sil. Foss. Antic., p. 56, Anticosti Gr.

doris, Hall, 1862, V 15th Rep. N. Y. and Pal. N. Y., Up. Held. Gr. elevatum, Hall, 1868 Nat. Hist., p. 391

CYC.



FIG. 664.-Cyc

hageri, Billings, 186 29, Trenton Gr. hallanum, Salter, 1 Decade 1, p. 26, 1 hamiltoniæ, Hall, Mus. Nat. Hist., vol. 5, pt. 2, p. 37 humile, Billings,

Antic., p. 56, An lea



FIG. 665.-Cvclohalla-

me

Catal. Sil. Foss. Ar montrealense, Billi vol. 1, p. 30, Tren multiliratum, Hall, Mus. Nat. Hist.,

nema

num

vol. 5, pt. 2, p. 36 obsolescens, Hall, 1

Foss., p. 243, and 2, p. 38, Chemu stead of C. obsol

was preoccupied. obsoletum, Hall, 1

p. 90, Clinton Gr. cupied. See C. o obsoleta, Hall.

percarinatum, Hall percarinata,) Pal. Trenton and Huc

percingulatum, Bi Progr. Geo. Sur. and Niagara Grs.

phædra, Billings, 18 p. 188, Quebec Gi

[CAL.-CYC.



[CAL.-CYC.

78, Ann. Rep. id Geo. Wis.,

84, Pal. Foss. m. a

Turions loseodv uely lip ture

Codo n o-Pal. chilus Ety. Type

N. Y., vol. 2, ventricose with an im-

llings, 1866, 'oss. Antic., p. Gr 1842, (Pleuro-.) Jour. Acad. 8, p. 271, and 701. 1, p. 305, irs Miller, 1874,

1, p. 320, Hud.

ar. Jour. Sci., ìr. ttorina cancel-N. Y., p. 72, 90, Clinton Gr.

atal. Sil. Foss.

1st. Devonian Y., vol. 5, pt.

1st. Devonian rit. oc. Acad. Nat. vol. 1, p. 213,

ital. Sil. Foss. r.

GASTEROPODA.

pyramidatum, James, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 152, Hud. Riv. Gr.

- rugilineatum, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p 186, Niagara Gr.
- semicarinatum, Salter, 1859, Can. Org. Rem., Decade 1, p. 27, Black Riv. Gr.
- subangulatum, Hall, 1858, (Pleurotomaria subangulata,) Trans. Alb. Inst., vol. 4, p. 25, and Bull. Am. Mus. Nat. Hist., p. 76, Warsaw Gr.
- sulcatum, Hall, 1852, Pal. N. Y., vol. 2, p. 347, Guelph Gr.
- tennesseense, Roemer, 1860, (Turbo ten-nesseensis,) Sil. Fauna. des West Tenn., p. 77, Niagara Gr.
- thalia, Billings, 1857, (Pleurotomaria tha-lia,) Rep. of Progr. Geo. Sur. Can., p. 303, Hud. Riv. Gr.
- varians, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 305, Mid. Sil.
- varicosum, Hall, 1870, 24th Rep. N. Y. Mus. Nat. Hist., pl. 8. (Published by mistake in 14th Rep. 1861, as C. ventricosa.) Trenton Gr.
- ventricosum, Hall, 1852, Pal. N. Y., vol. 2, p. 90, Clinton Gr.
- CYCLORA, Hall, 1845, Am. Jour. Sci., vol. 48, p. 294. [Ety. kuklos, circle.] Shells minute, suture deep, surface smooth, lip thin, aperture circular. Type C. minuta.
- alta, Foerste, 1885, Bull. Sci. Lab. Denison Univ., p. 96, Niagara Gr. Does not belong to this genus.

depressa, Ulrich, 1879, Jour. Cin. Soc. Nat.

Hist., vol. 2, p. 13, Hud. Riv. Gr. hoffmanni, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 313, Hud. Riv. Gr.

minuta, Hall, 1845, Am. Jour. Sci., vol. 48, p. 294, Utica Slate and Hud. Riv. Gr.

nana, syn. for Cyclora minuta. FIG. 666

Cycl parvula, Hall, 1845, (Turbo hoffmanparvula,) Am. Jour. Sci., vol. ni. 48, p. 294, and Ohio Pal., vol. 1, p. 154, Hud. Riv. Gr.

pulcella, S. A. Miller, 1882, Jour. Cin. Soc.

Nat. Hist., vol. 5, p. 231, Hud. Riv. Gr. turbinata, Whiteaves, 1881, Can. Nat., vol. 10, p. 101, Devonian.

valvatiformis, Whiteaves, 1881, Can. Nat., vol. 10, p. 100, Devonian.

Cyclostoma, Lamarck, 1801, Syst. An. sans Vert. [Ety. kuklos. circle; stoma, mouth.] Not a Palæozoic genus.

pervetusta, see Pleurotomaria pervetusta.



FIG. 667. - Cyr-

tus.

tolites carina-

CYRTOLITES, Conrad, 1838, Ann. Rep. N. Y., p. 118. Ety. kurtos, curved; lithos. stone.] Shell coiled in the same plane, gradually tapering, volutions one or more, angu-

lar or carinated on the back and sides; section

subquadrate; aperture not expanded; surface ornamented. Type C. ornatus.

401



76, 28th Rep. p. 93. [Ety.] Patellitorm, ex central or triated, older ically.

enton Gr. 376, 28th Rep.)4, Trenton Gr. nema, thread.] 8 sed by oblique vilicus; mouth treme: inner sely reflected, concave. Type

1, 1874, (Cyclo-



FIG nema num



halla-35, Ham. Gr.

mediocre, Billings, 1866. Catal. Sil. Foss. Antic., p. 56, Anticosti Gr. montrealense, Billings, 1862, Pal. Foss., vol. 1, p. 30, Trenton Gr.

multiliratum, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 48, and Pal. N. Y., vol. 5, pt. 2, p. 36, Ham. Gr.

- obsolescens, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 243, and Pal. N. Y., vol. 5, pt. 2, p. 38, Chemung Gr. Proposed in-stead of C. obsoleta, Hall, 1876, which was preoccupied.
- obsoletum, Hall, 1852, Pal. N. Y., vol. 2, p. 90, Clinton Gr.
- obsoleta, Hall. The name was preoccupied. See C. obsolescens.
- percarinatum, Hall, 1847, (Pleurotomaria percarinata,) Pal. N. Y., vol. 1, p. 177,
- Trenton and Hud. Riv. Grs. percingulatum, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 304, Clinton and Niagara Grs.
- phædra, Billings, 1865, Pal. Foss., vol. 1, p. 188, Quebec Gr.

CYC.

Gr. striatum.

th Rep. N. Y.



v doris, Hall, 1862, (Pleurotomaria doris,) 15th Rep. N. Y. Mus. Nat. Hist., p. 43, and Pal. N. Y., vol. 5, pt. 2, p. 34,

elevatum, Hall, 1868, 20th Rep. N. Y. Mus.

FIG. 664.-Cyclonema hageri.

hageri, Billings, 1862, Pal. Foss., vol. 1, p.

1858,

leavenworthanum, Hall,

leavenworthana,

Trans. Alb. Inst,, vol. 4, p. 24, and Bull. Am.

Mus. Nat. Hist., p. 75,

Warsaw Gr.

(Pleurotomaria

Up. Held. Gr.

carinatus, S. A. Miller, 1874. Cin. Quar. Jour. Sci., vol. 1, p. 311, Utica Slate. compressus, Conrad, 1838, (Phragmolites compressus,) Ann. Rep. N. Y., p. 119,

and Pal. N. Y., vol. 1, p. 188, Black Riv. and Trenton Grs.

conradi, Hall, 1862, Geo. Rep. Wis., p. 55, Trenton Gr.

costatus, see Bucania costata.

cristatus, Safford, 1869, Geo. of Tenn., p. 289, Nashville Gr.

desideratus, Billings, 1866, Catal. Sil. Foss. Antic., p. 21, Hud. Riv. Gr. dyeri, Hall, 1871, 24th Rep. N. Y. Mus.

Nat. Hist., p. 230, Hud. Riv. Gr.

elegans, S. A. Miller, 1874,

Čin. Quar. Jour. Sci., vol. 1, p. 310, Hud. Riv. Gr.

expansus, Hall, 1859, Pal. N. Y., vol. 3, p. 479, Oriskany sandstone.

annu FIG. 668.—Cyrto-lites elegans.

668.-Cyrto-les elegans. Emmons, 1842, Geo. Rep. 2d Dist. N.Y., p. 372, and Pal. N. Y., vol. 1, p. 190, Trenton Gr.

gillanus, White & St. John, 1868, Trans. Chi. Acad. Sci., p. 123, Coal Meas. imbricatus, Meek & Worthen, 1868, Geo.

Sur. Ill., vol. 3, p. 340, Hud. Riv. Gr.

magnus, S. A. Miller, 1878, Jour. Cin. Soc. Nat, Hist., vol. 1, p. 103, Hud. Riv. Gr.

mitella, see Cyrtonella mitella. Ulrich, 1878,

nitidulus, Ulrich, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 12, Utica

Slate Gr. ornatus, Conrad, 1838, Ann. Rep. N. Y., p. 118, and Pal. N. Y., vol. 1, p. 308, Hud. Riv. Gr.

pannosus, Billings, 1866, Catal. Sil. Foss. Antic.,

FIG. 670.

Cyrtonella pileolus.

by the

mitella.

p. 20, Hud. Riv. Gr. Hud. Kiv. Gr. FIG. 669.—Cyrto-see Cyrtonella lites ornatus. pileolus, pileolus.

- sinuatus, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th parallel, vol. 4, p. 237, Quebec Gr.
- sinuosus, Hall, 1876, 28th Rep. N. Y. Mus. Nat Hist., p. 178, Niagara Gr.

trentonensis, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 270, and Pal. N. Y., vol. 1, p. 189, Trenton Gr.

CYRTONELLA, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 123. [Ety. diminutive of Cyr-tolites.] Shells ovoid, trumpet-shaped;

volutions one or more in the same plane; apex minute, making about a single turn, and rapidly expanding beyond; peristome entire; dorsum angular or subcarinate; sculptured; dissurface tinguished from Cyrtolites Type C. rapid expansion.

mitella, Hall, 1862, (Cyrtolites mitella,) 15th Rep. N. Y. Mus. Nat. Hist., p. 61. and Pal. N. Y., vol. 5, pt. 2, p. 123, Ham. Gr.

134. June 1998 Hall, 1862, (Crytolites pileolus,) 15th Rep. N. Y. Mus. Nat. Hist., p. 61, and Pal. N. Y., vol. 5, pt. 2, p. 125, Ham. Gr.

- DAWSONELLA, Bradley, 1874, Am. Jour. Sci., 3d series, vol. 7, p. 151. [Ety. proper name.] Helicoid, having a thin plate attached to the columella, covering half or more than half of the aperture of the
- shell as in Navicella. Type D. meeki, meeki, Bradley, 1872, (Anomphalus meeki,) Am. Jour. Sci., 3d series, vol. 4, p. 88, Coal Meas.
- DENTALIUM, Linnæus, 1740, Syst. Nat., 2d Ed., p. 64. [Ety. dens, tooth.] Shell elongate, terete, or angular, smooth, costate, or striate; aperture circular; lip simple, entire; margin of the posterior opening without a fissure. Type D. elephantinum.
 - aciculatum, see Coleolus aciculatus.
 - acutisulcatum, Gurley, 1883, New Carb. Foss., p. 7. Publication not valid.
 - annulostriatum, Meek & Worthen, 1870, Proc. Acad. Nat. Sci., p. 45, and Geo. Sur. Ill., vol. 5, p. 589, Coal Meas. arquense, Winchell, 1862, barquense,

Proc. Acad. Nat. Sci., p. 425, Marshall Gr.

- canna, White, 1874, Rep. In-FIG. 671 vert. Foss., p. 23, and Geo. Sur. W. 100th Mer., vol. 4, Dentalium p. 156, Carb. grandævum, Winchell, 1863, phantinum.
- Proc. Acad. Nat, Sci., p. 18, Marshall Gr. illiuoisense, Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 325, and Geo. Sur. Ill., vol. 8,
- p. 145, Kaskaskia Gr. martini, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 203, Up. Held. Gr. meekanum, Geinitz, 1866, Carb. und Dyas
- in Neb., p. 13, and Geo. Sur. Ill., vol. 5, p. 590, Coal Meas.
- missouriense, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 99, Kaskaskia Gr.
- obsoletum, Hall. Preoccupied by Schlotheim in 1832. See D. sublæve.
- primarium, Hall, 1858, Geo. Rep. Iowa,
- p. 666, Warsaw Gr. sublave, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 244, Coal Meas. Proposed instead of D. obsoletum, Hall, 1858, Geo. Sur. Iowa, which was preoccupied.
- venustum, Meek & Worthen, 1861, Proc. Acad. Nat. Sci., p. 145, and Geo. Sur. Ill., vol. 2, p. 284, St. Louis Gr.
- Discolites, Emmons, syn. for Cyclora. minutus, see Cyclora minuta.
- ECCYLIOMPHALUS, Portlock, 1843, Geol. Rep. Lond., p. 411. [Ety. ecculiomphalus, un-rolled umbilicus.] Shell discoid, a few

EOT.-EUO.]

CYR - ECC.

tapering, widely upper surface us plane, or slightly face of whorls Type E. buckland atlanticus, Billings 1, p. 250, Quebec canadensis, Billing Geol., vol. 6, p. 3 circinatus, Whitea vol. 3, p. 35, Gue comes, Hall, 1876 pl. 16, Ham. Gr. devonicus, Walcot Geo. Sur., vol. 8,

- distans, Billings, 1 p. 249, Quebec G eboracensis, Hall, eboracensis,) 15t Hist., p. 55, and 2, p. 61, Ham. G gyroceras, Roeme
- gyroceras,) Krei Silurian. intortus, Billings,

Geol., vol. 6, p. laxus, Hall, 1861, 15th Rep. N. Y. and Pal. N. Y., Held. Gr. paradoxus, Winche

paradoxus,) Proc and Pal. N. Y., v

shall Gr. priscus, Whitfield, Nat. Hist., vol. 2 spiralis, Billings,

Geol., vol. 6, p.

superbus, Billings, 1, p. 250, Quebec

undulatus, Hall, 18 37, Trenton Gr.

volutatus, Whitfield Nat. Hist., vol. 1 EOTROCHUS, Whitfield Nat. Hist., p.





CYR - ECC.

EOT.-EUO.]

olites mitella,) at. Hist., p. 61, pt. 2, p. 123,

lites pileolus.) at. Hist., p. 61, pt. 2, p. 125.

Am. Jour. Sci., [Ety. proper g a thin plate a, covering half aperture of the ype D. meeki. (Anomphalus 3d series, vol.

Syst. Nat., 2d tooth.] Shell gular, smooth, rture circular; gin of the posfissure. Type

icu-883, ub-Vor-Nat. Sur. eas. 862 425,

In-FIG. 671 – Geo. Denta-. 4, lium ele phantinum. 863,

8, Marshall Gr. , Geo. Sur. Ill., ur. Ill., vol. 8,

Ann. N. Y. Up. Held. Gr. Carb. und Dyas Sur. Ill., vol. 5,

63, Trans. St. p. 99, Kaskas-

ied by Schlotiblæve. eo. Rep. Iowa,

Ed. Am. Pal. Proposed in-[all, 1858, Geo. eoccupied. en, 1861, Proc. and Geo. Sur. uis Gr. Cyclora.

843, Geol. Rep. diomphalus, undiscoid, a few

GASTEROPODA.

tapering, widely disconnected whorls; upper surface usually flattened in one plane, or slightly elevated; lower surface of whorls round; no chambers. Type E. bucklandi.

atlanticus, Billings, 1865, Pal. Foss., vol. 1, p. 250, Quebec Gr.

canadensis, Billings, 1861, Can. Nat. and Geol., vol. 6, p. 320, Quebec Gr.

circinatus, Whiteaves, 1884, Pal. Foss., vol. 3, p. 35, Guelph Gr. comes, Hall, 1876, Illust. Devon. Foss.,

pl. 16, Ham. Gr.

devonicus, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 187, Devonian.



FIG. 672.-Eccyliomphalus distans.

- distans, Billings, 1865, Pal. Foss., vol. 1, p. 249, Quebec Gr.
- eboracensis, Hall, 1861, (Euomphalus eboracensis,) 15th Rep. N. Y. Mus. Nat. Hist., p. 55, and Pal. N. Y., vol. 5, pt. 2, p. 61, Ham. Gr.
- gyroceras, Roemer, 1852, (Euomphalus gyroceras,) Kreid. von Texas, p. 91, Silurian.
- Geol., vol. 6, p. 321, Quebec Gr. laxus, Hall, 1861, (Euomphalus laxus,)
- 15th Rep. N. Y. Mus. Nat. Hist., p. 54, and Pal. N. Y., vol. 5, pt. 2, p. 60, Up. Held. Gr.
- paradoxus, Winchell, 1863, (Phanerotinus paradoxus,) Proc. Acad. Nat. Sci., p. 21, and Pal. N. Y., vol. 5, pt. 2, p. 60, Marshall Gr.
- priscus, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 46, Calciferous Gr. spiralis, Billings, 1861, Can. Nat. and Geol., vol. 6, p. 321, Quebec Gr. superbus, Billings, 1865, Pal. Foss., vol.
- p. 250, Quebec Gr. undulatus, Hall, 1861, Geo. Rep. Wis., p, 37. Trenton Gr.
- volutatus, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 314, Birdseye Gr. EOTROCHUS, Whitfield, 1882, Bull. Am. Mus.
- Nat. Hist., p. 77. [Ety. eos, dawn;

Trochus, a genus.] Conical above, flat or concave beneath, and broadly and deeply umbilicated; aperture very oblique, and the outer angle of volutions strongly carinated; surface ornamentation unlike on the upper and lower parts. Type E. concavus. concavus, Hall, 1858,

(Pleurotomaria concava,) Trans. Alb. Inst., vol. 4, p. 24, and Bull. Am. Mus. Nat. Hist., p. 78, Warsaw Gr.



Eulima, Risso, 1826, His- FIG. 673.-Eotrochus concavus toire Naturelle des

Principales, p. 123. Not an American Palæozoic genus.

peracuta, see Polyphemopsis peracuta.

EUNEMA, Salter, 1859, Can. Org. Rem., Decade 1, p. 24. [Ety. eu, beautiful; nema, line.] Turbinate, thin; few angular whorls, strong concentric ridges, crossed by sinuate or oblique lines of growth; inner lip not reflected; peritreme simple; mouth rather effuse below; no umbilicus. Type E. strigillatum.



cerithioides, Salter, 1859, Can. Org. Rem., Decade 1, p. 30, Black Riv. Gr. erigone, Billings, 1862,

Pal. Foss., vol. 1, p. 35, Black Riv. Gr. pagoda, Salter, 1859, Can. Org. Rem., Dec-

FIG. 674,—Eunema cerithioides.

- ade 1, p. 30, Black Riv. Gr. priscum, Billings, 1859, Can. Nat. and
- Geo. vol. 4, p. 360, Calciferous Gr. salteri, see Orthonema salteri.
- strigillatum, Salter, 1859, Can. Org. Rem., Decade 1, p. 29, Black Riv. Gr.
- trilineatum, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 397, Niagara Gr. EUOMPHALUS, Sowerby, 1812, Min. Conch.,
- vol. 1, p. 97. [Ety. eu, wide; omphalos, umbilicus.] Shell

discoid, spire flattened; whorls numerous, angulated; umbilicus very wide, exposing volutions; mouth nearly circular; peritreme entire, not in-dented by the preceding whorl; sculptured. Type



surface usually Fig. 675 - Euomphalus pentangulatus.

- E. pentangulatus. ammon, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 301, Kinderhook Gr.
- boonensis, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 99, Burlington Gr. calciferus, Whitfield, 1889, Bull. Am. Mus.
- Nat. Hist., vol. 2, p. 47, Calciferous Gr.

- catilloides, Conrad, 1842, (Inachus catilloides,) Jour. Acad. Nat. Sci., vol. 8, p. 273, Coal. Meas.
- circumliratus, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 308, Birdseye Gr.
- clymenioides, see Straparollus clymenioides

comes, Hall, syn. for Phanerotinus laxus. conradi, syn. for Pleuronotus decewi. cyclostomus, see Straparollus cyclostomus. decewi, see Pleuronotus decewi.

- decollatus, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 244, Low. Held. Gr. Proposed instead of E. disjunctus, Hall, 1859, Pal. N. Y., vol. 3, p. 340.
- depressus, Hall, 1843. Preoccupied by Goldfuss in 1832. See Straparollus
- hecale. disjunctus, Hall. Preoccupied by Goldfuss. See E. decollatus.
- eboracensis, see Eccyliomphalus eboracensis.
- exortivus, Dawson, 1868, Acad. Geol., p. 308, Carboniferous.
- expansus, Conrad, 1842, Jour. Acad. Nat.
- Sci., vol. 8, p. 273, Niagara Gr. gyroceras, see Eccyliomphalus gyroceras. hecale, see Straparollus hecale.
- hecale var. corpulens, see Straparollus he-
- cale var. corpulens. hemispherica, see platystoma hemisphericum.
- inops, see Straparollus inops. latus, Hall, 1858, Geo. Rep. Iowa, p. 605, Burlington Gr.
- laxus, see Eccyliomphalus laxus.
- lens, see Straparollus lens.
- luxus, White, 1875, Expl. W. 100th Meridian, vol. 4, p. 94, Subcarboniferous. macrolineatus, Whitfield, 1878, Ann. Rep.
- Geo. Sur. Wis., p. 82, and Geo. Sur. Wis., vol. 4, p. 294, Niagara Gr. minnesotensis, Owen, 1852, Geo. Sur. Wis.,
 - Iowa, and Minn., p. 581, Calcifer-
- ous Gr. minutissimus, Castelnau, 1843, Syst. Sil., p.
- 35. Not recognized.
- obtusus, Hall, 1858, Geo. Rep. Iowa, p. 523, Kinderhook Gr.
- ophirensis, see Straparollus ophirensis.
- pernodosus, Meek & Worthen, 1870, (Straparollus pernodosus,) Proc. Acad. Nat. Sci., p. 45, and Geo. Sur. Ill., vol. 5, p. 604, Coal Meas.
- perspectivus, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 98, Kaskaskia Gr.
- pervetus, Conrad, 1843, (Inachus per-vetus,) Proc. Acad. Nat. Sci., vol. 1, p. 334, Trenton Gr.
- planidorsatus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 462, and Geo. Sur. Ill., vol. 2, p. 302, Kaskaskia Gr.
- planispira, see Straparollus planispiratus. planodiscus, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 109, and Pal. N. Y., vol. 5, pt. 2, p. 57, Ham. Gr.

- polygyratus, Roemer, 1852, Kreid. von Texas, p. 91, Silurian.
- profundus, see Bucania profunda.
- quadrivolvis, see Straparollus quadrivolvis, roberti, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 22, Burlington Gr.
- rotuliformis, Meek, 1870, Proc. Acad. Nat.
- Sci., p. 61, Calciferous Gr.
- rotundus, see Pleurotomaria rotunda. rudis, see Straparollus rudis.
- rugilineatus, see Cyclonema rugilineatum.
- rugosus, Hall, 1858, Geo. Sur. Iowa, p. 722. Preoccupied by Sowerby in 1812. See
- E. subrugosus. sanctisabæ, see Straparollus sanctisabae.
- sinuatus, see Straparollus sinuatus.
- spergenensis, see Straparollus spergensis.
- spergenensis var. planorbiformis, see Straparollus spergenensis var. planorbiformis.
- spirorbis, see Straparollus spirorbis.
- springvalensis, White, 1876, Proc. Acad. Nat. Sci., p. 32, and Cont. to Pal., No. 8, p. 167, Kinderhook Gr.
- strongi, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 66, and Geo. Wis., vol. 4, p. 200, Lower Magnesian Gr.
- subplanus, see Straparollus subplanus.
- subquadratus, Meek & Worthen, 1870, (Straparollus subquadratus,) Proc. Acad. Nat. Sci., p. 46, and Geo. Sur. Ill., vol. 5, p. 605, Up. Coal. Meas.
- subrugosus, Meek & Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 607, Coal Meas. Proposed instead of E. rugosus, Hall, which was preoccupied.
- sulcatus, Hall, 1843, Geo. Rep. 4th Dist.
- N. Y., p. 138, Onondaga Gr. tioga, Hall, 1876, Illust. Devonian Foss., pl. 15, and Pal. N. Y., vol. 5, pt. 2, p. 56, Chemung Gr.
- triliratus, Conrad, 1843, Proc. Acad. Nat. Sci., p. 333, Trenton Gr.
- trochiscus, see Raphistoma trochiscum. umbilicatus, see Straparollus umbilicatus. uniangulatus, see Ophileta uniangulata.
- utahensis, see Straparollus utahensis. vaticinus, Hall, 1863, 16th Rep. N. Y.
- Mus. Nat. Hist., p. 136, Potsdam Gr. verneuili, Castelnau, 1843, Syst. Sil., p. 34.
- Not recognized. whitneyi, see Omphalotrochus whitneyi.
- FUSISPINA, Hall, 1871, 24th Rep. N. Y. Mus.
- Nat. Hist., p. 229. [Ety. fusus, spindle; spira, spire.] Fusiform, imperforate; spire elevated, with rounded volutions; aperture elongate-ovate or elliptical, produced below, forming a subrimate canal; columella slightly twisted, without folds; peristome sharp. Type F. ventricosa. compacta, Hall & Whitfield, 1877, U.S.
- Expl. 40th Parallel, vol. 4, p. 236, Quebec. Gr.
- elongata, Hall, 1871, 24th Rep. N. Y. Mus. Nat. Hist., p. 229, Trenton Gr.
- subfusiformis, Hall, 1847, (Murchisonia subfusiforme,) Pal. N. Y., vol. 1, p. 180, Trenton and Hud. Riv. Grs.

HEL.-HOL.]

[FUS.

terebriformis, H N. Y. Mus. Na



FIG. 676.-Fusispira ver

- for Macrochilina HELICOTOMA, Salter, Decade 1, p. 13. shells; tome, notc spire nearly flat gular externally, bilicus broad; fo planulata.
- declivis, Safford, 186 Geo. of Tenn. N defined.
- eucharis, Billing 1865, Pal. Fost vol. 1, p. 249, Qu bec Gr.
- gorgonea, Billings, p. 248, Quebec Gu larvata, Salter, 18 Decade 1, p. 15,
- ton Grs. misera, Billings, 18 p. 309, Quebec G
- muricata, Salter, 18 muricata,) Can.
- p. 14, Black Riv naresi, Etheridge, 1
- Soc., vol. 34, p. 60 perstriata, Billings,
- Geo., vol. 4, p. 35 planulata, Salter, 1
- Decade 1, p. 14, B Grs.
- proserpina, Billings 1, p. 247, Quebec
- serotina, Nicholson, p. 120, Up. Held.
 - spinosa, Salter, 1859 ade 1, p. 15, Black tennesseensis, Safford,
 - Not defined.

FUS.

?, Kreid. von

unda. quadrivolvis. Bost. Soc. Nat. igton Gr. oc. Acad. Nat.

rotunda

rugilineatum. . Iowa, p. 722. in 1812. See

sanctisaba uatus. s spergensis mis, see Stravar. planorbi-

pirorbis. , Proc. Acad. t. to Pal., No.

nn. Rep. Geo. . Wis., vol. 4, Gr. ubplanus. orthen, 1870. s,) Proc. Acad. . Sur. Ill., vol.

en, 1873, Geo. I Meas. Prougosus, Hall.

Rep. 4th Dist. Hr. vonian Foss., ol. 5, pt. 2, p.

oc. Acad. Nat.

rochiscum. umbilicatus. niangulata. tahensis.

Rep. N. Y. otsdam Gr. vst. Sil., p. 34.

18 whitnevi. p. N. Y. Mus. fusus, spindle; imperforate; ounded volue-ovate or elr, forming a nella slightly ristome sharp.

d, 1877, U.S. 1. 4, p. 236,

ep. N. Y. Mus. ı Gr. (Murchisonia

vol. 1, p. 180, rs.

GASTEROPODA.

terebriformis, Hall, 1871, 24th Rep. N. Y. Mus. Nat. Hist., p. 230, Hud.

Riv. Gr. ventricosa. Hall, 1871, 24th Rep. N.Y. Mus. Nat. Hist., p. 229, Trenton Gr. vittata, Hall, 1847,(Murchisonia vittata,) Pal. N. Y., vol. 1, p. 181, Trenton Gr. sus, Bruguiere, 1789, En-cyc. Meth. This genus is unknown in the Palæo-

zoic rocks. FIG. 676.-Fusispira ventricosa. inhabilis, syn.

for Macrochilina primigenia.

HELICOTOMA, Salter, 1859, Can. Org. Rem., Decade 1, p. 13. [Ety. Helix, genus of shells; tome, notch.] Depressed discoid, spire nearly flat, whorls obtusely angular externally, rounded below; umbilicus broad; form helicoid. Type H. planulata.

declivis, Safford, 1869, Geo. of Tenn. Not defined. eucharis, Billings,



- 1865, Pal. Foss., FIG. 677.-Helicotoma vol. 1, p. 249, Queeucharis. bec Gr.
- gorgonea, Billings, 1865, Pal. Foss., vol. 1,
- p. 248, Quebec Gr. larvata, Salter, 1859, Can. Org. Rem., Decade 1, p. 15, Black Riv. and Trenton Grs.
- misera, Billings, 1865, Pal. Foss., vol. 1, p. 309, Quebec Gr.
- muricata, Salter, 1859, (H. planulata var. muricata, Can. Org. Rem., Decade 1, p. 14, Black Riv and Trenton Grs. naresi, Etheridge, 1878, Quar. Jour. Geo.
- Soc., vol. 34, p. 602, Up. Sil.
- perstriata, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 356, Calciferous Gr.
- planulata, Salter, 1859, Can. Org. Rem., Decade 1, p. 14, Black Riv. and Trenton Grs
- proserpina, Billings, 1865, Pal. Foss., vol.
- 1, p. 247, Quebec Gr. serotina, Nicholson, 1874, Rep. Pal. Ont., p. 120, Up. Held. Gr.
- spinosa, Salter, 1859, Can. Org. Rem., Decade 1, p. 15, Black Riv. Gr.
- tennesseensis, Safford, 1869, Geo. of Tenn. Not defined.

tritonia, Billings, 1865, Pal. Foss., vol. 1, р. 247, Quebec Gr. Ногорел, Hall, 1847, Pal. N. Y., vol. 1, р.

- [Ety. holos, entire; ope, aperture.] 169 Shell conical, ventricose, more or less oblique, or nearly direct; aperture round, ovate; margin entire; surface marked by fine curved striæ or cancellated; distinguished from Cyclonema by the presence of an umbilicus. Type H. symmetrica and H. obliqua.
- antiqua, Vanuxem, 1843, (Littorina antiqua,) Geo. Rep. 3d Dist. N. Y., p. 112, and Pal. N. Y., vol. 3, p. 294, Low. Held. Gr.
- Antiqua var. pervetusta, Hall, 1859, Pal. N. Y., vol. 3, p. 295, Low. Held. Gr. cassina, Whitfield, 1886, Bull. Am. Mus.
- Nat. Hist., p. 310, Birdseye Gr. chicagoensis, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., p. 99, Niagara Gr.
- conica, Winehell, 1863, Proc. Acad. Nat. Sci., p. 21, Marshall Gr.
- danai, Hall, 1859, Pal. N. Y., vol. 3, p. 295, Low. Held Gr.
- dilucula, Hall, 1847, (Turbo
- dilucula,) Pal. N. Y., vol. 1, p. 12, Calciferous Gr.
- (?) elongata, Hall, 1859, Pal. N. Y., vol. 3, p. 295, Low. Held. Gr.
- eriensis, Nicholson, 1874, Rep. Pal. Ont., p. 120, Up. Held. Gr.
- gracia, Billings, 1862, Pal. Foss., vol. 1, p.
- 159, Guelph Gr. guelphensis, Billings, 1862, Pal. Foss., vol. 1, p. 159, Guelph Gr.
- harmonia, Billings, 1862, Pal. Foss., vol. 1,
- p. 158, Guelph Gr. lavinia, Billings, 1862, Pal. Foss., vol. 1, p. 28, Trenton Gr.
- leiosoma, Billings, 1865, Pal. Foss., vol. 1, p. 187, Quebec Gr.
- magniventra, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 83, and Geo. Wis., vol. 4, p. 316, Niagara Gr.
- nana, Meek, 1871, Proc. Acad. Nat. Sci., p. 172, syn. for Cyclora minuta.
- nereis, Billings, 1862, Pal. Foss., vol. 1, p. 27, Trenton and Black Riv. Grs.
- newtonensis, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 224, Kaskaskia Gr.
- niagarensis, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., p. 99, Niagara Gr.
- obesa, Whitfield, 1882, Geo. Wis., vol. 4, p. 348, Low. Magnesian Gr. obliqua, Hall, 1847, Pal. N. Y., vol. 1, p.
- 170, Trenton and Hud. Riv. Gr.
- obscura, Hall, 1847, (Turbo obscura,) Pal. N. Y., vol. 1, p. 12, Calciferous Gr.
- occidentalis, Nicholson, 1875, Quar. Jour. Geo. Soc. Lond., vol. 31, p. 550, Guelph Gr.
- ophelia, Billings, 1865, Pal. Foss., vol. 1, p. 222, Quebec Gr.



FIG. 678 Holopea dilucula.





HEL.-HOL.]

- ovalis, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 351, Calciferous Gr.
- paludiniformis, Hall, 1847, Pal. N. Y., vol. 1, p. 171, Trenton Gr.
- proserpina, Billings, 1862, Pal. Foss., vol. 1, p. 28, Calciferous and Chazy Grs.
- proutana, Hall, 1858, Trans. Alb. Inst. vol. 4, p. 30, and Bull. Am. Mus. Nat. Hist., p. 72, Warsaw Gr. pyrene, Billings, 1862, Pal. Foss., vol. 1,
- p. 27, Black Riv. Gr.
- reversa, Hall, 1860, Can. Nat. and Geo. vol. 5, p. 154, Up. Silurian.
- subconica, Hall, 1859, Pal. N. Y., vol. 3, p. 294, Low. Held. Gr.
- subconica, Winchell, 1863, Proc. Acad. Nat. Sci., p. 21. This name was preoccupied. weeti, Whitfield, 1880, Ann. Rep. Geo.
- sweeti, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis. and Geo. Wis., vol. 4, p. 174, Potsdam Gr.
- symmetrica, Hall, 1847, Pal. N. Y., vol. 1, p. 170, Black Riv. Gr.
- turgida, Hall, 1847, (Pleurotomaria tur-gida,) Pal. N. Y., vol. 1, p. 12, Calciferous Gr.
- ventricosa, Hall, 1847, Pal. N. Y., vol. 1, p. 171, Trenton Gr.
- HOLOPELLA, McCoy, 1855, Brit. Pal. Foss. p. 303. [Ety. diminutive of Holopea.] Shell spiral, elongate, slender, of numerous gradually increasing whorls, generally crossed by slightly arched striæ; mouth circular, with the peritreme entire; base rounded, with or without a minute umbilicus. Type H. cancellata.
- mira, Winchell, 1863, Proc. Acad. Nat. Sci., p. 22, Marshall Gr.
- Inachus catilloides, see Euomphalus catilloides.

pervetus, see Euomphalus pervetus.

- pervetustus, see Pleurotomaria pervetusta. undatus, see Lituites undatus.
- ISONEMA, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 251. [Ety. isos, equal; nema, thread.] Depressed turbinate, subglobose, obtusely angular around the middle of the body whorl; aperture subrhombic; outer lip thin, entire; inner lip a little flattened in the umbilical region; surface ornamented with transverse, very regular lines on the upper side of the volutions. Type I. depressum.
- bellatulum, see Callonema bellatulum.

depressum, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 251, and Geo. Sur. Ill., vol. 3, p.

FIG. 679.-Isonema depressum

443, Ham. Gr. humile, Meek, 1871, Proc. Aca .. Nat. Sci., p. 79, and Ohio Pal., vol. 1, p. 214, Up. Held. Gr.

lichas, see Callonema lichas.

LEPETOPSIS, Whitfield, 1882 Bull. Am. Mus. Nat. Hist., No. 3, p. 67. [Ety. Lepeta, a genus; opsis, resemblance.] Shell patelliform, more or less regularly round or oval, apex subcentral, posterior to the middle, directed backward, the nucleus dextrally coiled; muscular imprint horseshoe-shaped, open in front, consisting of an irregular narrow band, which expands more or less at the anterior extremities; surface with six radiating lines, two anterior, two posterior, and two lateral.

HOL.-LOX.

Type L. levettii. chesterensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 25, and Geo. Sur. Ill.,

- vol. 8, p. 140, Kaskaskia Gr. levettii, White, 1882, (Pa-
- tella levettei,) 11th Rep. Geo. of Indiana, FIG. 680.-Lepe-topsis levettii. p. 359, Warsaw Gr. Littorina, Ferussac, 1821, Tab. Syst. An.
- Mollusques, etc.
- antiqua, see Holopea antiqua.
- cancellata, see Cyclonema cancellatum. wheeleri, see Naticopsis wheeleri.
- LOPHOSPIRA, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 312. [Ety. lophos, the keel; speira, a whorl.] Spire ele-vated, strongly keeled, and axis minutely perforate, when whorls are not disconnected. The types are Murchi-sonia milleri, Hall, and M. helicteres; but as the generic characters are not very satisfactorily or clearly defined, I leave the species with Murchisonia. cassina, see Murchisonia cassina.
- calcifera, see Murchisonia calcifera.
- LOXONEMA, Phillips, 1841, Pal. Foss., Cornwall, etc., p. 98. [Ety. loxos, oblique; nema, thread.] Shell elongate, many whorled; aperture simple, attenuate above, effuse below; lines of growth sigmoidal; no umbilicus. Type L. sinuosum.
 - aculeatum, Billings, 1866, Catal. Sil. Foss. Antic., p. 55, Anticosti Gr. acutulum, Dawson, 1868, Acad. Geol., p.
 - 309, Carboniferous.
 - approximatum, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 191, Devonian. attenuatum, Stevens, 1858, (Chemnitzia
 - attenuata,) Am. Jour. Sci. and Arts, 2d ser., vol. 25, p. 259, Coal Meas.
 - attenuatum, Hall, 1859, Pal. N. Y., vol. 3, p. 296. The name was preoccupied. See L. emaceratum.
 - attenuatum var. semicostatum, see L. semicostatum.
 - bellatulum, see Isonema bellatulum.
 - bellona, Hall, 1876, Illust. Devonian Foss., pl. 14, and Pal. N. Y., vol. 5, pt. 2, p. 46, Ham. Gr.
 - bellum, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 258, Subcarboniferous. boydi, see Murchisonia boydi.
 - breviculum, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 132, Ham. Gr.

LOX.]

cara, Dawson, Museum, No. 2 carinatum, see M cerithiforme, M Proc. Acad. N. Sur. Ill., vol. 2. coaptum, Hall, Foss., pl. 13, a 2, p. 44, Ham. cotteranum, Billi 6, p. 360, Corni Not defined so danvillense, Stev vol. 25, p. 259, delphicola, Hall Mus. Nat. His vol. 5, pt. 2, p. emaceratum, Hal Pal. N. Y., vo preoccupied. eurekense, Walc Geo. Sur., vol. fasciatum, King, 209, Permian G fitchi, Hall, 1859 296, Low. Held.

Acad. Nat. Sci.,

han R F F hyd fi Ν 19

inor

Arts, 2d ser., Held. Gr. læviusculum, Hall

Nat. Hist., p. 39

p. 317, Niagara (

- - minutum, Stevens,

compactum, Hal p. 297, Low. H

crassum, Webster

Foss., p. 244, L instead of L. at

gigantea, Webster

Not properly de halli, Norwood

Coal Meas.

FIG. 681.-Loxo nema hamil-5, toniæ

kanii, Meek, 186

5, pt. 2, p. 131, F laxum, Hall, 1879

2, p. 49, Chemui leda, Hall, 1868,

magnum, Whitfield Sur. Wis., p. 83,

macclintochi, Hau

- Dub. Soc., vol. 1,
- 2d series, vol. 25 moloch, Clarke, 188 No. 16, p. 30, Gei

multicostatum, Me Proc. Acad. Nat. Sur. Ill., vol. 2, p



HOL.-LOX.

LOX.]

Shell palarly round posterior to ard, the nuuscular imen in front, arrow band, ss at the anwith six ra-, two poste-



680. psis levettii.

). Syst. An.

cellatum. leri.

Il. Am. Mus. [Ety. lophos, Spire eleid axis miporls are not are Murchi-[. helicteres; ters are not ly defined, I chisonia. ina. cifera. Foss., Corn-

xos, oblique; ngate, many e, attenuate es of growth Type L. sinu-

tal. Sil. Foss.

ad. Geol., p.

385, Monogr. 91, Devonian. (Chemnitzia and Arts, 2d eas.

N. Y., vol. 3, preoccupied. see L. semi-

atulum.

vonian Foss., 5, pt. 2, p. 46,

gr. U. S. Geo. boniferous.

N. Y., vol. 5,

GASTEROPODA.

cara, Dawson, 1883, Rep. on Redpath Museum, No. 2, p. 11, Subcarboniferous. carinatum, see Macrochilina carinata.

cerithiforme, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 465, and Geo. Sur. Ill., vol. 2, p. 379, Up. Coal Meas. coaptum, Hall, 1876, Illust. Devonian Foss., pl. 13, and Pal. N. Y., vol. 5, pt.

- 2, p. 44, Ham. Gr.
- compactum, Hall, 1859, Pal. N. Y., vol. 3, p. 297, Low. Held. Gr.
- cotteranum, Billings, 1861, Can. Jour., vol. 6, p. 360, Corniferous limestone.
- crassum, Webster, 1888, Am. Nat., p. 446. Not defined so as to be recognized. danvillense, Stevens, 1858, Am. Jour. Sci.,

- danvillense, Stevens, 1858, Am. Jour. Sci., vol. 25, p. 259, Coal Meas.
 delphicola, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 52, and Pal. N. Y., vol. 5, pt. 2, p. 47, Ham. Gr.
 emaceratum, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 244, Low. Held. Gr. Proposed instead of L. attenuatum, Hall, 1859, in Pal. N. Y. vol. 3, p. 296 which was Pal. N. Y., vol. 3, p. 296, which was preoccupied.
- eurekense, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 190, Devonian. fasciatum, King, 1850, Permian Foss., p.
- 209, Permian Gr. fitchi, Hall, 1859, Pal. N. Y., vol. 3, p.
- 296, Low. Held. Gr.
- gigantea, Webster, 1888, Am. Nat., p. 445. Not properly defined.
- halli, Norwood & Pratten, 1855, Jour. Acad. Nat. Sci., 2d series, vol. 3, p. 77, Coal Meas.

hamiltoniæ, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 33, and Pal. N. Y., vol. 5, pt. 2, p. 45, Ham. Gr.

hydraulicum, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 193, and Pal. N. Y., vol.

FIG. 681.—Loxo-nema hamil-toniæ. 5, pt. 2, p. 44, Ham. Gr. inornata, see Polyphemopsis inornata.

- kanii, Meek, 1865, Am. Jour. Sci. and Arts, 2d ser., vol. 40, p. 33, Low. Held. Gr.
- læviusculum, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 131, Ham. Gr. laxum, Hall, 1879, Pal. N. Y., vol. 5, pt.
- 2, p. 49, Chemung Gr.
- leda, Hall, 1868, 20th Rep. N. Y. Mus. Nat. His¹., p. 398, Niagara Gr. magnum, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 83, and Geo. Wis., vol. 4, p. 317, Niagara Gr.
- macelintochi, Haughton, 1857, Jour. Roy. Dub. Soc., vol. 1, Devonian. minutum, Stevens, 1858, Am. Jour. Sci.,
- 2d series, vol. 25, p. 260, Coal Meas. moloch, Clarke, 1885, Bull. U. S. Geo. Sur.,
- No. 16, p. 30, Genesee shales. multicostatum, Meek & Worthen, 1861, Proc. Acad. Nat. Sci., p. 128, and Geo. Sur. Ill., vol. 2, p. 378, Coal Meas.

murrayanum, Salter, 1859, Can. Org. Rem., Decade 1, p. 31, Black Riv. Gr.

newberryi, see Soleniscus newberryi.

nexile, Sowerby. Not an American species. nitidula, see Polyphemopsis nitidula.

- nobile, Walcott, 1885, Monogr. U. S. Geo.
- Sur., vol. 8, p. 190, Devonian. nodosum, Stevens, 1858, Am. Jour. Sci.,
- 2d ser., vol. 25, p. 260, Coal Meas. noe, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 55, Portage Gr. obtusum, Hall, 1859, Pal. N. Y., vol. 3, p.
- 297, Low. Held. Gr.
- oligospiratum, Winchell, 1863, Proc. Acad. Nat. Sci., p. 22, Marshall Gr. owenense, Webster, 1888, Am. Nat., p. 446.
- Not defined so as to be recognized.
- parvum, Cox, 1857, (Chemnitzia parva,) Geo. Sur. Ky., vol. 3, p. 567, Coal Meas.
- Geo. Sur. Ky., Vol. 3, p. 567, Coal Meas.
 parvulum, Whitfield, 1882, Ann. N. Y.
 Acad. Sci., vol. 2, p. 204, Up. Held. Gr.
 peoriense, Worthen, 1884, Bull. No. 2, Ill.
 St. Mus. Nat. Hist., p. 7, and Geo. Sur.
 Ill., vol. 8, p. 139, Coal Meas.
 pexatum, Hall, 1861, 14th Rep. N. Y. Mus.
 Nat. Hist., p. 44, and Dol. N. Y.
- Nat. Hist., p. 104, and Pal. N. Y., vol. 5, pt. 2, p. 42, Up. Held. Gr. pexatum var. obsoletum, Hall, 1876, Il-
- lust. Devonian Foss., pl. 13, and Pal. N. Y., vol. 5, pt. 2, p. 43, Up. Held. Gr. planogyratum, Hall, 1839, Pal. N. Y., vol.
- 3, p. 298, Low, Held, Gr. plicatum, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 231, Coal Meas. politum, Stevens, 1858, Am. Jour. Sci., 2d
- series, vol. 25, p. 260, Coal Meas. postrenum, Hall, 1879, Pal. N. Y., vol. 5,
- pt. 2, p. 132, Chemung Gr.
- quadricarinatum, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 7, and Geo. Sur. Ill., vol. 8, p. 140, Coal Meas.
- rectistriatum, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 130, Ham. Gr. regulare, Cox, 1857, Geo. Sur. Ky., vol. 3,
- p. 566, Coal Meas.
- bob, Coal Meas.
 robustum, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 52, and Pal. N. Y., vols 5, pt. 2, p. 40, Schoharie grit.
 rossi, Haughton, 1857, Jour. Roy. Soc. Dub., vol. 1, Devonian.
- Dub., vol. 1, Devonian. rugosum, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 465, and Geo. Sur. Ill., vol. 2, p. 378, Up. Coal Meas. scitulum, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 464, and Geo. Sur. Ill., vol. 2, p. 372, Low. Coal Meas. semicostatum, Meek, 1871, (L. attenua-tum ver semicostatum) Proc. Acad Net
- tum var. semicostatum,) Proc. Acad. Nat. Sci., p. 174, and Geo. Sur. Ill., vol. 5, p. 596, Coal Meas.
- 2, p. 43, Up. Held. Gr. solidum, Hall, 1862; 15th Rep. N. Y. Mus.
- Nat. Hist., p. 51, and Pal. N. Y., vol. 5, pt. 2, p. 41, Schoharie grit.
- styliola, Hall, 1876, Illust. Devon. Foss., pl. 14, and Pal. N. Y., vol. 5, pt. 2, p. 48, Chemung Gr.

- subattenuatum, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 52, and Pal. N. Y., vol. 5, pt. 2, p. 40, Schoharie grit. subulata. see Murchisonia subulata.
- swallovanum, Shumard, 1859, (Chem-

swallovanum, Shumard, 1855, (Chem-nitzia swallovana,) Trans. St. Louis Acad. Sci., vol. 1, p. 399, Permian., tenuicarinatum, Stevens, 1858, Am. Jour. Sci., 2d series, vol. 25, p. 260, Coal Meas. tenuilineatum, Shumard, 1855, (Chemnitzia tenuilineata,) Geo. Rep. Mo., p.

207, Waverly Gr. or Choteau limestone. terebra, Hall, 1876, Illust.

Devon. Foss., pl. 14, and Pal. N. Y., vol. 5, pt. 2, p. 48. Chemung Gr.

teres, Hall, 1876, Illust., Devonian Foss., pl. 13, and Pal. N. Y., vol. 5, pt. 2, p. 42, Corniferous Gr. arritiforme, Hall, 1860, 13th Rep. N. Y. Mus. turritiforme, Nat. Hist., p. 109, Kin-

FIG. 682.-Loxonema yandellanum.

derhook Gr. vincta, see Murchisonia vincta.

- yandellanum, Hall, 1858, Trans. Alb.
- yandenanum, Itali, 1898, ITABS. Alb. Inst., vol. 4, p. 28, and Bull. Am. Mus. Nat. Hist., p. 77, Warsaw Gr.
 MACLUREA, LeSdeur, 1818, (Maclurites,) Jour. Acad. Nat. Sci., vol. 1, p. 312. [Ety. proper name.] Discoidal, few wholed whorled, reversed, upper surface convex, deeply perforate, outer side spi-rally grooved; operculum sinistrally subspiral, solid, with two internal projections for the attachment of muscles. Type M. magna.



- logani, Salter, 1851, Rep. British Assoc.,
- p. 63, Black Riv. Gr. magna, LeSueur, 1818, Jour. Acad. Nat.
- Sci., vol. 1, p. 312, and Pal. N. Y., vol. 1, p. 26, Chazy Gr. matutina, Hall, 1847, Pal. N. Y., vol. 1, p.
- 10. Calciferous Gr.
- minima, Hall & Whitfield, 1877, U. S. Geo. Expl., 40th parallel, vol. 4, p. 235, Chazy Gr.
- oceana, Billings, 1865, Pal. Foss., vol. 1. p. 237, Quebec Gr.
- ponderosa, Billings, 1865, Pal. Foss., vol. 1, p. 239, Quebec Gr. psyche, Billings, 1865, Pal. Foss., vol. 1,
- p. 244, Quebec Gr.
- rotundata, Billings, 1865, Pal. Foss., vol. 1, p. 245, Quebec Gr.
- speciosa, Billings, 1865, Pal. Foss., vol. 1, p. 240, Quebec Gr. sordida, Hall, 1847, Pal. N. Y., vol. 1, p.
- 10. Calciferous Gr.
- striata, see Scalites striatus.
- striata, Troost, 1840. Not defined. subannulata, Walcott, 1885, M Monogr. U. S. Geo. Sur., vol. 8, p. 82, Trenton Gr.
- subrotunda, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 75, and Geo. Wis., vol. 4, p. 246, Trenton Gr. sylpha, Billings, 1865, Pal. Foss., vol. 1, p.
- 244, Quebec Gr.
- transitionis, Billings, 1865, Pal. Foss., vol. 1, p. 241, Quebec Gr.

wadsworthi, Whit-field, 1884, Bull. Am. Mus. Nat. Hist., vol. 1, p. 139, Up. Taconic. Macrocheilus, Phillips, 1841, Pal. Foss., Cornwall, etc., p. 103. This name was preoccupied by Hope, in 1838, for a genus of Coleopterous in-

sects. Bayle has proposed Macrochilina, to which all the species are referred.

altonense, see Macrochilina worthenanus. altonense, see Macrochilina altonensis. anguliferum, see Macrochilina angulifera. attenuatum, Hall, syn. for Soleniscus

fusiformis. cooperense, see Macrochilina cooperensis. fusiforme, see Soleniscus fusiformis. gracile, see Macrochilina gracilis. hallanum, see Soleniscus hallanus. hamiltoniæ, see Macrochilina hamiltoniæ.

hebe, see Macrochilina hebe.

- hildrethi, see Macrochilina hildrethi.
- humile, see Machrochilina humilis. inhabile, syn. for Macrochilina primigenius.

intercalare, see Macrochilina intercalaris.

MAC. MET.]

MAC.

konsasense, see klipparti, see Sol macrostomum, se tomus.

mediale, see Mad missouriense, see ensis

newberryi, see So paludinæformis. formis

pingue, see Macr ponderosum, see primævum, see M primigenium, se genius.

priscum, see Mac pulchellum, syn. calaris.

spiratum, see Ma subcorpulentum, E pulenta.

terranovicum, see texanum, see Sole ventricosum, see S

MACROCHILINA, Bay chyliologie, 3r instead of M which was

> [Ety. diminuti globose, elonga convex, smoot ture subovate:

outer lip thin, inner lip thin

- low. Type M. altonensis, Worth
- altonense,) Geo Coal Meas.
- angulifera, White guliferum,) Re 22, and Geo. St

160, Carbonifer carinata, Stevens

natum,) Am. J Coal Meas.

cooperensis, Swal cooperense,) 7

Sci., vol. 2, p. 1 gracilis, Cox, 1857 Geo. Sur. Ky Meas.

- hamiltoniæ, Ha hamiltoniæ,) 15 Hist., p. 49 and p. 33, Ham. Gr
- hebe, Hall, 1862 15th Rep. N. Y and Pal. N. Y Ham. Gr.
- hildrethi, Conra
 - hildrethi,) Jour p. 275, Coal Me
- humilis. Keyes
- humile,) Proc.
 - xii, fig., 1, Coal intercalaris, Mee
 - (Macrocheilus i Nat. Sci., p. 467 2, p. 371, Up. C



FIG. 683.-Maclurea crenulata.

- acuminata, Billings, 1865, Pal. Foss., vol. 1, p. 240, Quebec Gr. affinis, Billings, 1865, Pal. Foss., vol. 1, p.
- 238, Quebec Gr.
- annulata, Walcott, 1885, Monogr. U. S.
- annulata, walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 81, Chazy Gr. atlantica, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 459, Chazy Gr. bigsbyi, Hall, 1861, Geo. Rep. Wis., p. 37, and Geo. Wis., vol. 4, p. 222, Trenton Gr.
- carinata, Walcott, 1885, Monrgr. U. S. Geo. Sur., vol. 8, p. 82, Trenton Gr. crenulata, Billings, 1865, Pal. Foss., vol. 1,
- p. 236, Quebec Gr. cuneata, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 75, and Geo. Wis., vol. 4, p. 246, Trenton Gr.







MAC.

. Foss., vol.

tish Assoc.,

Acad. Nat.

- N. Y., vol.
- Y., vol. 1, p.
- 1877, U. S.
- ol. 4, p. 235,
- Foss., vol. 1,
- I. Foss., vol.
- Foss., vol. 1,
- I. Foss., vol.
- Foss., vol. 1,
- Y., vol. 1, p.
- ined. Monogr. 5,). 82, Tren-
- Ann. Rep. 1 Geo. Wis.,
-)ss., vol. 1, p.
- Il. Foss., vol.
- orthi, Whit-1884, Bull. Mus. Nat. vol. 1, p. Up. Taconic.
- lus, Phillips, Pal. Foss.,
- wall, etc., p. This name preoccupied
- lope, in 1838. a genus of opterous in-Bayle has o which all
- worthenanus. tonensis. a angulifera. r Soleniscus

cooperensis. formis. cilis. lanus. hamiltoniæ.

ildrethi. umilis. ilina primi-

intercalaris.

- GASTEROPODA.
- konsasense, see Macrochilina kansasensis. klipparti, see Soleniscus klipparti. macrostomum, see Macrochilina macros-
- tomus. mediale, see Macrochilina medialis.
- missouriense, see Macrochilina missouriensis.
- newberryi, see Soleniscus newberryi.

MAC. MET.]

- paludinæformis, see Soleniscus paludiniformis. pingue, see Macrochilina pinguis.
- ponderosum, see Macrochilina ponderosus. primævum, see Macrochilina primævus. primigenium, see Macrochilina primigenius.
- priscum, see Macrochilina prisca. pulchellum, syn. for Macrochilina intercalaris.
- spiratum, see Macrochilina spirata. subcorpulentum, see Macrochilina subcor-
- pulenta. terranovicum, see Macrochilina terranovica. texanum, see Soleniscus texanus.
- ventricosum, see Soleniscus ventricosus. MACROCHILINA, Bayle, 1880, Journal de Conchyliologie, 3me. ser., t. 19. Proposed instead of Macrocheilus of Phillips, which was preoccupied by Hope. [Ety. diminutive of Macrocheilus.] Subglobose, elongate; apex pointed; whorls convex, smooth, last one large; aperture subovate; columella imperforate; outer lip thin, without notch or sinus; inner lip thin above and thickened below. Type M. acuta
- altonensis, Worthen, 1873, (Macrocheilus altonense,) Geo. Sur. Ill., vol. 5, p. 593, Coal Meas
- angulifera, White, 1874, (Macrocheilus anguliferum,) Rep. Invertebrate Foss., p. 22, and Geo. Sur. 100th Mer., vol. 4, p. 160, Carboniferous.
- carinata, Stevens, 1858, (Loxonema carinatum,) Am. Jour. Sci., vol. 25, p. 259, Coal Meas.
- cooperensis, Swallow, 1863, (Macrocheilus cooperense,) Trans. St. Louis Acad. Sci., vol. 2, p. 100, Kaskaskia Gr.
- gracilis, Cox, 1857, (Macrocheilus gracile,) Geo. Sur. Ky., vol. 3, p. 570, Coal Meas.
- hamiltoniæ, Hall, 1862, (Macrocheilus hamiltoniæ,) 15th Rep. N. Y. Mus. Nat. Hist., p. 49 and Pal. N. Y., vol. 5, pt. 2, p. 33, Ham. Gr.
- hebe, Hall, 1862. (Macrocheilus hebe,) 15th Rep. N. Y. Mus. Nat. Hist., p. 48, and Pal. N. Y., vol. 5, pt. 2, p. 32, Ham. Gr.
- hildrethi, Conrad, 1842, (Plectostylus hildrethi,) Jour. Acad. Nat. Sci., vol. 8, p. 275, Coal Meas.
- humilis, Keyes, 1888, (Macrocheilus humile,) Proc. Acad. Nat. Sci. Phil. pl.
- xii, fig., 1, Coal Meas. intercalaris, Meek & Worthen, 1860, (Macrocheilus intercalare,) Proc. Acad. Nat. Sci., p. 467, and Geo. Sur. Ill., vol. 2, p. 371, Up. Coal Meas.

kansasensis, Swallow, 1858, (Macrocheilus kansasense,) Trans. St. Louis Acad. Sci., vol. 1, p. 201, Coal Meas. littonana, Hall, 1858,

(Natica littonana,)

- Trans. Alb. Inst., vol. 4, p. 30, and Bull. Am. Mus. Nat. Hist., p. 72, Warsaw Gr.
- macrostoma, Hall, 1862. Macrochellus macrostomum.) 15th Rep.
 - N. Y. Mus. Nat. Hist., p. 49, and Pal. N. Y., ero 684. -Ma. crochilina litto-
- vol. 5, pt. 2, p. 33, nana. Ham. Gr. medialis, Meek & Worthen, 1860, (Ma-
- crocheilus mediale,) Proc. Acad. Nat. Sci., p. 466, and Geo. Sur. Ill., vol. 2, p. 370, Up. Coal Meas.
- missouriensis, Swallow, 1859, (Macrochei-lus missouriense,) Trans. St. Louis Acad.
- Sci., vol. 1, p. 201, Coal Meas. pinguis, Winchell, 1863, (Macrocheilus pingue,) Proc. Acad. Nat. Sci., p. 21, Marshall Gr.
- ponderosa, Swallow, 1858, (Macrocheilus ponderosum,) Trans. St. Louis Acad.
- Sci., vol. 1, p. 202, Coal Meas. primæva, Hall, 1876, (Macrocheilus pri-mævum,) Illust., Devonian Foss., pl. 12, and Pal. N. Y., vol. 5, pt. 2, p. 35, Schoharie grit.
- primigenia, Conrad, 1835, (Stylifer primigenia,) Trans. Geo. Soc. Penn., vol. 1,
- p. 267, Coal Meas. prisca, Whitfield, 1882, (Macrocheilus priscum.) Ann. N. Y. Acad. Sci., vol. 2, p. 204, Up. Held. Gr.
- spirata, McCoy, 1850, (Macrocheilus spira-tum,) Brit. Pal. Rocks, p. 549, Coal Meas.
- subcorpulenta, Whitfield, 1882, (Macrocheilus subcorpulentum,) Ann. N. Y.
- Acad. Sci., vol. 2, p. 224, Kaskaskia Gr. terranovica, Dawson, 1883, (Macrocheilus terranovicum,) Rep. on Redpath Museum, No. 2, p. 14, Carboniferous.
- worthenanus, n. sp. St. Louis Gr. Pro-posed instead of Macrocheilus altonense in Geo. Sur. Ill., vol. 8, p. 143, which name was preoccupied.
- METOTOMA, Phillips, 1836, Geo. of York-shire, pt. 2, p, 223. [Ety. metopon, front: tome, incision.] Patelliform, truncated under the apex, at the posterior side; horseshoe-shaped muscular scar, with the open end directed from the truncated side. Type M. oblonga. alceste, Billings, 1862, Pal. Foss., vol. 1, p. 153, Hud. Riv. Gr.
 - alta, Whitfield, 1889, Bull. Am. Mus. Nat.
 - Hist., vol. 2, p. 44, Calciferous Gr. analoga, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 84, Trenton Gr.
- angusta, Billings, 1862, Pal. Foss., vol. 1, p. 88, Quebec Gr.
- anomala, Billings, 1862, Pal. Foss., vol. 1, p. 89, Quebec Gr.

Ø



barabuensis, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 60, and Geo. Wis., vol. 4, p. 195, Low. Magnesian Gr. billingsi, Walcott, 1883, 35th Rep. N. Y. Mus. Nat. Hist., p. 212, Trenton Gr.



5. — Metoptoma canadensis. a, side; b, side view; c, under side. a, Upper FIG. 685.

canadensis, Billings, 1865, Pal. Foss., vol. 1, p. 394, (Chiton canadensis,) Black Riv. Gr.

cornutiformis, Walcott, 1879, Desc. New

Spec. Foss., p. 1, Calciferous Gr. devonica, Walcott, 1885, Monogr. U. S.

Geo. Sur., vol. 8, p. 195, Devonian. dubia, Hall, 1847, Pal. N. Y., vol. 1, p. 23, Chazy Gr.

erato, see Tryblidium erato.

estella, Billings, 1862, Pal. Foss., vol. 1, p. 153, Hud. Riv. Gr.

eubule, see Tryblidium eubule.

hyrie, see Tryblidium hyrie.

instabilis, Billings, 1865, Pal. Foss., vol. 1,

p. 251, Quebec Gr. melissa, Billings, 1862, Pal. Foss., vol. 1, p. 86, Quebec Gr.

montrealensis, Billings, 1865, Pal. Foss., vol. 1, p. 394, Chazy Gr. niobe, see Tryblidium niobe.

nycteis, see Tryblidium nycteis.

- orithyia, Billings, 1862, Pal. Foss., vol. 1, p. 38, Calcif. Gr.
- orphyne, Billings, 1862, Pal. Foss., vol. 1, p. 88, Quebec Gr.
- peroccidens, Walcott, 1885, Monogr. U. S.
- Geo. Sur., vol. 8, p. 260, Subcarb. perovalis, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 74, and Geo. Wis.,

vol. 4, p. 211, Trenton Gr. phillipsi, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 83, Trenton Gr.

- quebecensis, Billings, 1865, Pal. Foss., vol. 1, p. 308, Quebec Gr.
- recurva, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 61, and Geo. Wis., vol. 4,
- p. 196, Low. Mag. Gr. retrorsa, Whitfield, 1880, Ann. Rep. Ged Sur. Wis., p. 54, and Geo. Wis., vol. 4

p. 197, Low. Mag. Gr.

rugosa, see Stenotheca rugosa.

similis, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 61, and Geo. Wis., vol. 4, p. 196, Low. Mag. Gr.

simplex, see Tryblidium simplex. superba, Billings, 1865, Pal. Foss., vol. 1,

- p. 172, Black Riv. Gr. trentonensis, Billings, 1862, Pal. Foss.,
- vol. 1, p. 40, Trenton Gr. undata, Winchell, 1865, Proc. Acad. Nat.
- Sci. Phil., p. 131, Kinderhook Gr. umbella, Meek & Worthen, 1866, Proc.
- Acad. Nat. Sci. Phil., p. 267, and Geo. Sur. Ill., vol. 3, p. 506, Burlington Gr.

venilia, Billings, 1862, Pal. Foss., vol. 1, p. 88, Quebec Gr.

- MICROCERAS, Hall, 1845, Am. Jour. Sci., vol. 48, p. 294. [Ety. mikros, small; keras, horn.] General form like Cyrtolites, but distinguished by its minute size. smooth surface, and less angular dorsal margin. Type M. inornatum.
 - inornatum, Hall, 1845, Am. Jour. Sci., vol. 48, p. 294, and Ohio Pal., vol. 1, p. 147, Hud. Riv. Gr.
 - minutissimum, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 13, Hud. Riv. Gr.
- MICRODOMA, Meek & Worthen, 1866, Proc. Acad. Nat. Sci., p. 269. [Etv. mikros. small; domus, house.] Shell small, subtrochiform; volutions seven or more, flattened on a line with the slope of the shell; suture deep; aperture oblique;
 - surface ornamented with nodular ridges. Type M. conica. conica, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 269, and Geo. Sur. Ill., vol. 5, p. 598, Low. Coal Meas.

MURCHISONIA, D'Archiac & Verneuil, 1841. Bull. Soc. Geo. Fr., vol. 12, p. 154, and Phillips Pal. Foss. Cornwall, etc., p. 101. [Ety. proper name.] Shell elongated, many whorled; whorls variously sculptured and zoned; outer lip deeply notched; aperture slightly channeled Type M. bilineata. in front.

- abbreviata, Hall, 1847, Pal N. Y., vol. 1, p. 32 The name was preoccupied by DeKoninck in 1841. See M. subabbreviata.
- aciculata, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 154, Up. Silurian.
- acrea, Billings, 1865, Pal. Foss., vol. 1, p. 232, Quebec Gr
- ada, Billings, 1865, Pal. Foss., vol. 1, p. 346, Calciferous Gr.
- adelina, Billings, 1865, Pal. Foss., vol. 1, p. 232, Quebec Gr
- agilis, Billings, 1865, Pal. FIG. 686 Foss., vol. 1, p. 235, Que- Murchisonia bec Gr. bilineata.

alexandra, Billings, 1865, Pal. Foss., vol. 1, p. 172, Black Riv. Gr.

- angulata, Phillips, 1836, (Rostellaria angulata,) Geo. of Yorkshire, p. 230, Devonian. Very doubtfully identified in America.
- angustata, Hall, 1847, Pal. N. Y., vol. 1, p. 41, Birdseye Gr.
- anna, Billings, 1859, Can. Nat. and Geol., vol. 4, p. 358, Calciferous Gr.
- archimedea, McChesney, 1861, Desc. New Pal. Foss., p. 89, Coal Meas.
- arenaria, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 359, Calciferous Gr. arisaigensis, Hall, 1860, Can. Nat. and
- Geo., vol. 5, p. 154, Silurian.

artemesia, Billir 1, p. 345, Calc aspera, Billings, vol. 4, p. 458, attenuata, Hall, vol. 4, p. 27, a

Hist., p. 88, W augustina, Billir 1, p. 234, Quel

bellicincta, Hall,

p. 179, Trenton bicincta, Hall, 18 177. Preoccup

See M. milleri. bilirata, Hall, 18

299, Low. Held billingsana, n. s. instead of M. h

1, p. 157, whic bivittata, Hall, 1

345, Guelph Gi bowdeni, Safford 288, Nashville

boydi, Hall, 1843. Rep. 4th Dist. N. Y., vol. 2, p boylii, Nicholson

Soc. Lond., vo calcifera, Whitf calcifera,) Bull vol. 2, p. 55, Ca

carinifera, Shuma Acad. Sci., vo ous Gr.

cassandra, Billing p. 189, Quebec cassina, Whitfield sina, Bull. An p. 312, Birdseye

catharina, Billing 1, p. 231, Queb

chamberlini, Wh Geo. Sur. Wis.

vol. 4, p. 317, N confusa, Whitfiel Nat. Hist., vo ous Gr.

cicelia, Billings, 1 233, Quebec Gr conoidea, Hall, 18 13, Medina Gr.

conradi, Hall, 186 Nat. Hist., p. 3

constricta, White vol. 3, p. 25, Gi copii, White, 18

New Mex., p. x decurta, Hall, 187 Foss., p. 244,

breviata. desiderata, Hall,

Mus. Nat. Hist. vol. 5, pt. 2, p.

egregia, Billings, 58, Up. Held. G elegantula, see Ple estella, Billings, p. 157, Guelph

MUR.]

MIC.-MUR.

Foss., vol. 1,

our. Sci., vol. small; kerns, Cyrtolites, minute size. ngular dorsal 1m. our. Sci., vol.

rol. 1, p. 147,

Jour. Cin. p. 13, Hud.

1866, Proc. Ety. mikros, ll small, suben or more. slope of the are oblique; th nodular

1866, Proc. 69, and Geo. Low. Coal

rneuil, 1841. p. 154, and l, etc., p. 101. lí elongated, iously sculplip deeply 7 channeled

Y., vol. 1, p. occupied by 1. subabbre-



Murchisonia bilineata

Riv. Gr. stellaria anp. 230. Deidentified in

Y., vol. 1, p.

t. and Geol.,

łr. I, Desc. New

n. Nat. and rous Gr. D. Nat. and n.

MUR.]

GASTEROPODA.

- artemesia, Billings, 1865, Pal. Foss., vol. 1, p. 345, Calciferous Gr.
- aspera, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 458, Chazy Gr. attenuata, Hall, 1858, Trans. Alb. Inst.,
- vol. 4, p. 27, and Bull. Am. Mus. Nat. Hist., p. 88, Warsaw Gr.
- augustina, Billings, 1865, Pal. Foss., vol.
- 1, p. 234, Quebec Gr. bellicincta, Hall, 1847, Pal. N. Y., vol. 1, p. 179, Trenton and Hud. Riv. Grs.
- hicincta, Hall, 1847, Pal. N. Y., vol. 1, p. 177. Preoccupied by McCoy in 1844. See M. milleri.
- bilirata, Hall, 1859, Pal. N. Y., vol. 3, p. 299, Low. Held. Gr.
- billingsana, n. s., Guelph Gr. Proposed instead of M. hercyna in Pal. Foss., vol. 1, p. 157, which was preoccupied.
- bivittata, Hall, 1852, Pal. N. Y., vol. 2, p. 345, Guelph Gr.
- bowdeni, Safford, 1869, Geo. of Tenn., p. 288, Nashville Gr.
- boydi, Hall, 1843, (Loxonema boydi,) Geo. Rep. 4th Dist. N. Y., p. 138, and Pal. N. Y., vol. 2, p. 346, Guelph Gr.
- boylii, Nicholson, 1875, Quar. Jour. Geo. Soc. Lond., vol. 31, p. 547, Guelph Gr. calcifera, Whitfield, 1889, (Lophospira calcifera,) Bull. Am. Mus. Nat. Hist., vol. 2, p. 55, Calciferous Gr.
- carinifera, Shumard, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 106, Calciferous Gr.
- cassandra, Billings, 1865, Pal. Foss., vol. 1, p. 189, Quebec Gr.
- cassina, Whitfield, 1886, (Lophospira cas-sina,) Bull. Am. Mus. Nat. Hist., vol. 1, p. 312, Birdseye Gr.
- catharina, Billings, 1865, Pal. Foss., vol. 1, p. 231, Quebec Gr.
- chamberlini, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 84, and Geo. Wis., vol. 4, p. 317, Niagara Gr.
- confusa, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 54, Calciferous Gr.
- cicelia, Billings, 1865, Pal. Foss., vol. 1, p. 233, Quebec Gr.
- conoidea, Hall, 1852, Pal. N. Y., vol. 2, p. 13, Medina Gr.
- conradi, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 396, Niagara Gr.
- constricta, Whiteaves, 1884, Pal. Foss., vol. 3, p. 25, Guelph Gr.
- copii, White, 1882, Rep. Invert. Foss. New Mex., p. xxx, Coal Meas.
- decurta, Hall, 1877, 1st Ed. of Am. Pal. Foss., p. 244, syn. for M. subabbreviata.
- desiderata, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 50, and Pal. N. Y. vol. 5, pt. 2, p. 89, Up. Held. Gr.
- egregia, Billings, 1874, Pal. Foss., vol. 2, p. 58, Up. Held. Gr.
- elegantula, see Pleurotomaria elegantula. estella, Billings, 1862, Pal. Foss., vol. 1, p. 157, Guelph Gr.

- extenuata, Hall, 1859, Pal. N. Y., vol. 3, p. 298, Low. Held. Gr.
- funata, Billings, 1866, Catal. Sil. Foss. Antic., p. 55, Anticosti Gr.
- gigantea, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 298, Mid. Sil.
- gracilens, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 53, Calciferous Gr.
- gracilis, Hall, 1847, Pal. N.Y. vol. 1, p. 181, Trenton and Hud. Riv. Gr.
- gypsea, Dawson, 1868, Acad. Geol., p. 310, Carboniferous
- hebe, Billings, 1874, Pal. Fig. 687.-Foss., vol. 2, p. 57, Gaspe gracilis. limestone No. 8, Devonian.
- helicteres, Salter, 1859, Can. Org. Rem., Decade 1, p. 21, Black Riv. and Trenton Grs.
- hercyna, Billings, 1862, Pal. Foss., vol. 1, p. 158. The name was preoccupied by Roemer in 1843. See M. billingsana.
- hermione, Billings, 1862, Pal. Foss., vol. 1,
- p. 33, Chazy or Black Riv. Gr. hespelerensis, Whiteaves, 1884, Pal. Foss., vol. 3, p. 24, Guelph Gr.
- hyale, Billings, 1862, Pal. Foss., vol. 1, p. 33, Chazy or Black Riv. Gr.
- infrequens, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 457, Chazy Gr. inornata, Meek & Worthen, 1866, Proc. Acad. Nat. Sci., p. 274, and Geo. Sur.
- Ill., vol. 5, p. 599, Coal Meas.
- insculpta, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 26, and Bull. Am. Mus. Nat. Hist. p. 85, Warsaw Gr.
- intercedens, Hall, 1879, Pal. N. Y., vol. 5,
- pt. 2, p. 92, Up. Held. Gr. jessica, Billings, 1865, Pal. Foss., vol. 1, p. 189, Quebec Gr.
- kansasensis, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 195, Coal Meas.
- keokuk, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 141, Keokuk Gr. laphami, Hall, 1861, Rep. of Progr. Wis.,
- p. 36, Niagara Gr.
- latifasciata, Etheridge, 1878, Quar. Jour. Geo. Soc., vol. 34, p. 600, Up. Sil. lasallensis, Worthen, (in press.) Geo. Sur.
- Ill., vol. 8, p. 141, Up. Coal Meas. leda, Hall, 1861, 14th Rep. N. Y. Mus. Nat.
- Hist., p. 103, and Pal. N. Y., vol. 5, pt. 2, p. 91, Up. Held. Gr. limitaris, Hall, 1860, 13th Rep. N. Y. Mus.
- Nat. Hist., p. 108, Kinderhook Gr.
- linearis, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 359, Calciferous Gr. logani, Hall, 1852, Pal. N. Y., vol. 2, p.
- 346, Guelph Gr.
- longispira, Hall, 1852, Pal. N. Y., vol. 2, p. 345, Guelph Gr.
- macrospira, Hall, 1852, Pal. N. Y., vol. 2, p. 346, Guelph Gr.





maia, Hall, 1861, 14th Rep. N. Y. Mus. Nat. Hist., p. 103, and Pal. N. Y., vol. 5, pt. 2, p. 91, Up. Held. Gr. major, Hall, 1851, Geo. Lake Sup. Land

412

- Dist., vol. 2, p. 209, Trenton Gr. marcouana, Geinitz, 1866, Carb. und Dyas
- in Neb., p. 11, Coal Meas.
- melaniformis, Shumard, 1855, Geo. Rep. Mo., p. 208, Calciferous Gr. micula, Hall, 1877, 1st Ed. Am. Pal. Foss.,
- p. 244, and Pal. N. Y., vol. 5, pt. 2. p. 93, Ham. Gr. Proposed instead of M. turricula, Hall, 1862, which was preoccupied.
- milleri, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 244, Trenton and Hud. Riv. Grs. Proposed instead of M. bicincta, Hall, 1847, Pal. N. Y., vol. 1, p. 177, which was preoccupied.
- minima, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 203, Middle Coal Meas.
- minuta, Hall, 1859, Pal. N. Y., vol. 3, p. 298, Low. Held. Gr.
- missisquoi, Billings, 1865, Pal. Foss., vol. 1, p. 307, Quebec Gr.
- modesta, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 299, Hud. Riv. Gr.
- mucro, Winchell, 1866, Rep. Low. Penin-
- sula Mich., p. 96, Ham. Gr. multigruma, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 104, Hud. Riv. Gr.
- multivolvis, Billings, 1857, Rep. Progr. ⁶ Geo. Sur. Can., p. 299, Hud. Riv. Gr. mylitta, Billings, 1862, Pal. Foss., vol. 1, p. 157, Guelph Gr.
- nebraskensis, Geinitz, 1866, Carb. und Dyas in Neb., p. 12, and Pal. E. Neb.,
- p. 234, Coal Meas. neglecta, Winchell, 1863, Proc. Acad. Nat.
- Sci., p. 20, Marshall Gr. obelisca, Whitfield, 1886, Bull. Am. Mus.
- Nat. Hist., vol. 1, p. 317, Birdseye Gr. obsoleta, Meek, 1871, Proc. Acad. Nat. Sci., p. 175, Coal Meas.
- obtusa, Hall, 1852, Pal. N. Y., vol. 2, p. 333, Coralline limestone.
- ozarkensis. Shumard, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 106, Calciferous Gr.
- papillosa, Billings, 1857, Rep. of Progr.
- Geo. Sur. Can., p. 301, Mid. Sil. perangulata, Hall, 1847, Pal. N. Y., vol. 1, p. 41, Black Riv. and Trenton Grs.
- perversa, Swallow, 1858, Trans. St. Louis
- Acad. Sci., vol. 1, p. 195, Up. Coal Meas. petilla, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 186, Niag-
- ara Gr. placida, Billings, 1865, Pal. Foss., vol. 1, p. 235, Quebec Gr.
- procris, Billings, 1862, Pal. Foss., vol. 1,
- procris, Bilack Riv. Gr. prava, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 316, Birdseye Gr. prolixa, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 303, Kinderhook Gr.

- quadricincta, Winchell, 1863, Proc. Acad. Nat. Sci., p. 19, Marshall Gr.
- rugosa, Billings, 1857, Rep. of Progr. Geo. Sur. Can. p. 299, Hud. Riv. Gr.
- serrulata, Salter, 1859, Can. Org. Rem., Dec. ade 1, p. 20, Black Riv. and Trenton Grs. shumardana, Winchell, 1863, Proc. Acad.
- Nat. Sci. Phil., p. 20, Marshall Gr. simulatrix, Billings, 1865, Pal. Foss., vol. 1, p. 232, Quebec Gr.
- soluta, Whiteaves, 1884, Pal. Foss., vol. 3, p. 28, Guelph Gr.
- sororcula, Billings, 1865, Pal. Foss., vol. 1, p. 233, Quebec Gr.
- subabbreviata, D'Orbigny, 1850, Prodr. d. Paléont, t. 1, p. 8, Chazy Gr. Proposed instead of M. abbreviata, Ilall, 1847, Pal. N. Y., vol. 1, p. 32, which was
- preoccupied. subfusiformis, see Fusispira subfusiformis.
- subtæniata, see Orthonema subtæniatum. subulata, Conrad, 1842, (Loxonema subu-latum,) Jour. Acad. Nat. Sci., vol. 8, p.
- 273, and Pal. N. Y., vol. 2, p. 91, Clinton Gr.
- sumnerensis, Safford, 1869, Geo. of Tenn., p. 288, Nashville Gr.
- sylvia, Billings, 1865, Pal. Foss., vol. 1, p. 190, Quebec Gr.
- terebra, White, 1879, Bull. U. S. Geo. Sur.
 Terr., vol. 5, No. 2, p. 219, and Cont. to Pal., No. 6, p. 139, Carboniferous.
 terebralis, Hall, 1852, Pal. N. Y., vol. 2, p.
- 334, Coralline limestone.
- terebriformis, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 28, and Bull. Am. Mus. Nat. Hist., p. 86, Warsaw Gr. teretiformis, Billings, 1857, Rep. of Progr.
- Geo. Sur. Can., p. 298, Hud. Riv. Gr. texana, Shumard, 1860, Trans. St. Louis
- Acad. Sci., vol. 1, p. 626, Coal $M \in as$. tricarinata, Hall, 1847, Pal. N. Y., vol. 1,
- p. 178, Trenton Gr.
- tricingulata, Dawson, 1868, Acad. Geol., p. 310, Carboniferous.
- p. 510, Carbonnerous.
 tropidophora, Whiteaves, 1884, Pal. Foss., vol. 3, p. 29, Guelph Gr.
 turricula, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 301, Mid. Sil.
 turricula, Hall. The name was prece-
- cupied. See M. micula.
- turritella, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 27, and Bull. Am. Mus. Nat. Hist., p. 88, Warsaw Gr. turritiformis, Hall, 1852, Pal. N. Y., vol.
- 2, p. 347, Guelph Gr.
- uniangulata, Hall, 1847, Pal. N. Y., vol. 1, p. 179, Trenton and Hud. Riv. Grs.
- uniangulata var. abbreviata, Hall, 1847,
- Pal. N. Y., vol. 1, p. 304, Hud. Riv. Gr.
 varians, Billings, 1857, Rep. of Progr.
 Geo. Sur. Can., p. 300, Hud. Riv. Gr.
 varicosa, Hall, 1847, Pal. N. Y., vol. 1, p.
- 42, Birdseve Gr. ventricosa, Hall, 1847, Pal. N. Y., vol. 1,
- p. 41, Black Riv. and Trenton Grs.
- vermicula, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 27, and Bull. Am. Mus. Nat. Hist., p. 87, Warsaw Gr.

NAT -OPH.]

vesta, Billings, 186: 32, Calciferous G vincta, Hall, 1858 Trans. Alb. Inst., Am. Mus. Nat.

saw Gr. vitellia, Billings. 18

p. 156, Guelph G vittata, see Fusispir worthenana, S. A Cin. Soc. Nat.

Niagara Gr. xanthippe, Billings

1, p. 155, Guelph Natica, Adanson, 17 du Senegal, p. 17

with a fluctuating is unknown in H

altonensis, see Natic carleyana, see Natio chesterensis, see Nat littonana, see Macro magister, syn. for N shumardi, see Natic ventricosa, see Natic

NATICOPSIS, McCoy, 1 Ireland, p. 33.

- to the genus Nati imperforate; wh idly expanding, short: aperture the inner side, mella callous, flat pression for the entire; surface marked with ob
- phillipsi. æquistriata, Meek, Sci., p. 76, and O Up. Held Gr.
- altonensis, McChe tonensis,) Desc. Geo. Sur. Ill., Meas.
- carleyana, Hall, 18 Trans. Alb. Inst. Am. Mus. Nat. I

chesterensis, Swal Louis Acad. Sci kaskia Gr.

- comperta, Hall, 18 pt. 2, pl. 29, Up. cretacea, Hall & W N. Y. Mus. Na
- Held. Gr.
- depressa, Winchell Sci., p. 22, Marsh dispassa, Dawson,
- 309, Carbonif. gigantea, Hall & W N. Y. Mus. Na
- mung Gr. hollidayi, see Trach

howi, Hartt, 1868 Carboniferous.

humilis, see Isonen lævis, Meek, 1871, 76, and Ohio Pa Held. Gr.

MUR.

MUR.

NAT -OPH.]

saw Gr.

Niagara Gr.

phillipsi.

Meas.

kaskia Gr.

Held. Gr.

309, Carbonif.

Carboniferous.

mung Gr.

Held. Gr.

Up. Held Gr.

p. 156, Guelph Gr.

vittata, see Fusispira vittata.

vitellia, Billings, 1862, Pal. Foss., vol. 1,

worthenana, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 225,

xanthippe, Billings, 1862, Pal. Foss., vol. 1, p. 155, Guelph Gr.

Natica, Adanson, 1757, Histoire Naturelle du Senegal, p. 172. [Ety. nato, to swim

is unknown in Palæozoic rocks.

altonensis, see Naticopsis altonensis.

carleyana, see Naticopsis carleyana. chesterensis, see Naticopsis chesterensis.

shumardi, see Naticopsis shumardi.

littonana, see Macrochilina littonana.

magister, syn. for Naticopsis ventricosa.

ventricosa, see Naticopsis ventricosa. NATICOPSIS, McCoy, 1844, Synop. Carb. Foss.

Ireland, p. 33. [Ety. from resemblance to the genus Natica.] Subglobose, solid, imperforate; whorls few, convex, rap-

idly expanding, last one large; spire

short; aperture subovate, straighter on

the inner side, rounded below; colu-

mella callous, flattened, longitudinal im-

pression for the operculum; lip sharp, entire; surface smooth in part or marked with oblique striæ. Type N.

æquistriata, Meek, 1871, Proc. Acad. Nat.

altonensis, McChesney, 1865, (Natica al-

carleyana, Hall, 1858, (Natica carleyana,)

chesterensis, Swallow, 1863, Trans. St.

comperta, Hall, 1879, Pal. N. Y., vol. 5.

pt. 2, pl. 29, Up. Held. Gr. cretacea, Hall & Whitfield, 1873, 23d Rep. N. Y. Mus. Nat. Hist., p. 240, Up.

depressa, Winchell, 1863, Proc. Acad. Nat.

dispassa, Dawson, 1868, Acad. Geol., p.

gigantea, Hall & Whitfield, 1873, 23d Rep.

howi, Hartt, 1868, Acad. Geol., p. 309,

lavis, Meek, 1871, Proc. Acad. Nat. Sci., p.

76, and Ohio Pal., vol. 1, p. 215, Up.

hollidayi, see Trachydomia hollidayi.

N. Y. Mus. Nat. Hist., p. 238, Che-

Sci., p. 22, Marshall Gr.

humilis, see Isonema humile.

Trans. Alb. Inst., vol. 4, p. 31, and Bull.

Am. Mus. Nat. Hist., p. 71, Warsaw Gr.

Louis Acad. Sci., vol. 2, p. 100, Kas-

Sci., p. 76, and Ohio Pal., vol. 1, p. 216,

tonensis,) Desc. New. Pal. Foss., and

Geo. Sur. Ill., vol. 5, p. 595, Coal

with a fluctuating motion.] This genus

3, Proc. A cad.

rg. Rem., Dec.

. Foss., vol. 3.

. Foss., vol. 1,

32, which was

xonema subu-Sci., vol. 8, p. 2, p. 91, Clin-

Jeo. of Tenn.,

oss., vol. 1, p.

J. S. Geo. Sur. and Cont. to iferous. . Y., vol. 2, p.

ins. Alb. Inst., m. Mus. Nat.

Rep. of Progr. ud. Riv. Gr. ns. St. Louis Coal Meas. N. Y., vol. 1,

Acad. Geol.,

84, Pal. Foss.,

ep. of Progr. d. Sil. e was preoc-

s. Alb. Inst., m. Mus. Nat.

al. N. Y., vol.

1. N. Y., vol. d. Riv. Grs. i, Hall, 1847. Hud. Riv. Gr. p. of Progr. id. Riv. Gr. . Y., vol. 1, p.

N. Y., vol. 1, ton Grs. is. Alb. Inst., m. Mus. Nat. GASTEROPODA.

- vesta, Billings, 1862, Pal. Foss., vol. 1, p. littonana var. genevievensis, Meek & Worthen, 1866, Proc. Acad. Nat. Sci., 32, Calciferous Gr. vincta, Hall, 1858, (Loxonema vincta,)
 - p. 268, Kaskaskia Gr. Trans. Alb. Inst., vol. 4, p. 28, and Bull. madisonensis, Worthen, Am. Mus. Nat. Hist., p. 88, War-1884, Bull. No. 2, Ill. St.
 - Mus. Nat. Hist., p. 9, and Geo. Sur. Ill., vol. 8, p. 144, St. Louis Gr.
 - magister, syn. for N. ventri-COSA. copsis lævis.
 - monilifera, White, 1880, 12th Rep. U. S. Geo. Sur. Terr., p. 168, Up. Coal Meas.
 - nana, Meek & Worthen, 1860, (Platystoma nana,) Proc. Acad. Nat. Sci., p. 463, and Geo. Sur. Ill., vol. 2, p. 365, Up. Coal Meas.
 - nodosa, see Trachydomia nodosa. ortoni, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 230, Coal Meas.
 - pricii, Shumard, 1858, Trans. St. Louis
 - Acad. Sci., vol. 1, p. 202, Up. Coal Meas. remex, White, 1876, Geo. Uinta Mount-
 - ains, p. 109, and Cont. to Pal., No. 6, p. 139, Low. Aubrey Gr.
 - shumardi, McChesney, 1860, (Natica shu-mardi,) Desc. New. Pal. Foss., p. 62, Coal Meas.
 - subovata, Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 595, Coal Meas.
 - ventricosa, Norwood & Pratten, 1854, Natica ventricosa,) Jour. Acad. Nat. Sci., 2d ser., vol. 3, p. 76, Coal Meas.
 - wheeleri, Swallow, 1860, (Littorina wheeleri,) Trans. St. Louis Acad. Sci., vol. 1, p. 658, and Geo. Sur. Ill., vol. 5, p. 595, Coal Meas.
 - ziczac, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 223, Kaskaskia Gr.
 - OMPHALOTROCHUS, Meek, 1864, Geo. California, vol. 1, p. 15. [Ety. omphalus, um-bilicus; Trochus, a genus.] Distinguished from Euomphalus by having a more prominent spire, in having its whorls flattened or broadly concave around the outer side, and flattened, with an outward slope; it is a more ponderous shell, with a more oblique outline to its lip, in consequence of which it projects much farther forward on the upper than on the lower side of the aperture. Type O. whitneyi.
 - whitneyi, Meek, 1864, Pal. of California, vol. 1, p. 15, Carboniferous. Ophileta, Vanuxem, 1842, Geo. Rep. N. Y.
 - p. 36. [Ety, ophis, snake.] Discoidal spire sunk above; umbilicus perfectly open, exposing the whorls on one plane; whorls slender, numerous, truncate, and biangular exteriorly; aperture having a sinus below and a notch above. Type O. complanata.
 - abdita, Billings, 1865, Pal. Foss., vol. 1, p. 189, Quebec Gr.
 - (?) bella, Billings, 1865, Pal. Foss., vol. 1, p. 310, Quebec Gr.
 - compacta, Salter, 1859, Can. Org. Rem., Decade 1, p. 16, syn. for O. complanata.

413

Meek &

Gr. of Progr. Geo. v. Gr.

I Trenton Grs. 3, Proc. Acad. shall Gr. Pal. Foss., vol.

1850, Prodr. azy Gr. Propreviata, Hall,

subfusiformis. ubtæniatum

GASTEROPODA.

complanata, Vanuxem, 1842, Geo. Rep. N. Y., p. 36, and Pal. N. Y., vol. 1, p. 11, Calciferous Gr.

complanata var. nana, Meek, 1870, Hayden's U. S. Geo. Sur. Terr., p. 295, and Geo. 4th Parallel, vol. 4, p. 17, Calciferous Gr.

disjuncta, Billings, 1865, Pal. Foss., vol. 1, p. 344, Calciferous Gr.

levata, Vanuxem, 1842, Geo. Rep. N. Y., p. 36, Calciferous Gr. nerinė, Bill-

ings, 1865, Pal. Foss., vol. 1, p. 245, Quebec Gr. ottawensis, Billings, 1860.

Can. Nat. and

FIG. 680.-Ophileta nerine.

Geol., vol. 5, p. 167, Trenton Gr. owenana, Meek & Worthen, 1868,

Sur. Ill., vol. 3, p. 313, Galena Gr. primordialis, Winchell, 1864, (Straparollus primordialis,) Am. Jour. Sci. and Arts, 2d ser., vol. 37, p. 228, and Geo. Wis., vol. 4, p. 173, Potsdam Gr. profunda, Billings, 1865, Pal. Foss., vol. 1,

p. 188, Quebec Gr.

uniangulata, Hall, 1847, (Euomphalus uniangulatus,) Pal. N. Y., vol. 1, p. 9, Calcifer. Gr.

ORMATHICHNUS, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 222. [Ety. ormathos, string of beads; ichnos, track.] Supposed to be the trail of a Gasteropod, and consisting of a continuous beaded track or trail. Type O. moniliformis.

moniliformis, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 222, Utica Slate Gr.

ORTHONEMA, Meek & Worthen. 1861. Proc. Acad. Nat. Sci., Phil., p.

146. [Ety. orthos, straight; nema, thread.] elongate, many whorled, ornamented with revolving carinæ, crossed by nearly straight lines of growth; body whorl angular, not much enlarged or produced below; apersture angular above, slightly effuse below; peristome incomplete; outer lip simple, nearly straight; imperforate. axís Type O. salteri.

carbonarium, Worthen, 1884, Bull.

No. 2, Ill. St. Mus. Nat. Hist., p. 7, and Geo. Sur. Ill., vol. 8, p. 145, Coal Meas. conicum, Meek & Worthen, 1866, Proc. Acad. Nat. Sci.

FIG. 690. Orthonema newberryl.

Phil., p. 270, and Geo. Sur. Ill., vol. 5, p. 590, Coal Meas. newberryi, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 81,

and Ohio Pal., vol. 1, p. 217, Up. Held. Gr.

salteri, Meek & Worthen, 1860, (Eunema (?) salteri,) Proc. Acad. Nat. Sci. Phil., p. 464, and Geo. Sur. Ill., vol. 2, 381 Low. Coal Meas.

subtæniatum, Geinitz, 1866, (Muychisonia subtæniata,) Carb. und Dyas/in Neb

ORM.

PAL

p. 12, and Pal. E. Neb., p. 228, Coal Meas. Orthonychia, Hall, 1843. syn. for Platyceras ORTHOSTOMA, Conrad, 1838, Ann. Rep. N.Y. p. 119. [Ety. orthos, straight; stoma.

mouth.] Shell spiral, spire plain convex. terminal volution, ending in a straight tube. Type O. commune



FIG. 691.-Orthostoma commune.

- commune, Conrad, 1838, Ann. Rep. N.Y
- р. 119, figured in 1841, Ann. Rep. pl. 2, fig. 16, Birdseye Gr. Рацжасмжа, Hall & Whitfield, 1873, 23d Rep. N. Y. Mus. Nat. Hist., p. 242. [Ety. palaios, ancient; Acmæa, an exist-ing genus of shells.] Conical, more or less elevated; apex subcentral, erect or slightly curved; peristome entire, not sinuate; surface marked concentrically. Type P. typica.



FIG. 692.-Palæotrochus kearneys.

- irvingi, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 51, and Geo. Wis., vol. 4, p. 173, Potsdam Gr.
- typica, Hall & Whitfield, 1873, 23d Rep. N. Y. Mus. Nat. Hist., p. 242 Potsdam Gr.
- PALEOTROCHUS, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 133. [Ety, *palaios*, ancient; *Trochus*, a genus.] Conical, trochiform; spire elevated; volutions moderately

PAT. PLA.]

convex; aperture kearneyi. kearneyi, Hall,

earneyi, Hall, kearneyi,) 14th F Hist., p. 105, Up.

pracursor, Clarke, Sur. No. 16, p. 55 Patella. Linnæus, 175

Ety. patella, dis genus.

lerettei, see Lepetops Phanerotinus, Sowerby vol. 7, p. 29. [Et teino, extended. phalus.

paradoxus, see Eccyl Phragmolites, syn. for compressus, see Cyrt



FIG. 693. - Phragmo. stoma cymbula. View of aperture; L, lam-ina; S, septum.

cunulæ, Hall, 1861, Nat. Hist., p. 94, cymbula, Hall, 1861

Nat. Hist., p. 94, natator, see Belleroj Physa, Dapernaud, Moll. Not a Pala prisca, Walcott, 188 Sur., vol. 8, p. 265

Pileopsis conoides. P. n and P. spiralis, Sil. Not recogniz tubifer, syn. for Plat

vetustus, Sowerby. Planorbis, Guettard, Paris. Not a Pala

trilobatus, see Bucan PLATYCERAS, Conrad,

p. 205. [Ety. plat Depressed subg obliquely subcon lutions none, o columella; apert panded, often can times with lip re tire or sinuous; s lated, lamellose,

P. dumosum. acutirostre, Hall, rostris,) Trans. A

and Geo. Sur. Iov agreste, Hall, 1859,] Low. Held. Gr.

ammon, Hall, 1862, Nat. Hist., p. 37, pt. 2, p. 20, Up. H ORM. PAL PAT. PLA.]

., vol. 2, 381. 366, (Muychisonia d Dyas/in Neb. p. 228, Coal Meas. n. for Platyceras. Ann. Rep. N.Y., straight: stoma. spire plain. conn, ending in a). commune.



commune.

Ann. Rep. N.Y. , Ann. Rep. pl.

tfield, 1873, 23d . Hist., p. 242. Acmæa, an exist-Conical, more or ocentral, erect or tome entire, not d concentrically.



neŷó.

Ann. Rep. Geo. eo. Wis., vol. 4,

1873, 23d Rep. , p. 242 Pots-

Pal. N. Y., vol. alaios, ancient; cal, trochiform; ons moderately

GASTEROPODA.

- convex; aperture transverse. Type P. kearneyi
- kearneyi, Hall, 1862, (Pleurotomaria kearneyi,) 14th Rep. N. Y. Mus. Nat. Hist., p. 105, Up. Held. Gr.
- pracursor, Clarke, 1885, Bull. U. S. Geo.
- Sur. No. 16, p. 55, Portage Gr. Patella, Linnæus, 1758, Syst. Nat. 10th Ed. [Ety. patella, dish.] Not a Palæzoic genus.

levettei, see Lepetopsis levetti.

- *planerotinus*, Sowerby, 1844, Min. Conch., vol. 7, p. 29. [Ety. *phaneros*, aperture; *teino*, extended. Syn. for Eccyliomphalus.
- paradoxus, see Eccyliomphalus paradoxus. Phragmolites, syn. for Cyrtolites. compressus, see Cyrtolites compressus.

PHRAGMOSTOMA, Hall,

1861, 14th Rep. N. Y. Mus. Nat. Hist., p. 94. [Ety. phragmos, a partition; stoma, the mouth; from the septum within aperture, the which distinguishes this ge-nus from Carinaropsis and Bel-

lerophon.]

Type

- FIG. 693. Phragmo-stoma cymbula. View of aperture; L, lamina; S, septum.
- P. cymbula. cunulæ, Hall, 1861, 14th Rep. N. Y. Mus. Nat. Hist., p. 94, Hud. Riv. Gr. cymbula, Hall, 1861, 14th Rep. N. Y. Mus.
- Nat. Hist., p. 94, Hud. Riv. Gr. natator, see Bellerophon natator.
- Physa, Dapernaud, 1801, Hist. Nat. d.
- Moll. Not a Palæozoic genus.
- prisca, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 262, Subcarboniferous. Pileopsis conoides, P. naticoides, P. rotundata,
- and P. spiralis, Castelnau, 1843, Syst. Sil. Not recognized.
- tubifer, syn. for Platyceras dumosum.
- vetustus, Sowerby. Not American. Planorbis, Guettard, 1756, Mem. Acad. Sci.
- Paris. Not a Palæozoic genus.
- trilobatus, see Bucania trilobata.
- PLATYCERAS, Conrad, 1840, Ann. Rep. N. Y., p. 205. [Ety. platys, broad; keras, horn.] Depressed subglobose, subovoid, or obliquely subconical; spire small; volutions none, or very few, without columella; aperture more or less expanded, often campanulate, and sometimes with lip reflexed; peristome entire or sinuous; surface striated, cancellated, lamellose, or spiniferous. Type P. dumosum.
- acutirostre, Hall, 1858, (Capulus acutirostris,) Trans. Alb. Inst., vol. 4, p. 31, and Geo. Sur. Iowa, p. 665, Warsaw Gr. agreste, Hall, 1859, Pal. N. Y., vol. 3, p. 338, Low. Held. Gr.
- ammon, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 37, and Pal. N. Y., vol. 5, pt. 2, p. 20, Up. Held. Gr.

- angulatum, Hall, 1852, (Aeroculia angulata,) Pal. N. Y., vol. 2, p. 289, Clinton and Niagara Grs.
- arctistoma, Ulrich, 1886, Cont. to Am. / Pal., p. 30, Up. Held. Gr.
- arcuatum, Hall, 1859, Pal. N. Y., vol. 3, p.
- 336, Low. Held. Gr. argo, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 39, and Pal. N. Y., vol. 5, pt. 2, p. 19, Up. Held. Gr. attenuatum, Hall, 1862, 15th Rep. N. Y.
- Mus. Nat. Hist., p. 30, and Pal. N. Y., vol. 5, pt. 2, p. 6, Ham. Gr.
- attenuatum, see P. dumosum var. attenuatum.
- auriculatum, Hall, 1876, Illust. Devonian Foss., pl. 3, Ham. Gr.
- billingsi, Hall, 1859, Pal. N. Y., vol. 3, p. 315, Low. Held. Gr.
- biseriale, Hall, 1860, Supp. to Geo. Iowa, vol. 1. pt. 2, p. 90, Burlington Gr. bisinuatum, Hall, 1859, Pal. N. Y., vol. 3,
- p. 318, Low. Held. Gr.
- bisulcatum, Hall, 1859, Pal. N. Y., vol. 3,
- p. 327, Low. Held. Gr. bivolve, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 302, Kinderhook Gr.
- bucculentum, Hall, 1862, 15th Rep. N.Y. Mus. Nat. Hist., p. 33, and Pal. N. Y.,
- vol. 5, pt. 2, p. 10, Ham. Gr. calantica, Hall, 1859, Pal. N. Y., vol. 3, p. 328, Low Held. Gr.
- callosum, Hall, 1859, Pal. N. Y., vol. 3, p. 478, Oriskany sandstone. campanulatum, Winchell & Marcy, 1865,
- Mem. Bost. Soc. Nat. Hist., p. 99, Niagara Gr.
- capax, Keyes, 1888, Proc. Am. Phil. Soc., (author's copy, p. 13,) Burlington Gr. capulus, Hall, 1860, Supp. Geo. Iowa, p.
- 91, Burlington Gr.
- carinatum, Hall, 1862, 15th Rep. N. Y Mus. Nat. Hist., p. 33, and Pal. N. Y. vol. 5, pt. 2, p. 5, Up. Held. Gr. chesterense, Meek & Worthen, 1866, Proc.
- Acad. Nat. Sci., p. 265, Kaskaskia Gr.
- cirriforme, Conrad, 1841, Ann. Rep. N. Y. Not clearly defined.
- clavatum, Hall, 1859, Pal. N. Y., vol. 3, p. 337, Low. Held. Gr.
- concavum, Hall, 1862, 15th Rep. N. Y. V Mus. Nat. Hist., p. 30, and Pal. N. Y., vol. 5, pt. 2, p. 3, Up. Held. Gr. conicum, Hall, 1862, 15th Rep. N. Y. Mus.
- Nat. Hist., p. 31, and Pal. N. Y., vol. 5, pt. 2, p. 3, Ham. Gr. conradi, Walcott, 1885, Monogr. U. S. Geo.
- Sur., vol. 8, p. 182, Devonian. cornuforme, Winchell, 1863, Proc. Acad.
- Nat. Sci., p. 18, Marshall Gr.
- crassum, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 36, and Pal. N. Y., vol. 5, pt. 2, p. 18, Up. Held. Gr.
- curvirostrum, Hall, 1859, Pal. N. Y., vol.
- 3, p. 338, Low. Held. Gr. cymbium, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 35, and Pal. N. Y., vol. 5, pt. 2, p. 12, Up. Held Gr.

cyrtolites, McChesney, 1859, Pal. Foss., p. 71. Coal Meas.

dentalium, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 29, and Pal. N. Y., vol. 5, pt. 2, p. 2, Up. Held. Gr. dilatatum, Hall, 1859, Pal. N. Y., vol. 3,

p. 322, Low. Held. Gr.

dumosum, Conrad, 1840, Ann. Rep. N. Y., p. 205, and Pal. N. Y., vol. 5, pt. 2, p. 14, Up. Held. Gr.



FIG. 694. Platyceras dumosum.

- dumosum var. attenuatum, Meek, 1871, Proc. Acad. Nat. Sci., p. 75, and Ohio Pal., vol. 1, p. 212, Up. Held. Gr.
- dumosum var. rarispinum, Hall, 1862, 15th Rep. N.Y. Mus. Nat. Hist., p. 38, and Pal. N. Y., vol. 5, pt. 2, p. 16, Up. Held. Gr.
- echinatum, Hall, 1862, 15th Rep. N.Y. Mus. Nat. Hist., p. 38, and Pal. N. Y.,
- vol. 5, pt. 2, p. 13, Ham. Gr. elongatum, Hall, 1859, Pal. N. Y., vol. 3, , p. 335, Low. Held. Gr.
- equilaterale, Hall, 1860, Supp. to vol. 1,
- equinaterate, Hall, 1860, Supp. to Vol. 1, pt. 2, Iowa Rép., p. 89, and Geo. Sur. Ill., vol. 5, p. 518, Keokuk Gr. erectum, Hall, 1843, (Acroculia erecta,) Geo. 4th Dist. N. Y., p. 174, and Pal. N. Y., vol. 5, pt. 2, p. 5, Cornif. & Ham. Grs.

expansum, see Strophostylus expansus.

fissurellum, Hall, 1860, Supp. to Geo. Rep. Iowa, vol. 1, pt. 2, p. 90, and Geo. Sur. Ill., vol. 5, p. 519, Keokuk Gr. fluctuosum, Ulrich, 1886, Cont. to Am.

Pal., p. 31, Up. Held. Gr.

- formosum, Keyes, 1888, Proc. Am. Phil. Soc., (author's copy, p. 14,) Kinderhook Gr.
- fornicatum, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 35, and Pal, N. Y., vol. 5, pt. 2, p. 11, Up. Held. Gr.
- fornicatum var. contractum, Hall, 1876, Illust. Devonian Foss., pl. 5, Up. Held. Gr.
- gebhardi, Conrad, 1840, Ann. Rep. N. Y., p. 206, and Pal. N. Y., vol. 3, p. 312, Low. Held. and Oriskany Grs.
- gibbosum, Hall, 1859, Pal. N. Y., vol. 3, p. 322, Low. Held. Gr.
 - haliotoides, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 264, and Geo. Sur. Ill., vol. 3, p. 458, Kinderhook Gr.
 - herzeri, Winchell, 1870, Proc. Am. Phil. Soc., p. 256, Marshall Gr.

incile, Hall, 1859, Pal. N. Y., vol. 3, p. 332. Low. Held. Gr.

- infundibulum, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 266, and Geo. Sur. Ill., vol. 5, p. 517. Keokuk Gr.
- intermedium, Hall, 1859, Pal. N. Y., vol. 3, p. 321, Low. Held. Gr.
- laciniosum, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 14, Niag. ara Gr.
- lævigatum, Meek & Worthen, 1866, Proc
- Acad. Nat. Sci., p. 263, Kaskaskia Gr. lamellosum, Hall, 1859, Pal. N. Y., vol.3, p. 330, Low. Held. Gr.
- latum, Keyes, 1888, Proc. Am. Phil. Soc.
- (author's copy, p. 14,) Burlington Gr. lodiense, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 170, and Ohio Pal., vol. 2 p. 313, Waverly Gr.
- magnificum, Hall, 1859, Pal. N. Y., vol. 3. p. 476, Oriskany sandstone.
- membranaceum, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 45, Niag. ara Gr.
- minutissimum, Walcott, 1879. De c. New Spec. Foss., p. 1, Calciferous G
- multisinuatum, Hall, 1859, Pal. N. Y. vol. 3, p. 319, Low. Held. Gr. multispinosum, Meek, 1871, Proc. Acad.
- Nat. Sci. Phil., p. 73, and Ohio Pal. vol. 1, p. 210, Cornif. Gr.
- naticoides, Etheridge, 1878, Quar. Jour.
- Geo. Soc., vol. 34, p. 603, Up. Sil. nebraskense, Meek, 1872, Pal. E. Neb., p. 227, Coal Meas.
- newberryi, Hall, 1859, Pal. N. Y., vol. 3. p. 333, Low. Held. Gr.
- niagarense, Hall, 1852, (Acroculia niagarensis,) Pal. N. Y., vol. 2, p. 288, Niagara Gr.
- nodosum, Conrad, 1841, Ann. Rep. N. Y. p. 56, and Pal. N. Y., vol. 3, p. 473, Oriskany sandstone.
- obesum, Hall, 1859, Pal. N. Y., vol. 3, p. 329, Low. Held. Gr.
- obliquum, Keyes, 1888, Proc. Am. Phil. Soc., (author's copy, p. 13,) Burlington Gr.
- occidens, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 254, Subcarboniferous.
- ovale, Stevens, 1858, (Acroculia ovalis,) Am. Jour. Sci., vol. 25, p. 261, Subcarboniferous.
- pabulocrinus, Owen, 1862, (Pileopsis pabulocrinus,) Geo. Sur, Indiana, p. 364, Keokuk Gr.
- paralium, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 302, Kinderhook Gr.
- patulum, Hall, 1859, Pal. N. Y., vol. 3, p. 477, Oriskany sandstone.
- pentalobus, Hall, 1859, Pal. N. Y., vol. 3, p. 319, Low. Held. Gr.
- perlatum, Hall, 1859, Pal. N. Y., vol. 3, p. 328, Low. Held. Gr.
- perplexum, Hall, 1876, Illust. Devonian Foss., pl. 2, Up. Held. Gr.



perplicatum, Hall, 18 p. 325, Low. Held. pileiforme, Hall, 1859 p. 327, Low. Held.

piso, Walcott, 1885. Sur., vol. 8, p. 254,

platystoma, Hall, 185 p. 326, Low. Held.

platystoma var. alvea N. Y., vol. 3, p. 32 plicatile, Hall, 1859, 325, Low. Held. Gi

plicatum, Conrad, 18-Ann. Rep. N. Y., I vol. 3, p. 334, Low. primævum, Billings,

Geol., vol. 6, p. 22 primordiale, Hall, 1 Mus. Nat. Hist., p

proclive, Ringueberg Nat. Sci., vol. 5, p.

pyramidatum, Hall, 3, p. 336, Low. He

quincyense, McChes Foss., p. 90, and C p. 510, Burlington quinquesinuatum, U

Am. Pal., p. 29, U reflexum, Hall, 1859 477, Oriskany sand retrorsum, Hall, 185 p. 320, Low. Held.

retrorsum var. abno N. Y., vol. 3, p. 35



versum.

1859, Pal. N. Y., Held. Gr. senex, Winchell &

lia senex.) Mem. p. 111, Niagara G

serratum, Ulrich, 18 p. 30, Up. Held. (

sinuatum, Hall, 185 p. 314, Low. Held

spinigerum, Worthe vol. 5, p. 594. Cos spirale, Hall, 1859, 331, Low. Held. C

squalodens, Whitfi Acad. Sci., vol. 2,

subnodosum, Hall, 3, p. 474, Oriskan

subplicatum, Meek Acad. Nat. Sci. P

Sur. Ill., vol. 3, p.

PLA.

PLA. PLA.

325, Low. Held. Gr.

p. 327, Low. Held. Gr.

p. 326, Low. Held. Gr.

325, Low. Held. Gr.

pileiforme, Hall, 1859, Pal. N. Y., vol. 3,

piso. Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 254, Subcarboniferous.

platystoma, Hall, 1859, Pal. N. Y., vol. 3,

platystoma var. alveatum, Hall, 1859, Pal.

N. Y., vol. 3, p. 326, Low. Held. Gr. plicatile, Hall, 1859, Pal. N. Y., vol. 3, p.

plicatum, Conrad, 1840, (Calceola plicata,)

Ann. Rep. N. Y., p. 207, and Pal. N. Y., vol. 3, p. 334, Low. Held. Gr.

primævum, Billings, 1871, Can. Nat. and Geol., vol. 6, p. 220, Georgia Gr. primordiale, Hall, 1863, 16th Rep. N. Y.

Mus. Nat. Hist., p. 136, Potsdam Gr.

proclive, Ringueberg, 1886, Bull. Buf. Soc.

Nat. Sci., vol. 5, p. 14, Niagara Gr. pyramidatum, Hall, 1859, Pal. N. Y., vol.

quincyense, McChesney, 1861, New Pal. Foss., p. 90, and Geo. Sur. Ill., vol. 3,

quinquesinuatum, Ulrich, 1886, Cont. to

Am. Pal., p. 29, Up. Held. Gr. reflexum, Hall, 1859, Pal. N. Y., vol. 3, p.

retrorsum, Hall, 1859, Pal. N. Y., vol. 3,

retrorsum var. abnorme, Hall, 1859, Pal.

reversum,

91,

Gr.

Hall.

1860, Supp. to Geo. Rep. Iowa,

vol. 1, pt. 2, p. Burlington

rictum, Hall, 1862 15th Rep. N. Y.

N. Y., vol. 3, p. 321, Low. Held. Gr.

3, p. 336, Low. Held. Gr.

p. 510, Burlington Gr.

477, Oriskany sandstone.

p. 320, Low. Held. Gr.

. Y., vol. 3, p. 332

z Worthen, 1866, Phil., p. 266, and 5, p. 517. Keo

), Pal. N. Y., vol. Gr.

1886, Bull. Buf. 5, p. 14, Nisg.

rthen, 1866, Proc. 3, Kaskaskia (ir. Pal. N. Y., vol. 3.

c. Am. Phil. Soc. Burlington Gr. Proc. Acad. Nat. Ohio Pal., vol. 2,

Pal. N. Y., vol. 3, stone.

berg, 1886, Bull. 1. 5, p. 15, Niag-

1879, Desc. New iferous GL 859, Pal. N. Y.

eld. Gr. 871, Proc. Acad. , and Ohio Pal.

Fr. 878, Quar. Jour.

)3, Up. Sil. , Pal. E. Neb., p.

al. N. Y., vol. 3.

(Acroculia niagol. 2, p. 288, Ni-

Ann. Rep. N. Y. , vol. 3, p. 473,

N. Y., vol. 3, p.

Proc. Am. Phil. p. 13,) Burling-Monogr. U. S. 254, Subcarbon-

croculia ovalis,) p. 261, Subcar-

2, (Pileopsis pa-Indiana, p. 364

field, 1862, Proc. vol. 8, p. 302,

N. Y., vol. 3, p.

al. N. Y., vol. 3,

N. Y., vol. 3, p.

llust. Devonian Gr.

GASTEROPODA.

- perplicatum, Hall, 1859, Pal. N. Y., vol. 3, subrectum, Hall, 1859, 12th Rep. N.Y., Mus. Nat. Hist., p. 18, and Pal. N. Y., vol. 5, pt. 2, p. 1, Up. Held. Gr.
 - subrectum, Hall, 1860, Supp. to Iowa Rep. The name being preoccupied, Meek & Worthen proposed P. infundibulam.
 - subsinuosum, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 38, Low. Held. Gr. Proposed instead of P. subundatum, M. & W., which was preoccupied.
 - subundatum, Conrad, 1841, Ann. Rep. N. Y., p. 56, Up. Held. Gr.
 - subundatum, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 457. The name was preoccupied. See P. subsinuosum.
 - sulcatum, Conrad, 1841, Ann. Rep. N. Y., p. 56, Oriskany sandstone.
 - sulcoplicatum, Hall, 1859, Pal. N. Y., vol. 3, p. 324, Low. Held. Gr.
 - symmetricum, Hall, 1862, 15th Rep. N.Y.
 - Mus. Nat. Hist., p. 34, and Pal. N. Y., vol. 5, pt. 2, p. 9, Ham. and Up. Held. Grs.
 - tenuiliratum, Hall, 1859, Pal. N. Y., vol. 3, p. 317, Low. Held. Gr.
 - thetiforme, Walcott, 1885, Monogr. U. S.
 - Geo. Sur., vol. 8, p. 184, Devonian. thetis, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 32, and Pal. N. Y., vol. 5, pt. 2, p. 8, Up. Held. and Ham. Grs. thetis var. subspinosum, Hall, 1876, Illust Devonian Focs. pl. 3. Ham. Gr.
 - Illust. Devonian Foss., pl. 3, Ham. Gr.
 - tortum, Meek, 1871, Proc. Acad. Nat. Sci.4 p. 171, and Ohio Pal., vol. 2, p. 345, Coal Meas.
 - tortuosum, Hall, 1859, Pal. N. Y., vol. 3, p. 472, Oriskany sandstone.
 - tribulosum, White, 1880, 12th Rep. U. S. Geo. Sur. Terr., p. 168, Burling-
 - ton Gr. trigonale, Stevens, 1858, (Acroculia trigonalis,) Am. Jour. Sci. and Arts, vol. 25, p. 260, Carboniferous.
 - trilobatum, Hall, 1859, Pak N. Y., vol. 3, p. 316, Low. Held. Gr.
 - tubiforme, Hall, 1859, Pal. N. Y., vol. 3, p. 332, Low. Held. Gr. uncum, Meek & Worthen, 1866, Proc.
 - Acad. Nat. Sci., p. 264, and Geo. Sur. Ill., vol. 5, p. 516, Keokuk Gr.
 - undatum, Hall, 1876, Illust. Devonian Foss., pl. 7, and Pal. N. Y., vol. 5, pt.
 - 2, p. 17, Up. Held. Gr. undulatum, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 184, Devonian.
 - undulostriatum, Hall, 1859, Pal. N. Y., vol. 3, p. 336, Low. Held. Gr.
 - unguiforme, Hall, 1859, Pal. N. Y., vol. 3, p. 322, Low. Held. Gr.
 - uniseriale, Nicholson, 1874, Rep. Pal. Ont., p. 116, Up. Held. Gr. unisulcatum, Hall, 1859, Pal. N. Y., vol.
 - 3, p. 316, Low. Held. Gr.
 - ventricosum, Conrad, 1840, Ann. Rep. N. Y., p. 206, and Pal. N. Y., vol. 3, p. 311, Low. Held. Gr.
 - vomerium, Winchell, 1863, Proc. Acad. Nat. Sci., p. 19, Marshall Gr.



Mus. Nat. Hist.,

p. 35, and Pal. N. Y., vol. 5, pt. 2, p. 13, Ham. and Up. Held. Grs robustum,

Hall, 1859, Pal. N. Y., vol. 3, p. 313, Low. Held. Gr.

- senex, Winchell & Marcy, 1865, (Porcel-lia senex.) Mem. Bost. Soc. Nat. Hist., p. 111, Niagara Gr.
- serratum, Ulrich, 1886, Cont. to Am. Pal.,
- p. 30, Up. Held. Gr. sinuatum, Hall, 1859, Pal. N. Y., vol. 3, p. 314, Low. Held. Gr.
- spinigerum, Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 594. Coal Meas. spirale, Hall, 1859, Pal. N. Y., vol. 3, p.
- 331, Low. Held. Gr.
- squalodens, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 202, Up. Held. Gr. subnodosum, Hall, 1859, Pal. N. Y., vol.
- 3, p. 474, Oriskan'y sandstone. subplicatum, Meek & Worthen, 1866, Proc.
 - Acad. Nat. Sci. Phil., p. 265, and Geo. Sur. Ill., vol. 3, p. 457, Kinderhook Gr.

FIG. 695.-Platyceras reversum.

PLATYSCHISMA, McCoy, 1844, Syn. Carb. Foss. Ireland, p. 38. [Ety. platys, wide; schisma, slit.] Obtusely conical, ventricose; spire short, obtuse, few whorls; aperture very oblique, large, lunate, deeply indented by the preceding whorl, rounded anteally, narrow retrally, with a very wide, shallow sinus in the middle part of the outer lip not forming a definite band, sometimes obsolete; no trace of inner lip; pillar thin, a little reflected; surface smooth or only marked by the retrally waved lines of growth; umbilicus small, round, open. Type P. helicites.

ambiguum, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 188, Devonian. dubium, Dawson, 1868,



FIG. 696.-Platy

bium.

schisma du-

V

Y

5

Acad. Geol., p. 309, Carboniferous.

Walcott, 1885, mccoyi, Monogr, U. S. Geo. Sur., vol. 8, p. 188, Devonian. PLATYSTOMA, Conrad, 1842, Jour. Acad. Nat. Sci.,

vol. 8, p. 275. [Ety. *platys*, broad; stoma, mouth.] Spire short; aperture large, dilated; labrum joining the body whorl. This name was preoccupied for a shell by Klein in 1753, for an insect by Meigen in 1803, and for a fish by Agassiz in 1829. The genus has been named

Platycerina. Type P. ventricosum. affine, Billings, 1874, Pal. Foss., vol. 2, p. 60, Gaspe limestone, No. 8, Devonian.

aplatum, Hall, 1876, Illust. Devonian Foss., pl. 11, and Pal. N. Y., vol. 5, pt. 2, p. 26, Schoharie grit

arenosum, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 276, and Pal. N. Y., vol. 3, p. 302, Low. Held. Gr.

belial, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 30, Genesee shales.

defiguratum, Hall, 1876, Illust. Devonian Foss., pl. 9, and Pal. N. Y., vol. 5, pt. 2, p. 24, Ham. Gr.

depressum, Hall, 1859, Pal. N. Y., vol. 3, p. 301, Low. Held. Gr.

- euomphaloides, Hall, 1876, Illust. Devo-nian Foss., pl. 9, and Pal. N. Y., vol. 5, pt. 2, p. 25, Ham. Gr.
 - hemisphericum, Hall, 1843, (Euomphalus hemisphericus,) Geo. Rep. 4th Dist. N. Y., p. 109, and Pal. N. Y., vol. 2, p. 288, Niagara Gr.
 - grayvillense, Worthen, 1882, Bull. No. 1. Ill. St. Mus. Nat. Hist., p. 38, Coal Meas, Proposed instead of P. tumidum, M. & W., which was preoccupied.
- inornatum, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 255, Subcarboniferous.

lichas, see Callonema lichas.

lineatum, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 276, and Pal. N. Y., vol. 5, pt. 2, p. 21, Up. Held and Ham. Grs. lineatum var. amplum, Hall, 1876, Illust. Devonjan Foss., pl. 9, and Pal. Foss. N. Y., vol. 5, pt. 2, p. 23, Ham. Gr.

lineatum var. callosum, Hall, 1876, Illust **Devonian Foss.**, pl. 9, and Pal. Foss. N. Y., vol. 5, pt. 2, p. 23, Ham. Gr.

lineatum var. sinuosum, Hall, 1876. Illust

Devonian Foss., pl. 11, and Pal. Foss. N. Y., vol. 5, pt. 2, p. 24. Ham. Gr. minutissimum, Clarke, 1885, Bull. U. 8. Geo. Sur., No. 16, p. 55, Portage Gr. nana, see Naticopsis nana.

niagarense,

Hall, 1852, Pal. N. Y., vol. 2, p. 287, Niagara Gr. peoriense, Mc-Chesney,

1860, Desc. New Pal. Foss., Up.

Coal Meas. plebeium.

Hall, 1876, 28th Rep. N. Mus. Nat.

Hist., p. 175,

FIG. 697.-Platystoma ni-Niagara Gr. agarense. pleurotoma,

Hall, 1876, Illust. Devonian Foss., pl. 10, and Pal. N. Y., vol. 5, pt. 2, p. 30, Up. Held. Gr.

- plicatum, Whiteaves, 1887, Cont. to Can. Pal., vol. 1, p. 118, Ham. Gr.
- shumardi, Verneuil, 1846, (Turbo shumardi) Bull. d. 1. Soc. Geol. d. France, and Pal. N. Y., vol. 5, pt. 2, p. 135, Ham. Gr.
- strophium, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 41, and Pal. N.Y., vol. 5, pt. 2, p. 25, Cornif. Gr. subangulatum, Hall, 1859, Pal. N. Y., vol.

3, p. 301, Low. Held. Gr.

trigonostoma, Meek. 1871, Proc. Acad. Nat. Sci., p. 169, and Ohio Pal., vol. 1, p. 185, Niagara Gr tumidum, Meek &

1860.

Fig. 698.-Platystoma Worthen. trigonostoma Proc. Acad, Nat.

- Sci., p. 463, Up. Coal Meas. turbinatum, Hall, 1861, 14th Rep. N. Y. Mus. Nat. Hist., p. 106, and Pal. N. Y., vol. 5, pt. 2, p. 27, Up. Held. Gr.
- turbinatum var. cochleatum, Hall, 1876, Illust. Devonian Foss., pl. 10, and Pal. N. Y., vol. 5, pt. 2, p. 28, Up. Held. Gr.
- unisulcatum, Conrad, 1842, (Pleurotomaria unisulcata,) Jour. Acad. Nat. Sci., vol. 8, p. 271, and Pal. N. Y., vol. 5, pt. 2, p. 27, Up. Held. Gr.
- ventricosum, Connad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 275, and Pal. N. Y., vol. 3, p. 300, Low. Held. Gr.
- Plectostylus, Conrad, 1842, Jour. Acad. Nat. Sci., p. 275. The name was preoc-Sci., p. cupied.

hildrethi, see Macrochilina hildrethi.

PLEURONOTUS, Hall, 5. pt. 2, p. 138. notos, back.] Dist phalus by the bro ture, sinuate on making a deep meets a periphe



Fig. 699.-P

decewi, Billings, decewi,) Can. Held. Gr.

PLEUROTOMARIA, Defr Corps. Organises

Dict. Sci. Nat., t. 4 side; tome, cut or form, more or less variable in thick an umbilicus; ve tened, or rounde surface ornamen with striæ, nod granulations, or c inæ; aperture si quadrate, semiov suborbicular, or si rhombic; inner thin; fissure of ou lip narrow a deep; revolvi band correspond in depth with th glica.

abrupta, Billings, 18 vol. 4, p. 354, Cal acadica, Dawson, 1

Mus., p. 11, Subc adamsi, Worthen, St. Mus. Nat. Hi

Ill., vol. 8, p. 137 adjutor, Hall, 1879 2, p. 80, Up. Hel advena, Winchell,

and Arts, 2d serie dam Gr.

agarista, Billings, p. 230, Quebec G

PLA. -PLE.

PLE. [PLA. -PLE

Hall, 1876, Illust), and Pal. Foss. 23, Ham. Gr Hall, 1876, Illust. 1, and Pal. Foss. 24. Ham. Gr. 1885, Bull. U. s , Portage Gr. 1a.



-Platystoma nigarense.

onian Foss., pl. l. 5, pt. 2, p. 30,

7, Cont. to Can. 1. Gr. 6, (Turbo shu-Geol. d. France,

5, pt. 2, p. 135,

5th Rep. N. Y. and Pal. N.Y., if. Gr. Pal. N. Y., vol.

r. onostoma, Meek, 371, Proc. Acad. at. Sci., p. 169. nd Ohio Pal., vol. p. 185, Niagara

idum, Meek & orthen, 1860, roc. Acad, Nat. leas. 4th Rep. N. Y.

and Pal. N. Y., Held. Gr. um, Hall, 1876. ., pl. 10, and 2, p. 28, Up.

2, (Pleurotoma-Acad. Nat. Sci., V. Y., vol. 5, pt.

2, Jour. Acad. and Pal. N. Y., . Gr. our. Acad. Nat.

ae was preoc-

hildrethi.

GASTEROPODA.

- agave, Billings, 1865, Pal. Foss., vol. 1, p. 170. Trenton Gr.
- ambigua, Hall, 1847, Pal. N. Y., vol. 1, p. 176, Trenton Gr.
- americana, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 164, Trenton Gr.
- amphitrite, Billings, 1862, Pal. Foss., vol. 1, p. 32, Chazy or Black Riv. Gr.
 - angulata, Conrad, 1843, Proc. Acad. Nat. Sci. Phil. This name was preoccupied by Sowerby.
 - antiquata, Hall, 1847, Pal. N. Y., vol. 1, p. 31, Chazy Gr.
 - aperta, see Raphistoma apertum.
 - apicalis, Hall, 1876, Illust. Devonian Foss., pl. 20, and Pal. N. Y., vol.
 - 5, pt. 2, p. 88, Chemung Gr. arabella, Billings, 1865, Pal. Foss., vol. 1, p. 343, Calciferous Gr.
 - arachne, Billings, 1862, Pal. Foss.. vol. 1, p. 31, Black Riv. Gr.
 - arata, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 42, and Pal. N. Y., vol. 5, pt. 2, p. 64, Schoharie grit.
 - arata var. clausa, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 65, Up. Held. Gr.
 - axion, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 394, Niag-
- ara Gr. beckwithana, McChesney, 1860, Desc. New Pal. Foss., p. 61, Coal Meas.
- beekmanensis, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 53, Calciferous Gr.
- biangulata, Hall, 1847, Pal. N. Y., vol. 1, p. 31, Chazy Gr.
- bicarinata, McChesney, 1860. Preoccu-pied. See P. turbiniformis.
- bilix, see Cyclonema bilix.
- bispiralis, Hall, 1852, Pal. N. Y., vol. 2, p. 348, Guelph Gr.
- bonharborensis, Cox, 1857, Geo. Sur. Ky., vol. 3, p. 567, Coal Meas.
- brazoensis, Shumard, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 624, and Geo. Sur. Ill., vol. 2, p. 354, Low. Coal Meas.
- broadheadi, White, 1880, 12th Rep. U. S. Geo. Sur. Terr., p. 169, Coal Meas.
- calcifera, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 352, Calciferous Gr.
- calphurnia, Billings, 1865, Pal. Foss., vol. 1, p. 230, Up. Taconic, Quebec Gr.
- calyx, Billings, 1859, Can. Nat. and Geo.,
- vol. 4, p. 454, Chazy Gr. canadensis, Billings, 1865, Pal. Foss, vol. 1, p. 342, Calciferous Gr.
- capillaria, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 271, and Pal. N. Y., vol. 5, pt. 2, p. 77, Ham. Gr. carbonaria, Norwood & Pratten, 1854,
- Jour. Acad. Nat. Sci., 2d series, vol. 3, p. 75, Çoal Meas.
- casii, Meek & Worthen, 1868, Geo. Sur.
- Ill., vol. 3, p. 359, Niagara Gr. cavumbilicata, Winchell, 1866, Rep. Low. Penin. Mich., p. 96, Ham. Gr.

inæ: aperture subquadrate, semioval, suborbicular, or subrhombic; inner lip thin; fissure of outer lip narrow and FIG. 700.-Pleurotodeep; revolving maria anglica.

Fig. 699.-Pleuronotus decewi.

decewi, Billings, 1861, (Euomphalus decewi,) Can. Jour., p. 358, Up.

PLEUROTOMARIA, Defrance, 1824, Tableau d.

Corps. Organises Fossiles, p. 114, and Dict. Sci. Nat., t. 41, p. 381. [Ety. pleura,

side; tome, cut or notch.] Shell trochi-

form, more or less conical, pearly within,

variable in thickness, with or without

an umbilicus; volutions angular, flat-

PLEURONOTUS, Hall, 1879, Pal. N. Y., vol.

5. pt. 2, p. 138. [Ety. pleura, side; notos, back.] Distinguished from Euom-

phalus by the broadly expanded aper-

ture, sinuate on the upper margin, making a deep retral angle, which

meets a peripheral band. Type P.

decewi.

Held. Gr.

tened, or rounded;

surface ornamented

- band corresponding in depth with the sinus. Type P. an-
- glica. abrupta, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 354, Calciferous Gr.
- acadica, Dawson, 1883, Rep. on Redpath
- Mus., p. 11, Subcarboniferous. adamsi, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 5, and Geo. Sur.
- Ill., vol. 8, p. 137, Coal Meas. adjutor, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 80, Up. Held Gr.
- advena, Winchell, 1864, Am. Jour. Sci. and Arts, 2d series, vol. 37, p. 228, Potsdam Gr.
- agarista, Billings, 1865, Pal. Foss., vol. 1, p. 230, Quebec Gr.

with striæ, nodes, granulations, or car-

1861, (Euomphalus

- chesterensis, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 460, and Geo. Sur. 111., vol. 2, p. 303, Kaskaskia Gr.
- chesterensis, Swallow, 1863, Trans. St. Louis Acad. Sci. The name was preoccupied, but it is probably a synonym. circe, Billings, 1857, Rep. of Progr. Geo.
- Sur. Can., p. 303, Hud. Riv. Gr.
- clipeiformis, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 57, Niagara Gr.
- concava, see Eotrochus concavus. Coniformis, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 38, Coal Meas. Proposed instead of P. conoides,
- M. & W.
- conoides, Meek & Worthen, 1866, Proc. Acad. Nat. Sci., p. 271. Preoccupied by Deshayes in 1831. See P. coniformis.
- conulus, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 26, and Bull. Am. Mus. Nat. Hist., p. 84, Warsaw Gr.
- cooperensis, n#s. Kaskaskia Gr. Proposed instead of P. trochiformis, Swal-low, Trans. St. Louis Acad. Sci., vol. 2, p. 99, that was preoccupied.
- coronula, Hall, syn. for P. sphærulata. coxana, Meek & Worthen, 1866, Proc. Acad. Nat. Sci., p. 272, and Geo. Sur.
- Ill., vol. 5, p. 600, Coal Meas. coxana, Worthen, 1884. The name was preoccupied. See P. iowensis.
- crevieri, Billings, 1859, Can. Nat. and Geol., vol. 4, p. 456, Chazy Gr.
- cryptata, Billings, 1866, Catal. Sil. Foss. Antic., p. 54, Anticosti Gr. cyclonemoides, Meek & Worthen, 1868,
- Geo. Sur. Ill., vol. 3, p. 360, Niagara Gr.
- vol. 3, p. 23, Guelph Gr. deiopea, Billings, 1862, Pal. Foss., vol. 1, p. 155, Guelph Gr.
- delia, Billings, 1874, Pal. Foss., vol. 2, p. 61, Gaspe limestone No. 8, Devonian.
 - delicatula, Hall, 1876, Illust. Devonian Foss, pl. 19, and Pal. N. Y., vol. 5, pt. 2, p. 70, Up. Held. Gr.
 - delphinuloides, Goldfuss, as identified by d'Archiac & Verneuil. Not American. depauperata, Hall, 1862, Geo. Rep. Wis., p. 55, Hud. Riv. Gr.
 - depressa, Cox, 1857, Geo. Sur. Ky., vol. 3, Coal Meas. The name was preoccupied by Passy in 1832, by Phillips in 1836, and by DeKoninck in 1841. See P. kentuckiensis.
- disjuncta, Hall, 1876, Illust. Devonian Foss. pl. 20, and Pal. N. Y., vol. 5, pt. 2, p. 84, Ham. Gr.
 - dispersa, Dawson, 1868, Acad. Geol., p. 310, Carboniferous.
 - docens, Billings, 1859, Can. Nat. and Geol., vol. 4, p. 452, Chazy Gr.
 - doris, see Cyclonema doris.
 - dryope, Billings, 1865, Pal. Foss., vol. 1, p. 170, Black Riv. Gr.

- durhamensis, Whiteaves, 1884, Pal. Foss., vol. 3, p. 24, Guelph Gr. elegantula, Hall, 1858, (Murchisonia ele-
- gantula,) Trans. Alb. Inst., vol. 4, p. 27, and Bull. Am. Mus. Nat. Hist., p. 84, Warsaw Gr.
- ella, Hall, 1876, Illust. Devonian Foss., pl. 19, and Pal. N. Y., vol. 5, pt. 2, p. 72, Ham. Gr.
- elora, Billings, 1862, Pal. Foss., vol. 1, p. 154, Guelph Gr.
- emmetensis, Winchell, 1866, Rep. Low. Penin. Mich., p. 96, Ham. Gr. estella, Hall & Whitfield, 1872, 24th Rep.
- N. Y. Mus. Nat. Hist., p. 195, Ham. Gr.
- etna, Billings, 1865, Pal. Foss., vol. 1, p. 226, Quebec Gr.
- eugenia, Billings, 1862, Pal. Foss., vol. 1, p. 30, Black Riv. Gr.
 euomphaloides, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 18, Ham. Gr.
 exigua, Winchell, 1862, Proc. Acad. Nat.
- Sci., p. 424, Marshall Gr. filitexta, Hall, 1876, Illust. Devonian
- Foss., pl. 19, and Pal. N. Y., vol. 5, pt. 2, p. 73, Ham. Gr.
- galtensis, Billings, 1862, Pal. Foss., vol. 1. p. 154, Guelph Gr. giffordi, Worthen, 1884, Bull. No. 2, Ill.
- St. Mus. Nat. Hist., p. 5, and Geo. Sur. Ill., vol. 8, p. 135, Coal Meas. glandula, Shumard, 1860, Trans. St. Louis
- Acad. Sci., vol. 1, p. 626, Coal Meas. gonopleura, Winchell & Marcy, 1865, Bost. Soc. Nat. Hist., p. 98, Niagara Gr.
- granulostriata, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 459, and Geo. Sur. Ill., vol. 2, p. 356, Low. Coal Meas.
- grayvillensis, Norwood & Pratten, 1854, Jour. Acad. Nat. Sci., 2d series, vol. 3, p. 75, Coal Meas.
- gregaria, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 355, Calciferous Gr. gurleyi, Meek, 1871, Proc. Acad. Nat. Sci.,
- p. 177, Coal Meas.
- halii, see Trochonema halii.
- hallana, Shumard, 1859, Trans. St. Louis Acad. Sci., vol. 1, p. 399, Permian Gr.
- halli, see Raphistoma halli.
- harpya, Billings, 1865, Pal. Foss., vol. 1. p. 227, Quebec Gr.
- haydenana, Geinitz, 1866, Carb. und Dyas in Neb., p. 11, and Pal. E. Neb., p. 231, Coal Meas.
- bebe, Hall, 1861, 14th Rep. N. Y. Mus.
 Nat. Hist., p. 105, and Pal. N. Y., vol. 5, pt. 2, p. 68, Up. Held. Gr.
- helena, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 165, Hud. Riv. Gr. hickmanensis, Winchell, 1869, Geo. of Tenn. and Proc. Am. Phil. Soc. vol., 12, p. 257, Waverly Gr.
- hortensia, Billings, 1865, Pal. Foss., vol.
- 1, p. 227, Quebec Gr. hoyi, Hall, 1861, Rep. of Progr. Wis. Sur., p. 35, Niagara Gr.
- humerosa, Meek & Hayden, 1858, Proc. Acad. Nat. Sci. Phil., p. 262, and Pal. Up. Mo., p. 46, Coal Meas.

PLE

humilis, Hall, 185 4, p. 21, and Bu p. 82, Warsaw (humilis, Winchell

preoccupied. huronensis, Winc

- Nat. Sci. Phil., Portage Gr.
- hyale, Billings, 18 228, Quebec Gr. idia, Hall, 1861, R
- p. 35, Niagara G ignobilis, Dawson 310, Carbonifer
- illinoisensis, Wor Ill. St. Mus. Na
- Sur. Ill., vol. 8, imitator, see Callo immatura, Billing Geo., vol. 4, p.
- indenta, Hall, 184 176, Trenton Gr
- inexpectans, Hall Pal., vol. 2, p. 1 inornata, Meek, 1
- Coal Meas. insolita, Hall, 1
- Foss., pl. 20, an 2, p. 81, Ham. (iowensis, Worthe Ill., vol. 8, p. 13
- isaacsi, Hall & W N. Y. Mus. N mung Gr.
 - itys, Hall, 1876, pl. 20, and Pal.
 - 76, Ham. Gr. itys var. tenuispira
 - vol. 5, pt. 2, p. 1 kearneyi, see Palæ kentuckiensis, n.
 - instead of P. de vol. 3, p. 569, wl labrosa, Hall, 185
 - 339, Low. Held.
 - laphami, Whitfiel Sur. Wis., p. 84 p. 296, Niagara
 - lapicida, see Raph laurentina, Billing Geo., vol. 4, p. 3
 - leavenworthana, se worthanum.
 - lenticularis, see Ra lineata, Hall, 1843,
 - Rep. 4th Dist. See P. itys. litorea, Hall, 1852
 - 12, Medina sanc lonensis, Walcott
 - Geo. Sur., vol. 8 lucina, Hall, 1862
 - Nat. Hist., p. 42 pt. 2, p. 67, Up.
 - lucina var. perfas Devonian Foss.,
 - vol. 5, pt. 2, p. 8 lydia, Billings, 18 62, Gaspe limes

PLE

PLE.]

preoccupied.

Portage Gr.

228, Quebec Gr.

p. 35, Niagara Gr.

176, Trenton Gr.

Coal Meas.

mung Gr.

76, Ham. Gr.

310, Carboniferous.

humilis, Hall, 1858, Trans. Alb. Inst., vol.

p. 82, Warsaw Gr. humilis, Winchell, 1862. This name was

huronensis, Winchell, 1862, Proc. Acad. Nat. Sci. Phil., vol. 6, 2d ser., p. 425,

hyale, Billings, 1865, Pal. Foss., vol. 1, p.

idia, Hall, 1861, Rep. of Progr. Wis. Sur.,

ignobilis, Dawson, 1868, Acad. Geol., p.

illinoisensis, Worthen, 1884, Bull. No. 2,

immatura, Billings, 1859, Can. Nat. and

indenta, Hall, 1847, Pal. N. Y., vol. 1, p.

inexpectans, Hall & Whitfield, 1875, Ohio

Pal., vol. 2, p. 117, Clinton Gr. inornata, Meek, 1872, Pal. E. Neb. p. 232,

insolita, Hall, 1876, Illust. Devonian

iowensis, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 138, Keokuk Gr. isaacsi, Hall & Whitfield, 1873, 23d Rep.

itys, Hall, 1876, Illust. Devonian Foss.,

itys var. tenuispira, Hall, 1879, Pal. N. Y.,

kentuckiensis, n. s. Coal Meas. Proposed

laphami, Whitfield, 1878, Ann. Rep. Geo.

laurentina, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 354, Calcif. Gr.

leavenworthana, see Cyclonema leaven-

lenticularis, see Raphistoma lenticulare.

lineata, Hall, 1843, (Turbo lineatus,) Geo. Rep. 4th Dist. N. Y. Preoccupied.

litorea, Hall, 1852, Pal. N. Y., vol. 2, p.

lonensis, Walcott, 1885, Monogr. U. S.

Geo. Sur., vol. 8, p. 80, Trenton Gr. lucina, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 42, and Pal. N. Y., vol. 5,

pt. 2, p. 67, Up. Held. and Ham. Grs.

lucina var. perfasciata, Hall, 1876, Illust. Devonian Foss., pl. 20, and Pal. N. Y.,

lydia, Billings, 1874, Pal. Foss., vol. 2, p. 62, Gaspe limestone, No. 8, Devonian.

vol. 5, pt. 2, p. 83, Ham. Gr.

lapicida, see Raphistoma lapicidum.

Sur. Wis., p. 84, and Geo. Wis., vol 4,

instead of P. depressa in Geo. Sur. Ky., vol. 3, p. 569, which was preoccupied. labrosa, Hall, 1859, Pal. N. Y., vol. 3, p.

vol. 5, pt. 2, p. 87, Ham. Gr.

339, Low. Held. Gr.

p. 296, Niagara Gr.

12, Medina sandstone.

worthanum.

See P. itys.

kearneyi, see Palæotrochus kearneyi.

N. Y. Mus. Nat. Hist., p. 238, Che-

pl. 20, and Pal. N. Y., vol. 5, pt. 2, p.

Foss., pl. 20, and Pal. N. Y., vol 5, pt. 2, p. 81, Ham. Gr.

imitator, see Callonema imitator.

Geo., vol. 4, p. 454, Chazy Gr.

Ill. St. Mus. Nat. Hist., p. 4, and Geo. Sur. Ill., vol. 8, p. 135, Coal Meas.

4, p. 21, and Bull. Am. Mus. Nat. Hist.,

GASTEROPODA.

1884, Pal. Foss.,

furchisonia elest., vol. 4, p. 27, at. Hist., p. 84,

vonian Foss., pl.

. 5, pt. 2, p. 72,

Foss., vol. 1, p.

366, Rep. Low. n. Gr. 1872, 24th Rep. . 195, Ham. Gr. Foss., vol. 1, p.

- al. Foss., vol. 1,
- 62, 15th Rep. 5. 18, Ham. Gr. roc. Acad. Nat.
- ust. Devonian f. Y., vol. 5, pt.
- I. Foss., vol. 1,
- ull. No. 2, Ill. and Geo. Sur. leas.
- 'rans. St. Louis Coal Meas.
- Ircy, 1865, Bost. agara Gr. Vorthen, 1860, 459, and Geo. ow. Coal Meas.
- Pratten, 1854, series, vol. 3,
- . Nat. and Geo., Gr. Acad. Nat. Sci.,

rans. St. Louis Permian Gr.

. Foss., vol. 1,

arb. und Dyas L. Neb., p. 231,

- p. N. Y. Mus. Pal. N. Y., vol. Gr. Nat. and Geo.,
- Gr. 1869, Geo. of
- l. Soc. vol., 12,
- al. Foss., vol.
- ogr. Wis. Sur.,
- n, 1858, Proc. 262, and Pal. 8.

- marcouana, Geinitz, 1866, Carb. und Dyas in Neb., p. 10, and Pal. E. Neb., p. 233, Coal Meas.
 - meekana, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 22, and Bull. Am. Mus. Nat. Hist., p. 82, Warsaw Gr.
- meta, Meek & Worthen, 1865, Proc. Acad. Nat. Sci., p. 252, Keokuk Gr.
- micula, Hall, 1862, Geo. Rep. Wis., p. 55, Hud. Riv. Gr.
- misera, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 354, Calcif. Gr.
- mississippiensis, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 302, Kinderhook Gr.
- missisquoi, Billings, 1865, Pal. Foss., vol. 1, p. 191, Quebec Gr.
- missouriensis, Swallow, 1860, (Trochus missouriensis,) Trans. St. Louis Acad. Sci., vol. 1, p. 657, Coal Meas.
- mitigata, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 108, Kinderhook Gr.
- modesta, Keyes, 1888, Proc. Acad. Nat. Sci. Phil., pl. xii, figs. 2a, 2b, Coal Meas.
- mohawkensis, n. sp. Birdseye limestone. Proposed instead of P. nodulosa, in Pal. N. Y., vol. 1, p. 44, which was preoccupied.
- montezuma, Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 324, Burlington Gr.
- muralis, Owen, 1852, Geo. Sur. Wis., Iowa, and Minn., p. 581, Trenton Gr.
- nasoni, Hall, 1861, Geo. Rep. Wis., p. 34, and Geo. Wis., vol. 4, p. 215, Trenton Gr. nauvooensis, Worthen, 1884, Bull. No. 2,
- Ill. St. Mus. Nat. Hist., p. 5, and Geo. Sur. Ill., vol. 8, p. 137, Keokuk Gr.
- nevadensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 259, Subcarboniferous.
- newportensis, White, 4880, 12th Rep. U. S. Geo. Sur. Terr., p. 469, Coal Meas.
- niota, Hall, 1861, Geo. Rep. Wis., p. 33, Trenton Gr.
- nitela, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, V p. 85, Up. Held. Gr.
- nodomarginata, McChesney, 1860, Desc. New. Pal. Foss., p. 70, and Trans. Chi. Acad. Sci., p. 47, Ham. Gr.
- nodulosa, Hall, 1847, Pal. N. Y., vol. 1, p. 44. The name was preoccupied by Sandberger in 1842, and by King in 1844 See P. mohawkensis.
- nodulostriata, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 21, and Bull. Am. Mus. Nat. Hist., p. 80, Warsaw Gr. normani, Billings, 1865, Pal. Foss., vol. 1,
- p. 228, Quebec Gr.
- nucleolata, Hall, 1847, Pal. N. Y., vol. 1, p. 42, Birdseye Gr.
- numeria, Billings, 1865, Pal. Foss., vol. 1, p. 229, Quebec Gr.
- obsoleta, Hall, 1847, Pal. N. Y., vol. 1, p. 44, Birdseye Gr.
- obtusispira, Shumard, 1859, Trans. St. Louis Acad. Sci., vol. 1, p. 401, Coal Meas.
- occidens, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., pp. 342, 364, Niagara Gr.

parvispira, Winchell, 1862, Rep. Low. Peninsula Mich., p. 96, Ham. Gr. pauper, Billings, 1859, Can. Nat. and Geol., vol. 4, p. 457, Chazy Gr.

422

- pauper, syn. for Trochonema halii. percarinata, see Cyclonema percarinatum.
- perhumerosa, Meek, 1872, Pal. E. Neb., p. 232, Coal Meas.
- perizomata, White, 1882, Rep. Invert. Foss. New Mex., p. xxxi, Coal Meas. perlata, Hall, 1852, Pal. N. Y., vol. 2, p.
- 349, Guelph Gr.
- perornata, Shumard, 1859, Trans. St. Louis Acad. Sci., vol. 1, p. 401, Coal Meas. pervetusta, Conrad, 1838, (Cyclostoma pervetusta,) Ann. Rep. N. Y., p. 65,
 - Medina sandstone.
- piasensis, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 22, and Bull. Am. Mus. Nat. Hist., p. 83, Warsaw Gr.
- planidorsalis, Hall, 1876, Illust. Devonian Foss., pl. 20, and Pal. N. Y., vol. 5, pt. 2, p. 82, Ham. Gr.
- plena, Hall, 1876, Illust. Devonian Foss., pl. 17, and Pal. N. Y., vol. 5, pt. 2, p. 66, Ham. Gr.
- postumia, Billings, 1862, Pal. Foss., vol. 1, p. 91, Quebec Gr.
- poulsoni, Conrad, 1842, Jour. Acad. Nat.
- Sci., vol. 8, p. 270, Onondaga Gr. pratteni, Meek & Worthen, 1860, Proc.
- Acad. Nat. Sci., p. 459, and Geo. Sur. Ill., vol. 2, p. 357, Low. Coal Meas. princessa, Billings, 1874, Pal. Foss. vol. 2, p. 59, Up. Held. Gr.
- progne, Billings, 1860, Can. Nat. and Geol., vol. 5, p. 163, Black Riv. and Trenton Grs.
- proutana, Shumard, 1859, Trans. St. Louis Acad. Sci., vol. 1, p. 401, Coal Meas. quadricarinata, Hall, 1847, Pal. N. Y., vol.
- 1, p. 43, Birdseye Gr.
- quadrilix, Hall, 1879, Pal. N. Y., yol. 5, pt. 2, p. 86, Up. Held. Gr.

quebecensis, Billings, 1865, Pal. Foss., vol. 1, p. 190, Quebec Gr.

1, p. 190, Quebec Gr. quinquesulcata, Winchell, 1865, Proc. Acad. Nat. Sci., p. 131, Marshall Gr. racinensis, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 84, and Geo. Wis., vol. 4, p. 296, Niagara Gr. ramsayi, Billings, 1859, Can. Nat. and Geol., vol. 4, p. 351, Calciferous Gr.



FIG. 701.-Pleurotomaria ramsayi.

regulata, Hall, 1860, 13th Rep., p. 108, Ham. Gr.

riddelli, Shumard, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 625, Coal Meas.

- rota, Winchell, 1863, Proc. Acad. Nat. Sci., p. 19, Marshall Gr.
- rotalia, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 46, and Pal. N. Y., vol. 5, pt. 2, p. 71, Ham. Gr.
- rotuloides, see Raphistoma rotuloides. rotunda, Hall, 1843, (Euomphalus (" ro-
- tundus,) Geo. Rep. 4th Dist. N. Y 172, and Illust. Devon. Foss., pl. 18. Corniferous Gr.
- rotundata, Hall, see P. subglobosa.
- rotundispira, Billings, 1865, Pal. Foss., vol. 1, p. 191, Quebec Gr. rugulate, Hall, 1860, 13th Rep. N. Y. Mus.
- Yuguata, Hall, 1800, 13th Rep. N. Y. Mus. Nat. Hist., p. 108, and Pal. N. Y., vol. 5, pt. 2, p. 75, Ham. Gr. scitula, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 461, and Geo. Sur. Ill., vol. 2, p. 353, Low. Coal Meas. selecta, Billings, 1865, Pal. Foss., vol. 1, 2010,
- p. 224, Quebec Gr.
- semele, Hall, 1861, Geo. Rep. Wis., p. 36, Hud. Riv. Gr.
- shumardi, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil, p. 462, and Geo. Sur. Ill., vol. 2, p. 260, Keokuk Gr. sigaretoides, Winchell & Marcy, 1865, Bost. Soc. Nat. Hist., vol. 1, p. 98, Ni-
- agara Gr.
- sinistrorsa, Swallow, 1858, Trans St. Louis
- Acad. Sci., vol. 1, p. 203, Coal. Meas. solarioides, Hall, 1852, Pal. N. Y., vol. 2, p. 348, Guelph Gr.
- peciosa, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 459, and Geo. Sur. Ill., vol. 2, p. 352, Low. Coal Meas.
- sphærulata, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 272, Coal Meas. spironema, Meek & Worthen, 1866, Proc.
- Acad. Nat. Sci. Phil., p. 272, and Geo. Sur. Ill., vol. 5, p. 601, Coal Meas. sponsa, Billings, 1865, Pal. Foss., vol. 1,
- p. 226, Quebec Gr. stella, Winchell, 1862, Proc. Acad. Nat.
- Sci., p. 424, Marshall Gr.
- subangulata, see Cyclonema subangulatum. subconica, Hall, 1847, Pal. N. Y., vol. 1, p. 174, Black Riv., Trenton, and Hud.
- Riv. Grs.
- subconstricta, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 458, and Geo. Sur. Ill., vol. 2, p. 351, Low. Coal Meas.
- subdecussata, Geinitz, 1866, Carb. und Dyas in Neb., p. 10, and Pal. E. Neb., p. 233, Coal Meas.
- subdepressa, Hall, 1852, Pal. N. Y., vol. 2, p. 333, Coralline limestone.
- subglobosa, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 245, Warsaw Gr. Proposed instead of P. rotundata, Hall, 1858. which was preoccupied. subscalaris, Meek & Worthen, 1860, Proc.
- Acad. Nat. Sci. Phil., p. 460, and Geo. Sur. Ill., vol. 2, p. 360, Low. Coal Mess. subsinuata, Meek & Worthen, 1860, Proc.
- Acad. Nat. Sci. Phil., p. 460, and Geo. Sur. Ill., vol. 2, p. 358, Low. Coal. Meas.

POL.]

PLE.

subtilstriata, see atum.

subturbinata, Me Acad. Nat. Sci

- Up. Mo., p. 47 sulcomarginata, (
- Nat. Sci., vol. 8 vol. 5, pt. 2, p. supracingulata,
 - Progr., Geo. S ton Gr.
- swallovana, Hall, vol. 4, p. 24, ar
- Hist., p. 80, Wa sybillina, Billings
- Antic., p. 54, Antabulata, Conrad, Trans. Geo. Soc
- Coal Meas. taggarti, Meek. 1
- U. S. Geo. Sur. to Pal., No. 6, p tectoria, Winchel
- Sci., p. 19, Mars tenuicincta, Meek
- Acad. Nat. Sci. Ill., vol. 2, p. 35
- tenuimarginata, H concavus. tenuistriata, Shu
- Louis Acad. Se Meas.
- textiligera, Meek, Sci., p. 176, and Waverly Gr.
- thalia, see Cyclone trilineata, Hall,
- vol. 4, p. 25, an Hist., p. 80, Wa trilix, Hall, 1862,

Nat. Hist., p. 48 pt. 2, p. 79, Hai

- trochiformis, Swal was preoccupie See P. Cooperen tropidophora, Mee
 - and Arts, 3d se Ohio Pal., vo Riv. Gr.



FIG. 702. - Pleurotomaria turbiniform is.

Acad. Sci., vol. & vadosa, Hall, 18 Mus. Nat. Hi hook Gr. vagrans, Billings, p. 90, Quebec Gi valeria, Billings, 1

169, and vol. 3,

c. Acad. Nat.

p. N. Y. Mus. . N. Y., vol. 5,

rotuloides. phalus (?) ro-Dist. N. Y., p. Foss., pl. 18,

lobosa. Pal. Foss., vol.

ep. N. Y. Mus. al. N. Y., vol.

1860, Proc. ۱. 461, and Geo. w. Coal Meas. Foss., vol. 1.

p. Wis., p. 36,

n, 1860, Proc. 462, and Geo. eokuk Gr. Marcy, 1865, l. 1, p. 98, Ni-

Trans St. Louis 3, Coal. Meas. N.S.Y., vol. 2,

n, 1860, Proc. 459, and Geo. ow. Coal Meas. Jour. Acad. Coal Meas. en, 1866, Proc. 272, and Geo. Coal Meas. Foss., vol. 1,

)c. Acad. Nat.

subangulatum. N. Y., vol. 1, ton, and Hud.

Vorthen, 1860, nil., p. 458, and 351, Low. Coal

36, Carb. und Pal. E. Neb.,

l. N. Y., vol. 2, ne.

Ed. Am. Pal. Gr. Proposed a, Hall, 1858,

en, 1860, Proc. 460, and Geo. ow. Coal Meas. en, 1860, Proc. 460, and Geo. 8, Low. Coal.

- subtilstriata, see Raphistoma subtilstriatum
- subturbinata, Meek & Hayden, 1858, Proc. Acad. Nat. Sci. Phil., p. 264, and Pal. Up. Mo., p. 47, Coal Meas.
- sulcomarginata, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 272, and Pal. N. Y., vol. 5, pt. 2, p. 69, Ham. Gr. supracingulata, Billings, 1857, Rep. of Progr., Geo. Sur. Can., p. 302, Tren-
- ton Gr.
- swallovana, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 24, and Bull. Am. Mus. Nat. Hist., p. 80, Warsaw Gr.
- sybillina, Billings, 1866, Catal. Sil. Foss. Antic., p. 54, Anticosti Gr.
- tabulata, Conrad, 1835, (Turbo tabulata,) Trans. Geo. Soc. Penn., vol. 1, p. 267, Coal Meas.
- taggarti, Meek, 1874, 7th Rep. Hayden's U. S. Geo. Sur. Terr., p. 271, and Cont. to Pal., No. 6, p. 140, Coal Meas. tectoria, Winchell, 1863, Proc. Acad. Nat.
- Sci., p. 19, Marshall Gr.
- tenuicincta, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 459, and Geo. Sur. Ill., vol. 2, p. 355, Up. Coal Meas. tenuimarginata, Hall, syn. for Eotrochus
- concavus.
- tenuistriata, Shumard, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 625, Coal Meas.
- textiligera, Meek, 1871, Proc. Acad. Nat. Sci., p. 176, and Ohio Pal., vol. 2, p. 314, Waverly Gr.

thalia, see Cyclonema thalia.

- trilineata, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 25, and Bull. Am. Mus. Nat. Hist., p. 80, Warsaw Gr. trilix, Hall, 1862, 15th Rep. N. Y. Mus.
- Nat. Hist., p. 45, and Pal. N. Y., vol. 5,
- pt. 2, p. 79, Ham. Gr. trochiformis, Swallow, 1863. The name was preoccupied by Portlock in 1843. See P. Cooperensis.

tropidophora, Meek, 1872, Am. Jour. Sci. and Arts, 3d series, vol. 4, p. 278, and Ohio Pal., vol. 1, p. 154, Hud. Riv. Gr.

turbiniformis, Meek & Worthen, 1860, Proc. Acad. Nat. Sci., p. 461, and Geo. Sur. Ill., vol. 2, p. 359, Up. Coal Meas. turgida, see Holopea turgida.

umbilicata, see Trochonema umbilicatum. unisulcata, Conrad,

tormis. 1842, Jour. Phil. Acad. Sci., vol. 8, p. 271, Up. Held. Gr. vadosa, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 108, Kinder-book Gr. hook Gr.

FIG. 702. - Pleuroto-

formis

maria turbini-

vagrans, Billings, 1862, Pal. Foss., vol. 1, p. 90, Quebec Gr.

valeria, Billings, 1865, Pal. Foss., vol. 1, p. 169, and vol. 3, p. 23, Guelph Gr.

- valvatiformis, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 273, and Geo. Sur. Ill., vol. 5, p. 602, Coal Meas.
- viola, Billings, 1865, Pal. Foss., vol. 1, p. 169, Guelph Gr.
- virgo, Billings, 1865, Pal. Foss., vol. 1, p. 224, Quebec Gr.
- virguncula, Billings, 1865, Pal. Foss., vol. 1, p. 225, Quebec Gr. vitruvia, Billings, 1865, Pal. Foss., vol. 1,
- p. 171, Black Riv. Gr.
- voltumna, Billings, 1874, Pal. Foss., vol. 2, p. 61, Gaspe limestone No. 8, Devonian.
- whitii, Winchell, 1862, Proc. Acad. Nat. Sci., p. 423, Marshall Gr.
- wortheni, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 23, and Geo. Sur. Iowa, p. 664, Warsaw Gr.
- POLYPHEMOPSIS, Portlock, 1843, Geol. Londonderry, p. 415. [Ety. Polyphemus, a genus of shells; opsis, appearance.] Subfusiform; spire elongated; whorls flattened, last one produced below and forming half the length of the shell; outer lip thin, nearly straight; inner lip wanting; columella without folds, slightly twisted and truncated at the connection with the outer lip; aperture narrow, subovate, effuse or slightly notched at the base of the columella; surface smooth, or only with obscure lines of growth. Type P. elongata. chrysalis, Meek & Worthen, 1866, Proc.
- Acad. Nat. Sci. Phil., p. 267, and Geo. Sur. Ill., vol. 5, p. 596, Coal Meas.
- keokuk, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 144, Keokuk Gr.
- inornata, Meek & Worthen, 1860, (Loxonema inornatum,) Proc. Acad. Nat. Sci. Phil., p. 463, and Geo. Sur. Ill., vol. 2, p. 374, Up. Coal Meas.
- louisvillæ, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 193, Up. Held. Gr.
- melanoides, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 225, Kaskaskia Gr. nitidula, Meek &

Worthen, 1860, (Loxonema nitidula,) Proc. Acad. Nat. Sci. Phil., p. 465, and Geo. Sur. Ill., vol. 2, p. 374, Up. Coal Meas.

peracuta, Meek & Worthen, 1860, (Eulima (?) peracuta,) Proc. Acad. Nat. Sci. Phil., p.

466, and Geo. Sur. Fig. 703.—Polyphemop Ill., vol. 2, p. 375, sis nitidula. Up. Coal Meas.

teretiformis, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 245, Warsaw Gr. Proposedinstead of P. elongata, Hall, 1858, which was preoccupied.



PLE.

POL.]

GASTEROPODA.

France, vol. 2, p. 39. [Ety. proper Discoid, depressed; whorls name.] very slightly embracing, exposed in a very wide umbilicus, slightly deeper on one side than the other, from a trifling obliquity of the first one or two turns; a narrow band extends along the middle of the exterior, ending in a narrow slit in the lip; surface often nodular and ornamented with rough striæ. Type P. puzosi.



crassinoda, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 303, Kinder-hook Gr. hertzeri, Hall, 1876, Illust. Devonian Foss.,

pl. 16, and Pal. N. Y.

vol. 5, pt. 2, p. 126,

FIG. 704.-Porcellia puzosi.

- Up. Held Gr. √ nais, Hall, 1862, (Gyroceras nais,) 15th Rep. N. Y. Mus. Nat. Hist., p. 68, and Pal. N. Y., vol. 5, pt. 2, p. 127, Chemung Gr.
 - nodosa, Hall, 1860, Supp. to vol. 1, pt. 2, Iowa Geo. Sur., p. 92, Kinderhook Gr.
 - obliquinodus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 21, Marshall Gr. peoriensis, Worthen, 1884, Bull. No. 2,
 - Ill. St. Mus. Nat. Hist., p. 6, and Geo. Sur. Ill., vol. 8, p. 138, Coal Meas.
 - rectinoda, Winchell, 1863, Proc. Acad.
 - Nat. Sci., p. 18, Marshall Gr. rotatoria, Hall, see Goniatites plebeiformis.
- scioto, Hall & Whitfield, 1873, 23d Rep. N. Y. Mus. Nat. Hist., p. 240, Up. Held. Gr.

senex, see Platyceras senex.

PSEUDOPHORUS, Meek, 1873, Ohio Pal., vol. 1, p. 221. [Ety. pseudes, false; Phorus, a genus. Shell depressed, subtrochiform; umbilicus broad, shallow, eccentric; volutions two or three; suture obscure; aperture transversely rhombic, three times as wide as high, acutely angular at the outer and inner extremities; upper side of lip oblique and extended forward; surface bearing lines of growth directed obliquely backward. Type P. antiquus.



FIG. 705.—Pseudophorus antiquus.

antiquus, Meek, 1871, (Trochita antiqua,) Proc. Acad. Nat. Sci. Phil., p. 82, and Ohio Pal., vol. 1, p. 221, Up. Held. Gr.

PORCELLIA, Leveille, 1835, Mem. Soc. Geol. PUPA, Humphrey, 1797, Museum Calonni-France, vol. 2, p. 39. [Ety. proper | anum, and Lamarck Syst. Anim. sans Vert., p. 88. [Ety. Pupa, chrysalis shell.]

POR. - RAP.

Shell rimate or perforate, cylindrical or oblong; aperture rounded, often toothed, margins distant, mostly united by a callous lamina. Type P.

- uva. bigsbyi, Dawson, 1880, Am. Jour. Sci. and Arts, 3d ser., vol. 20, p. 410, Coal Meas.
- FIG. 706 vermilionensis, Bradley, 1872, Pupa uva. Am. Jour. Sci., 3d series, vol. 4, p. 87,
- Coal Meas.
- vetusta, Dawson, 1860, Quar. Jour. Geo. Soc., vol. 16, p. 268, and Acad. Geol., p. 383, Coal Meas.
- vetusta var. tenuistriata, Dawson, 1880. Am. Jour. Sci. and Arts, 3d ser., vol. 20, p. 406, Coal Meas.
- RAPHISTOMA, Hall, 1847, Pal. N. Y., vol. 1, p. 28. [Ety. raphe, seam or suture; stoma, mouth.] Depressed, often discoid ; spire flat or nearly so; sutures close; whorls acute-angular externally and often with an angular edge to the moderate umbilicus. Type R. striatum. acutum, Hall & Whitfield, 1877, U. S.
 - Geo. Expl. 40th parallel, vol. 4, p. 235, Chazy Gr.
 - affinis, Foerste, 1885, Bull. Sci. Lab. Denison Univ., p. 95. Not properly defined. angulatum, Emmons, 1856, (Straparollus
 - angulatus,) Am. Geol. p 157, Calciferous Gr.
 - apertum, Salter, 1859, Can. Org. Rem., Decade 1, p. 12, Black Riv. and Trenton Gr.
 - compressum, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 309, Birdseye Gr.

halli, S. A. Miller, 1874, Pleurotomaria halli, Cin. Quar. Jour. Sci., vol. 1, p. 318, Hud. Riv. Gr.

FIG. 707. -707. — Raphis-toma halli.

labiatum, Emmons, 1842, (Maclurea labiata,) Geo. Rep. N. Y., p. 312, Calcifer-

ous and Birdseye Gr. lapicida, Salter, 1859, Can. Org. Rem., Decade 1, p. 12, Black Riv. and Trenton Gr.

lenticulare, Emmons,

1842, (Pleurotomaria lenticularis,) Geo.



- and Hud. Riv. Gr. toma lenticulare. niagarense, Whitfield,
- 1878, Ann. Rep. Geo. Sur. Wis., p. 82, and Geo. Wis., vol. 4, p. 295, Niagara Gr.
- planistria, Hall, 1847, Pal. N. Y., vol. 1, p. 30, Chazy Gr.
- planistria var. parvum, Hall, 1847, Pal. N. Y., vol. 1, p. 30, Chazy Gr.

ROT.-SOL.]

prævium, Whit Mus. Nat. His ous Gr.

rotuliforme, Mee Sci., p. 61, an Parallel, vol. 4 rotuloides, Hall, uloides,) Pal. I

ton Gr. stamineum, Hal 1, p. 29, Chazy striatum, Emmo ata,) Geo. Rep N. Y., vol. 1, p



FIG. 709.-Ra

subplanum, Shu Louis Acad. Sc ous Gr. subtilstriatum, H subtilstriata,) Trenton Gr. trochiscum, Me trochiscus,) Pr and Geo. Sur. 77, Calciferous

ROTELLA, Lamarck,



FIG. 710. -Rotella vestiaria. merous, subequ

verruculifera, Foss., New Meas.

SCEVOGYRA, Whit Geo. Sur. Wis

vol. 4, p. 19 the left; gurus elevated, volu open, broad, : tire, uniting w inner side an Type S. swezey

elevata, Whitfiel Sur. Wis., p. 6 p. 199, Low. M obliqua. Whitfie

Sur. Wis., p. 63 199, Low. Mag

swezeyi, Whitfie Sur. Wis., p. 6

p. 198, Low. M SCALITES, Emmons p. 312. [Ety. binate, whorls

POR. - RAP.

eum Calonnit. Anim. sans rysalis shell.]



Am. ser.,

FIG. 706 872. Pupa uva. vol. 4, p. 87,

r. Jour. Geo. cad. Geol., p.

Jawson, 1880, 3d ser., vol.

. Y., vol. 1, p. suture ; stoma, discoid ; spire close ; whorls nd often with derate umbili-

1877, U. S. vol. 4, p. 235,

ci. Lab. Deniperly defined. (Straparollus 157, Calcifer-

Org. Rem., iv. and Tren-

36, Bull. Am. p. 309, Birds-

Miller, 1874, omaria halli,) ar. Jour. Sci., p. 318, Hud.

Emmons. faclurea labi-312, Calcifer-

Org. Rem., iv. and Tren-



708.-Raphis na lenticulare.

r. Wis., p. 82, , p. 295, Ni-

N. Y., vol. 1,

all, 1847, Pal. y Gr.

GASTEROPODA.

prævium, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 52, Calciferous Gr.

rotuliforme, Meek, 1870, Proc. Acad. Nat. Sci., p. 61, and U. S. Geo. Sur. 40th Parallel, vol. 4, p. 18, Calciferous Gr. rotuloides, Hall, 1847, (Pleurotomaria rotuloides,) Pal. N. Y., vol. 1, p. 173, Tren-

ton Gr. stamineum, Hall, 1847, Pal. N. Y., vol. 1, p. 29, Chazy Gr.

striatum, Emmons, 1842, (Maclurea stri-ata,) Geo. Rep. N. Y., p. 312, and Pal. N. Y., vol. 1, p. 28, Chazy Gr.



FIG. 709.-Raphistoma striatum.

subplanum, Shumard, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 106, Calciferous Gr.

subtilstriatum, Hall, 1847, (Pleurotomaria subtilstriata,) Pal. N. Y., vol. 1, p. 172, Trenton Gr.

trochiscum, Meek, 1870, (Euomphalus trochiscus,) Proc. Acad. Nat. Sci., p. 61, and Geo. Sur. W. 100th Mer., vol. 4, p. 77. Calciferous or Trenton Gr. ROTELLA, Lamarck, 1822, Hist. Nat. Anim. sans

ROT.-SOL.]

wheel.] Lenticular, polished; spire depressed; base callous, lingual FIG. 710. -Rotella vestiaria. teeth 13; uncini, nu-merous, subequal. Type R. vestiaria.

Vert., vol. 7, p. 6. [Ety.

diminutive of rota, a

verruculifera, White, 1882, Rep. Invert. Foss., New Mexico, p. xxxi, Coal Meas.

- SCEVOGYRA, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 61, and Geo. Wis., vol. 4, p. 198. [Ety. scavus, toward the left; gurus, circle.] Sinistral, spire elevated, volutions rounded ; umbilicus open, broad, no callus; peristome entire, uniting with the volution on the inner side and spreading externally. Type S. swezeyi.
- elevata, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 62, and Geo. Wis., vol. 4, p. 199, Low. Mag. Gr.
- obliqua. Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 63, and Geo. Wis., vol. 4, p. 199, Low. Mag. Gr.
- swezeyi, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 62, and Geo. Wis., vol. 4, p. 198, Low. Mag. Gr.
- SCALITES, Emmons, 1842, Geo. Rep. N. Y., p. 312. [Ety. scala, staircase.] Turbinate, whorls flat above, turrited, pro-

duced below; no umbilicus; form elongate. Type S. angulatus. angulatus, Emmons,

1842, Geo. Rep. N. Y., p. 312, and Pal. N. Y., vol. 1, rai, N. T., Vol. I, p. 27. Chazy Gr. Scollostofia, Braun, 1838, Neues Jahr. Min. Geo. Geol. Pe-tref., p. 298. [Ety. skolios, curved stoma, mouth.] Small, upper part

pupiform; aperture extended, curved outward. Type S. FIG. 711.--Scalites angulatus. dannenbergi.

- americana, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 195, Low. Devonian.
- Solarium, Lamarck, 1801, Syst. An. sans Vert. Not Palæozoic.

leai, one of Troost's catalogue names

- SolENISCUS, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 467. [Ety. Acad. Nat. Sci. Phil., p. 467. [Ety. soleniskos, little channel or gutter.] Fusiform, pointed; whorls nearly flat, last one contracted and produced below into a straight canal; surface smooth or obscurely marked by lines of growth; aperture narrow; outer lip thin, entire; inner lip thickened and bearing a more or less distinct revolving fold; columella straight, imperforate. Type S. typicus.
 - brevis, White, 1882, Rep. Invert. Foss., New Mex., p. xxvii, Coal Meas. fusiformis, Hall, 1858, (Macrocheilus fusi
- forme,) Geol. of Iowa, p. 718, Coal Meas.
- hallanus, Geinitz, 1866, (Macrocheilus hallanum,) Carb. und Dyas in Neb. p. 6, Coal Meas.

helicoides, Sowerby, (Ampullaria 1829. helicoides,) Min. Conch., vol. 6, p. 40, Coal Meas.

klipparti, Meek, 1872, (Macrocheilus klipparti,) Proc. Acad. Nat. Sci., vol. 24, p. 328, and Ohio Pal., vol. 2, p. 346, Low. Coal Meas.

newberryi, Stevens, 1858, (Loxonema newberryi,) Am. Jour. Sci. and Arts, 2d ser., vol. 25, p. 259, and Geo. Sur. Ill., vol. 5, p. 594, Coal. Meas.

paludiniformis, Hall, FIG. 712.-Soleniscus 1858, (Macrocheilus paludiniformis,) Geo.

of Iowa, p. 719, Coal Meas. planus, White, syn. for S. newberryi.

klipparti.



texanus, Shumard, 1859, (Macrocheilus texanum,) Trans. St. Louis Acad. Sci., vol. 1, p. 402, Coal Meas. typicus, Meek & Wor-then, 1860, Proc. Acad.



FIG. 713.-Soleniscus typicus.

Meas. ventricosus, Hall, 1858, (Macrocheilus ventricosum,) Geo. Sur. Iowa, p. 718, Coal Meas.

Nat. Sci. Phil., p. 467,

and Geo. Sur. Ill., vol.

2, p. 384, Up. Coal

GASTEROPODA.

- STRAPAROLLINA, Billings, 1865, Pal. Foss., vol., p. 223. [Ety. from the resemblance to shells of the genus Straparol*lus.*] thell turbinate, with round or ob-scurely angulated whorls; aperture nearly circular, sometimes with a notch in the inner lower angle of the lip. Type S. pelagica. asperostriata, Billings, 1860, (Straparollus
 - asperostriatus,) Can. Nat. and Geol.,
- vol. 5, p. 162, Black Riv. Gr. circe, Billings, 1860, (Straparollus circe,) Can. Nat. and Geol., vol. 5, p. 161, Black Riv. Gr.
- eurydice, Billings, 1860.

(Straparollus eurydice,) Can. Nat. and. Geol., vol. 5, p. 162, Black

Riv. Gr. pelagica, Billings, 1865, Pal. Foss., vol. 1. p. 223,



Quebec Gr.

- remota, Billings, 1874, Pal. Fig. 714.-Strap-Foss., vol. 2, p. 70, Up. arollina pelagica. Taconic.
- STRAPAROLLUS, Montfort, 1810, Conch. Syst. vol. 2, p. 174. [Ety. strabos, turned about.] Discoid, depressed conic, smooth
 - or transversely striated; whorls rounded; umbilicus wide, exposing the whorls; mouth indented by the penultimate whorl; peritreme simple, thin, most so on the left side. Type S. dionysii.
 - ammon, White and Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 307, Marshall Gr.
 - angulatus, see Raphistoma angulatum. asperostriatus, see Straparollina aspero-
- striata barrisi, Winchell, 1863, Proc. Acad. Nat.
- Sci. Phil., p. 20, Marshall Gr. canadensis, Billings, 1861, Can. Jour., vol. 6, p. 359, Up. Held, Gr.

circe, see Straparollina circe.

- clymenioides, Hall, 1862, (Euomphalus clymenioides,) 15th Rep. N. Y. Mus. Nat. Hist., p. 54, and Pal. N. Y., vol. 5, pt. 2, p. 62, Up. Held. Gr. cornudanus, Shumard, 1859, Trans. St,
- Louis Acad. Sci., vol. 1, p. 400, Coal Meas. crenulatus, Whiteaves, 1884, Pal. Foss., vol. 3, p. 21, Guelph Gr.
- cyclostomus, Hall, 1858, (Euomphalus cyclostomus,) Geo. Sur. Iowa, p. 516, Ham. Gr.

- daphne, Billings, 1862, Pal. Foss., vol. 1. p. 160, Guelph Gr.
- eurydice, see Straparollina eurydice.
- hecale, Hall, 1876, (Euomphalus hecale,) Illust. Devon. Foss., pl. 16, Chemung Gr.
- hecale var. corpulens, Hall, 1876, (Euomphalus hecale var. corpulens,) Illust. Dev. Foss., pl. 27, Chemung Gr.
- hippolyta, Billings, 1862, Pal. Foss., vol. 1, p. 160, Guelph Gr.
- inops, Hall, 1876, (Euomphalus inops,) Illust. Devonian Foss., pl. 16, Up Held. Gr.
- labiatus, see Raphistoma labiatum.
- lens, Hall, 1860, (Euomphalus lens) 13th Rep.

N. Y. Mus. Nat. Hist., FIG.715.-Straparolp. 109, Kinderhook lus hippolyta Gr.

- macromphalus, Winchell, 1863, Proc. Acad. Nat. Sci. Phil., p. 20, Marshall Gr.
- magnificus, Shumard, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 110, Carbon-Trans. St. iferous. Too poorly defined for recognition.
- minnesotensis, see Euomphalus minnesotensis.
- mopsus, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 390, Niagara Gr. newarkensis, Walcott, 1885, Monogr. U.S.
- Geo. Sur., vol. 8, p. 187, Devonian. niagarensis, Hall & Whittield, 1875, Ohio Pal., vol. 2, p. 144, Niagara Gr. ophirensis, Hall & Whittield, 1877, (Euom
 - phalus ophirensis,) U. S. Geo. 40th Parallel, vol. 4, p. 261, Waverly Gr.
- pernodosus, see Euomphalus pernodosus. planispira, Hall, 1858, (Euomphalus plan-
- ispira,) Trans. Alb. Inst., vol. 4, p. 20, and Bull. Am. Mus. Nat. Hist., p. 70, Warsaw Gr.
- primordialis, see Ophileta primordialis.
- quadrivolvis, Hall, 1858, (Euomphalus quadrivolvis,) Trans. Alb. Inst., vol. 4, p. 19, and Bull. Am. Mus. Nat. Hist., p. 71, Warsaw Gr.
- rudis, Hall, 1876, (Euomphalus rudis.) Illust. Dev. Foss., pl. 16, and Pal. N. Y., vol. 5, pt. 2, p. 58, Ham. Gr.
- sanctisabæ, Roemer, 1852, (Euomphalus sanctisabæ,) Kreid. von Texas, p. 91, Silurian.
- similis, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 145, and Geo. Sur. Ill., vol. 2, p. 285, St. Louis Gr.
- similis var. planus, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 146, and Geo. Sur. Ill., vol. 2, p. 286, St. Louis Gr.
- sinuatus, Hall, 1859, (Euomphalus sin-uatus,) Pal. N. Y., vol. 3, p. 340, Low. Held. Gr.
- spergenensis, Hall, 1858, (Euomphalus spergenensis,) Trans. Alb. Inst., vol. 4, p. 19, and Bull. Am. Mus. Nat. Hist., p. 69, Warsaw Gr.
- spergenensis var. planorbiformis, Hall, 1858, (Euomphalus spergenensis var.

STR.-SUB.]

planorbiformis 4, p. 20, and B p. 70, Warsaw spirorbis, Hall, 1

bis,) 13th Rep p. 109, Kinder

subplanus, Hall planus,) Stans

p. 414, Coal M subauadratus, se

ratus.

subrugosus, see E subumbilicatus,

Geo. Sur. Ill. kia Gr.

umbilicatus, Me omphalus un Nat. Sci. Phil.,

vol. 2, p. 362, utahensis, Hall

Geo. Expl., 40

- Waverly Gr.
- valvatiformis, S Louis Acad. S ous Gr.

varsoviensis, W Sur. Ill., vol. 8 whitneyi, see Om

STREPTAXIS, Gray, 484, [Ety. stre Shell ovate or

hemispherical rapidly enlarg penultimate v right and dors umbilicules b often nearly c

the edge slig flexed, and oft the outer side

lip. Type S. ozoic genus. whitfleldi, Meek, Sci. Phil., p. 17 5, p. 596, Coal

STROPHITES, Daws and Arts, 3d s from the ge sembling the apex obtuse; surface cover

- ridges, separat Тур as wide. grandævus, Daw
- and Arts, 3d vonian.

STROPHOSTYLUS, H 3, p. 303. [Et: stylos, column globose; spire tricose body v reflected; colu grooved withi bilicus; aper ovate or trans S. elegans.

andrewsi, Hall, p. 472, Oriska



STR.

l. Foss., vol. 1,

eurydice. phalus hecale,) pl. 16, Che.

, 1876, (Euomoulens,) Illust. ung Gr. Pal. Foss., vol.

ph**alus** inops,) pl. 16, Up.



1.715.—Straparollus hippolyta

1863, Proc. 0, Marshall Gr. 3, Trans. St. p. 110, Carbonined for recog-

alus minneso-

ep. N. Y. Mus. a Gr. , Monogr. U. S.

Devonian. eld, 1875, Ohio ra Gr.

1, 1877, (Euom-S. Geo. 40th
averly Gr.
pernodosus.
mphalus plan-., vol. 4, p. 20,
it. Hist., p. 70,

rimordialis. (Euomphalus). Inst., vol. 4, us. Nat. Hist.,

phalus rudis,) and Pal. N. Y., Gr. (Euomphalus

Texas, p. 91,

1861, Proc.
145, and Geo.
Louis Gr.
Worthen, 1861,
il., p. 146, and
β. St. Louis Gr.
pmphalus sinp. 340, Low.

(Euomphalus). Inst., vol. 4,). Nat. Hist., p.

iformis, Hall, rgenensis var. GASTEROPODA.

- planorbiformis,) Trans. Alb. Inst., vol. 4, p. 20, and Bull. Am. Mus. Nat. Hist., p. 70, Warsaw Gr.
- spirorbis, Hall, 1859, (Euomphalus spirorbis,) 13th Rep. N. Y. Mus. Nat. Hist., p. 109, Kinderhook Gr.
- subplanus, Hall, 1852, (Euomphalus subplanus,) Stans. Ex. to Gt. Salt Lake, p. 414, Coal Meas.
- subquadratus, see Euomphalus subquadratus.
- subrugosus, see Euomphalus subrugosus.
- subumbilicatus, Worthen, (in press) Geo. Sur. 111., vol. 8, p. 142, Kaskaskia Gr.
- umbilicatus, Meek & Worthen, 1860, (Euomphalus umbilicatus,) Proc. Acad. Nat. Sci. Phil., p. 462, and Geo. Sur. Ill., vol. 2, p. 362, Coal Meas.
- utahensis, Hall & Whitfield, 1877, U. S. Geo. Expl., 40th parallel, vol. 4, p. 259, Waverly Gr.
- valvatiformis, Shumard, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 105, Calciferous Gr.
- varsoviensis, Worthen (in press) Geo. Sur. Ill., vol. 8, p. 142, Keokuk Gr. whitneyi, see Omphalotrochus whitneyi.
- STREPTAXIS, Gray, 1837, Mag. Nat. Hist., p. 484, [Ety. streptos, twisted; axis, axis.] Shell ovate or oblong; when young, subhemispherical, deeply umbilicated, with rapidly enlarging whorls; at length the penultimate whorl is bent toward the right and dorsal side of the axis and the umbilicules become compressed and often nearly closed; the mouth lunate; the edge slightly thickened and reflexed, and often with a single tooth on the outer side of the inner or hinder lip. Type S. comboides. Not a Palæozoic genus.
- whitfieldi, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 173, and Geo. Sur. Ill., vol. 5, p. 596, Coal Meas.
- STROPHITES, Dawson, 1880, Am. Jour. Sci. and Arts, 3d ser., vol. 20, p. 413. [Ety. from the genus *Strophia*.] Shell resembling the modern *Strophia*, conical; apex obtuse; whorls four or more; surface covered with sharp vertical ridges, separated by spaces three times as wide. Type S. grandæyus.
- as wide. Type S. grandævus. grandævus, Dawson, 1880, Am. Jour. Sci. and Arts, 3d ser, vol. 20, p. 413, Devonian.
- STROPHOSTYLUS, Hall, 1859, Pal. N. Y., vol. 3, p. 303. [Ety. strophe, turning round; stylos, column.] Subglobose or ovoid globose; spire small with a large ventricose body whorl; outer lip thin, not reflected; columella twisted or spirally grooved within, not reflected; no umbilicus; aperture somewhat round, ovate or transversely broad oval. Type S. elegans.
- andrewsi, Hall, 1859, Pal. N. Y., vol. 3, p. 472, Oriskany sandstone.

cancellatus, Meek & Worthen, 1868, Geo. V Sur. Ill., vol. 3, p. 404, Oriskany sandstone.



 $\label{eq:FIG.716} FIG. 716. \\ - Strophostylus cancellatus. \ B, \ Surface \\ markings enlarged.$

- cyclostomus, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 218, Niagara Gr.
- cyclostomus var. disjunctus. Hall, 1879, 28th Rep. N. Y. Mus. Nat. Hist., p. 177, Niagara Gr.
- depressus, Hall, 1859, Pal. N. Y., vol. 3, p. 306, Low, Held, Gr.
- p. 306, Low. Held. Gr. elegans, Hall, 1859, Pal. N. Y., vol. 3, p. 304, Low. Held. Gr.
- expansus, Conrad, 1841, (Platyceras expansum,) Ann. Rep. N. Y, p. 55, and Pal. N. Y., vol. 3, p. 470, Oriskany sand-stone.
- fitchi, Hall, 1859, Pal. N. Y., vol. 3, p. 306, Low. Held. Gr.
- globosus, Hall, 1859, Pal. N. Y., vol. 3, p. 305, Low. Held. Gr.
- matheri, Hall, 1859, Pal. N. Y., vol. 3, p. 471, Oriskany sandstone.
- obliquus, Nicholson, 1874, Rep. Pal. Ont., p. 119, Up. Held. Gr.
- obtusus, Hall, 1859, Pal. N. Y., vol. 3, p. 305, Low. Held. Gr.
- ovatus, Nicholson, 1874, Rep. Pal. Ont., p. 118, Up. Held. Gr.
- rotundatus, Hall, 1859, Pal. N. Y., vol. 3, p. 307, Low. Held. Gr.
- subglobosus, Nicholson, 1874, Rep. Pal. Ont., p. 118, Up. Held. Gr. transversus, Hall, 1859, Pal. N. Y., vol. 3,
- transversus, Hall, 1859, Pal. N. Y., vol. 3, p. 470, Oriskany sandstone. unicus, Hall, 1862, 15th Rep. N. Y. Mus.
- unicus, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 41, and Pal. N. Y., vol. 5, pt. 2, p. 30, Schoharie grit.
- varians, Hall, 1876, Illust. Devonian Foss., pl. 11, and Pal. N. Y., vol. 5, pt. 2, p. 31, Up. Held. Gr.
- Stylifer, Broderip, 1829, in Sowerby, Gen. Shells.
- primigenia, see Macrochilina primigenia. SUBULITES, Conrad, 1847, Pal. N. Y., vol. 1,
- p. 182. [Ety. subula, an awl.] Subulate, volutions wide, suture oblique; aperture very elongate, narrow, pointed above, but wider below. Type S. elongatus.
- abbreviatus, Hall, 1850, 3d Rep. N. Y. Mus. Nat. Hist., p. 180, Trenton Gr.
- brevis, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., vol. 1, p. 100, Niagara Gr.
- calciferus, Billings, 1859, Can. Nat. & Geo., vol. 4, p. 360, Calciferous Gr.

STR.-SUB.]

GASTEROPODA.

Type T.

nana, Foerste, 1885, Univ., p. 94. No pauper, Hall, syn. 1 pauper var. ohioen 1875, Ohio Pal., ve rectilatera, Hall & Rep. N. Y. Mus.

Held. Gr. tricarinatum, Billin Geo., vol. 4, p. 38 tricarinata, see Tro



FIG. 719.—Trochonema umbilicatum.

gal. [Ety. troch Palæozoic genus. huronensis, Castelna 35. Not recogniz missouriensis, see Pl ensis.

TRYBLIDIUM, Lindstr Silurica, p. 15.

Patelliform, oboy riorly, enlarged scars in six discon in an oblong ci front. Type T. 1 acutum, Whitfield,

Nat. Hist., vol. 2 canadense, Whitea

vol. 3, p. 31, Gue conicum, Whitfield

Nat. Hist., vol. 1, erato, Billings, 186 Pal. Foss., vol. 1

eubule, Billings, bule,) Pal. Foss. ous and Black R



FIG. 720.-Tryl

hyrie, Billings, 186 Pal. Foss., vol. 1 niobe, Billings, 186 Pal. Foss., vol. 1 nycteis, Billings, 18 Pal. Foss., vol.1,

compactus, Whiteaves, 1884, Pal. Foss. vol. 3, p. 16, Guelph Gr.



FIG. 717.-Subulites calciferus.

daphne, Billings, 1865, Pal. Foss., vol. 1, p. 223, Quebec Gr.

elongatus, Emmons, 1842, Geo. Rep. N. Y., p. 392, and Pal. N. Y., vol. 1, p. 182, Trenton Gr. gracilis, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist.,

vol. 5, p. 116, Niagara Gr. inflatus, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 47, and Geo. Sur. Ill., vol. 6, p. 495, Galena Gr.

notatus, Billings, 1866, Catal. Sil. Foss. Antic., p. 54, Anticosti Gr.

obesus, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 318, Birdseye Gr.

- parvulus, Billings, 1862, Pal. Foss., vol. 1, p. 36, Black Riv. Gr.
- psyche, Billings, 1865, Pal. Foss., vol. 1, p. 188, Quebec Gr.

richardsoni, Billings, 1857, Rep. of Progr., Geo. Sur. Can., p. 306, Hud. Riv. Gr. terebriformis, Hall & Whit-

field, 1875, Ohio Pal., vol. 2, p. 141, Niagara Gr.

ventricosus, Hall, 1852, Pal. N. Y., vol. 2, p. 347, Niagara and Guelph Gr.

TRACHYDOMIA, Meek & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 364. [Ety. trachys, rough; doma, house.] In

FIG. 718.-Sub-ulites elon-

gatus.

TRY.-TUR.]

hollidayi, Meek & Worthen, 1860, (Naticopsis hollidayi,) Proc. Acad. Nat. Sci. Phil., p. 463, and Geo. Sur. Ill., vol. 2, p. 367, Low. Coal Meas.

nodosum, Meek & Worthen, 1860, (Naticopsis nodosa,) Proc. Acad. Nat. Sci. Phil., p. 463, and Geo. Sur. Ill., vol. 2, p. 366, Low. Coal Meas.

form like Naticopsis, but distinguished

by having the surface ornamented with

regularly disposed nodes.

nodosum.

- p. 300, Low. Coal Meas.
 nodulosum, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 8, and Geo.
 Sur. Ill., vol. 8, p 146., Coal Meas.
 TREMANOTUS, Hall, 1868, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 347. [Ety. trema, hole; notos, back.] Distinguished from Bucevic back of science were of hold. Bucania by a single row of hollow spines upon the back of the last whorl. In casts the spines are usually broken off, and hence Carpenter argues they never had spines. Type T. chicagoensis.
 - alpheus, Hall, 1864, 10th Rep. N. Y. St. Mus. Nat. Hist. Syn. for T. chicagoensis.
 - chicagoensis, McChesney, 1860, (Bucania chicagoensis,) New Pal. Foss., p. 69, Niagara Gr.
 - trigonostoma, Hall & Whitfield, 1875. Ohio Pal., vol. 2, p. 146, Niagara Gr.
- Trochita, Schumacher, 1817, Essai N. Syst., p. 184. [Ety. trochus, wheel.] Not a Palæozoic genus.
 - antiqua, see Pseudophorus antiquus.
 - carbonaria, Meek, 1866, Proc. Acad. Nat. Sci., p. 270, Kaskaskia Gr. Not rec-ognized.
- TROCHONEMA, Salter, 1859, Can. Org. Rem., Decade 1, p. 27. [Ety. trochus, a wheel; nema, a thread.] Turbinate, thin, of few angular whorls; strong concen-tric ridges, crossed by oblique lines of growth; umbilicus wide, open; inner
 - grown; umblicus wide, open; inner lip thin, scarcely reflected; peritreme complete. Type T. umblicatum. beloitense, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 74, and Geo. Wis., vol. 4, p. 212, Trenton Gr. beachi Whitfield, 1878, Ann. Rep. Geo.
 - Sur. Wis., p. 74, and Geo. Wis., vol. 4, p. 213, Trenton Gr.
 - emaceratum, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 193, Ham. Gr.
 - exile, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 57, Calciferous Gr. fatua, Hall, 1867, 20th Rep. N. Y. Mus.

 - Nat. Hist., p. 394, Niagara Gr. halii, Hall, 1861, (Pleurotomaria halei,) Geo. Sur. Wis., p. 34, Niagara Gr.
 - inornatum, Whiteaves, 1884, Pal. Foss., vol. 3, p. 19, Guelph Gr.
 - meekanum, n. sp. Up. Held. Gr. at Marblehead, Ohio. Proposed instead of T. tricarinatum, Meek, 1871, Proc. Acad. Nat. Sci., p. 82, and Ohio Pal., vol. 1, p. 218, which was preoccupied.

 $[\mathbf{TRA.} - \mathsf{TRO.}]$

namented with Type T.

en, 1860, (Nati-Acad. Nat. Sci. Sur. Ill., vol. 2.

n, 1860, (Natilead. Nat. Sci.

4, Bull. No. 2, p. 8, and dieo. th Rep. N. Y. 7. [Ety. trema, nguished from ow of hollow the last whorl. isually broken er argues they

Rep. N. Y. St. or T. chicago-

1860, (Bucania oss., p. 69, Ni-

hitfield, 1875, Niagara Gr. Essai N. Syst., heel.] Not a

antiquus. oc. Acad. Nat. Gr. Not rec-

in. Org. Rem., chus, a wheel; nate, thin, of trong concenblique lines of , open; inner ed; peritreme licatum. 8, Ann. Rep. nd Geo. Wis.,

r. nn. Rep. Geo.). Wis., vol. 4,

ield, 1872, 24th Hist., p. 193,

Il. Am. Mus. alciferous Gr. p, N. Y. Mus. a Gr. omaria halei,) igara Gr. 34, Pal. Foss.,

Held. Gr. at posed instead k, 1871, Proc. nd Ohio Pal., preoccupied.

TRY.-TUR.]

nana, Foerste, 1885, Bull. Sci. Lab. Denison Univ., p. 94. Not properly defined. pauper, Hall, syn. for P. halii.

pauper var. ohioense, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 144, Niagara Gr. rectilatera, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 193, Up. Held. Gr.

tricarinatum, Billings, 1859, Can. Nat. & Geo., vol. 4, p. 356, Calciferous Gr. tricarinata, see Trochonema meekanum.

umbilicatum, Hall, 1847, (Pleuroto-

maria umbilicata,) Pal. N. Y., vol. 1, p. 43, Chazy to Hud. Riv. Gr.

yandellanum, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 194, Up. Held.

FIG.

Palæozoic genus.

huronensis, Castelnau, 1843, Syst. Sil., p. 35. Not recognized.

missouriensis, see Pleurotomaria missouriensis.

TRYBLIDIUM, Lindstrom, 1880, Fragmenta Silurica, p. 15. [Ety. trublion, a cup.] Patelliform, obovate, acuminate anteriorly, enlarged posteriorly; muscular scars in six disconnected pairs arranged in an oblong circle open toward the front. Type T. reticulatum.

acutum, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 45, Calciferous Gr. canadense, Whiteaves, 1884, Pal. Foss.,

vol. 3, p. 31, Guelph Gr. conicum, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 306, Birdseye Gr.

erato, Billings, 1862, (Metoptoma erato,) Pal. Foss., vol. 1, p. 39, Black Riv. Gr. eubule, Billings, 1862, (Metoptoma eubule,) Pal. Foss., vol. 1, p. 38, Calciferous and Black Riv. Gr.



FIG. 720.-Tryblidium nycteis.

hyrie, Billings, 1862, (Metoptoma hyrie,) Pal. Foss., vol. 1, p. 87, Quebec Gr. niobe, Billings, 1862, (Metoptoma niobe,) Pal. Foss., vol. 1, p. 37, Calciferous Gr. nycteis, Billings, 1862, (Metoptomanycteis, Pal. Foss., vol.1, p. 38, Calciferous Gr.

GASTEROPODA.

ovale, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 305, Birdseye Gr. ovatum, Whitfield, 1886, Bull. Am. Mus.

Nat. Hist., vol. 1, p. 305, Birdseye Gr. pileolum, Whitfield, 1889, Bull. Am. Mus.

Nat. Hist., vol. 2, p. 46, Calciferous Gr. simplex, Billings, 1865, (Metoptoma simplex,) Pal. Foss., vol. 1, p. 346, Calcifer-

ous Gr. TURBO, Klein, 1753, Tent. Meth. Ostr. [Ety. turbo, top.] Shell thick, ovate; body whorl rounded, ventricose; spire small, of several convex whorls, pointed; surface spirally grooved or nodulated; aperture large, nearly circular, slightly



FIG. 721.-Turbo marmo-

or less modified by the preceding whorl; outer and inner lips thin ; operculum thick, shelly, rugged without, flattened and spirally sulcated

produced and

broadly

rounded in

front, more

429

ratus. within. Type T. marmoratus. Not an

American Palæozoic genus. The species left here is, for want of material, to refer them where they belong.

bicarinatus, Troost, 1840. Not defined.

dilucula, see Holopea dilucula.

guadalupensis, Shumard, 1859, Trans St. Louis Acad. Sci., vol. 1, p. 398, Permian Gr.

huronensis, Castelnau, 1843. Not recognized.

lineatus, see Pleurotomaria lineata.

obesus, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 202, Up. Coal Meas.

(?) obscura, see Holopea

obscura. shumardi, see Platys-

toma shumardi.

tabulata, see Pleurotomaria tabulata.

tennesseensis, see Cyclonema tennesseense.

texanus, Shumard, 1859, Trans. St. Louis Acad. Sci., vol. 1, p.

400, Coal Meas. Turbonilla, Leach, 1826, Risso Eur. Merid. 4. [Ety.di minutive

of Turbo, a genus.] Not a Palæzoic genus.

FIG. 722.-Turritella imbricata swallovana, see Aclisina swallovana.

TURRITELLA, Lamarck, 1801, Syst. An. sans Vert., p. 89. Not a Palæozoic genus. Type T. imbricata.



t distinguished

les.

ur. Ill., vol. 2,

oal Meas.





CEPHALOPODA.

schohariensis, Castelnau, 1843, Syst. Sil., p. 35. Not recognized.

stevensana, Meek & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 382, Up. Coal Meas.

Xenophora, Fischer, 1806, Museum Demidovianum, p. 213. Not an American Palæozoic genus.

antiqua, see Pseudophorus antiquus.

ZAPTYCHIUS, Walcott, 1884, Monogr. U. S. Geo. Sur., vol. 8, p. 263. Shell minute, elongate; aperture large, oblong, nearly vertical; outer lip thin; collumellar lip reflected, plicated; surface marked by slightly oblique vertical striæ.

Type Z. carbonarius.

FIG. 723.—Zaptychius carbonarius. carbonarius, Walcott, 1884, Monogr. U. 8. Geo. Sur., vol. 8, p. 263, Subcarboniferous.

XEN. ZON.



FIG. 724.-Zonites priscus

ZONITES, Montfort, 1810, Conch. Syst., vol. 2, p. 282. [Ety. zone, belt.] A coiled shell, closely resembling a Helix, having an open umbilicus; the surface is transversely sculptured. Type Z. algireus.

priscus, Carpenter, 1867, Quar. Jour. Geo., Soc., vol. 23, p. 331, and Acadian Geol., p. 385, Coal Meas.

CLASS CEPHALOPODA.

[Ety. kephale, head; pous, foot.]

THE animals of this class are all marine, and they reach a higher state of animal development than any other marine group among the Mollusca. Some of them have a rudimentary, cartilaginous, cephalic skeleton, which indicates superority over other marine Mollusca. The locomotive organs consist of arms surrounding the head, furnished with sucking cups that take a firm hold on other objects. Many have fins, and all can propel themselves by the forcible expulsion of water from the respiratory chamber. They swim rapidly, creep on the bottom of the sea, and are very predatory in their habits. The body is short, thick, and symmetrical, with branchize on both sides.

The Palæozoic fossils of this Class belong to the Order Tetrabranchiata (fourgilled), which is represented in tropical seas by the Nautilus. The shells are straight, as in the family Orthoceratidæ; curved, as in Cyrtoceratidæ; discoid, as in the Gyroceratidæ and Trocholitidæ; spiral, as in the Trochoceratidæ; involute, as in the Nautilidæ; or involute and having lobed sutures, as in the Goniatitidæ. Internally the shell is divided into numerous chambers by partitions, or septa, the animal inhabiting the last chamber, and retaining connection through the preceding chambers by a tube, or siphuncle, but having no connection with the interior of the several chambers after having cut itself off by the secretion of the shelly septa. The outlines of the septa are called sutures, and in Goniatites the elevations of the folded sutures are called saddles, and the intervening depressions lobes. Each septum began t the siphuncle as the being a point of mus two septa until the siphuncle, forming a

ACT.]

The fossil shells rous, like those of th composition as the G is destroyed, even w Sometimes the shell upon the siphuncle. while another part i portance. The shap importance. We re-

> FAMILY ASCOCI FAMILY CYRTO FAMILY DISCOS FAMILY ENDOC FAMILY GOMPH FAMILY GOMPH FAMILY GYROC FAMILY LITUIT FAMILY NAUTH chilus, Tree

FAMILY ORTHO moceras, O

Family Phrag Family Piloci

FAMILY TROCH

FAMILY TROCH FAMILY UNCER

- ILI UNCER
- ACTINOCERAS, Bronn, 1 tica, p. 97. [Et horn.] Exterior phuncle very lau the chambers, au slender central tu Type A. bigsbyi, lyoni. The genu fore the species w beaudanti, Castelnau rien, p. 31. Not beaumonti, Castelna rien, p. 32. Not

bigsbyi, Stokes, 1840 series, vol. 5, p. 7 blainvillei, Castelnau rien, p. 31. Not cordieri, Castelnau, 1

p. 31. Not recognized deshayesi, Castelnau rien, p. 32. Not

XEN. ZON.

ACT.

CEPHALOPODA.

34, Monogr. U. 8. 63, Subcarbonif-



oriscus

Conch. Syst., zone, belt.] A embling a Helix, bilicus; the surculptured. Type

Quar. Jour. Geo. d Acadian Geol.,

her state of anusca. Some of ndicates superiarms surroundn other objects. ulsion of water tom of the sea, nd symmetrical,

anchiata (four-The shells are e; discoid, as in æ; involute, as oniatitidæ. Ine, or septa, the the precedith the interior a of the shelly tites the elevapressions lobes. Each septum began to form at the circumference of the shell, and slowly approached the siphuncle as the animal moved forward in the body chamber. The siphuncle, being a point of muscular attachment, was not vacated by the animal between any two septa until the anterior one had been firmly closed by attachment to the siphuncle, forming a chamber of support.

The fossil shells are very thin in proportion to their size. They are not porous, like those of the Brachiopoda; nor horny, like the Crustacea; nor of the same composition as the Gasteropoda or Lamellibranchiata. Generally the exterior shell is destroyed, even when the associated shells of other classes are well preserved. Sometimes the shell appears as if it had melted and run together, or run down upon the siphuncle. Such molecular change will occur in one part of a specimen while another part is unchanged. The general form of the shell is of family importance. The shape of the siphuncle and the external markings are of generic importance. We recognize the following families:

FAMILY ASCOCERATIDE.—Ascoceras.

- FAMILY CYRTOCERATIDE.—Cyrtoceras, Cyrtocerina, Oncoceras.
- FAMILY DISCOSORIDÆ.-Discosorus.
 - FAMILY ENDOCERATIDÆ.—Cameroceras, Colpoceras, Endoceras.
 - FAMILY GOMPHOCERATIDÆ.--Gomphoceras.
- FAMILY GONIATITIDE. -Goniatites.
- FAMILY LITUITIDE.-Lituites.
- FAMILY NAUTILIDÆ.—Discites, Nautilus, Pteronautilus, Solenochilus, Temnochilus, Trematodiscus.
- FAMILY ORTHOCERATIDÆ.—Actinoceras, Bactrites, Gonioceras, Huronia, Ormoceras, Orthoceras, Trematoceras.
- FAMILY PHRAGMOCERATIDÆ.—Phragmoceras, Streptoceras.
- FAMILY PILOCERATIDÆ.—Piloceras.
- FAMILY TROCHOCERATIDÆ. Trochoceras.
- FAMILY TROCHOLITIDÆ.—Trocholites.
- FAMILY UNCERTAIN.—Petalichnus, Særichnites, Teratichnus, Trachomatichnus.
- ACTINOCERAS, Bronn, 1837, Lethaea Geognostica, p. 97. [Ety. aktin, ray; keras, horn.] Exterior like Orthoceras; siphuncle very large, inflated between the chambers, and connected with a slender central tube by radiating plates. Type A. bigsbyi, A. richardsoni, and A. lyoni. The genus was established before the species were defined.
- beaudanti, Castelnau, 1843, Systéme Silurien, p. 31. Not recognized.
- beauminti, Castelnau, 1843, Systéme Silurien, p. 32. Not recognized. bigsbyi, Stokes, 1840, Trans. Geo. Soc., 2d
- series, vol. 5, p. 707, Chazy Gr.
- blainvillei, Castelnau, 1843, Système Silurien, p. 31. Not recognized. cordieri, Castelnau, 1843, Système Silurien,
- p. 31. Not recognized.
- deshayesi, Castelnau, 1843, Systéme Silurien, p. 32. Not recognized.

dufresnoyi, Castelnau, 1843, Système Silurien, p. 32. Not recognized.



T r a n s . Big. 725.—Actinoceras richardsoni. Geol. Soc.,

2d series, vol. 5, p. 708, Black Riv. Gr. simmsi, Stokes, 1840, Trans. Geo. Soc., 2d series, vol. 5, p. 708, Sil. Ammonites bellicosus, Morton, 1836, Am. Jonr. Sci. and Arts, vol. 29, Coal Meas. Not recognized.

colubrellus, see Goniatites colubrellus. hildrethi, see Goniatites hildrethi.

- ASCOCERAS, Barrande, 1855, Bull. de la Soc. Geol. de France, vol. 12, 2d ser., p. 157. [Ety. askos, leather bottle; keras, horn.] Chambers behind the living one short and rapidly tapering; living chamber long and constricted near the aperture; aperture somewhat T-shaped. Type A. bohemicum.
- anticostiense, Billings, 1866, Catal. Sil. Foss. Antic., p. 60, and Pal. Foss., vol. 1, p. 164, (fig. 148b, Anticosti Gr.
- canadense, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 310, Hud. Riv. Gr. This species is made the type of the genus Billingsites by Hyatt.



FIG. 726.-Ascoceras canadense.

newberryi, Billings, 1862, Pal. Foss., vol. 1, p. 163, Hud. Riv. and Anticosti Grs. southwelli, Worthen, (in press,) Geo. Sur.

- Bronn's Jahrb., p. 240. [Ety. baktron, staff.] Shell long, straight, gradually tapering, many-chambered; sutures curve abruptly backward over the siphuncle, forming "the dorsal lobe" similar to that of a Goniatites. Type B. carinatus.
- (clavus) Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 316, Ham. Gr.
 - CAMEROCERAS, Conrad, 1842, Jour. Acad. Nat. Sci. Phil., vol. 8, p. 267. [Ety. kamara, chamber; keras, horn.] Shell straight, and in form like Endoceras; siphuncle

marginal, and obliquely annulated at the junction of the septa. Type C trentonense.

trentonense, Conrad, 1842, Jour. Acad. Nat. Sci. Phil., vol. 8, p. 267, and Pal. N. Y. vol. 1, p. 221, Trenton Gr. Colpoceras, Hall, 1850,

3d Rep. N. Y. Mus. Nat. Hist., p. 181. [Etv. kolpos, furrow; keras, horn.] Disfrom tinguished Orthoceras by the oblique septa, arched upon the dorsal side, and bending down in a deep sinus on the ventral side, and strongly arching toward the mouth. arching Type C. virgatum. arcuatum, James, a poorly defined siphuncle of an Endoceras.

Wetherby, clarkii, Jour. Cin. 1881, Soc. Nat. Hist., vol.

4, p. 77, Tren-FIG. 727.-Colpoceras ton Gr.

virgatum, Hall, 1850, 3d Rep. N. Y. Mus. Nat. Hist., p. 182, Birdseye and Black Riv. Grs.

clarkii

- Clymenia, Munster, 1839. [Ety. mytho-logical name.]
 - complanata, see Goniatites complanatus. erato, see Goniatites erato.
- Conilites, Schlotheim, 1820, Petrefaktenkunde, etc. [Ety. konos, cone, lithos, stone.]
- capricornulus, Troost, 1840, 5th Geo. Rep. Tenn. Not satisfactorily defined.
- Conotubularia, Troost, syn. for Orthoceras. brongniarti, see Orthoceras brongniarti. cuvieri, see Orthoceras cuvieri.

defrancii, see Orthoceras defrancii. goldfussi, see Orthoceras goldfussi.

- Conulites, Cozzens, 1848. Not satisfactorily defined.
- angulosum, Cozzens, 1848. Not satisfactorily defined. It may be a plant.
- Cryptoceras, D'Orbigny, 1850. [Ety. kryptos, concealed; keras, horn.] This name was preoccuppied by Latreille for a genus of insects, and had been previously used by Barrande for a genus of Cephalopods.

capax, see Solenochilus capax.

CYRTOCERAS, Goldfuss, 1832, in De la Beche's Handbuch der Geognosie bearbeitet von v. Deschen, p. 536. [Etv. kurta, curved; keras, horn.] Shell long, conical, gently curved, aperture some times contracted; siphuncle straight or expanded between the septa, and variable in position, but usually at the outer edge.

absens, see Gomphoceras absens.



acinacellum, Whitfie Mus. Nat. Hist ... eye Gr.

emulum, Hall, 1879 2, p. 371, Up. Held alethes, Billings, 186 193, Quebec Gr.

alternatum, Hall, 18 pt. 2, p. 365, Marce instead of C. undu

ammon, Billings, 180 p. 361, Corniferous amœnum, S. A. Mi

Soc. Nat. Hist., Riv. Gr.

amplicorne, Hall, 18 Mus. Nat. Hist., p cules.

annulatum, Hall, 1 preoccupied by G subannulatum.

arcticameratum, Hal 2, p. 349, Guelph (arcuatum, Hall, 1847

196. The name Steininger in 1830

aristides, Billings, 1 p. 316, Quebec Gr. ashmanni, n. sp. curved; section su subcircular near

side a little less c tral; siphuncle n surface longitudi finely sculptured rows and transv

tinct on the ver 6



FIG. 728. - Cyrtoceras ash manni. The two section views are natural

and is in the collec beekmanense, Whit Mus. Nat. Hist.,

erous Gr. bannisteri, see Troch belus, Billings, 1861

361, Corniterous (boycii, Whitfield, Nat. Hist., vol. 1,

billingsi, Salter, 1 Decade 1, p. 33, Cl

bondi, Safford, 1869 Nashville Gr.

brevicorne, Hall, 1 Mus. Nat. Hist., J camuruin, Hall, 184

196, Trenton Gr. cancellatum, Hall, 18 p. 290. The nam

Roemer in 1844. carrollense, Worthe vol. 6, p. 496, Gal

CYR.
AMM CYR.

CYR.

eye Gr.

ely annulated at septa. Type C

2, Jour. Acad. Nat. 7, and Pal. N. Y Gr.



G. 727.-Colpoceras clarkii.

at. Hist., p. 182, v. Grs. [Ety. mytho-

s complanatus. 20, Petrefakten-108, cone, lithos.

0, 5th Geo. Rep. ly defined. for Orthoceras. s brongniarti.

vieri. defrancii.

oldfussi. Vot satisfactorily

8. Not satisfacbe a plant. 0. [Ety. kryptos, This name n.] atreille for a gead been previe for a genus of

apax.

, in De la Beche's nosie bearbeitet [Ety. kurtos, Shell long, **36**.] aperture someuncle straight or septa, and variusually at the

absens.

- cessator, Hall & Whitfield, 1877, U. S. Expl. Exped. 40th parallel, vol. 4, p. 278, Coal Meas.
- citum, Hall, 1879, Pal. N. Y., vol. 5, p. 372, amulum, Hall, 1879, Pal. N. Y., vol. 5, pt. Up. Held. Gr.
 - clavatum, see Gomphoceras clavatum.
 - clitus, Billings, 1866, Catal. Sil. Foss. Antic., p. 85, Niagara Gr.
 - confertissimum, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 327, Birdseve Gr.
 - conicum, Owen, 1840, Rep. on Min. Lands, p. 70, Up. Magnesian Gr.
 - conoidale, Wetherby, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 78, Hud. Riv. Gr. constrictostriatum, Hall, 1847, Pal. N. Y.,
 - vol. 1, p. 195, Trenton Gr.
 - corniculum, Hall, 1862, Geo. Rep. Wis. The name was preoccupied by Barrande in 1848, and again by Eichwald in 1860, see C. tenuistriatum.
 - corydon, Billings, 1866, Catal Sil. Foss. Antic., p. 85, Niagara Gr.
 - cretaceum, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 209, Up. Held Gr. curtum, Meek & Worthen, 1860, Proc.
 - Acad. Nat. Sci. Phil., p. 468, and Geo. Sur. Ill., vol. 2, p. 388, Up. Coal Meas. Was this name preoccupied by Eichwald?
 - dactyloides, Dwight, 1884, Am. Jour. Sci. and Arts, 3d ser., vol. 27, p. 255, Calciferous Gr.
 - dardanus, Hall, 1861, Rep. of Progr. Geo. Sur. of Wis., p. 43, Niagara Gr. densum, Hall, 1879, Pal. N. Y., vol. 5, pt.
 - 2, p. 363, Ham. Gr.
 - dictys, Billings, 1865, Pal. Foss., vol. 1, p. 192, Quebec Gr.
 - dictyum, White, 1876, Proc. Acad. Nat. Sci., p. 33, Devonian.
 - dilatatum, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 468, and Geo. Sur. Ill., vol. 2, p. 389, Up. Coal Meas. dorsatum, Swallow, 1858, Trans. St. Louis

 - Acad. Sci., vol. 1, p. 197, Permian Gr.
 eugenium, Hall, 1862, 15th Rep. N. Y. v
 Mus. Nat. Hist., p. 70, and Pal. N. Y.,
 vol. 5, pt. 2, p. 369, Schoharie grit.
 eugium, Hall, 1861, Rep. of Progr. Wis.,
 - p. 40, Chazy and Black Riv. Grs.
 - exiguum, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 172, Trenton Gr. This is made the type of the genus Climoceras by Hyatt.
 - faberi, James, 1886, Jour. Cin. Soc. Nat. Hist., vol 8, p. 246, Hud. Riv. Gr.
 - falx, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 314, and Can. Org. Rem., Decade 1, p. 32, Black Riv. and Trenton Grs.
 - filosum, Emmons, 1842, Nat. Hist. N. Y., vol. 4, p. 392, Trenton Gr.
 - formosum, Hall, 1879, Pal. N. Y., vol. 5, V pt. 2, p. 362, Ham. Gr. fosteri, Hall, 1861, Rep. of Progr. Geo. Sur.

 - Wis., p. 41, Niagara Gr. fragile, Billings, 1866, Catal. Sil. Foss. Antic., p. 59, Anticosti Gr.

433



annulatum, Hall, 1847. This name was preoccupied by Goldfuss in 1832, see C. subannulatum. arcticameratum, Hall, 1852, Pal. N. Y., vol.

Riv. Gr.

cules.

2, p. 349, Guelph Gr. arcuatum, Hall, 1847, Pal. N. Y., vol. 1, p. 196. The name was preoccupied by Steininger in 1830, see C. subarcuatum.

acinacellum, Whitfield, 1886, Bull. Am.

alethes, Billings, 1865, Pal. Foss., vol. 1, p.

alternatum, Hall, 1879, Pal. N. Y., vol. 5

amœnum, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 105, Hud.

amplicorne, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 358, syn for C. her-

instead of C. undulatum of Hall. ammon, Billings, 1861, Can. Jour., vol. 6,

p. 361, Corniferous limestone.

pt. 2, p. 365, Marcellus Shale. Proposed

2, p. 371, Up. Held. Gr.

193, Quebec Gr.

Mus. Nat. Hist., vol. 1, p. 327, Birds-

aristides, Billings, 1865, Pal. Foss., vol. 1, p. 316, Quebec Gr. ashmanni, n. sp. Shell small, géntly

curved; section subelliptical, becoming subcircular near the point, the dorsal side a little less convex, than the ventral; siphuncle near the dorsal side; surface longitudinally furrowed and finely sculptured transversely, the furrows and transverse lines most distinct on the ventral side; there are eight chambers in the



FIG. 728. - Cyrtoceras ash manni. The two section views are natural

one-half diameter; body chamber unknown Collected by Mr. George Ashmann, among the minute fossils at Spergen Hill, Indiana, Warsaw Gr.,

specimen figured,

which is enlarged

and is in the collection of Charles Faber. beekmanense, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 57, Calciferous Gr.

bannisteri, see Trochoceras bannisteri.

- belus, Billings, 1861, Can. Jour., vol. 6, p. 361, Corniferous Gr.
- boycii, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 326, Birdseve Gr. billingsi, Salter, 1859, Can. Org. Rem.,
- Decade 1, p. 33, Chazy or Black Riv. Grs. bondi, Safford, 1869, Geo. of Tenn., p. 290,
- 196, Trenton Gr.
- cancellatum, Hall, 1852, Pal. N. Y., vol. 2, p. 290. The name was preoccupied by Roemer in 1844. See C. subcancellatum. carrollense, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 496, Galena Gr.
- brevicorne, Hall, 1867, 20th Rep. N. Y.
- Mus. Nat. Hist., p. 407, Niagara Gr. camurum, Hall, 1847, Pal. N. Y., vol. 1, p.
- Nashville Gr.

Pal. Foss., Niagara Gr. In 1861 Mc-Chesney referred this species to the genus Lituites, and proposed for it the name Lituites cancellatus. Prof. Hall, in the meantime, described it as Lituites occidentalis. It is now referred to the genus Nautilus, and as both the earlier names were preoccupied, McChesney's name cancellatus has precedence.

hallanum, D'Orbigny, 1850, Prodrome de Pal., tome 1, p. 1, Trenton Gr. Pro-posed instead of C. lamellosum, Hall, 1847, which was preoccupied. Hyatt founded his genus Zitteloceras on this species.

- kirbyi, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 57, Calciferous Gr.
- lamellosum, Hall, 1847, Pal. N. Y., vol. 1, p. 193. The name was preoccupied by d'Archiac & Verneuil in 1842. See C. hallanum.
- laterale, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 407, Niagara Gr.
- ligarius, Billings, 1865, Pal. Foss., vol. 1 p. 176, Hud. Riv. Gr. liratum, Hall, 1862, 15th Rep. N. Y. Mus.
- Nat. Hist., p. 72, Ham. Gr. loculosum, Hall, 1861, Rep. of Progr. Wis.
- p. 42, Trenton Gr.
- lucillus, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 406, Niagara Gr. lysander, Billings, 1862, Pal. Foss., vol. 1,
- p. 161, Hud. Riv. Gr.



FIG. 729.-Cyrtoceras magister.

hector, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 364, Up. Chemung Gr. hercules, Winchell & Marcy, 1865, (Lit-

uites hercules,) M.m. Bost. Soc. Nat. Hist., p. 102, Niagara Gr.

hertzeri, see Gomphoceras hertzeri.

- huronense, Billings, 1865, Pal. Foss., vol. 1, p. 176, Black Riv. or Trenton Grs.
- infundibulum, Whitfield, 1880, Ann. Rep.
- Geo. Sur. Wis., p. 66, and Geo. Wis., vol. 4, p. 300, Niagara Gr. irregulare, Wetherby, 1881, Jour. Cin. Soc.
- Nat. Hist., vol. 4, p. 79, Hud. Riv. Gr. isidorus, Billings, 1865, Pal Foss., vol. 1, p.
- 175, Black Riv. or Trenton Gr.
- janus, see Streptoceras janus.
- jason, see Gyroceras jason.
- juvenale, Billings, 1865, Pal. Foss., vol. 1, pp. 177, 420, Trenton Gr.

- macrostomum, Hall 1847, Pal. N. Y., vol. 1, p. 194, Black Riv. and Trenton Grs.
- magister, S. A. Miller, 1875, Cin. Quar. Jour. of Sci., vol. 2, pp. 132, 284, Hud. Riv. Gr.
- marginale, Conrad, 1843, Proc. Acad. Nat. Sci., p. 334. The name was preoccu-pied by Phillips in 1841, and the species is poorly defined.
- markæi, Castelnau, 1843, Système Silurien, p. 30, Trenton Gr. Not recognized.
- massiense, Safford, 1869, Geo. of Tenn., p. 290, Nashville Gr.
- matheri, see Gyroceras matheri.
- maccoyi, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 467 Chazy Gr. maximum, see Nautilus maximus,
- mercurius, see Cyrtocerina mercurius.

metellus, Billings, 1 p. 191, Quebec Gr metula, Hall, 1862,

Nat. Hist., p. 72, ar pl. 46, Up. Held.

- microscopicum, Dw Sci. and Arts, 3d
- Calciferous Gr. missisquoi, Billings.
- 1, p. 314, (Orthoce bec Gr.

morsum, Hall, 1862. Nat. Hist., p. 71, pt. 2, p. 367, Up.

multicameratum, H vol. 1, p. 195, Black

myrice, Hall & Whi vol. 2, p. 149, Nia neleus, Hall, 1861, F

40, Chazy and Bla nevadense, Walcott Geo. Sur., vol. 8,

obscurum, S. A. Mil ter because obscu ohioense, Meek, 18 Sci. Phil., p. 86,

p. 229, Up. Held. olenus, Hall, 1877, orion.

opimum, Keyes, 18 Sci. Phil., pl. xii., orcas, see Oncoceras orestes, Billings, 18 p. 177, Niagara Gi orion, see Trochoce

orodes, Billings, 18 p. 162, Guelph Gi planidorsatum, Whi

Geo. Sur. Wis., 1 vol. 4, p. 231, Tre postumius, Billings

1, p. 178, Hud. Ri

pusillum, Hall, 18 Mus. Nat. Hist., J raei, Whitfield, 188

Hist., vol. 2, p. 58 rectum, Whitfield, Sur. Wis., p. 85,

p. 319, Niagara G

regulare, Billings, Geo. Sur. Can., J Trenton Grs.

reversum, Spencer, Univ. St. Mo., p.

rigidum, Hall, 1867, Mus. Nat. Hist., p.

rockfordense, Winc Acad. Nat. Sci., hook Gr.

septoris, see Gomphe

simplex, Billings, Progr. Geo. Sur Black Riv. and J

sinuatum, Billings, Progr. Geo. Sur Black Riv. Gr.

spinosum, see Gyroo stonense, Safford, 1 290, Trenton Gr.

CYR. CYR.

metellus, Billings, 1865, Pal. Foss., vol. 1,

metula, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 72, and Illust. Devon. Foss.,

microscopicum, Dwight, 1884, Am. Jour.

missisquoi, Billings, 1865, Pal. Foss., vol.

morsum, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 71, and Pal. N. Y., vol. 5, pt. 2, p. 367, Up. Held. Gr.

multicameratum, Hall, 1847, Pal. N. Y.

myrice, Hall & Whitfield, 1875, Ohio Pal.,

neleus, Hall, 1861, Rep. of Progr. Wis., p. 40, Chazy and Black Riv. Grs.

nevadense, Walcott, 1885, Monogr. U. S.

Geo. Sur., vol. 8, p. 203, Devonian. obscurum, S. A. Miller, changed to magister because obscurum was preoccupied. ohioense, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 86, and Ohio Pal., vol. 1,

olenus, Hall, 1877, syn. for Trochoceras

opimum, Keyes, 1888, Proc. Acad. Nat.

orestes, Billings, 1865, Pal. Foss., vol. 1,

orodes, Billings, 1862, Pal. Foss., vol. 1,

planidorsatum, Whitfield, 1880, Ann. Rep.

postumius, Billings, 1865, Pal. Foss., vol.

pusillum, Hall, 1867, 20th Rep. N. Y.

Mus. Nat. Hist., p. 407, Niagara Gr. raei, Whitfield, 1889, Bull. Am. Mus. Nat.

Hist, vol. 2, p. 58, Calciferous Gr. rectum, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis, p. 85, and Geo. Wis., vol. 4,

regulare, Billings, 1857, Rep. of Progr.

Geo. Sur. Can., p. 314, Black Riv. and

reversum, Spencer, 1884, Bull. No. 1, Mus.

Univ. St. Mo., p. 60, Niagara Gr. rigidum, Hall, 1867, 20th Rep. N. Y.

Mus. Nat. Hist., p. 408, Niagara Gr. rockfordense, Winchell, 1865, Proc.

Acad. Nat. Sci., p. 132, Kinder-

septoris, see Gomphoceras septore.

Black Riv. and Trenton Grs. sinuatum, Billings, 1857, Rep. of

simplex, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 313,

Progr. Geo. Sur. Can., p. 314,

spinosum, see Gyroceras spinosum.

stonense, Safford, 1869, Geo. of Tenn., p.

Geo. Sur. Wis., p. 57, and Geo. Wis., vol. 4, p. 231, Trenton Gr.

Sci. Phil., pl. xii., fig. 5, Ham. Gr.

vol. 2, p. 149, Niagara Gr.

p. 229, Up. Held. Gr.

orcas, see Oncoceras orcas.

orion, see Trochoceras orion.

1, p. 178, Hud. Riv. Gr.

p. 319, Niagara Gr.

Trenton Grs.

hook Gr.

Black Riv. Gr.

290, Trenton Gr.

p. 177, Niagara Gr.

p. 162, Guelph Gr.

vol. 1, p. 195, Black Riv. and Trenton Gr.

1, p. 314, (Orthoceras missisquoi,) Que-

Sci. and Arts, 3d ser., vol. 27, p. 256,

p. 191, Quebec Gr.

pl. 46, Up. Held. Gr.

Calciferous Gr.

bec Gr.

orion.

- Bull. Am. Mus. p. 57, Calcifer.
- al. N. Y., vol. 1, preoccupied by in 1842. See (
- Rep. N. Y. Mus. ara Gr. al. Foss., vol. 1
- Rep. N. Y. Mus. Gr.
- p. of Progr. Wis., Rep. N. Y. Mus.

ara Gr. Pal. Foss., vol. 1.



- 7 Pal. N. Y., Riv. and Tren-
- 875, Cin. Quar. . 132, 284, Hud.
- Proc. Acad. Nat. e was preoccuand the species
- ystème Silurien, recognized. Geo. of Tenn..
- atheri. Can. Nat. and y Gr. iximus, mercurius

subannulatum, D'Orbigny, 1850, Prodr. de Pal., t. 1, p. 1, Black Riv. and Tren-ton Grs. Proposed instead of C. annulatum, Hall, 1847, which was preoccupied.

435

- subarcuatum, D'Orbigny, 1850, Prodr. de Pal., t. 1, p. 2, Trenton Gr. Proposed instead of C. arcuatum, Hall, 1847, which was preoccupied.
- subcancellatum, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 243, Niagara Gr. Proposed instead of C. cancellatum, Hall, 1852, which was preoccupied.
- subcompressum, Beecher, 1888, Pal. N. Y., vol. 7, p. 35, Clinton Gr.
- subrectum, Hall, 1859, Pal. N. Y., vol. 3, p. 342, Low. Held. Gr.
- subturbinatum, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 312, Chazy and Black Riv. Grs.
- surgens, Barrande, 1870, Syst. Sil. de
- Boh., vol. 2, p. viii, pl. 431, Quebec Gr. syphax, Billings, 1865, Pal. Foss., vol. 1, p. 194, Quebec Gr. This species is the type of Eremoceras, by Hyatt. tenuiseptum, Faber, 1886, Jour. Cin. Soc.
- Nat. Hist., vol. 9, p. 18, Hud. Riv. Gr.
- tenuistriatum, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 243. Proposed instead of C. corniculum, Hall, 1862, which was preoccupied. Trenton Gr.
- tessellatum, DeKoninck. Not American.
- transversum, see Gyroceras transversum.
- trentonense, Emmons, 1842, (Orthoceras trentonensis,) Geo. Rep. N. Y., p. 396, Trenton Gr.
- trivolvi, see Gyroceras trivolve.
- typicum, see Cyrtocerina typica.
- undulatum, Hall, 1876, see C. alternatum. undulatum, Vanuxem, see Gyroceras un-
- dulatum. unicorne, Winchell,
- 1863, Proc. Acad. Nat. Sci., p. 23, Marshall Gr.
- vallandighami, S. A.

Miller, 1874, Cin. Miller, 1874, Cin. Quar. Jour. Sci., vol. FIG. 730.—Cyrtoceras 222 Hud. Riv. vallandighami. Gr.

vassarinum, Dwight, 1884, Am. Jour. Sci. and Arts., 3d ser., vol. 27, p. 254, Calciferous Gr.



FIG. 731.-Cyrtoceras ventricosum.

ventricosum, S. A. Miller, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 131, Hud. Riv. Gr.



whitneyi, Hall 1861, Rep, of Progr. Wis., p. 39, Hud. Riv. Gr.

CYRTOCERINA, Billings, 1865, Pal. Foss., vol. 1, p. 178. [Ety. from the termination inus, signifying resemblance to Cyrto-

ceras.] In form like a short, rapidly tapering Cyrtoceras, and having a large siphuncle on the concave side. Type C. typica.

mercurius, Billings, 1865, Pal. Foss., vol. 1, p. 194, Quebec Gr.

typica, Billings, 1865, Pal. Foss., vol. 1, p. 178, Black Riv. Gr. typica a, Dorsal view, showing cav-ity of siphuncle; b, Diploceras, Conrad, 1842, Jour. Acad. Nat.

Sci., vol. 8, p. 267, [Ety. diploos, double; keras, horn.] Foundedupon the fragment of an Endoceras, and very poorly defined. vanuxemi, see Endoceras vanuxemi.

DISCITES, DeHaan, 1825, Mongr. Ammon., etc., p. 31. [Ety. diskos, quoit.] Dis-coid; umbilicus wide; whorls quadrangular, sides flattened, and dorsum gibbous; longitudinally striated and sometimes lined transversely; siphon above the center; living chamber from one-fourth to three-fourths of a whorl

in length; aperture with deep ventral sinus. Type D. costellatus. ammonis, Hall, 1879, Pal. N. Y., vol. 5,

pt. 2, p. 425, Up. Held. Gr.

disciformis, Meek & Worthen, 1865, Proc. Afcad. Nat. Sci. Phil., p. 261, and Geo. Sur. Ill., vol. 5, p. 522, Keokuk Gr.

hartti, Dawson, 1868, (Gyroceras hartti,) Acadian Geol., p. 311, Subcarboniferous. Made the type of Hyatt's genus, Stroboceras.

highlandensis, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 531, Coal Meas.

inopinatus, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 426, Up. Held. Gr.



FIG. 733.-Discites marcellensis.

marcellensis, Vanuxem, 1842, (Goniatites marcellensis,) Geo. Sur. 3d Dist. N. Y. p. 146, Marcellus Shale. The type of Hyatt's genus Centroceras. ornatus, syn. for D. marcellensis. toddanus, Gurley, 1883, New Carb. Foss., p. 7. Publication invalid.

tuberculatus, Owen, 1852, Geo. Sur. Wis. Iowa, and Minn., p. 581, Subcarb. Discosorus, Hall, 1852, Pal. N. Y., vol 2, p.

- 99. [Ety. diskos, quoit; soros, heap or pile.] Composed of a series of disks gradually diminishing in size from the body chamber; outer edes rounded joining surfaces flat. Type D. con. oideus.
- conoideus, Hall, 1852, Pal. N. Y., vol. 2. p. 99, Clinton and Niagara Gr.
- ENDOCERAS, Hall, 1847, Pal. N. Y., vol. 1, p. 58. [Ety. endos, within; keras, horn.] An elongated conical shell, resembling an Orthoceras, and possessed of one or more smooth siphuncles, which do not expand in passing through the cham. bers. Type E. annulatum.
- angusticameratum, Hall, 1847, Pal. N. Y. vol. 1, p. 218. Trenton Gr.
- annulatum, Hall, 1847, Pal. N. Y., vol. 1. p. 207, Trenton Gr.
- approximatum, Hall, 1847, Pal. N. Y., vol. 1, p. 219, Trenton Gr.
- arctiventrum, Hall, 1847, Pal. N. Y., vol. 1, p. 217, Trenton Gr.

atlanticum, Barrande, 1870, Syst. Sil. de Boh., vol. 2, p. viii, pl. 430, Quebee Gr. bristolense, S. A. Miller, 1882, Jour Cin. Soc.

Nat. Hist., vol. 5, p. 85, Hud. Riv. Gr. distans, Hall, 1847, Pal. N. Y., vol. 1, p.

220, Trenton Gr. duplicatum, Hall, 1847, Pal. N. Y., vol. 1,

- p. 219, Trenton Gr.
- egani, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 84, Hud. Riv. Gr.



FIG. 734.-Endoceras longissimum.

gemelliparum, Hall, 1847, Pal. N. Y., vol. 1, p. 60, Black Riv. Gr.

inæquabile, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 86, Hud. Riv. Gr.

END. -GOM.]

CYR.-END.

insulare, Barrande vol. 2, p. viii, pl lativentrum, Hall Mus. Nat. Hist., longissimum, Hal 1, p. 59, Black I magniventrum, H

1, p. 218, Trento marcoui, Barrande

2d ser., 4me, Qu multitubulatum, vol. 1, p. 59, Blac The type of Hy proteiforme, Hall

1, p. 208, Hud. proteiforme var. Pal. N. Y., vol. proteiforme var.

Pal. N. Y., vol. proteiforme var. s

Pal. N. Y., vol. proteiforme var. te Pal. N. Y., vol.

proteiforme var. t Pal. N. Y., vol. rapax, Billings, 18 Can. Nat. and

Black Riv. Gr. rottermundi, Bar rottermundi,) S 2me, p. xiii, pl. subannulatum, W

Geo. Sur. Wis., vol. 4, p. 230, T subcentrale, Hall,

1, p. 59, Black I vanuxemi, Conra uxemi,) Jour.

Trenton Gr. Endolobus, Meek & Acad. Nat. Sci. 1

within : lobos, 1 later that this g Temnochilus, a probably be a genus Bisiphites

peramplus, see Te spectabilis, see Ter Glossoceras, Barrance

Bohemia, vol. tongue; keras, der annulated v



FIG. 735.— A pert u Gomphoceras

GOMPHOCERAS, SOW Syst. p. 620. [H

FIG. 732.-Cyrtocerina

outline, side view.

[CYR.-END.

END.-GOM.]

2, Geo. Sur. Wis., 31, Subcarb.

l. N. Y., vol 2, p. t; soros, heap or series of disks, in size from the · edes rounded: Type D. con-

al. N. Y., vol. 2, gara Gr.

. N. Y., vol. 1, p. in; keras, horn.] shell, resembling ssessed of one or es, which do not rough the chamum.

1847, Pal. N. Y. Gr. Pal. N. Y., vol. 1,

7, Pal. N. Y., vol.

, Pal. N. Y., vol.

870, Syst. Sil. de 430, Quebee Gr. 82, Jour Cin. Soc. Hud. Riv. Gr. N. Y., vol. 1, p.

Pal. N. Y., vol. 1.

Jour. Cin. Soc. Hud. Riv. Gr.



ngissimum , Pal. N. Y., vol.

1882, Jour. Cin. 5, p. 86, Hud. CEPHOLOPODA.

insulare, Barrande, 1870, Syst. Sil. de Boh., vol. 2, p. viii, pl. 430-431, Quebec Gr. lativentrum, Hall, 1850, 3d Rep. N. Y.

Mus. Nat. Hist., p. 181, Trenton Gr. longissimum, Hall, 1847, Pal. N. Y., vol. 1, p. 59, Black Riv. and Trenton Gr. magniventrum, Hall, 1847, Pal. N. Y., vol.

1, p. 218, Trenton Gr. marcoui, Barrande, 1869, Syst. Sil. de Boh.,

2d ser., 4me, Quebec Gr. multitubulatum, Hall, 1847, Pal. N. Y., vol. 1, p. 59, Black Riv. and Trenton Grs.

- The type of Hyatt's genus Vaginoceras. proteiforme, Hall, 1847, Pal. N. Y., vol. 1, p. 208, Hud. Riv. and Trenton Grs. proteiforme var. elongatum, Hall, 1847, Pal. N. Y., vol. 1, p. 216, Trenton Gr. proteiforme var. lineolatum, Hall, 1847, Pal. N. Y., vol. 1, p. 211, Trenton Gr.
- proteiforme var. strangulatum, Hall, 1847, Pal. N. Y., vol. 1, p. 212, Trenton Gr. proteiforme var. tenuistriatum, Hall, 1847,
- Pal. N. Y., vol. 1, p. 209, Trenton Gr. proteiforme var. tenuitextum, Hall, 1847,
- Pal. N. Y., vol. 1, p. 210, Trenton Gr. rapax, Billings, 1860, (Orthoceras rapax,)
- Can. Nat. and Geol., vol. 5, p. 176, Black Riv. Gr. rottermundi, Barrande, 1866, (Orthoceras rottermundi,) Syst. Sil. de Boh., 2d ser.,
- 2me, p. xiii, pl. 230, Trenton Gr.
- subannulatum, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis., p. 56, and Geo. Wis., vol. 4, p. 230, Trenton Gr.
- subcentrale, Hall, 1847, Pal. N. Y., vol. 1, p. 59, Black Riv. Gr.
- vanuxemi, Conrad, 1842, (Diploceras vanuxemi,) Jour. Acad. Sci., vol. 8, p. 267, Trenton Gr.
- Endolobus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 259. [Ety. endos, within; lobos, lobe.] Prof. Meek said later that this genus is not distinct from Temnochilus, and if distinct it would probably be a synonym for Montfort's genus Bisiphites.

peramplus, see Temnochilus peramplum. spectabilis, see Temnochilus spectabile. Glossoceras, Barrande, 1865, Cephalopods of

Bohemia, vol. 2, p. 372. [Ety. glosse, tongue; keras, horn.] Having a slender annulated whorl, and an obscurely

Y - shaped aperture. It is not known as an American genus, desideratum, Billings, 1866,Catal. Sil. Foss. Antic., p. 60. Not defined so as to be rec-

ognized.

FIG. 735.—A perture of Gomphoceras.

GOMPHOCERAS, Sowerby, 1839, Murch. Sil. Syst. p. 620. [Ety. gomphos, club; keras, horn.] Shell fusiform or globular with a tapering apex; aperture contracted in the middle; siphuncle moniliform, subcentral. Type G. pyriforme.

abruptum, Hall. 1879, Pal. N. Y., vol. 5, pt. 2, p. 339, Ham. Gr. absens, Hall, 1876, (Cyrtoceras absens,) Illust. Devon. Foss., pl. 47, and Pal. N. Y.,

vol. 51 pt. 2, p. 324, Up. Held. Gr. ajax, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 350,

Portage Gr. amphora. Whit-

field, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 207, Up. Held. Gr.

FIG. 736 -Gomphoceras pyriforme.

- beta, Hall, 1862. 15th Rep. N. Y. Mus. Nat. Hist., p. 72, and Pal. N. Y., vol. 5, pt. 2, p. 326, Up. Held, Gr.
- breviposticum, Whitfield, 1882, Geo. Wis.,
- vol. 4, p. 339, Ham. Gr. cammarus, Hall, 1879, Pal. N. Y., vol. 5,
- p. 333, Up. Held. Gr. cassinense, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 322, Birdseve Gr.
- cincinnatiense, S. A. Miller, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 19, Hud. Riv. Gr.
- clavatum, Hall, 1876, (Cyrtoceras clava- v tum,) Illust. Devon. Foss., pl. 47, Up. Held. Gr.
- conradi, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 106, Ham. Gr.
- crenatum, Beecher, 1888, Pal. N. Y., vol. 7, p. 33, Up. Held. Gr. cruciferum, Hall, 1879, Pal. N. Y., vol. 5,
- p. 328, Schoharie grit.
- eos, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 100, Hud. Riv. Gr.
- eximium, Hall, 1861, 14th Rep. N. Y. Mus. Nat. Hist., p. 109, and Pal. N. Y., vol. 5, pt. 2, p. 299, Up. Held. Gr.
- faberi, S. A. Miller, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 19, Hud. Riv. Gr.
- fax, Hall, 1879, Pal. N. Y., vol. 5, p. 321, * Schoharie grit.

fischeri, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 106, and Pal. N. Y., vol. 5, pt. 2, p. 336, Ham. Gr.

fusiforme, Whitfield, 1882, Geo. Wis., vol. 4, p. 338, Ham. Gr.

hertzeri, Hall & Whitfield, 1875, (Cyrtoceras hertzeri,) Ohio Pal., vol. 2, p. 150, Niagara Gr.





- gomphus, Hall, 1879, Pal. N. Y., vol. 5, p. | GONIATITES, DeHaan, 1825, Monographia-334, Up. Held. Gr.
- hyatti, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 206, Up. Held. Gr.
- illænus, Hall, 1879, Pal. N. Y., vol. 5, p. 332. Schoharie grit. impar, Hall, 1879, Pal. N. Y., vol. 5, p.
- 332, Up. Held. Gr.
- lunatum, Hall, 1879, Pal. N. Y., vol. 5, p. 341, Ham. Gr. manes, Hall, 1879, Pal. N. Y., vol. 5, p.
- 339, Genesee Slate.
- marcyæ, Winchell & Marcy, 1855, Mem. Bost. Soc. Nat. Hist. Syn. for G. scrinium.
- minimum, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 321, Birdseye Gr.
- minum, Beecher, 1888, Pal. N. Y., vol. 7, p. 34, Ham. Gr.
- mitra, Hall, 1879, Pal. N. Y., vol. 5, p. 330, Up. Held. Gr.
- nasutum, Beecher, 1888, Pal. N. Y., vol. 7, p. 34, Chemung Gr.
- p. 34, Chemung Gr. ob+sum, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 311, Utica Gr. omicron, Winchell, 1866, Rep. Low. Pen-insula Mich., p. 97, Ham. Gr. oviforme, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 105, Ham. Gr. pingue, Hall, 1879, Pal. N. Y., vol. 5, p. 346 Ham. Gr.
- 346, Ham. Gr.
- planum, Hall, 1879, Pal. N. Y., vol. 5, p. 352, Ham. Gr.
- plenum, Beecher, 1888, Pal. N. Y., vol. 7, p. 33, Up. Held. Gr.
- poculum, Hall, 1879, Pal. N. Y., vol. 5, p. 340, Ham. Gr.
- potens, Hall, 1879, Pal. N. Y., vol. 5, p. 351, Waverly Gr.
- powersi, James. Not recognized. raphanus, Hall, 1879, Pal. N. Y., vol. 5,
- p. 347, Ham. Gr. rude, Hall, 1879, Pal. N. Y., vol. 5, p. 327,
- Ham/. Gr
- sacculus, Meek & Worthen, 1866, Proc. Acad. Nat. Sci., p. 258, and Geo. Sur.
- Ill., vol. 3, p. 445, Ham. Gr. sciotoense, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 208, Up. Held. Gr.
- scrinium, Hall, 1864, 20th Rep. N. Y. Mus. Nat. Hist., p. 410, Niagara Gr.
- septore, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 410, Niagara Gr.
- solidum, Hall, 1879, Pal. N. Y., vol. 5, p. 338, Marcellus Shale.
- subgracile, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 311, Up. Sil.
- suboviforme, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 202, Devonian.
- tumidum, Hall, 1879, Pal. N. Y., vol. 5, p. 351, Chemung Gr.
- turbiniforme, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 258, and Geo. Sur. Ill., vol. 3, p. 444, Ham. Gr.

Ammoniteorum et Goniatiteorum, p. 159.

[Ety. gonia, an angle; lithos, stone. This name, it

seems, should be spelled Gonialites.] Discoid; whorlsembracing, sometimes closing the umbili-



cus; septa FIG. 737.-Goniatites sphericus

- zigzag lines or sutures; when the septa are tolded the elevations are called saddles; body chamber long, sometimes constituting a whorl, but never expanding but slightly; siphuncle ventral.
- Type Goniatites sphericus. allii, Winchell, 1862, Am. Jour. Sci., 2d series, vol. 33, p. 363, Marshall Gr. amplexus, Beecher, 1889, Pal. N. Y., vol.
- 7, p. 39, Tully limestone. andrewsi, Winchell, 1870, Proc. Am. Phil. Soc., vol. 12, p. 259, Marshall Gr.
- astarte, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 29, Marcellus Shale.
- bicostatus, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 245, and Pal. N. Y., vol. 5, pt. 2, p. 450, Portage Gr.
- canadensis, Castelnau, 1843, Syst. Sil. p. 34. Probably a syn. for Bellerophon bilobatus.
- chemungensis, Vanuxem, 1842, Geo. Rep. 3d Dist. N. Y., p. 182, and Pal. N. Y.,
- vol. 5, pt. 2, p. 467, Chemung Gr. chemungensis var. æquicostatus, Hall, 1875, 27th Rep. N. Y. Mus. Nat. Hist., p. 135, Chemung Gr.
- choctawensis, Shumard, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 109, Coal Meas
- colubrellus, Morton, 1836, (Ammonites colubrellus), Am. Jour. Sci. and Arts,
- vol. 29, p. 154, Waverly Gr. compactus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 154, and Geo. Sur. Ill., vol. 5, p. 611, Coal Meas. complanatus, Hall, 1843, (Clymenia (?)
- complanatus,) Geo. Rep. 4th Dist. N. Y. p. 244, and Pal. N. Y., vol. 5, p. 455. Portage Gr.
- complanatus var. perlatus, Hall, 1875, 27th Rep. N. Y. Mus. Nat. Hist., p. 132, Chemung Gr.
- desideratus, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 203, Devonian.
- discoideus, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 97, and Illust. Devon. Foss., pl. 71, Ham. Gr. The type of Hyatt's genus Parodiceras.
- discoideus var. ohioensis, Hall, 1874, 27th Rep. N. Y., p. 200, Up. Held. Gr.
- entogonus, Gabb, 1861, Proc. Acad. Nat. Sci., p. 372, Carboniferous.

erato, Hall, 1862, Rep. N. Y. Mus Illust. Devon. F expansus, Vanuxen occupied by Vo G. vanuxemi.

FIG. 739.-Goniatites gl losus. Outline.

goniolobus, Meek, 40th Parallel, vol hathawayanus, M New Pal. Foss.,]

GON.

GON.

GON.

GON.]

, Monographiæ titeorum, p. 159. 108, stone. This



atites sphericus

when the septa ons are called ong, sometimes never expanduncle ventral. us.

Jour. Sci., 2d arshall Gr. Pal. N. Y., vol.

), Proc. Am.), Marshall Gr. U. S. Geo. Sur., Shale. . Rep. 4th Dist.

. Y., vol. 5, pt.

3, Syst. Sil. p. r Bellerophon

1842, Geo. Rep. nd Pal. N. Y., mung Gr. ostatus, Hall, us. Nat. Hist.,

363, Trans. St. , p. 109, Coal

, (Ammonites Sci. and Arts, Fr. en, 1865, Proc. 154, and Geo. oal Meas. (Clymenia (?) th Dist. N.Y., vol. 5, p. 455.

s, Hall, 1875,
 t. Hist., p. 132,

Monogr. U. S. Devonian. h Rep. N. Y. , and Illust. am. Gr. The rodiceras.

Up. Held. Gr. bc. Acad. Nat.



FIG. 738.-Goniatites globulosus

erato, Hall, 1862, (Clymenia erato,) 15th Rep. N. Y. Mus. Nat. Hist., p. 64, and Illust. Devon. Foss., pl. 70, Ham. Gr. *expansus*, Vanuxem. The name was preoccupied by Von Buch in 1838. See G. vanuxemi.

globulosus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 471, and Geo. Sur. Ill., vol. 2, p. 390, Up. Coal Meas. globulosus' var. excelsus, Meek, 1876, Bull. U.S. Geo. Sur. Terr., yvol. 1, No. 6,

445, Coal

FIG. 739.—Goniatites globulosus. Outline. p. 44 Meas.

goniolobus, Meek, 1877, U. S. Geo. Sur. 40th Parallel, vol. 4, p. 98, Carboniferous. hathawayanus, McChesney, 1860, Desc. New Pal. Foss., p. 66, Coal Meas. hildrethi, Morton, 1836, (Ammonites hildrethi,) Am. Jour. Sci. and Arts, vol. 29, p. 149, Waverly Gr.

holmesi, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 659, Waverly or Choteau Gr.

houghtoni, Winchell, 1862, Am. Jour. Sci., 2d ser., vol. 33, p. 363, Marshall Gr. hyas, Hall, 1860, syn. for G. lyoni.

- hyas, Hall, 1860, syn. for G. lyoni iowensis, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 471, and Geo. Sur. Ill., vol. 2, p. 392, Coal Meas. Type of Hyatt's genus Paralegoceras.
- ixion, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 125, Kinderhook Gr. This species is founded on the form which has been identified with the European species G. rotatorius.
- kentuckiensis, n. sp. Shell very globose and wide or broadly rounded on the dorsal side; outer volution embracing the inner ones; umbilicus small and disclosing none of the inner volutions, though the body chamber is broken from our specimens; suture having a sharp, dorso-lateral lobe and an equally

CEPHALOPODA.

deep, bifid, central dorsal lobe; dorsal This species is saddle subangular. readily distinguished by its deep, globose form and sharply bifid lobe on the dorsal side. Collected by Charles Faber at Crab Orchard, Kentucky, in the St. Louis Group.





FIG. 740.—Goniatites kentuckiensis. The saddles are generally more angular than they appear in the figure

- kingi, Hall & Whitfield, 1877, U. S. Geo. Expl. Exped., 40th parallel, vol. 4, p. 279, Coal Meas.
- lutheri, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 50, Chemung Gr. lyoni, Meek & Worthen, 1860, Proc. Acad.
- Nat. Sci. Phil.; vol. 12, p. 471, and Geo. Sur. Ill., vol. 2, p. 165, Kinderhook Gr. marcellensis, see Discites marcellensis.
- marshallensis, Winchell, 1862, Am. Jour.
 - Sci., 2d ser., vol. 33, p. 362, Marhall Gr.
 - minimus, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 200, Coal Meas. mithrax, Hall, 1860, 13th Rep. N. Y. Mus.
 - Nat. Hist., p. 98, and Pal. N. Y., vol. 5, pt. 2, p. 433, Up. Held. Gr. monroensis, Worthen, (in press.) Geo.

Sur. Ill., vol. 8, p. 150, St. Louis Gr.

- morganensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 659, Waverly or Choteau Gr.
- nodifer, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 21, Marcellus Shale.

nolinensis, Cox, 1857, Geo. Sur. Ky., vol. 3, p. 574, Coal Meas.

- nundaia, Hall, 1875, syn. for G. sinuosus. ohioensis, Winchell, 1870, Proc. Am. Phil.
- Soc., vol. 12, p. 259, Marshall Gr. opimus, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 305,
- Kinderhook Gr. orbicella, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 99, Ham. Gr.
- osagensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 659, Waverly or Choteau Gr.
- oweni, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 100, Kinderhook Gr.
- oweni var. parallelus, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 101, Kinder-hook Gr. Type of Hyatt's genus Munsteroceras.

parvus, Shumard, 1858, Trans. St. Louis, Acad. Sci., vol. 1, p. 199, Coal Meas.

patersoni, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 99, Portage Gr.

peracutus, Hall, 1876, Illust. Devonian Foss., pl. 69, and Pal. N. Y., vol. 5, pt. 2, p. 463, Portage Gr.

- planorbiformis, Shumard, 1855, Geo. Sur. Mo., p. 208, Coal Meas.
- plebeiformis, Hall, 1879, Pal. N. Y., vol. 5, p. 448, Marcellus Shale.
- politus, Shumard, 1858, Trans. St. Louis
- Acad. Sci., vol. 1, p. 199, Coal Meas, propinguus, Winchell, 1862, Am. Jour. Sci. and Arts, 2d series, vol. 33, p. 365, Marshall Gr.
- punctatus, Conrad, 1838, Ann. Rep. N. Y., p. 117, Ham. Gr. Not properly defined.
- pygmæus, Winchell, 1862, Am. Jour. Sci. and Arts, 2d series, vol. 33, p. 366, Mar. shall Gr.
- romingeri, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 427, Marshall Gr. rotatorius, DeKoninck, 1843, Desc. des Anim. Foss. du Terr. Carb. See G. ixion. shumardanus, Winchell, 1865, Am. Jour.
- Sci. and Arts, 2d series, vol. 33, p. 363, Marshall Gr. simulator, Hall, 1875, 27th Rep. N.Y.
- Mus. Nat. Hist., p. 133, Chemung Gr. Type of Hyatt's genus Manticoceras.
- sinuosus, Hall, 1843. Geo. Rep. 4th Dist. N. Y., p. 243, and Pal. N. Y., vol. 5, pt. 2, p. 460, Portage Gr. Type of Hyatt's genus Gephuroceras.

subcircularis n.

sp. Shell small, circular; outer volution embracing the inner ones; umbilicus does not ex-



pose any of FIG. 741.-Goniatites subcirthe inner vocularis. Lateral and dorsal views magnified 2 diam. lutions; four furrows or constrictions radiate from the umbilicus and divide the shell into four subequal parts, but become obsolete on the dorsal side, and in this respect resemble Goniatites divisus of De-Koninck; dorsal side round; body chamber unknown; suture lobed; entire surface longitudinally striated. Collected by Charles Faber, at Crab Orchard, Kentucky, in the St. Louis Group.

- sulciferus, Winchell. Not defined. texanus, Shumard, 1863, Trans. St. Louis
- Acad. Sci., vol. 2, p. 109, Coal Meas. uniangularis, Conrad, 1842, Jour Acad.
- Nat. Sci., vol. 8, p. 268, Ham. Gr. Type of Hyatt's genus Tornoceras.
- unilobatus, Hall, 1875, 27th Rep. N. Y.

Mus. Nat. Hist., p. 133, and Illust. Devon. Foss., pl. 71, Ham. Gr. vanuxemi, Hall, 1879, Pal. N. Y., vol. 5, p. 434, Marcellus Shale. Proposed instead of G. expansus, of Vanuxem, which was preoccupied by Von Buch. whitii, Winchell, 1862, Proc. Acad. Nat. Sci., vol. 6, p. 428, Portage Gr.

GON.-GYR.]

GON.

GONIOCERAS, Hall, 1 p. 54. [Ety. go Somewhat in the but more or les form; transvers a depressed e angles; siphunc over the ventra illustration. Ty



FIG. 742.--Go

anceps, Hall, 184 54, Black Riv. (occidentale, Hall, p. 47, Trenton (

GYROCERAS, DeKon Foss. Belg., p. 5

keras, horn.] Meyer, 1829. - 1 plane; volution but not embrac circular, elliptic onal; body cha times straight o opening hollow border like the and frequently ward; siphon sl usually subcent border, but sol the concave bo lous, having imb ringed with pro

septa. Type G. abruptum, Hall, Foss., p. 19, an Nat. Hist., Ind.

americanum, Billin Can. Geo. Sur.,

- baeri, Meek & Wo ras baeri,) Proc. and Ohio Pal.,
- Riv. Gr. bannisteri, Winch Bost. Soc. Nat.
- agara Gr. burlingtonense, see N

columbiense, Whi Acad. Sci., vol. constrictum, Meek

Sur. Ill., vol. 3, cornutum, Owen, Lands, p. 69, De cyclops, Hall, 186

Nat. Hist., p. Foss., pl. 53, Up duplicostatum, Wl Geo. Sur. Wis.,

vol. 4, p. 235, T

GON.

GON.-GYR.]

lust. Devonian . Y., vol. 5, pt.

1855, Geo. Sur.

Pal. N. Y., vol. e. rans. St. Louis Coal Meas.

62, Am. Jour. , vol. 33, p. 365. nn. Rep. N. Y.

operly defined. Am. Jour. Sci. 33, p. 366, Mar-

Proc. Acad. il Gr. 43, Desc. des b. See G. ixion. 865, Am. Jour. vol. 33, p. 363,

th Rep. N.Y. Chemung Gr. fanticoceras. Rep. 4th Dist. Y., vol. 5, pt. 'ype of Hyatt's



oniatites subcirateral and dorsal nified 2 diam.

s radiate from e the shell into become obsoand in this res divisus of Deround; body ure lobed; eny striated. Colber, at Crab the St. Louis

lefined. rans. St. Louis Coal Meas. 2, Jour Acad. lam. Gr. Type eras.

th Rep. N. Y. 3, and Illust. m. Gr.

N. Y., vol. 5, Proposed inof Vanuxem, y Von Buch. oc. Acad. Nat. e Gr.

CEPHALOPODA.

GONIOCERAS, Hall, 1847, Pal. N. Y., vol. 1, p. 54. [Ety. gonia, angle; keras, horn.] Somewhat in the form of an Orthoceras, but more or less flattened and subfusiform; transverse section in the form of a depressed ellipse with projecting angles; siphuncle ventral, septa curve over the ventral side, as shown in the illustration. Type G. anceps.



FIG. 742.—Gonjoceras ancens.

anceps, Hall, 1847, Pal. N. Y., vol. 1, p. 54, Black Riv. Gr.

occidentale, Hall, 1861, Rep. of Progr. Wis., p. 47, Trenton Gr.

- GYBOCERAS, DeKoninck, 1844, Desc. An. Foss. Belg., p. 530. [Ety. gyros, circle; keras, horn.] Not Gyroceratites of keras, horn.] Not Gyroceratites of Meyer, 1829. Discoid, rolled in one plane; volutions in contact or open, but not embracing; transverse section circular, elliptical, scutiform, or polygonal; body chamber large and sometimes straight or tangent to the spiral; opening hollowed out on the exterior border like the Nautilus; septa arched and frequently project, curving backward; siphon slender, cylindrical, and usually subcentral toward the convex border, but sometimes found within the concave border; surface tuberculous, having imbricated excrescences or ringed with projecting fringes from the septa. Type G. paradoxicum. abruptum, Hall, 1879, Desc. New Spec.
- Foss., p. 19, and 11th Rep. Geo. and Nat. Hist., Ind. p. 325, Niagara Gr.
- americanum, Billings, 1857, Rep. of Progr.
- Can. Geo. Sur., p. 309, Up. Sil. baeri, Meek & Worthen, 1865, (Trochoce-ras baeri,) Proc. Acad. Nat. Sci., p. 263, and Ohio Pal., vol. 1, p. 157, Hud. Riv. Gr.
- bannisteri, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., vol. 1, p. 102, Niagara Gr.
- burlingtonense, see Nautilus burlingtonensis. columbiense, Whitfield, 1882, Ann. N. Y.
- Acad. Sci., vol. 2, p. 210, Up. Held. Gr. constrictum, Meek & Worthen, 1868, Geo.
- constructum, Meek & Wortnen, 1808, Geo.
 Sur. Ill., vol. 3, p. 446, Ham. Gr.
 cornutum, Owen, 1840, Rep. on Min.
 Lands, p. 69, Devonian.
 cyclops, Hall, 1862, 15th Rep. N. Y. Mus.
 Nat. Hist., p. 68, and Illust. Devon.
 Foss., pl. 53, Up. Held. Gr.
 duplicostatum, Whitfield, 1878, Ann. Rep.
 Geo. Sur. Wis., p. 78, and Geo. Wis.
- Geo. Sur. Wis., p. 78, and Geo. Wis., vol. 4, p. 235, Trenton Gr.

- elrodi, White, 1882, 11th Ann. Rep. Geol. and Nat. Hist. Indiana, p. 356, Niagara Gr. eryx, Hall, 1862, 15th Rep. N. Y. Mus.
- Nat. Hist., p. 67, Ham. Gr.
- expansum, Saeman, Dunker & Von Meyer, 1853, Palæontographica, vol. 4. See Nautilus buccinum.
- gracile, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 105, Kinderkook Gr. Probably a syn. for Trematodiscus digonus.
- hartti, see Discites hartti.
- inelegans, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 89, and Ohio Pal., vol. 1, p. 232, Up. Held. Gr.
- jason, Hall, 1862, (Cyrtoceras jason,) 15th Rep. N. Y. Mus. Nat. Hist., p. 71, Up. Held. Gr. Type of Hyatt's genus Rutoceras.
- laciniosum, Hall, 1879, Pal. N. Y., vol. 5, p. 376, Up Held. Gr.
- liratum, see Nautilus liratus.
- logani, Meek, 1868, Trans. Chi. Acad. Sci., p. 110, Devonian.
- magnificum, see Lituites magnificus.
- matheri, Conrad, 1840, Ann. Rep. N. Y., p. 206, and Pal. N. Y., vol. 5, pt. 2, p. 377, (Cyrtoceraslmatheri,) Up. Held. Gr.
- nais, see Porcellia nais. nereus, Hall, 1862, 15th Rep. N. Y. Mus.
- Nat. Hist., p. 67, and Pal. N. Y., vol. 5, pt. 2, p. 373, Up. Held. Gr. numa, Billings, 1875, Can. Nat. and Geol., vol. 7, p. 238, Up. Held. Gr.
- ohioense, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 87, and Ohio Pal., vol. 1, p. 230, Up. Held. Gr.
- paucinodum, Hall, 1876, Illust. Devonian Foss., pl. 55, and Pal. N. Y., vol. 5, pt. 2, p. 380, Up. Held. Gr.
- pratti, Barris, 1879, Proc. Dav. Acad. Sci., vol. 2, p. 287, Up. Held. Gr.
- rhombolineare, Owen, 1862, Geo. Sur. Indiana, p. 362, Silurian.
- rockfordense, Meek & Worthen, 1866, (Nautilus (Cryptoceras) rockfordensis,) Proc. Acad. Nat. Sci. Phil., p. 275, and Geo. Sur. Ill., vol. 3, p. 459, Kinderhook Gr.
- seminodosum, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 211, Up. Held. Gr.
- spinosum, Conrad, 1840, (Phragmoceras spinosum,) Ann. Rep. N. Y., p. 206, and Pal. N. Y., vol. 5, pt. 2, p. 382, Schoharie grit.
- stebos, Beecher, 1888, Pal. N. Y., vol. 7, p. 36, Waverly Gr.
- subliratum, see Nautilus subliratus.
- transversum, Hall, 1860, (Cyrtoceras transversum,) 13th Rep. N. Y. Mus. Nat. Hist., p. 104, and Pal. N. Y., vol. 5, pt. 2, p. 384, Ham. Gr. trivolve, Conrad, 1840, (Cyrtoceras tri-volvie) App. Rep. N. Y. 2006 and Pal
- volvis,) Ann. Rep. N. Y., p. 206, and Pal.
- N. Y., vol. 5, pt 2, p. 374, Up. Held. Gr. N. 1., vol. 5, pt 2, p. 517, Op. 1101. du undulatum, Vanuxem, 1842, (Cyrtoceras undulatum,) Geo. Rep. N. Y., p. 139, and Pal. N. Y., vol. 5, pt. 2, p. 378, Up. Held.
- Gr. Type of Hyatt's genus Halloceras.

CEPHALOPODA. *

vagrans, Billings, 1857, Rep. of Progr. Can. Geo. Sur., p. 308, Black Riv. Gr. validum, Hall, 1876, Illust. Devonian Foss., pl. 51, and Pal. N. Y., vol. 5, pt. 2, p. 385, Schoharie grit.



FIG. 743.—Gyroceras undulatum

Hortholus americanus, see Lituites americanus.

HURONIA, Stokes, 1823, Geo. Trans., n. s., vol. 1, p. 203. When this genus was proposed, the author thought he was describing a coral. Prof. Billings said the name was proposed for the siphuncle of an Orthoceras, and is, therefore, merely a synonym. This seems to be the correct opinion, though the shells to which the peculiar siphuncles belong are unknown. Type H. bigsbyi. annulata, Hall, 1851, Lake Superior Land Dist. by Foster & Whitney, p. 221, Ni-

agara Gr. bigsbyi, Stokes, 1823, Trans. Geo. Soc.,

vol. 1, p. 195, Clinton Gr. minuens, Barrande, 1869, Syst. Sil. de

Boh., 2d series, vol. 4, pl. ix, p. 435, Clinton Gr.

series, vol. 1, p. 203, Clinton Gr.

portlocki, Stokes, 1840, Trans. Geo. Soc., 2d series, vol. 5, p. 710, Clinton Gr. sphæroidalis, Stokes. 1840, Trans. Geo. Soc., 2d series, vol. 5, p. 710, Clinton Gr. stokesi, Castelnau, 1843,

Syst. Sil., p. 33, Schoharie grit. Not recognized.

turbinata, Stokes, 1823. Trans. Geo. Soc., 2d series, vol. 1, p. 203, Clinton Gr.

vertebralis, Stokes, 1840.

vertebralis. Trans Geo. Soc., 2d series, vol. 5, p. 710, Niagara and Clinton Grs. See Orthoceras canadense.

Hydnoceras, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8. See Dictyophyton, a spottge. tuberosum, see Dictyophyton tuberosum LITUITES,

Mont-1808. fort. Conch. Syst., vol. 1, p. 279, [Ety. lituus, trumpet. Shell spiral in the beginning; last chambers produced straight;



HOR.- LIT.

teus. Quarter size whorls free or

- open in one plane; septa simple; siphuncle central; section circular. Type L. lituus.
- americanus, D'Orbigny, 1850, (Hortholus americanus,) Prodr. d. Paléont., t. 1, p. 1, Black Riv. Gr.
- apollo, Billings, 1862, Pal. Foss., vol. 1, p. 25, Calciferous Gr.
- bickmoreanus, Whitfield, 1885, Bull. Am. Mus. Nat. Hist., vol. 1, p. 191, Niagara Gr.
- cancellatus, McChesney, 1861, New Pal. Foss., Niagara Gr. See L. occidentalis and Nautilus cancellatus and N. occi dentalis. If this species, as Prof. Hall suggests, is a true Nautilus, McChesney's name has precedence.

capax, see Nautilus capax.

- complanatus, Shumard, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 107, Calciferous Gr.
- convolvans, Schlotheim, 1813, in Jahrbuch, as identified by Hall, Pal. N. Y., vol. 1, p. 53. See L. americanus.
- eatoni, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 331, Birdseye Gr.
- eatoni var. cassinensis, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 332, Birdseye Gr.
- farnsworthi, Billings, 1861, Pal. Foss., vol. 1, p. 21, Calciferous Gr.
- graftonensis, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil. p. 51, and Geo. Sur. Ill., vol. 6, p. 507, Niagara Gr. hercules, Winchell & Marcy, 1865, Mem.
- Bost. Soc. Nat. Hist., Niagara Gr. Syn. for Cyrtoceras amplicorne. See 20th Rep. N. Y. Mus. Nat. Hist.
- imperator, Billings, 1861, Pal. Foss., vol. 1, p. 23, Calciferous Gr.
- magnificus, Billings, 1857, (Gyroceras magnificus,) Rep. of Progr. Geo. Sur. Can., p. 307, Hud. Riv. Gr. Type of Hyatt's genus Aspidoceras.
- marshi, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 404, Niagara Gr. internistriatus, Whitfield, 1886, Bull. Am.
- Mus. Nat. Hist., vol. 1, p. 332, Birdseye Gr.
- multicostatus, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis., p. 67, and Geo. Wis.,
- vol. 4, p. 303, Niagara Gr. murchisoni, Truost. Not defined so as to be recognized.

MEL.-NAU.]

niagarensis, Sper Mus. Univ. St. occidentalis, Hall.

Sur. Wis., Nia now referred b Nautilus, see Nat. Hist., p. 40 by McChesney giganteum, but cupied, in 186 cancellatus. If word occidents McChesnev's n

cedence. ortoni, Meek, 18 186, Niagara G

palinurus, Billing p. 25, Calcifero

pluto, Billings, 18 259, Quebec Gr

robertsoni, Hall, p. 38, Chazy ar seelyi, Whitfield Nat. Hist., vol.

undatus, Emmor tus,) Geo. Rep. N. Y., vol. 1,

Trenton Grs. undatus var. occi of Progr. Wis. Trenton Grs.

Melia cancellatus, En Not defined so

cincinnatiæ, D'OI Paléont., t. 1, p be recognized.

NAUTILUS, Breynin p. 11. [Ety. N tor.] Shell si volutions coiled tiguous; umbi septa simple, a lateral margins subcentral; lip

and ventro-lat smooth, striate, Type N. pompi acræus, Hall, 187

2, p. 417, Ham. avonensis, see Sole avus, Barrande,

vol. 4, p. viii, p barrandi, Hall, 18 biserialis, Hall, 1

2, Iowa Geo. St buccinum, Hall, Foss., pl. 60, au 2, p. 412, Ham

genus Nephriti calciferus, Billing

1, p. 258, Calcif cancellatus, McC cancellatus,) No

agara Gr. canaliculatus, Co vol. 3, p. 575, C

att's genus Sole capax, Hall 1860, Progr. Geo. Su





FIG. 744. – Huronia

HOR.- LIT.

our. Acad. Nat. hyton, a sponge. n tuberosum.



Lituites gigan Quarter size

pta simple; sicircular. Type

350, (Hortholus Paléont., t. ∣, p.

Foss., vol. 1, p.

1885, Bull. Am. p. 191, Niag-

861, New Pal. L. occidentalis s and N. occias Prof. Hall ١., tilus, McChesace.

863, Trans. St. p. 107, Calcif-

3, in Jahrbuch, 1. N. Y., vol. 1, ull. Am. Mus.

Birdseye Gr. Vhitfield, 1886, list., vol. 1, p.

Pal. Foss., vol.

hen, 1870, Proc. . 51, and Geo. iagara Gr. y, 1865, Mem. gara Gr. Syn. rne. See 20th ist. Pal. Foss., vol.

7, (Gyroceras ogr. Geo. Sur. Gr. Type of

88. ep. N. Y. Mus. a Gr.

886, Bull. Am. p. 332, Birds-

880, Ann. Rep. nd Geo. Wis.,

efined so as to

- capax, Meek & Worthen, 1865. This was preoccupied and must yield unless it can be retained in the subgenus Solenochilus
- cavus, Hall, 1879, Pal. N. Y., vol. 5, p. 416, Ham. Gr.
- champlainensis, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 329, Birdseve Gr.
- chesterensis, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 469, and Geo. Sur. Ill., vol. 2, p. 306, Kaskaskia Gr. clarkanus, Hall, 1858, Trans. Alb. Inst.,
- vol. 4, p. 32, and Bull. Am. Mus. Nat. Hist., p. 92, Warsaw Gr.
- collectus, see Solenochilus collectum.
- cornulum, Hall, 1876, Illust. Devonian Foss., pl. 60, and Pal. N. Y., vol. 5, pt. 2, p. 414, Ham. Gr.
- coxanus, see Temnochilus coxanum.
- danvillensis, White, 1878, Proc. Acad. Nat. Sci., p. 36, and Cont to Pal., No. 8, p. 170, Coal Meas.
- decoratus, Cox, 1857, Geo. Sur. Ky., vol. 3, p. 572, Coal Meas.
- desertus, Billings, 1865, Pal. Foss., vol. 1, p. 258, Quebec Gr.
- digonus, see Trematodiscus digonus.
- disciformis, see Discites disciformis.
- discoidalis, see Trematodiscus discoidalis.
- divisus, White & St. John, 1868, Trans. Chi. Acad. Sci., p. 124, Up. Coal Meas. The name was preoccupied by Meyer in 1831.
- eccentricus, Meek & Hayden, 1858, Trans. Alb. Inst., vol. 4, p. 83, and Pal. Up. Mo., p. 65, Permian Gr.



FIG. 746.—Nautilus faberi. Lateral and front views. Magnified 2 diam.

- faberi. n. sp. Shell small, smooth, all volutions embraced in the outer one, leaving only a small round umbilicus; aperture semielliptical above the interior volution. The species is founded on a single specimen having a piece chipped from the dorsal side of the last volution, and a small piece broken from the inner volution, but nowhere dis-closing the septa. It was found in the Coal Measures, on Elk Horn Creek, Kentucky, and belongs to Mr. Charles Faber's collection.
- ferox, Billings, 1865, Pal. Foss., vol. 1, p. 351, Calciferous Gr.

MEL.-NAU.]

cedence.

186, Niagara Gr.

259, Quebec Gr.

Trenton Grs.

be recognized.

2, p. 417, Ham. Gr.

p. 25, Calciferous Gr.

now referred by Prof. Hall to the genus

Nautilus, see 20th Rep. N. Y. St. Mus. Nat. Hist., p. 400. It was first described

by McChesney, Jan. 1860, as Cyrtoceras giganteum, but that name being preoc-

cupied, in 1861 he proposed Lituites

cancellatus. If it is a Nautilus, the word occidentalis being preoccupied, McChesney's name cancellatus has pre-

ortoni, Meek, 1873, Ohio Pal., vol. 1, p.

palinurus, Billings, 1862, Pal. Foss., vol. 1,

pluto, Billings, 1865, Pal. Foss., vol. 1, p.

robertsoni, Hall, 1861, Rep. of Progr. Wis..

p. 38, Chazy and Black Riv. Grs. seelyi, Whitfield, 1886, Bull. Am. Mus.

Nat. Hist., vol. 1, p. 330, Birdseye Gr. undatus, Emmons, 1842, (Inachus unda-tus,) Geo. Rep. N. Y., p. 394, and Pal. N. Y., vol. 1, p. 52, Black Riv. and Trenton Grs. It is not a Lituites.

undatus var. occidentalis, Hall, 1861, Rep. of Progr. Wis., p. 38, Black Riv. and

Melia cancellatus, Emmons, 1856, Am. Geol.

Not defined so as to be recognized.

cincinnatiæ, D'Orbigny, 1850, Prodr. d. Paléont., t. 1, p. 4. Not defined so as to

NAUTILUS, Breynius, 1732, Dissert. Polyth.,

p. 11. [Ety. Nautilos, sailor or navigator.] Shell subglobose, compressed; volutions coiled in the same plane, cor-

tiguous; umbilicus open or closed; septa simple, arched or waved on the

lateral margins; siphunche central or subcentral; lip sinuous on the dorsal and ventro-lateral margins; surface

smooth, striate, costate, or bearing nodes. Type N. pompilius. acræus, Hall, 1879, Pal. N. Y., vol. 5, pt.

avonensis, see Solenochilus avonense.

avus, Barrande, 1869, Syst. Sil. de Boh.,

vol. 4, p. viii, pl. 435, Quebec Gr. barrandi, Hall, 1876, see N. Magister. biserialis, Hall, 1860, Supp. to vol. 1, pt. 2, Iowa Geo. Sur., p. 92, Coal Meas. buccinum, Hall, 1876, Illust. Devonian Foss. pl. 60, and Pal. N. V. vol. 5

Foss., pl. 60, and Pal. N. Y., vol. 5, pt. 2, p. 412, Ham. Gr. Type of Hyatt's

genus Nephriticeras. calciferus, Billings, 1865, Pal. Foss., vol.

cancellatus, McChesner, 1861, (Lituites

canaliculatus, Cox, 1857, Geo. Sur. Ky.,

capax, Hall 1860, (Lituites capax,) Rep. of

cancellatus,) New Pal. Foss., p. 96, Ni-

vol. 3, p. 575, Coal Meas. Type of Hy-

Progr. Geo. Sur. Wis., p. 3, Niagara Gr.

1, p. 258, Calciferous Gr.

att's genus Solenoceras.

agara Gr.

CEPHALOPODA.

ferratus, Cox, 1857, Geo. Sur. Ky., vol. 3, p. 574, Coal Meas.

forbesanus, McChesney, 1860, Desc. New Pal. Foss., p. 63, and Trans. Chi. Acad. Sci., p. 50, Coal Meas. gilpini, Swallow, 1860. Trans. St. Louis Acad. Sci., vol. 1, p. 658, Coal Meas.

FIG. 747.-Nautilus forbesanus.

globatus, Sowerby, 1825, Min. Conch., vol. 5, p. 129, Kaskaskia Gr.

Can. Geo. Sur., p. 306, Hud. Riv. Gr. highlandensis, see Discites highlandensis. hyatti, Beecher, 1888, Pal. N. Y., vol. 7, p. 37, Ham. Gr.

illinoisensis, McChesney, 1860, Desc. New. Pal. Foss., p. 64, Coal Meas.

ingentior, Winchell, 1862, Am. Jour. Sci., 2d series, vol. 33, p. 361, Marshall Gr.

insolens, Billings, 1865, Pal. Foss., vol. 1, p. 258, Quebec Gr.

jason, Billings, 1859, Can. Nat. and Geol., vol. 4, p. 464, Chazy Gr. Type of Hy-att's genus Plectoceras.

kelloggi, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 328, Birdseye Gr. lasallensis, Meek & Worthen, 1866, Proc.

Acad. Nat. Sci. Phil., p. 261, and Geo. Sur. Ill., vol. 5, p. 610, Up. Coal Meas. latus, see Temnochilus latum.

lawsi, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 658, Ham. Gr. *leidyi*, see Solenochilus leidyi.

liratus, Hall, 1860, (Gyroceras liratum,) 13th Rep. N. Y. Mus. Nat. Hist., p. 104, Marcellus Shale.

liratus var. juvenis, Hall, 1879, Pal. N. Y., vol. 5, Ham. Gr.

magister, Hall, 1879, Pal. N. Y., vol. 5, p. 422, Ham. Gr. Proposed instead of N. barrandi, Hall, which was preoccupied.

marcellensis, see Discites marcellensis. maximus, Conrad, 1838, (Cyrtoceras max-imus,) Ann. Rep. N. Y., p. 117, and Pal. N. Y., vol. 5, pt. 2, p. 418, Ham. Gr. machanus, and Tramatodiagus machanus. meekanus, see Trematodiscus meekanus.

missouriensis, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 198, Coal Meas. montgomeryensis, Worthen, 1884, Bull.

No. 2, Ill. St. Mus. Nat. Hist., p. 4, and Geo. Sur. Ill., vol. 8, p. 148, Up. Coal Meas.

natator, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 466, Chazy Gr. Type of Hyatt's genus Barrandoceras.

niotensis, see Temnochilus niotense. nodocarinatus, McChesney, syn. for N. oc.

- cidentalis. nodoso-dorsatus, Shumard, 1858, Trans.
- St. Louis Acad. Sci., vol. 1, p. 198, Coal Meas.
- occidentalis, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 196, and Pal. E. Neb., p. 234, Permian Gr. occidentalis, Hall, 1860, 20th Rep. N.Y.
- Mus. Nat. Hist., p. 400, Niagara Gr. This name being preoccupied, McChes-ney's name cancellatus, has precedence. See Lituites cancellatus.
- oceanus, Hall, 1879, Desc. New Spec. Foss., p. 19, and 11th Rep. Geo. and Nat. Hist. Ind., p. 325, Niagara Gr. oriens, Hall, 1876, Illust. Devonian Foss., pl. 61, and Pal. N. Y., vol. 5, pt. 2, p.
- 420, Marcellus Shale.
- ornatus, Hall, 1860, syn. for N. marcel. lensis.
- ortoni, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 231, Coal Meas.
- parallelus, Beecher, 1888, Pal. N. Y., vol. 7, p. 38, Coal-Meas.
- pauper, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 226, Kaskaskia Gr. permianus, Swallow, 1858, Trans. St.
- Louis Acad. Sci., vol. 1, p. 196. Permian Gr.
- planidorsalis, see Trematodiscus planidorsalis.
- planorbiformis, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 469, and
- Geo. Sur. Ill., vol. 2, p. 386, Coal Meas. planovolvis, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 198, Coal Meas.

pomponius, Billings, 1862, Pal. Foss., vol. 1, p. 26, Calciferous Gr.

- ponderosus, White, 1872, Pal., of E. Neb., p. 236, Coal Meas. Type of Hyatt's genus Titanoceras.
- quadrangularis, McChesney, 1860, Desc. quadrangularis, McChesney/ 1800, Desc.
 New Pal. Foss., p. 65, and Trans. Chi.
 Acad. Sci., vol. 1, p. 57, Coal Meas.
 Type of Hyatt's genus Tainoceras.
 rockfordensis, Meek & Worthen, 1866,
 Proc. Acad. Nat. Sci. Phil., p. 275, Kindensek (Er. Prohably a Gyroverse)
- derhook Gr. Probably a Gyroceras.
- See Ill. Geo. Sur., vol. 3. sangamonensis, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 470, and Geo. Sur. Ill., vol. 2, p. 386, Coal Meas. Type of Hyatt's genus Metacoceras.
- seebachanus, see Pteronautilus seebachanus

spectabilis, see Temnochilus spectabile. springeri, see Solenochilus springeri. striatulus, see Trematodiscus striatulus.

subglobosus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 469, syn. for N. globatus, see Geo. Sur. Ill., vol. 3,

p. 305.

b. 500.
subliratus, Hall, 1876, (Gyroceras subliratum,) Illust. Devon. Foss., pl. 58, and Pal. N. Y., vol. 5, pt. 2, p. 409, Ham. Gr. subquadrangularis, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 232, Coal Meas.

subsulcatus, Phillips clearly identified sulcatus, see Trems trigonus, see Trems trisulcatus, see Tre tyrans, Billings, 11 vol. 4, p. 465, Cł versutus, Billings, p. 259, Quebec genus Litoceras winslowi, see Temi Nelimenia incognita, Sil., p. 33. Pr Phragmoceras o ONCOCERAS, Hall, 184 196. [Ety. onkos Curved, apertu part of the body

part of septate



F16. 748. - Oncoceras constric-tum.

5

am

Geo. Sur. Wis., vol. 4, p. 234, Tr constrictum, Hall,

vol. 4, p. 232, Tr orcas, Hall, 1861, (of Progr. Geo. S

ara Gr. ovoides, Hall, 185 342, Low. Held.

pandion, Hall, 186

p. 45, and Geo Chazy and Blacl pettiti, Billings, 1 Antic., p. 86, Nis plebeium, Hall, 18

44, Trenton Gr. subrectum, Hall,

p. 94, Clinton G teucer, Billings,

Antic., p. 86, Nia

p. 197, Black Ri dilatatum, Hall, Mus. Nat. Hist.,

p. 13, Medina sa

lycus, Hall, 1861,

45, Chazy and B mummiforme, Wh Geo. Sur. Wis.,

Antic., p. 59, Cli

gibbosum, Halı, 1

expansum, Hall, p. 337, Coralline futile, Billings, 1

brevicurvatum, W

ab alc

NEL. -ORT.]

NAU.

NEL -ORT.] NAU.

niotense , syn. for N. oc.

d, 1858, Trans. l. 1, p. 198, ('oal

858, Trans. St. p. 196, and Pal. n Gr. Oth Rep. N.Y.

00, Niagara Gr. upied, McCheshas precedence.

sc. New Spec. Rep. Geo. and Niagara Gr. Devonian Foss. vol. 5, pt. 2, p.

for N. marcel-

in. N. Y. Acad. Meas. Pal. N. Y., vol.

nn. N. Y. Acad. skia Gr. 58, Trans. St. 1, p. 196. Per-

odiscus plani-

Worthen, 1860. il., p. 469, and 386, Coal Meas. 58, Trans. St. 198, Coal Meas. Pal. Foss., vol.

Pal., of E. Neb.,) of Hyatt's ge-

y/ 1860, Desc. nd Trans. Chi. 57, Coal Meas. ainoceras. orthen, 1866,

il., p. 275, Kina Gyroceras.

Vorthen, 1860, il., p. 470, and 86, Coal Meas. etacoceras. tilus seebach-

spectabile. springeri. s striatulus en, 1860, Proc. 469, syn. for ur. Ill., vol. 3,

oceras subliras., pl. 58, and 409, Ham. Gr. ld, 1882, Ann. 232, Coal Meas.

subsulcatus, Phillips, 1836, Geo. York. Not

clearly identified in this country. sulcatus, see Trematodiscus sulcatus. trigonus, see Trematodiscus trigonus. trisulcatus, see Trematodiscus trisulcatus.

tyrans, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 465, Chazy Gr.

versutus, Billings, 1865, Pal. Foss., vol. 1, p. 259, Quebec Gr. Type of Hyatt's genus Litoceras.

winslowi, see Tempochilus winslowi.

Nelimenia incognita, Castelnau, 1843, Syst. Sil., p. 33. Probably a fragment of Phragmoceras or Oncoceras.

ONCOCERAS, Hall, 1847, Pal. N. Y., vol. 1, p. 196. [Ety. onkos, swelling; keras, horn.] Curved, aperture constricted; lower part of the body chamber, and upper part of septate portion ventricose; abruptly contracted to-

strictum.

Trenton Gr.

ward the apex ; siphuncle dorsal; septa plane,

nearly flat, slightly ele-vated on the dorsal margin. Type O. con-

abruptum, Hall, 1861, Rep. of Progr. Wis., p. 44,



alceus, Hall, 1861, Rep. of Progr. Wis., p. 46, Chazy and Black Riv. Grs.

amator, Billings, 1866, Catal. Sil. Foss. Antic., F1G. 748. -- Oncoceras constrictum. p. 59, Clint 7 Gr.

brevicurvatum, Whitfield, 1880, Ar . Rep. Geo. Sur. Wis., p. 59, and Geo. Wis., vol. 4, p. 234, Trenton Gr.

constrictum, Hall, 1847, Pal. N. Y., vol. 1, p. 197, Black Riv. and Trenton Grs.

dilatatum, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 105, Ham. Gr. expansum, Hall, 1852, Pal. N. Y., vol. 2,

p. 337, Coralline limestone. futile, Billings, 1866, Catal. Sil. Foss. Antic., p. 59, Clinton Gr.

gibbosum, Hali, 1852, Pal. N. Y., vol. 2, p. 13, Medina sandstone.

lycus, Hall, 1861, Rep. of Progr. Wis., p. 45, Chazy and Black Riv. Gr.

mummiforme, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis., p. 58, and Geo. Wis.,

- vol. 4, p. 232, Trenton Gr. orcas, Hall, 1861, (Cyrtoceras orcas,) Rep. of Progr. Geo. Sur. of Wis., p. 42, Niagara Gr.
- ovoides, Hall, 1859, Pal. N. Y., vol. 3, p. 342, Low. Held. Gr.
- pandion, Hall, 1861, Rep. of Progr. Wis., p. 45, and Geo. Wis., vol. 4, p. 233, Chazy and Black Riv. Grs.
- pettiti, Billings, 1866, Catal. Sil. Foss. Antic., p. 86, Niagara Gr.
- plebeium, Hall, 1861, Geo. Rep. Wis., p. 44. Trenton Gr.
- subrectum, Hall, 1852, Pal. N. Y., vol. 2,
- p. 94, Clinton Gr. teucer, Billings, 1866, Catal. Sil. Foss. Antic., p. 86, Niagara Gr.

- thales, Billings, 1866, Catal. Sil. Foss. Antic., p. 87, Niagara Gr.
- vasiforme, Dwight, 1884, Am. Jour. Sci. and Arts, 3d ser., vol. 27, p. 257, Calciferous Gr.
- ORMOCERAS, Stokes, 1840, Trans. Geo. Soc., 2d ser., vol. 5, p. 709. [Ety. ormos, a chain or necklace; keras, horn; from the appearance of the siphuncle.] Ex-ternally like Orthoceras, and distinguished only by having the siphuncle constricted within each chamber instead of at the place of union with the septa. Types O. backi, and O. bayfieldi.
- backi, Stokes, 1840, Trans. Geo. Soc., 2d ser., vol. 5, p. 709, Clinton Gr.

bayfieldi, Stokes, 1840, Trans. Geo. Soc., 2d ser., vol. 5, p. 709, Clinton Gr.

crebrisep tum, Hall,

1, p. 313, Hud. Riv. Gr

gracile, Hall. 1847, Pal. N. Y., vol. 1, p. 58, Black Riv. Gr.

remot is ep-

tum, Hall, FIG. 749.-Ormoceras bayfieldi 1850, - 3d Rep. N. Y. Mus. Nat. Hist., p. 181,

Trenton Gr. tenuifilum, Hall, 1847, Pal. N. Y., vol. 1,

p. 55, Black Riv. and Trenton Gr. tenuifilum var. distans, Hall, 1847, Pal.

N. Y., vol. 1, p. 58, Black Riv. Gr.

vertebratum, Hall, 1852, Pal. N. Y., vol. 2, p. 94, Clinton Gr.

- whitii, Stokes, 1840, Trans. Geo. Soc., 2d ser., vol. 5, p. 709, Clinton Gr.
- ORTHOCERAS, Breynius, 1732, Dissertatio physica de Polythalamiis. [Ety. orthos, physica de Polythalamiis. straight; keras, horn.] Shell conical, straight, or nearly so; body chamber large, behind which the shell is composed of numerous chambers separated by convex, transverse septa, with simple edges, at right angles to the longer axis of the shell; siphuncle central, subcentral or eccentric, cylindrical or dilated in the chambers; surface smooth or transversely, or longitudinally stri-ated, or furrowed. Typical O. breynii, O. annulatum, and O. striatum.
- abnorme, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 415, Niagara Gr.

abruptum, Hall, 1852, Pal. N. Y., vol. 2, p. 97, Clinton Gr.

- acicula, Hall, see Coleolus acicula. aciculoides, Clarke, 1885, Bull. U.S. Geo.
- Sur., No. 16, p. 51, Chemung Gr. aculeatum, Swallow, 1858, Trans. St. Louis
- Acad, Sci., vol. 1, p. 200, Coal Meas. ægea, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 80, Ham. Gr.



æquale, Emmons, 1842, Geo. Rep. N. Y. p. 404, Hud. Riv. Gr.

(5)

- alienum, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 414, Niagara Gr.
- allumettense, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 331, Chazy and Black Riv. Grs.
- amplicameratum, Hall, 1847, Pal. N. Y., vol. 1, p. 205, Black Riv. and Trenton Grs.
- amycus, Hall, 1879, Desc. New Spec. Foss., p. 18, and 11th Rep. Geo. Sur. Ind., p. 324, Niagara Gr.
- anax, Billings, 1875, Can. Nat. and Geol.,
- vol. 7, p. 238, Up. Held. Gr. anguis, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 312, Chemung Gr.
- angulatum, (?) Wahlenberg, 1821, Nova. Acta. Soc. Sci. Upsal., p. 90, Niagara Gr. See remarks on this species by Prof. Hall in 20th Rep. N. Y. Mus. Nat. Hist., p. 413.
- anellus, Conrad, 1843, Proc. Acad. Nat. Sci. Phil., vol. 1, p. 334, and Pal. N. Y., vol. 1, p. 202, Black Riv. and Trenton Grs.
- annulato-costatum, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 147. This name was preoccupied by Boll in 1857. See O. randolphense.
- annulatum, Sowerby, 1818, Min. Conch., vol. 2, p. 77, Clinton and Niagara Grs. antenor, Billings, 1859, Can. Nat. and Geo.,
- vol. 4, p. 463, Chazy Gr.
- anticostiense, Billings, 1857. Rep. of Progr. Geo. Sur. Can., p. 316, Hud. Riv. Gr.
- aptum, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p. 282, Marcellus Shale.
- arcuatellum, Sandberger. Is not an American species.
- arcuoliratum, Hall, 1847, Pal. N. Y., vol. 1, p. 198, Black Riv. and Trenton Grs. arenosum, Hall, 1859, Pal. N. Y., vol. 3,
- p. 480, Oriskany sandstone.
- asmodeus, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 30, Genesee Shale. atreus, Hall, 1879, Pal. N. Y., vol. 5, p.
- 305, Portage Gr.
- atticus, Billings, 1865, Pal. Foss., vol. 1, p. 312, Quebec Gr.
- aulax, Hall, 1879, Pal. N. Y., vol. 5, p. 293, Ham. Gr.
- autolycus, Billings, 1862, Pal. Foss., vol. 1, p. 91, Quebec Gr.
- baculum, Meek, 1860, Proc. Acad. Nat. Sci., p. 310, Subcarboniferous.
- baculum, Hall, 1862. The name was preoccupied. See O. stylus. balteatum, Billings, 1857, Rep. of Progr.
- Geo. Sur. Can., p. 318, Hud. Riv. Gr. barquianum, Winchell, 1862, Am. Jour. Sci., 2d ser., vol. 33, Marshall Gr.
- bartonense, Spencer, 1884, Bull. No. 1, Mus. Univ. St. Mo., p. 60, Niagara Gr.
- bebryx, Hall, 1876, Illust. Devonian Foss., pl. 39, and Pal. N. Y., vol. 5, pt. 2, p. 275, Ham. Gr.

- bebryx var. cayuga, Hall, 1879, Pal. N. Y.,
- vol. 5, p. 276, Chemung Gr. becki, Billings, 1859, Can. Nat. and Geol., vol. 4, p. 362, Calciferous Gr.
- bellatulum, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 58, Clinton Gr. beloitense, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 97, and Geo. Wis. vol. 4, p. 226, Trenton Gr.
- bilineatum, Hall, 1847, Pal. N. Y., vol. 1. p. 199, Chazy, Black Riv., Trenton, and Hud. Riv. Grs.
- bilineatum var. a, Hall, 1847, Pal. N. Y., vol. 1, p. 200, Trenton Gr.
- bipartitum, Hall, 1879, Pal. N. Y., vol. 5,
- p. 313, Up. Chemung Gr. rainerdi, Whitfield, 1886, Bull. Am. brainerdi, Mus. Nat. Hist., vol. 1, p. 319, Birdseve Gr.
- brongniarti, Troost, 1838, (Conotubularia brongniarti,) Mem. Soc. Geo. de France, 3, p. 89, Low. Sil.
- brontes, Billings, 1866, Catal. Sil. Foss. Antic., p. 83, Niagara Gr.
- bucklandi, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 330, Up. Sil.



FIG. 750.—Orthoceras byrnesi.

- bullatum, (?) Sowerby, 1839, Murch. Sil. Syst., p. 705, Trenton Gr. byrnesi, S. A. Miller, 1875, Cin. Quar.
- Jour. Sci., vol. 2, p. 126, and Jour. Cin. Soc, Nat. Hist., vol. 4, p. 319, Hud. Riv. Gr.
- cadmus, Billings, 1866, Catal. Sil. Foss. Antic., p. 83, Niagara Gr. cælamen, Hall, 1879, Pal. N. Y., vol. 5, p.
- 298, Ham. Gr.
- cameolare, McChesney, 1861, New Pal. Foss., p. 93, Niagara Gr.
- canadense, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 321, Mid. Sil. Prof. Billings proposed this name as a substitute for Huronia vertebralis for the reason that Huronia is a syn. for Orthoceras, and there is one O. vertebralis.
- cancellatum, Hall, 1852, Pal. N. Y., vol. 2. The name was preoccupied by Eich-wald in 1842. See O. subcancellatum.
- capitolinum, Safford, 1869, Geo. of Tenn., p. 290, Trenton Gr.
- carleyi, Hall & Whitfield, 1875, Ohio Pal.,
- carleyi, Hall & Whiteld, 1875, Ohio Fal., vol. 2, p. 98, Hud. Riv. Gr.
 carltonense, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 85, and Geo. Wis., vol. 4, p. 318, Niagara Gr.
 carnosum, Hall, 1879, Pal. N. Y., vol. 5,
- p. 258, Schoharie grit. cataline, Billings, 1865, Pal. Foss., vol. 1,
- p. 315, Quebec Gr.

cato, Billings, 1868 314, Quebec Gr. catulus, Billings, p. 313, Quebec G

chemungense, Swi Louis Acad. Sci.,

- or Choteau Gr. chesterense, Swall
- Louis Acad. Sci., kia Gr.

chouteauense, Swa mungense var. cl Louis Acad. Sci., or Choteau Gr.

cincinnatiense, S. Quar. Jour. Sci.

Jour. Cin. Soc. N Hud. Riv. Gr.

cingulum, Hall, 18 p. 240, Schoharie

- clathratum, Hall, 1 p. 201, Trenton G
- clavatum, Hall, 18 104, Clinton Gr.
- clavatum, Hall, 1859 propriated. See

clinocameratum, Jour. Sci., 2d ser.

shall Gr. clintoni, Hall, 18

Foss., p. 244, Ch stead of O. sub which was preoc clouei, Barrande, 1

4me ser., p. viii bec Gr.

- cochleatum, Hall, 18 The name was p
- heim in 1813. collatum, Hall, 187

252, Schoharie g colon, White, 1874

10, and Geo. Sur p. 56, Quebec Gr

columnare, Hall, 18 Sur. Wis. The r

by Mark in 1857. conicum, Castelnau The name was

inger. consortale, Beecher

7, p. 29, Chemun constrictum, Vanu 3d Dist. N. Y., p

vol. 5, pt. 2, p. 28

constrictum, Conrad, as to be recognize

constrictum, see One coralliferum. Hall,

1, p. 312, Utica an cornuoryx, Whitf

Mus. Nat. Hist. eye Gr.

cornuum, Billings, Geo. Sur. Can., J crebescens, Hall,

Mus. Nat. Hist., 1

crebristristum, Me Proc. Acad. Nat.

ORT. 0

CEPHALOPODA.

cato, Billings, 1865, Pal. Foss., vol. 1, p.

catulus, Billings, 1865, Pal. Foss., vol. 1,

chemungense, Swallow, 1860, Trans. St.

chesterense, Swallow, 1863, Trans. St.

chouteauense, Swallow, 1860, (O. chemungense var. choteauense,) Trans. St.

cincinnatiense, S. A. Miller, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 127, and

cingulum, Hall, 1879, Pal. N. Y., vol. 5,

clathratum, Hall, 1847, Pal. N. Y., vol. 1,

clavatum, Hall, 1852, Pal. N. Y., vol. 2, p.

Jour. Sci., 2d ser., vol. 33, p. 356, Mar-

clintoni, Hall, 1877, 1st Ed. Am. Pal.

clouei, Barrande, 1869, Sys. Sil. de Boh.,

cochleatum, Hall, 1879, Pal. N. Y., vol. 5.

collatum, Hall, 1879, Pal. N. Y., vol. 5, p.

colon, White, 1874, Rep. Invert. Foss., p. 10, and Geo. Sur. W. 100th Mer., vol. 4,

columnare, Hall, 1860, Rep. Progr. Geo.

conicum, Castelnau, 1843, Syst. Sil., p. 29.

consortale, Beecher, 1888, Pal. N. Y., vol.

donstrictum, Vanuxem, 1842, Geo. Rep. 3d Dist. N. Y., p. 152, and Pal. N. Y., vol. 5, pt. 2, p. 288, Ham. Gr.

constrictum, Conrad, 1838. Not defined so

constrictum, see Oncoceras constrictum. coralliferum. Hall, 1847, Pal. N. Y., vol.

1, p. 312, Utica and Hud. Riv. Grs.

cornuoryx, Whitfield, 1886, Bull. Am.

cornuum, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 329, Chazy Gr.

crebescens, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 354, Niagara Gr. crebristristum, Meek & Worthen, 1865.

Proc. Acad. Nat. Sci. Phil., p. 255, and

Mus. Nat. Hist., vol. 1, p. 320, Birds-

The name was preoccupied by His-

by Mark in 1857. See O. orus.

Sur. Wis. The name was preoccupied

heim in 1813. See O. warrenense.

The name was preoccupied by Schlot-

4me ser., p. viii, pl. 432 to 434, Que-

Foss., p. 244, Chazy Gr. Proposed instead of O. subarcuatum, Hall, 1847,

propriated. See O. desideratum.

clinocameratum, Winchell, 1862,

The name was ap-

Am.

Jour. Cin. Soc. Nat. Hist., vol. 4, p. 319,

Louis Acad. Sci., vol. 1, p. 660, Waverly

Louis Acad. Sci., vol. 2, p. 98, Kaskas-

Louis Acad. Sci., vol. 1, p. 660, Waverly

314, Quebec Gr.

or Choteau Gr.

or Choteau Gr.

Hud. Riv. Gr.

p. 240, Schoharie grit.

which was preoccupied.

252, Schoharie grit.

p. 56, Quebec Gr.

7, p. 29, Chemung Gr.

as to be recognized.

p. 201, Trenton Gr.

104, Clinton Gr.

davatum, Hall, 1859.

shall Gr.

bec Gr.

inger.

eye Gr.

kia Gr.

p. 313, Quebec Gr.

- , 1879, Pal. N. Y., g Gr. . Nat. and Geol.,
- us Gr. 3, Catal. Sil. Foss.
- Gr. 878, Ann. Rep. and Geo. Wis.,
- Gr. al. N. Y., vol. 1,
- v., Trenton, and 1847, Pal. N. Y.,
- Gr. al. N. Y., vol. 5,
- Gr. 386, Bull. Am. I, p. 319, Birds-
- , (Conotubularia Geo. de France,
- Catal. Sil. Foss. r. Rep. of Progr.
- Up. Sil.



oy mean

- 839, Murch. Sil. r. 75, Cin. Quar. , and Jour. Cin.
- l, p. 319, Hud. Catal. Sil. Foss.
- N. Y., vol. 5, p.
- 861, New Pal
- Rep. of Progr. Mid. Sil. Prof. name as a subtebralis for the is a syn. for s one O. verte-
- l. N. Y., vol. 2. pied by Eichbcancellatum. Geo. of Tenn.,
- 1875, Ohio Pal., Fr.
- 878, Ann. Rep. and Geo. Wis.,
- . N. Y., vol. 5,
- 1. Foss., vol. 1,

- Geo. Sur. Ill., vol. 6, p. 503, Niagara Gr.
- creon, Hall, 1879, Pal. N. Y., vol. 5, p. 260, Schoharie grit.
- cribrosum, Geinitz, 1866, Carb. und Dyas in Neb., p. 4, and Pal. E. Neb., p. 234, Coal Meas.
- crocus, Billings, 1866, Catal. Sil. Foss. Antic., p. 22, Hud. Riv. Gr. Proposed instead of O. perannulatum, which was preoccupied.
- crotalum, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 78, Ham. Gr. Type of Hyatt's genus Spyroceras.
- cuvieri, Troost, 1838, (Conotubularia cuvieri,) Mem. Soc. Geo. de France. t. 3, p. 88, Low. Sil.
- dagon, Beecher, 1888, Pal. N. Y., vol. 7, p. 28, Up. Held. Gr.
- darwini, Billings, 1868, Pal. Foss., vol. 1, p. 161, Guelph Gr.
- dawsonanum, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss, p. 307, Carboniferous. Proposed instead of O. perstrictum, Dawson, in Acadian Geology, p. 312, fig. 129, as the name was preoccupied by Barrande.
- decrescens, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 337, Black Riv. and Trenton Gr.
- defrancii, Troost, 1838, (Conotubularia defrancei,) Mem. Soc. Geo. de France, t. 3, p. 90, Low. Sil.
- demus, Hall, 1879, Pal. N. Y., vol. 5, p. 311, Chemung Gr.
- deparcum, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 363, Calciferous Gr.
- desideratum, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 244, Low. Held. Gr. Proposed instead of O. clavatum, Hall, 1859, which was preoccupied.
- diffidens, Billings, 1865, Pal. Foss., vol. 1, p. 174, Chazy Gr.
- directum, Beecher, 1888, Pal. N. Y., vol. 7, p. 27, Up. Held. Gr.
- dolatum, Dawson, 1868, Acad. Geol. p. 311, Carboniferous.
- drummondi, Billings, 1865, Pal. Foss., vol. 1, p. 173, Black Riv. Gr.

duramen, Beecher, 1888, Pal. N. Y., vol. 7, p. 25, Schoharie grit.

duseri, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 97, Hud. Riv. Gr.



FIG. 751.—Orthoceras dyeri.

dyeri, S. A. Miller, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 125, and Jour. Cin. Soc. Nat. Hist., vol. 3, p. 236, Hud. Riv. Gr.

edax, Billings, 1865, Pal. Foss., vol. 1, p. 349, Calcif. Gr.

- elegantulum, Dawson, 1860, Can. Nat. and Geo., vol. 5, p. 155, and Acad. Geol., p. 607, Up. Sil.
- emaceratum, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 170, Ham. Gr. epigrus, Hall, 1858, Trans. Alb. Inst., vol.
- 4, p. 33, and Bull. Am. Mus. Nat. Hist., p. 91, Warsaw Gr.
- eriense, Hall, 1877, 1st Ed. Am. Pal. Foss. . 274, and Pal. N. Y., vol. 5, p. 274, Ham. Gr. Proposed instead of O. robustum, which was preoccupied.
- eurekense, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 265, Subcarboniferous.
- exile, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 78, and Pal. N. Y., vol. 5, pt. 2, p. 290, Ham. Gr.
- exornatum, Dawson, 1860, Can. Nat. and
- Geo., vol. 5, p. 198, Up. Sil. expansum, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 468, and Geo. Sur. Ill., vol. 2, p. 286, St. Louis Gr.
- explorator, Billings, 1865, Pal. Foss., vol. 1, p. 253, Quebec Gr. expositum, Beecher, 1888, Pal. N. Y., vol.
- 7, p. 29, Chemung Gr.
- ferum, Billings, 1866, Catal. Sil. Foss. Antic., p. 22, Hud. Riv. and Anticosti Gr.
- filiforme, Castelnau, 1843, Syst. Sil., p. 30, Niagara Gr. Not recognized.
- filosum, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 52, Chemung Gr. flavius, Billings, 1865, Pal. Foss., vol. 1,
- p. 255, Quebec. Gr. fluctum, Hall, 1879, Pal. N. Y., vol. 5, p.
- 239, Schoharie grit.
- foliatum, syn. for Cyrtoceras eugenium.
- formosum, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 317, Trenton, Hud. Riv., and Anticosti Grs.
- fosteri, S. A. Miller, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 127, and Jour. Cin. Soc. Nat. Hist., vol. 4, p. 319, Hud. Riv. Gr.
- foxense, Safford, 1869, Geo. of Tenn. Not defined.
- fulgidum, Hall, 1879, Pal. N. Y., vol. 5, p. 310, Chemung Gr.
- fulgur, Billings, 1866, Catal. Sil. Foss. Antic., p. 22, Hud. Riv. Gr. Proposed instead of O. propinguum, which was preoccupied.
- furtivum, Billings, 1865, Pal. Foss., vol. 1, p. 348, Calcif. Gr.
- fusiforme, Hall, 1847, Pal. N. Y., vol. 1, p. 60, Black Riv. and Trenton Grs.
- fustis, Hall, 1879, Pal. N. Y., vol. 5, p. 281, Marcellus Shale.
- glaucus, Billings, 1865, Pal. Foss., vol. 1, p. 350, Calciferous Gr.
- goldfussi, Troost, 1838, (Conotubularia goldfussi,) Mem. Soc. Geo. de France, t. 3, p. 90, Low. Sil.
- gracilium, Winchell, 1862, Proc. Acad. Nat. Sci., p. 429, Portage Gr.

- gregarium, Hall, 1861, Rep. of Progr. Wis. Preoccupied by Sowerby in 1839, Murch. Sil. Syst. See O. sociale.
- griffithi, Haughton, 1857, Jour. Roy. Dub. Soc., vol. 1, Devonian.?
- hæsitans, Billings, 1865, Pal. Foss., vol. 1. p. 254, Quebec Gr. hageri, Hall, 1861, Geol. of Vermont, p.
- 718, Calciferous Gr.



FIG. 752.—Orthoceras hallanum.

- hallanum, S. A. Miller, 1877, 1st Ed. Am. Pal. Foss., p. 245, Hud. Riv. Gr. Proposed instead of O. halli, in Cin. Quar. Jour. Sci., vol. 2, p. 128, which was preoccupied by Barrande.
- halli, see O. hallanum.
- harperi, S. A. Miller, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 128, and Jour. Cin. Soc. Nat. Hist., vol. 4, p. 319, Hud. Riv. Gr.
- harttanum, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss., p. 307, Carboniferous. Proposed instead of O. laqueatum, Hartt, in Acadian Geol, p. 312, fig. 128, which was preoccupied.
- hastatum, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 333, Black Riv. and Trenton Grs. Type of Hyatt's genus Tripteroceras.
- helderbergiæ, Hall, 1859, Pal. N. Y., vol
- 3, p. 345, Low. Held. Gr. henrietta, Dwight, 1884, Am. Jour. Sci. and Arts, 3d ser., vol. 27, p. 256, Calciferous Gr.
- herculaneum, Verneuil, 1846, Bull. de la Soc. Geol. de France, vol. 4, Low. Sil.
- hercules, Castelnau, 1843, Syst. Sil., p. 29, Up. Sil. Not recognized.
- heterocinctum, Winchell, 1863, Proc. Acad. Nat. Sci., p. 23, Kinderhook Gr. Proc.
- hindei, James. Founded on fragments of different species, most of them O. transversum.
- hoyi, McChesney, 1861, New Pal. Foss., p. 92, Niagara Gr.
- huronense, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 337, Trenton Gr.
- hyas, Hall, 1862, syn. for O. thoas. icarus, Beecher, 1888, Pal. N. Y., vol. 7,
- p. 31, Kinderhook Gr.
- idmon, Hall, 1879, Pal. N. Y., vol 5, p. 302, Ham. Gr.
- illinoisense, Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 323, and Geo. Sur. Ill., vol. 8, p. 148, Kaskaskia Gr.

ORT. ORT.

> imbricatum, Sower Syst., p. 620, and 291, Niagara Gr. inceptum, Foerste,

Denison Univ.,

defined. indagator, Billings, 1, p. 349, Calcife

indianense, Hall, Mus. Nat. His hook Gr.

inf-lix, Billings, 1 Antic., p. 57, Clin inoptatum, Hall, 1 p. 267, Up. Held iowense n. sp. De

stead of O. undu Lands, p. 69, pl. was preoccupied.

irregulare, McChes Foss., Niagara G

occupied. See O isogramma, Meek, Sci., p. 172, Coal jaculum, Hall, 1879

- 266, Up. Held. G jamesi, Hall & Wh
- vol. 2, p. 118, Cli jolietense, Meek & Acad. Nat. Sci. 1

Sur. Ill., vol. 6, p junceum, Hall, 184 204, Trenton Gr. kickapooense, Swal

Sci. St. Louis, v mian Gr.

kingi, Meek, 1877, Parallel, vol. 4, p

knoxense, McChes Foss., p. 69, Coal. læve, Hall, 1843, Ge

The name was pi in 1825. See O. a

lamarcki, Billings, Geo., vol. 4, p. 36

lamellosum, Hall, 1 p. 312, Hud. Riv. laphami, McChess

Foss., p. 91, Niag laqueatum, Hall, 1

p. 13, Calciferous

laqueatum var. a, vol. 1, p. 206, Tre laqueatum, Hartt, 1

- name was preoce anum.
- lasallense, Worthen vol. 7, p. 324, and p. 149, Coal Meas

lathropanum, Wind

Sci. and Arts, 2 Marshall Gr.

latiannulatum, Hal 1, p. 204, Trentor

leander, Hall, 1879 309, Chemung G

lima, Hall, 1879, Pa Ham. Gr.

ORT. ORT

defined.

hook Gr.

CEPHALOPODA.

- p. of Progr. Wis. y in 1839, Murch. le. Jour. Roy. Dub.
- Pal. Foss., vol. 1,
- of Vermont, p.



hallanum

- 877, 1st Ed. Am. Riv. Gr. Proli, in Cin. Quar. which was pre-
- 875, Cin. Quar. , and Jour. Cin. 4, p. 319, Hud.
- 883, 2d Ed. Am. oniferous. Proqueatum, Hartt, 2, fig. 128, which
- Rep. of Progr. Black Riv. and f Hyatt's genus
- Pal. N. Y., vol. r.
- Am. Jour. Sci. 27, p. 256, Cal-
- 846, Bull. de la ol. 4, Low. Sil. Syst. Sil., p. 29, d.
- 1863, Proc. Linderhook Gr. on fragments of f them O. trans-
- New Pal. Foss.,
- Rep. of Progr. Trenton Gr. O. thoas. d. N. Y., vol. 7,
- N. Y., vol 5, p.
- 3, Geo. Sur. Ill., Sur. Ill., vol. 8,

- lineolatum, McChesney, 1861, New Pal. Foss., p. 93, Niagara Gr. The name imbricatum, Sowerby, 1839, Murch. Sil. Syst., p. 620, and Pal. N. Y., vol. 2, p. 291, Niagara Gr. was preoccupied by Phillips in 1841.
 - linteum, Hall, 1879, Pal. N. Y., vol. 5, p. 277, Ham. Gr.

449

- longicameratum, Hall, 1859, Pal. N. Y., vol. 3, p. 343, Low. Held. Gr.
- Ioxias, Hall, 1867, 20th Rep. N. Y. Mus.
 Nat. Hist., p. 416, Low. Sil.
 luxum, Hall, 1876, Illust. Devonian Foss.
- pl. 35, and Pal. N. Y., vol. 5, pt. 2, p. 244, Schoharie grit,
- lyelli, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 320, Hud. Riv. Gr.
- magnisulcatum, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 330, Hud. Riv. Gr.
- marcellense, Vanuxem, 1842, Geo. Rep.
 N. Y., p. 147, and Pal. N. Y., vol. 5, pt.
 2, p. 278, Ham. Gr.
- marginale, Owen, 1840, Rep. on Min. Lands, p. 70, Up. Magnesian Gr.
- maro, Billings, 1859, Can. Nat. and Geol., vol. 4, p. 461, Chazy Gr. marshallense, Winchell, 1862, Am. Jour.
- Sci., 2d series, vol. 33, p. 356, Marshall Gr.
- masculum, Hall, 1879, Pal. N. Y., vol. 5, p. 238, Schoharie grit.
- medium, Hall, 1879, Pal. N. Y., vol. 5, p. 254, Schoharie grit.
- medon, Billings, 1866, Catal. Sil. Foss. Antic., p. 57, Clinton Gr.
- medullare, Hall, 1860, Rep. of Progr. Geo. Sur. Wis., p. 4, Niagar + Gr.
- meeki, S. A. Mil-
- ler, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 126, Hud. Riv.
- Gr. menelaus, Bill-
- ings, 1862, Pal. Foss., vol. 1, p.

Gr.



meeki

- mephisto, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 29, Genesee Shale. michiganense, S. A. Miller, 1883, 2d Ed.
- Am. Pal. Foss., p. 308, Marshall Gr. in the southern part of Michigan. Proposed instead of O. multicinctum, Winchell, Proc. Acad. Nat. Sci., Phil., Sept., 1862, p. 421.
- minganense, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 319, Chazy and Black Riv. Grs.

missisquoi, see Cyrtoceras missisquoi.



FIG. 574.-Orthoceras mohri

mohri, S. A. Miller, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 124, Hud. Riv. Gr.

inceptum, Foerste, 1885, Bull. Sci. Lab.

indagator, Billings, 1865, Pal. Foss., vol.

indianense, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 107, Kinder-

inf-lix, Billings, 1866, Catal. Sil. Foss.

Antic., p. 57, Clinton Gr. inoptatum, Hall, 1879, Pal. N. Y. vol. 5,

iowense n. sp. Devonian. Proposed in-

stead of O. undulatum in Rep. on Min.

Lands, p. 69, pl. 12, fig. 6, which name

irregulare, McChesney, 1861, New Pal. Foss., Niagara Gr. The name was pre-

occupied. See O. woodworthi. isogramma, Meek, 1871, Proc. Acad. Nat.

Sci., p. 172, Coal Meas. jaculum. Hall, 1879, Pal. N. Y., vol. 5, p.

jamesi, Hall & Whitfield, 1875, Ohio Pal.

jolietense, Meek & Worthen, 1865, Proc.

Acad. Nat. Sci. Phil., p. 256, and Geo. Sur. Ill., vol. 6, p. 505, Niagara Gr. junceum, Hall, 1847, Pal. N. Y., vol. 1, p.

kickapooense, Swallow, 1858, Trans. Acad.

kingi, Meek, 1877, U. S. Geo. Sur. 40th Parallel, vol. 4, p. 47, Devonian.

knoxense, McChesney, 1860, New Pal.

Foss., p. 69, Coal. Meas. lave, Hall, 1843, Geo. Rep. 4th Dist. N. Y.

lamarcki, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 362, Calciferous Gr. lamellosum, Hall, 1847, Pal. N. Y., vol. 1,

laphami, McChesney, 1861, New Pal.

laqueatum, Hall, 1847, Pal. N. Y., vol. 1, p. 13, Calciferous to Trenton Gr.

laqueatum var. a, Hall, 1847, Pal. N. Y., vol. 1, p. 206, Trenton Gr.

laqueatum, Hartt, 1868, Acad. Geol. The

lasallense, Worthen, 1883, Geo. Sur. Ill.,

lathropanum, Winchell, 1862, Am. Jour.

latiannulatum, Hall, 1847, Pal. N. Y., vol.

leander, Hall, 1879, Pal. N. Y., vol. 5, p.

lima, Hall, 1879, Pal. N. Y., vol. 5, p. 303,

Sci. and Arts, 2d ser., vol. 33, p. 357,

vol. 7, p. 324, and Geo. Sur. Ill., vol. 8, p. 149, Coal Meas.

name was preoccupied. See O. Hartt-

The name was preoccupied by Fleming

Sci. St. Louis, vol. 1, p. 197, Up. Per-

1, p. 349, Calciferous Gr.

p. 267, Up. Held. Gr.

was preoccupied.

266, Up. Held. Gr.

204, Trenton Gr.

mian Gr.

anum.

Marshall Gr.

Ham. Gr.

1, p. 204, Trenton Gr.

309, Chemung Gr.

vol. 2, p. 118, Clinton Gr.

in 1825. See O. sublæve.

p. 312, Hud. Riv. Gr.

Foss., p. 91, Niagara Gr

Denison Univ., p. 117. Not properly

molestum, Hall, 1876, Illust. Devonian Foss., pl. 35, and Pal. N. Y., vol. 5, pt. 2, p. 265, Up. Held. Gr.

450

- moniliforme, Hall, 1847, Pal, N. Y., vol. 1, p. 35, Chazy Gr.
- moniliforme, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1. The name was pre-occupied. See O. swallovanum.
- montrealense, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 363, Calciferous Gr.
- multicameratum, Emmons, 1842, Geo. Rep. N. Y., p. 382, and Pal. N. Y., vol. 1, p. 45, Birdseve Gr.
- multicinctum, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 76, and Pal. N. Y., vol. 5, pt. 2, p. 263, Schoharie grit. *multicinctum*, Winchell, 1862. The name
- was preoccupied. See O. michiganense.
- multilineatum, Emmons, 1842, Geo. Rep. N. Y., p. 397, Trenton Gr.
- multiseptum, Hall, 1852, Pal. N. Y., vol. 2, p. 14, Medina Gr.
- murrayi, Billings, 1857, Rep of Progr. Geo. Sur. Can., p. 332, Black Riv. and Trenton Grs.
- niagarense, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 416, Niagara Gr. nobile, Meek & Worthen, 1865, Proc.
- Acad. Nat. Sci., p. 256, Kaskaskia Gr. nodocostum, McChesney, 1861, New Pal.
- Foss., p. 94, Niagara Gr.
- novamexicanum, Marcou, 1858, Geol. North America, p. 44, Subcarbonifer-0118.
- nummularfum, (?) 1839, Murch. Sil. Sys., p. 632, Up. Sil.
- p. 005, 0 p. 611. nuntium. Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 79, and Pal. N. Y., vol. 5, pt. 2, p. 299, Ham. Gr. oberon, Billings, 1866, Catal. Sil. Foss. Antic., p. 82, Niagara Gr.
- occidentale, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 201, Coal Meas., Permian Gr.
- occidentale, Winchell, 1862. This name was preoccupied. See O. vinchellanum. edipus, Hall, 1879, Pal. N. Y., vol. 5, p. 294, Ham. Gr.
- okawense, Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 324, and Geo. Sur. Ill., vol. 8, p. 149, Kaskaskia Gr.
- olorus, Hall, 1877, 1st Ed. Am. Pal. Foss. p. 245, Trenton Gr. Proposed instead
- of O. vertebrale, Hall, 1847. which was preoccupied.
- ommaneyi, Salter, 1852, in Sutherland's
- Jour., vol. 2, Devonian. oneidense, Walcott, 1879, Trans. Alb. Inst., vol. x, p. 22, Utica Slate Gr.
- ontario, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 51, Chemung Gr. oppletum, Hall, 1879, Pal. N. Y., vol. 5,
- p. 248, Schoharie grit.
- ordinatum, Billings, 1865, Pal. Foss., vol. 1, p. 350, Calciferous Gr.
- ortoni, Meek, 1872, Proc. Acad. Nat. Sci. Phil., p. 330, and Ohio Pal., vol. 1, p. 155, Hud. Riv. Gr,

- orus, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 245, Niagara Gr. Proposed instead of O. columnare, Hall, 1860, which was preoccupied.
- ottawense, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 331, Black Riv and **Frenton** Grs.
- ozarkense, Shumard, 1863, Trans. St Louis Acad. Sci., vol. 2, p. 107, Calcif. erous Gr.
- pacator, Hall, 1879, Pal. N. Y., vol. 5, p. 307, Portage Gr.
- palmatum, Hall, 1879, Pal. N. Y., vol. 5
- p. 312, Chemung Gr. pauciseptum, Hall, 1859, Pal. N. Y., vol. 3, p. 346, Low. Held. Gr.
- pelops, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 73, and Pal. N. Y. vol.5, pt. 2, p. 233, Schoharie grit.
- pelops var. ohioense, Hall, 1876, Illust
- perops var. onlocase, nan, 1876, filinst. Devonian Foss., pl, 36, and Pal. N. Y., vol. 5, pt. 2, p. 236, Up. Held. Gr. perannulatum, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 319. This name was preoccupied by Portlock in 1843. Soc. Generative Series Content of Series (Series) (Se 1843. See O. crocus.
- perelegans, Salter, 1848, Mem. Geo. Sur. Gr. Brit., vol. 2, p. 354, Ham. Gr. perparvum, Billings, 1862, Pal. Foss., vol.
- 1, p. 27, Black Riv. Gr.
- perseus, Billings, 1865, Pal. Foss., vol. 1. p. 313, Quebec Gr.
- persiphonatum, Billings, 1857, Rep. of Prog. Geo. Sur. Can., p. 329, Mid. Sil. If the genus Huronia is valid, this species will belong to it.
- perstriatum, Hall, 1859, Pal. N. Y., vol. 3, p. 346, Low. Held. Gr. perstrictum, Dawson, 1868. The name was
- preoccupied by Barrande. See O. dawsonanum.
- pertextum, Hall, 1879, Pal. N. Y., vol. 5, p. 314, Chemung Gr.
- pertinax, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 75, Black Riv. Gr. pervicax, Hall, 1879, Pal. N. Y., vol. 5, p.
- 257, Schoharie grit.
- pileolum, Billings, 1866, Catal. Sil. Foss. Antic., p. 58, Medina Gr. piscator, Billings, 1865, Pal. Foss., vol. 1.
 - p. 251, Quebec Gr.
- piso, Billings, 1862, Pal. Foss., vol. 1, p. 168, Hud. Riv. Gr.
- planoconvexum, Hall, 1861, Rep. of Progr. Wis., p. 47, and Geo. Wis., vol. 4, p. 228, Black Riv. and Trenton Grs.
- pravum, Hall, 1879, Pal. N. Y., vol. 5, p. 255, Schoharie grit.
- pressum, Rogers, 1868, Bigsby, Thesaurus Siluricus, p. 180. Not defined.
- priamus, Billings, 1865, Pal. Foss., vol. 1, p. 253, Quebec Gr.
- primigenium, Vanuxem, 1842, Geo. Rep. N. Y., p. 36, and Pal. N. Y., vol. 1, p. 13, Calciferous Gr.
- procerum, Hall, 1876, Illust. Devonian Foss., pl. 35, and Pal. N. Y., vol. 5, pt. 2, p. 249, Schoharie grit.

ORT.

profundum, Hall, Mus. Nat. Hist., propinguum, Billing Geo. Sur. Can,, See O. fulgur.

punctostriatum, H Geo., vol. 5, p. 14 nstulosum, Winc

pustulosum, Peninsula Mich.

pylades, Billings, Antic., p. 84, Ni python, Billings, 18 Sur. Can., p. 335 randolphense, Wor

Ill. St. Mus. Nat. Gr. Proposed in

costatum, Meek preoccupied.

rapax, see Endocer raptor, Billings, 1

Antic., p. 57, M recedens. Barrand Boh., 4me ser., p

rectiannulatum, Ή vol. 1, p. 34, Ch recticameratum, H

vol. 1, p. 46, Bir rectum, Worthen,

vol. 6, p. 504, N remus, Billings, 1

Antic., p. 85, Nia repens, Billings, 1

p. 312, Quebec (reticulatum, Phillip

Chemung Gr.

in this country rigidum, Hall, 1859 344, Low. Held.

robustum, Winch Sci., 2d ser., v shall Gr.

robustum, Hall, 187 occupied. See O rotulatum, Billings

Geo. Sur. Can., j rude, Hall, 1859, P

Low. Held. Gr. rudens, Beecher, 1

p. 28, Ham. Gr.

rudicula, Hall, 1 Foss., pl. 37, and

- 2, p. 268, Up. He rushense, McChes
- Foss., p. 68, and p. 612, Coal Mea

sayi, Billings, 1865 315, Quebec Gr.

scammoni, McChe Foss., p. 92, Niag

sceptrum, Beecher 7, p. 26, Up. Hel scintilla, Hall, 1879 293, Ham. Gr.

sedgwicki, Billings Geo. Sur. Can.,

selwyni, Billings, p. 161, Guelph G servile, Billings, 18 252, Quebec Gr.

ORT.]

ORT.] ORT.

CEPHALOPODA.

profundum, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 76, Up. Held. Gr.

propinquum, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 320. Preoccupied.

punctostriatum, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 154, Up. Sil. pustulosum, Winchell, 1866, Rep. Low. Peninsula Mich., p. 97, Ham. Gr.

pylades, Billings, 1866, Catal. Sil. Foss. Antic., p. 84, Niagara Gr.

python, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 335, Trenton Gr. randolphense, Worthen, 1882, Bull. No. 1,

Ill. St. Mus. Nat. Hist., p. 38, Kaskaskia Gr. Proposed instead of O. annulato-

costatum, Meek & Worthen, which was

raptor, Billings, 1866, Catal. Sil. Foss. Antic., p. 57, Medina Gr.

Antic., p. 57, Medina Gr. recedens, Barrande, 1869, Sys. Sil. de Boh., 4me ser., p. viii, pl. 433, Quebec Gr. rectiannulatum, Hall, 1847, Pal. N. Y., vol. 1, p. 34, Chazy and Birdseye Grs. recticameratum, Hall, 1847, Pal. N. Y., vol. 1, p. 46, Birdseye Gr. rectum, Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 504, Niagara Gr. remus, Billings, 1866, Catal. Sil. Foss. Antic., p. 85, Niagara Gr. repens, Billings, 1865, Pal. Foss., vol. 1, p. 312, Quebec Gr.

p. 312, Quebec Gr. reticulatum, Phillips, 1836, Geol. York., Chemung Gr. Not clearly identified

rigidum, Hall, 1859, Pal. N. Y., vol. 3, p.

robustum, Winchell, 1862, Am. Jour. Sci., 2d ser., vol. 33, p. 356, Mar-

robustum, Hall, 1876. The name was pre-

rotulatum, Billings, 1857, Rep. of Progr.

Geo. Sur. Can., p. 334, Niagara Gr. rude, Hall, 1859, Pal. N. Y., vol. 3, p. 346,

rudens, Beecher, 1888, Pal. N. Y., vol. 7,

rudicula, Hall, 1876, Illust. Devonian

Foss., pl. 37, and Pal. N. Y., vol. 5, pt. 2, p. 268, Up. Held. Gr. rushense, McChesney, 1860, New. Pal.

Foss., p. 68, and Geo. Sur. Ill., vol. 5, p. 612, Coal Meas.

sayi, Billings, 1865, Pal. Foss., vol. 1, p.

scammoni, McChesney, 1861, New Pal. Foss., p. 92, Niagara Gr.

sceptrum, Beecher, 1888, Pal. N. Y., vol. 7, p. 26, Up. Held. Gr. scintilla, Hall, 1879, Pal. N. Y., vol. 5, p.

sedgwicki, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 320, Hud. Riv. Gr. selwyni, Billings, 1862, Pal. Foss., vol. 1,

p. 161, Guelph Gr. servile, Billings, 1865, Pal. Foss., vol. 1, p.

See O. fulgur.

preoccupied.

in this country.

Low. Held. Gr.

p. 28, Ham. Gr.

315, Quebec Gr.

293, Ham. Gr.

252, Quebec Gr.

shall Gr.

344, Low. Held. Gr.

occupied. See O. eriense.

rapax, see Endoceras rapax.

- Am. Pal. Foss., p. bosed instead of 1860, which was
- Rep. of Progr. Black Riv and
- 863, Trans. St. 2, p. 107, Calcif.
- N. Y., vol. 5, p.
- al. N. Y., vol. 5.
- Pal. N. Y., vol.
- Rep. N. Y. Mus. al. N. Y., vol. 5.
- grit. all, 1876, Illust. and Pal. N.Y.
- p. Held. Gr.
- 1857, Rep. of , p. 319. This by Portlock in
- Mem. Geo. Sur. Ham. Gr. , Pal. Foss., vol.
- al. Foss., vol. 1,
- 1857, Rep. of p. 329, Mid. Sil. a is valid, this
- Pal. N. Y., vol.
- The name was le. See O. daw-
- J. N. Y., vol. 5,
- Can. Nat. and KRiv. Gr. N. Y., vol. 5, p.
- Catal. Sil. Foss.
- al. Foss., vol. 1.
- Foss., vol. 1, p.
- 1, Rep. of Progr. Wis., vol. 4, p. enton Grs. N. Y., vol. 5, p.
- sby, Thesaurus lefined. 1. Foss., vol. 1,
- 1842, Geo. Rep. N. Y., vol. 1, p.
- llust. Devonian I. Y., vol. 5, pt.

- shumardi, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 460, Chazy Gr. sicinus, Hall, 1879, Pal. N. Y., vol. 5, p.
- 301, Marcellus Shale.
- sieboldi, Billings, 1866, Catal. Sil. Foss. Antic., p. 23, Hud. Riv. and Anticosti Grs.
- simpsoni, Billings, 1859, Rep. of Progr. Assiniboine and Saskatchewan Ex. Exp., p. 186, Silurian.
- simulator, Hall, 1876, 28th Rep. N. Y.
- Mus. Nat. Hist., p. 179, Niagara Gr. sirpus, Hall, 1879, Pal. N. Y., vol. 5, p. 269, Up. Held. Gr.
- sociale, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 245, Hud. Riv. Gr. Proposed instead of O. gregarium, Hall, 1861, which was preoccupied.
- sordidum, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 363, Calciferous Gr.
- spissiseptum, Dwight, 1884, Am. Jour. Sci. and Arts, 3d. ser., vol. 27, p. 256, Calciferous Gr.
- spissum, Hall, 1879, Pal. N. Y., vol. 5, p. 287, Ham. Gr.
- stebos, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 29, Genesee Shale.
- striatum, (?) Sowerby, 1812, Min. Conch., vol. 1, p. 129, Devonian.
- striælineatum, McChesney, 1861, New Pal. Foss., p. 94, Niagara Gr. strigatum, Hall, 1847, Pal. N. Y., vol. 1,
- p. 205, Trenton Gr.
- strix, Hall & Whitfield, 1875, Ohio Pal. vol. 2, p. 149, Niagara Gr.
- stylus, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 245, and Pal. N. Y., vol. 5, pt. 2, p. 253, Schoharie grit. Proposed instead of O. baculum, Hall, 1862, which was preoccupied.
- subarcuatum, Hall, 1847, Pal. N. Y. vol. 1, p. 34. Preoccupied by Portlock in 1843. See O. clintoni.
- subbaculum, Meek & Worthen, 1865, Proc. Acad. Nat. Sci., p. 256. Niagara Gr.
- subcancellatum, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 245, Niagara Gr. Proposed instead of O. cancellatum, Hall, 852, which was preoccupied.
- 1852, which was precentified. sublave, D'Orbigny, 1850, Prodrome de Pal., t. 1, p. 28, Onondaga Gr. Pro-posed instead of O. lave, Hall, 1843, which was preoccupied.
- subtextile, Hall, 1859, Pal. N. Y., vol. 3, p. 344, Low. Held. Gr.
- Bray, Down Hall, 1843, 4th Dist. (ieo.
 Rep. N. Y., p. 180, and Pal. N. Y., vol. 5, pt. 2, p. 283, Marcellus Shale.
- swallovanum, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss., p. 308, Coal Measures in the Valley of Verdigris in Kansas. Proposed instead of O. moniliforme, Swallow, in Trans. St. Louis Acad. Sci. vol. 1, p. 200, which was preoccupied by Hall.
- tantalus, Hall, 1879, Pal. N. Y., vol. 5, p. 241, Schoharie grit.
- telamon, Hall, 1879, Pal. N. Y., vol. 5, p. 291, Ham. Gr.

tenere, Hall, 1879, Pal. N. Y., vol. 5, p. 285. Ham. Gr.

- tenerum, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 174, Black Riv. Gr. tenui-annulatum, Hall, 1859, Pal. N. Y.,
- vol. 3, p. 345, Low. Held. Gr. tenuiseptum, Hall, 1847, Pal. N. Y., vol.
- 1, p. 35, Chazy Gr.
- teretiforme, Hall, 1847, Pal. N. Y., vol. 1, p. 198, Trenton Gr. tersum, Hall, 1879, Pal. N. Y., vol. 5, p.
- terstin, Hall, 1879, Fal. N. T., Vol. 5, p. 286, Ham. Gr.
 tetricum, Hall, 1862, 15th Rep. N. Y.
 Mus. Nat. Hist., p. 45, and Pal. N. Y., vol. 5, pt. 2, p. 251, Schoharie grit.
 textile, Hall, 1847, Pal. N. Y., vol. 1, p. 1999, Trenton Gr.
- textum, Hall, 1879, Pal. N, Y., vol. 5, p. 285, Ham. Gr.
- thestor, Hall, 1879, Pal. N. Y., vol. 5, p. 302, Marcellus shales.
- thoas, Hall, 1862, 15th Rep. N. Y. Mus. Nat. Hist., p. 75, and Pal. N. Y., vol. 5, pt. 2, p. 61, Schoharie grit.
- thyestes, Hall, 1879, Pal. N. Y., vol. 5, p. 306, Portage Gr.
- tityrus, Billings, 1865, Pal. Foss., vol. 1, p. 316, Quebec Gr.
- transversum, S. A. Miller, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 129, Hud. Riv. Gr.



F1G. 755.-Orthoceras transversum

- trentonense, see Cyrtoceras trentonense turbidum, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 100, Hud. Riv. Gr.
- typus, Saemann, as identified by Hall, 1876, Illust. Devonian Foss., is O. mar-
- cellense. undulåtum, Owen, 1840, Rep. on Min. Lands, Niagara Gr. The name was preoccupied by Sowerby in 1812. See O.
- iowense. undulostriatum, Hall, 1847, Pal. N. Y., vol. 1, p. 202, Trenton Gr. unionense, Worthen, 1875, Geo. Sur. Ill.,
- varro, Billings, 1866, Catal. Sil. Foss. Antic., p. 84, Niagara Gr. varrum, Hall, 1879, Pal. N. Y., vol. 5, p.
- 259, Schoharie grit.
- vastator, Hall, 1879, Pal. N. Y., vol. 5, p. 243, Schoharie grit. Correct in the in-
- dex, but printed O. obliquum, on page 243. velox, Billings, 1865, Pal. Foss., vol. 1, p. 173, Chazy Gr.
- vertebrale, Hall, 1847, Pal. N. Y., vol. 1, p 201. Preoccupied by Schlotheim in 1820,
- and by Eichwald in 1840. See O. olorus. veterator, Billings, 1865, Pal. Foss., vol. 1, p. 350, Calciferous Gr.
- viator, Hall, 1879, Pal. N. Y., vol. 5, p. 270, Up. Held. Gr.

- vinchellanum, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss. p. 308, Marshall Gr. in Southern Michigan. Proposed instead of O. occidentale, Winchell, 1862, Am. Jour. Sci. and Arts, 2d ser., vol. 33, p.
- 356, which was preoccupied by Swallow. vindobonense, Dawson, 1868, Acad. (reol. p. 311. Carboniferous.
- p. 632, and Pal. N. Y., vol. 2, p. 291 Niagara Gr.
- virgulatum, Hall, 1852, Pal. N. Y., vol.2, p. 96, Clinton and Niagara Grs.
- vittatum, Sandberger. Not American.
- vulgatum, Billings, 1857, R-p. of Progr. Geo. Sur. Can., p. 337, Trenton Gr. warrenense n. sp., Chemung Gr. Pro-posed instead of O. cochleatum, Hall,
- Pal. N. Y., vol. 5, p. 308, pl. exiii, fig. 19. which name was preoccupied.
- vauwatosense, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis., p. 66, and Geo. Wis., vol. 4, p. 297, Niagara Gr. whitii, Winchell, 1863, Proc. Acad. Nat. Sei, p. 99, Villard, 1863, Proc.
- Sci., p. 22, Kinderhook Gr.
- winchelli, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil, p. 257, and Geo. Sur. Ill., vol. 6, p. 512, Ham. Gr. woodworthi, McChesney, 1865, New Pal.
- Foss., p. 53, Niagara Gr. Proposed instead of O. irregulare, which was preoccupied.
- xerxes, Billings, 1865, Pal. Foss., vol. 1, p. 316, Quebec Gr.
- xiphias, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 318, Trenton Gr. zeus, Hall, 1879, Pal. N. Y., vol. 5, pt. 2, p.
- 235, Schoharie grit.
- PETALICHNUS, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 221. [Ety. pr-talos, spread out; ichnos, track.] A wide trail composed of numerous transversely elongated depressions arranged without order. Type P. multipartitus.
 - multipartitus, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 222, Utica Slate Gr.
- PHRAGMOCERAS, Broderip, 1839, Murch. Sil. Syst., p. 621. [Ety. phragmos, partition; keras, horn.] Shell short, arched, com-

pressed, more or less conical: sides of the mouth lapping toward each other; septa simple, crossed by the sig-moidal lines of growth; siphuncle on the internal edge, dilate between the septa. Type P. arcuatum.

byronense, Wor-Fig. 756. – Phragmoceras then, 1875, hector. Cast of interior then, 1875, hector. Cast of Interior Geo. Sur. Ill., vol. 6, p. 506, Niag-"ara Gr.



FIG. 757 -Phragmo

hoyi var. compr Ånn. Rep. Geo. Geo. Wis., vol. labiatum, Whitfie Sur. Wis., p. 8 p. 302, Niagara nestor, Hall, 1867 Nat. Hist., p. 40 nestor var. cana Pal. Foss., vol. parvum, Hall & Pal., vol. 2, p. 1

præmaturum, Bi and Geo., vol. 5 Trenton Grs.



FIG. 758. - Piloceras wortheni.

amplum, Dawson p. 1, Calciferou

PET. PHR.

ellipticum, Hall Pal., vol. 2, p. expansum, Winc Nat. Sci., p. 23, hector, Billings, 1

163, Guelph Gi hoyi, Whitfield, 1 Wis., p. 86, and Niagara Gr.



PET. PHR.

POL. -SOL.]

ler, 1883, 2d Ed. Marshall Gr. in roposed instead chell, 1862, Am. l ser., vol. 33, p. pied by Swallow. 868, Acad. Geol.,

Murch. Sil. Sys., ., vol. 2, p. 291,

Pal. N. Y., vol. 2, gara Grs.

ot American. Rep. of Progr. Trenton Gr.

mung Gr. Proochleatum, Hall, 08, pl. exiii, fig.

eoccupied. , 1880, Ann. Rep. , and Geo. Wis.,

Gr. Proc. Acad. Nat. Gr.

hen, 1866, Proc. p. 257, and Geo. Ham. Gr.

1865, New Pal. Fr. Proposed inwhich was preoc-

l. Foss., vol. 1, p.

Rep. of Progr. Trenton Gr. Y., vol. 5, pt. 2, p.

1880, Jour. Cin.). 221. [Ety. pe-, track.] A wide umerous transessions arranged P. multipartitus. ller, 1880, Jour. l. 2, p. 222, Utica

839, Murch. Sil. 'agmos, partition; ort, arched, com-



- Phragmoceras Cast of interior , p. 506, Niag-

ellipticum, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 152, Niagara Gr. expansum, Winchell, 1863, Proc. Acad.

Nat. Sci., p. 23, Kinderhook Gr. hector, Billings, 1862, Pal. Foss., vol. 1, p.

163, Guelph Gr. hoyi, Whitfield, 1878, Ann. Rep. Geo. Sur.

Wis., p. 86, and Geo. Wis., vol. 4, p. 300, Niagara Gr.



F1G. 757 - Phragmoceras hector. Side view.

hoyi var. compressum, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 82, and Geo. Wis., vol. 4, p. 301, Niagara Gr. labiatum, Whitfield, 1878, Ann. Rep. Geo.

Sur. Wis., p. 86, and Geo. Wis., vol. 4, p. 302, Niagara Gr. nestor, Hall, 1867, 20th Rep. N. Y. Mus.

Nat. Hist., p. 405, Niagara Gr. nestor var. canadense, Whiteaves, 1884,

Pal. Foss., vol. 3, p. 39, Guelph Gr. parvum, Hall & Whitfield, 1875, Ohio. Pal., vol. 2, p. 151, Niagara Gr. præmaturum, Billings, 1866, Can. Nat. and Geo., vol. 5, p. 173, Black Riv. and Trenton Grs. Type of Hyatt's genus

Mælnoceras. spinosum, see Gyroceras

spinosum. walshi, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 257, and Geo. Sur. Ill., vol. 6, p. 511, Ham. Gr.

PILOCEBAS, Salter, 1859, Quar. Jour. Geo. Soc. vol. 15, p. 376. [Ety. pilos, a cap; keras, horn.] Broad, conical, slightly curved, subcylindrical or compressed; siphuncle and septa combined as a series of conical, concave septa, which fit into each other sheathwise. Type P.

amplum, Dawson, 1881, Can. Nat., vol. 10, p. 1, Calciferous Gr.

FIG. 758. - Pilo-

ceras wortheni.

CEPHALOPODA.

canadense, Billings, 1860, Can. Nat. and Geol., vol. 5, p. 171, Calciferous Gr. explanator, Whitfield, 1886, Bull. Am.

Mus. Nat. Hist., vol. 1, p. 323, Birdseye Gr.

gracile, Billings, 1865, Pal. Foss., vol. 1, p. 257, Quebec Gr. triton, Billings, 1865, Pal. Foss., vol. 1, p.

257, Quebec Gr.

wortheni, Billings, 1865, Pal. Foss., vol. 1, p. 256, Quebec Gr.

Polycronites haani, Troost, 1840, 5th Geo. Rep. Tenn., Devonian. Not clearly defined, but probably a Gyroceras. PTERONAUTILUS, Meek, 1864, Pal. of Up. Mo.,

p. 64. [Ety. pteron, wing; Nautilus, a genus.] Shell with the involute body portion comparatively very small, and globular in form, scarcely umbilicate; outer chamber very large, and deflected from the involute body, its inner or ventral side being widely open, and the lateral margins greatly dilated, so as to form a very large, wing-like expansion on each side. Type P. seebachanus.

seebachanus, Geinitz, (Nautilus seebach-anus,) Carb. und Dyas, p. 43, Permian Gr.

SERICHNITES, Billings, 1866, Catal. Sil. Foss. Antic., p. 73. The author supposed the tracks might have been made by a species of Cephalopoda. They consist of two parallel rows of semicircular or subquadrate pits; each pit is about onehalf inch in diameter, and separated from the succeeding one by about one-fourth of an inch. Type S. abruptus, abruptus, Billings, 1866, Catal. Sil. Foss.

Antic., p. 73, Hud. Riv. Gr. Sidemina infundibuliforme, Castelnau, 1843, Syst. Sil., p. 33. Probably the fragment

of an Endoceras. Solenochilus, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., vol. 20, p. 47. [Ety. solen, a channel; cheilos, a lip.] Nautiloid in form, with small siphuncle in contact, or nearly in contact, with the outer shell; margins of the lip near the umbilicus, terminating in spout-like auricles. Type S. collectum.

a



FIG. 759.—Solenochilus avonense

avonense, Dawson, 1868, (Nautilus avonensis,) Acad. Geol., p. 311, Carboniferous.

invaginatum. 30

CEPHALOPODA.

- capax, Meek & Worthen, 1865, (Crypto-ceras capax,) Proc. Acad. Nat. Sci. Phil., p. 262, and Geo. Sur. Ill., vol. 6, p. 532, Coal Meas.
- collectum, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 48, and Geo. Sur. Ill., vol. 5, p. 544, St. Louis Gr. indianense, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 150, St. Louis Gr. leidyi, Meek & Worthen, 1865, (Nautilus leidyi,) Proc. Acad. Nat. Sci. Phil., p. 269 and Geo Sur. Ill. vol. 5, p. 524
- 262, and Geo. Sur. Ill., vol. 5, p. 524, Keokuk Gr.
- springeri, White & St. John, 1868, (Nau-tilus springeri,) Trans. Chi. Acad Sci.,
- vol. 1, p. 124, Up. Coal Meas. Spirula, Lamarck, 1801, Syst. An. sans Vert. mortoni, Troost, 1840, 5th Geo. Rep. Tenn., Niagara Gr. Not clearly defined.
- STREPTOCERAS, Billings, 1866, Catal. Sil. Foss. Antic., p. 88. [Ety. streptos, twisted; keras, horn.] Having the general form of Oncoceras, but with a trilobed aper-ture resembling Phragmoceras. Type S. janus.

 - heros, Billings, 1866, Catal. Sil. Foss. Antic., p. 89, Niagara Gr. janus, Billings, 1866, Catal. Sil. Foss. Antic., p. 88, Niagara Gr.



FIG. 760. - A perture of Streptoceras janus.

- TEMNOCHILUS, McCoy, 1844, Synop. Carb. ross. Ireland, p. 20. [Ety. temno, I di-vide; cheilos, lip.] Nautiloid in form, and characterized by a broad, deep, open umbilicus, showing all the volutions, with the outer side of the volutions broad or flattened, and the middle of each lateral margin prominently angular; the angle being sometimes nodose, while the transverse diameter of the volutions is always greater than the dorso-ventral; siphuncle between the middle and the outer side of the whorls. Type T. biangulatus.
 - coxanum, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 50, and Geo. Sur. 111., vol. 5, p. 543, St. Louis Gr.
- latum, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 49, and Geo. Sur. Ill., vol. 5, p. 608, Coal Meas.

niotense, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 260, and Geo. Sur. Ill., vol. 5, p. 523, Keokuk Gr. Type of Hyatt's genus Edaphoceras.



FIG. 761.-Temnochilus coxanum.

- peramplum, Meek & Worthen, 1865. (Endolobus peramplus,) Proc. Acad. Nat. Sci. Phil., p. 259, Kaskaskia Gr.
- scottense, Worthen, (in press.) Geo. Sur. Ill., vol. 8, p. 151, Warsaw Gr. spectabile, Meek & Worthen, 1860, (Nau-
- tilus spectabilis,) Proc. Acad. Nat. Sci. Phil., p. 469, and Geo. Sur. Ill., vol. 2, p. 308, Kaskaskia Gr.
- Minslowi, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 50, and Geo. Sur. Ill., vol. 5, p. 609, Coal Meas.
- TERATICHNUS, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 221. [Ety. teras, a wonder; ichnos, track.] A track supposed to have been made by a cephalopod, and consisting of numerous elongated, more or less bifurcated
 - impressions. Type T. confertus. confertus, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 221, Utica Slate Gr.
- TRACHOMATICHNUS, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 219. [Ety. trachoma, that which is made rough; ichnos, track.] A track supposed to have been made by a cephalopod and consisting of numerous simple or compound impressions arranged
 - in two series. Type T. numerosus. cincinnatiensis, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 220, Utica Slate Gr.
 - numerosus, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 219, Utica Slate Gr.
 - permultus, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 220, Utica Slate Gr.
- TREMATOCERAS, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 205. [Ety. trema,

TRE.-TRO.]

SPI.- TRE.

hole; keras, h conical, like septa, and sip a line of eld along one side stage of grov which were tended the she ohioense, White Acad. Sci., vol TREMATODISCUS, N Proc. Acad. N trema, hole; wide, shallow, the middle, s whorls slender sessed of revo striæ; siphune on the dorsal The name hav Haeckel for Ra Trematoceras. altidorsalis, Wir Nat. Sci., p. 42 digonus, Meek tilus digonus,) 470, and Geo. Kinderhook G discoidalis, Win Sci., vol. 33, shall Gr. konincki, Wethe





meekanus, Win Sci., 2d series shall Gr. planidorsalis, W Sci., 2d series shall Gr.

rockymontanus, Cin. Soc. Nat. lington Gr.

striatulus, Winc Nat. Sci., 2d se shall Gr.

strigatus, Winche Sci., p. 426, M

SPI.- TRE.

TRE.-TRO.]

nen, 1865, Proc. 260, and Geo. Keokuk Gr. Edaphoceras.



coxanum.

Northen, 1865, ,) Proc. Acad. 259, Kaskas-

ress.) Geo. Sur. iw Gr. en, 1860, (Nau-Acad. Nat. Sci. Sur. Ill., vol. 2.

en, 1870. Proc. . 50, and Geo. Coal Meas. 880, Jour. Cin. 221. [Ety. p. rack.] A track en made by a ing of numerless bifurcated onfertus. 880, Jour. Cin. p. 221, Utica

ler, 1880, Jour. ol. 2, p. 219. which is made A track suple by a cephalnumerous simesions arranged numerosus. er, 1880, Jour. rol. 2, p. 220,

1880, Jour. ol. 2, p. 219,

380, Jour. Cin. , p. 220, Utica

82, Ann. N. Y. i. [Ety. trema, hole; keras, horn.] Shell straight, obconical, like Orthroceras as to tube, septa, and siphuncle; characterized by a line of elongated, raised tubercles along one side of the shell, which at one stage of growth formed perforations, which were closed as the animal ex-

tended the shell. Type T. ohioense. ohioense, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 206, Up. Held. Gr. TREMATODISCUS, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 147. [Ety. trema, hole; diskos, quoit.] Discoid, wide, shallow, umbilicus, perforated in the middle, showing all the whorls; whorls slender, merely in contact possessed of revolving angles, grooves, or striæ; siphuncle central or subcentral on the dorsal side. Type T. stygialis. The name having been used in 1860 by Haeckel for Radiolaria, Hyatt proposed Trematoceras.

altidorsalis, Winchell, 1862, Proc. Acad. Nat. Sci., p. 429, Marshall Gr. digonus, Meek & Worthen, 1860, (Nau-

tilus digonus,) Proc. Acad. Nat. Sci., p. 470, and Geo. Sur. Ill., vol. 2, p. 163, Kinderhook Gr.

discoidalis, Winchell, 1862, Am. Jour. Sci., vol. 33, 2d series, p. 360, Mar. shall Gr.

konincki, Wetherby, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 79, Waverly Gr.



FIG. 762. - Trematodiscus konincki

meekanus, Winchell, 1862, Am. Jour. Sci., 2d series, vol. 33, p. 360, Marshall Gr.

- planidorsalis, Winchell, 1862. Am. Jour. Sci., 2d series, vol. 33, p. 358, Marshall Gr.
- rockymontanus, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 312, Burlington Gr.
- striatulus, Winchell, 1862, Proc. Acad. Nat. Sci., 2d series, vol. 33, p. 358, Marshall Gr.
- strigatus, Winchell, 1862, Proc. Acad. Nat. Sci., p. 426, Marshall Gr.

sulcatus, Meek & Worthen, 1866, Proc. Acad. Nat. Sci. Phil., p. 274, Kaskaskia Gr.

455

trigonus, Winchell, 1862, Am. Jour. Sci., 2d series, vol. 33, p. 358, Marshall Gr. trisulcatus, Meek & Worthen, 1860, Proc.

- Acad. Nat. Sci. Phil., p. 470, and Geo. Sur. Ill., vol. 2, p. 162, Kinderhook Gr. TROCHOCEBAS, Hall, 1852, Pal. N. Y., vol. 2,
 - p. 335. [Ety. trochos, hoop; keras, horn.] This name was proposed by Barrande at about the same time. Turbinate or trochiform, spire elevated, more or less umbilicated; ventricose; aperture rounded or round oval; volutions above
 - the outer one septate; siphuncle submarginal or dorsal. Type T. gebhardi. æneas, Hall, 1870, Rev. Ed. 20th Rep. N. Y. Mus. Nat. Hist. Expl., pl. 25,
 - Niagara Gr.
 - baeri, see Gyroceras baeri.
 - barrandii, Hall, 1879, Pal. N. Y., vol. 5, p. 398, Schoharie grit.
- biton, Hall, 1879, Pal. N. Y., vol. 5, p. 395, Schoharie grit.
- clio, Hall, 1861, 14th Rep. N. Y. Mus. Nat. Hist., p. 108, Schoharie grit. Type of Hyatt's genus Sphyradoceras.
- costatum, Hall, 1861, Geo. Rep. of Wis., Niagara Gr.
- desplainense, McChesney, 1860, New Pal. Foss., p. 68, Niagara Gr. discoideum, Hall, 1862, 15th Rep. N. Y.
- Mus. Nat. Hist., p. 64, and Illust. De-von. Foss., pl. 59, Schoharie grit.
- eugenium, Hall, 1861, 14th Rep. N. Y. Mus. Nat. Hist., p. 108, Schoharie grit. Type of Hyatt's genus Nædoceras.
- expansum, Hall, 1879, Pal. N. Y., vol. 5,
- p. 402, Schoharie grit. gebhardi, Hall, 1852, Pal. N. Y., vol. 2, p. 335, Coralline Gr.
- incipiens, Barrande, 1869, Syst. Sil. de Boh., 4me ser., Quebec Gr. notum, Hall, 1867, 20th Rep. N.Y. Mus.
- Nat. Hist., p. 403, Niagara Gr. abliquatum, Hall, 1876, Illust.) Devonian

Foss., pl. 48) Up. Held. Gr., orion, Hall, 1876, (Cyrtoceras orion,) Il-lust. Devonian Foss., pl. 48, Up. Held. Gr. pandion, Hall.

1876, Illust. Devonian Foss.,

pl. 48, and Pal. N. Y., vol. 5, pt. 2, p. 400, Scho-

harie grit. pandum, Hall, 1879, Pal. N.Y., . Hall,

vol. 5, p. 403, Schoharie grit.

turbinatum, Hall, 1852, Pal. N. Y.,

vol. 2, p. 336, Coralline Gr.

waldronen,se, FIG. 763.-Trochoceras waldronense

Hall, 1876, 28th Rep. N. Y. Mus. Nat. Hist., p. 179, Niagara Gr.



Ann. Geo.

lithos, stone.]

Discoidal vo-

lutions in the same plane,

rounded

slightly concave on the

ventral_side,

gradually enlarging toward the

aperture; septa direct;

outer cham-

siphuncle

ber

large;

four,

about



FIG. 764.—Trocholites ammonius.

ventral. Type T. ammonius. ammonius, Conrad, 1838, Ann. Geo. Rep. N. Y., p. 119, and Pal. N. Y., vol. 1, p. 192, Trenton, Utica, and Hud. Riv. Grs. circularis, Miller & Dyer, 1878, Cont. to Pal., No. 2, p. 9, Hud. Riv. Gr.

minusculus, Miller & Dyer, 1878, Cont. to Pal. No. 2, p. 9, Utica Slate Gr.

TRO.



FIG. 765.-Trocholites circularis.

planorbiformis, Conrad, 1842, Jour. Acad. Nat. Sci. Phil., vol. 8, p. 274, and Pal. N. Y., vol. 1, p. 310, Utica and Hud. Riv. Grs.

CLASS LAMELLIBRANCHIATA.

[Ety. lamella, a thin plate; branchiæ, gills.]

THE Lamellibranchiata, Blainville, or Conchifera, Lamarck, have bivalve shells, abound in the rivers of North America, in every ocean, and were common in all geological ages, back to early Silurian time. The river shells are known by the common name of mussels, and nearly all belong to three genera, Unio, Anodonta, and Margaritana. All known Palæozoic shells of this class inhabited salt water. The animals have a bilobed mantle, the sides of which secrete a calcareous shell having two valves, which are attached by some kind of a hinge. The hinge frequently has teeth on one valve that fit in cavities on the other. The valves being on each side of the animal, one is a right valve and the other a left valve. In most genera the valves are equal, and the animals lived in an erect position, resting on the edge of the shell opposite to the hinge, and, when moving, plowed a furrow in the sand or mud by the extension of a tongue-like foot. In some genera one valve is much larger than the other, and the shell lies on the larger valve, and adheres to some foreign object, as is the case with the common oyster; in other instances the locomotion is by suddenly opening and closing the valves, which causes the shell to dart through the water, first in one direction and then another, as the Pecten does. Some genera have a byssus by which they are attached to submarine bodies. Each valve commences to grow at the apex or beak, which is also called the umbo. The umbones are almost always directed toward the ante-

rior side of the length of a she is measured fro through the cer with ribs, radia the shell from t and when a de Many shells ha ligament betwee single muscle, t Order Monomy belong to the D ive, the other su are called the a border of the m there is a sinus tractile siphon, also been divide to wit : Asiphon Siphonophora.

It will be o æozoic shells are the presence or the character of sinus; the positi whether the valence or absence

Shells having a

Ambonychi pectenidæ, Cythe notidæ, Ostreida Trigoniidæ, Unic

Cardiidæ Ca Lucinidæ, Myaci domidæ, Tellinid

> FAMILY A sopteria FAMILY AM FAMILY AN FAMILY AR desma.

457

rior side of the shell, and sometimes project as far as the anterior margin. The length of a shell is the distance from the anterior to the posterior side; the width is measured from the hinge or dorsal side to the base; the thickness is measured through the center of the two valves. The surface of the shells is generally marked with ribs, radiating from the umbones, or concentric lines marking the growth of the shell from the umbones. A depression, anterior to the beak, is called a lunule, and when a depression exists posterior to the beak, it is called an escutcheon. Many shells have an external hinge ligament behind the umbones; some have a ligament between the umbones. When the valves are connected internally by a single muscle, the contraction of which brings the valves together, they belong to the Order Monomyaria; if there are two equally developed contracting mussels, they belong to the Dimyaria; or if there are two muscles, one large and functionally active, the other small, they belong to the Heteromyaria. These contracting muscles are called the adductors, and their places of attachment are indicated by scars. The border of the mantle makes an impression, which is called the pallial line, and if there is a sinus in the posterior part of the pallial line, it shows the animal had a retractile siphon, which, in burrowing shells, is often of great length. The Class has also been divided into two Orders, based on the presence or absence of a siphon, to wit: Asiphonida, Asiphonata, or Asiphonophora, and Siphonida, Siphonata, or Siphonophora. Each Order is spelled three different ways by different authors. Shells having a siphon are always gaping at the posterior or anterior side or at both.

It will be observed from the foregoing, the essential characters upon which Palgeozoic shells are classified are the following: Equality or inequality of the valves; the presence or absence of an external ligament; the number of muscular scars; the character of the hinge and its dentition; the presence or absence of a pallial sinus; the position of the umbones; the radiate or concentric surface markings; whether the valves fit each other or are gaping at one or both ends; and the presence or absence of a byssal sinus.

Order Asiphonida.

Ambonychiidæ, Amphicœliidæ, Anodontopsidæ, Areidæ, Aviculidæ, Aviculidæ, Aviculidæ, Cytherodontidæ, Modiomorphidæ, Mytilidæ, Nuculidæ, Nyassidæ, Orthonotidæ, Ostreidæ, Palæoconchidæ, Pinnidæ, Prothyridæ, Pteriniidæ, Technophoridæ, Trigoniidæ, Unionidæ.

ORDER SIPHONIDA.

Cardiidæ Cardiomorphidæ, Conocardiidæ, Cyprinidæ, Eopteriidæ, Grammysiidæ, Lucinidæ, Myacidæ, Palæanatinidæ, Phóladellidæ, Sanguinolitidæ, Solenidæ, Spirodomidæ, Tellinidæ.

FAMILY AMBONYCHIID.E. — Ambonychia, Angellum, Anomalodonta, Byssopteria.

FAMILY AMPHICCELIIDÆ. — Amphiccelia.

FAMILY ANODONTOPSIDE -- Anodontopsis, Cycloconcha.

FAMILY ARCIDÆ.—Carbonarca, Clinopistha, Macrodon, Megalomus, Ptychodesma.

TRO.

r, 1878, Cont. to ate Gr.



42, Jour. Acad. . 274, and Pal. Itica and Hud.

Α.

have bivalve were common are known by a. Unio, Anoinhabited salt te a calcareous The hinge The valves ۴. r a left valve. erect position, loving, plowed ot. In some on the larger mmon oyster; ng the valves, n and then any are attached or beak, which ward the ante-

- FAMILY AVICULIDÆ.—Actinodesma, Avicula, Aviculopinna, Bakevellia, Ectenodesma, Glyptodesma, Inoceranus, Liopteria, Leptodesma, Limoptera, Monopteria, Monotis, Palæopinæa, Posidonomya, Pseudomonotis, Pteronitella, Pteronites.
- FAMILY AVICULOPECTENIDÆ.—Aviculopecten, Crenipecten, Euchondria, Ly. riopecten, Pernopecten, Pterinopecten, Streblopteria.
- FAMILY CARDIDÆ.—Cardiola, Cardiopsis, Cardium, Dexiobia, Glyptocardia, Lunulicardium, Palæocardia, Panenka, Paracardium, Pararca.
- FAMILY CARDIOMORPHIDÆ.—Cardiomorpha, Edmondia, Euthydesma, Protomya.

FAMILY CHÆNOCARDIIDÆ. - Chænocardia.

FAMILY CONOCARDIIDÆ.—Conocardium.

- FAMILY CYPRINIDE.—Astartella, Cardinia, Clidophorus, Cypricardia, Cypricardites, Matheria, Pleurophorus, Vanuxemia.
- FAMILY CYTHERODONTIDÆ --- Cytherodon, Lyrodesma, Schizodus.

FAMILY EOPTERIDÆ.—Eopteria, Euchasma.

FAMILY GRAMMYSHDÆ.—Allorisma, Chænomya, Cuneamya, Grammysia, Leptodomus, Sedgwickia.

FAMILY LUCINIDÆ.—Paracylas.

FAMILY MODIOMORPHIDÆ.—Amnigenia, Cypricardella, Elymella, Goniophora, Glossites, Modiomorpha.

FAMILY MYACIDÆ.—Anthracomya.

FAMILY MYTILIDÆ.—Anthracoptera, Gosselettia, Lithophaga, Megambonia, Modiella, Modiolopsis, Myalina, Mytilarca, Mytilops, Plethomytilus, Pyanomya.

FAMILY NUCULIDÆ.—Nucula, Nuculana, Nuculites, Palæoneilo, Pyrenomœus, Solenomya, Tellinomya, Yoldia.

FAMILY NYASSIDÆ.---Nyassa.

FAMILY ORTHONOTIDÆ.—Orthodesma, Orthonota, Orthonotella, Palæosolen, Sphenolium.

FAMILY OSTREIDÆ.—Ostrea, Placunopsis.

FAMILY PALÆANATINIDÆ.—Ilionia, Palæanatina, Prorhynchus.

FAMILY PALÆOCONCHIDÆ.—Palæoconcha.

FAMILY PHOLADELLIDÆ.—Cimitaria, Pholadella, Phthonia.

FAMILY PINNIDÆ.—Pinda.

FAMILY PROTHYRIDÆ.—Prothyris.

FAMILY PTERINIDÆ.—Actinopteria, Pterinea, Ptychopteria, Vertumnia.

FAMILY SANGUINOLITIDÆ.—Cypricardinia, Promacrus, Spathella, Sphenotus, Sanguinolites.

FAMILY SOLENIDÆ.—Solenopsis.

FAMILY SPIRODOMIDÆ.—Spirodomus.

FAMILY TECHNOPHORIDÆ.—Technophorus.

FAMILY TELLINIDÆ. — Tellinopsis.

FAMILY TRIGONIDÆ.—Dolabra,? Ischyrinia.?

FAMILY UNIONIDÆ.—Anthracosia, Prisconaia.

ACT. -ALL.]

Actinodesma sub subrectum. ACTINOPTERIA, H

pt. 1, expla [Ety. aktin, In the text j 107, he wro which indici from the gei from *Pterine* lateral teeth, mental area first species n

FIG. 766.—Actino boydi. Right vi 1884, Pal. N.Y mung Gr. boydi, Conrae 1842, (Avicu boydi,) Jou Acad. Nat. Sc Phil., vol. 8, 237, and Pa N. Y., vol. 5, 113, Ham. Gr decussata, Ha 1843, (Avicu decussata Geo. 4th Dis N. Y., p. 203, 111, Ham. Gr. delta, Hall, 1883 Chemung Gr. doris, Hall, 1884 Marcellus Sha epsilon, Hall, 18 1, p. 122, Cher eta, Hall, 1884, 1 124, Chemung eximia, Hall, 18 1, p. 107, Up. iota, Hall, 1884, p. 127, Chemu kappa, Hall, 188 p. 128, Chemu muricata, Hall, Geo. Sur. 4th] N. Y., vol. 5, perobliqua, Coni bliqua,) Jour. 8, p. 235, and Ham. Gr. perstrialis, Hall, pt. 1, p. 118, C pleuroptera, Con roptera,) Jour p. 242, Ham. C pusilla, Hall, 188 1, p. 117, Ham. subdecussata, Ha 5, pt. 1, p. 110,

ACT. -ALL.]

subrectum.

kevellia, Ectena, Limoptera, onotis, Pteroni-

uchondria, Ly.

Glyptocardia, 'CB. hydesma, Pro-

icardia, Cypri-

ammysia, Lep-

a, Goniophora,

Megambonia, **Plethomytilus**,

, Pyrenomœus,

a, Palæosolen,

ertumnia. la, Sphenotus, tenuistriata, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 120, Chemung Gr. theta, Hall, 1884, Pal. N. Y., vol. 5, pt. 1,

p. 125, Chemung Gr.

zeta, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 123, Chemung Gr.

ALLORISMA, King, 1844, Ann. Mag. Nat. Hist., vol. 14, p. 315. [Ety. allos, variable; ereisma, support, expressive of the variable nature of the cartilage support or fulcrum.] Equivalve, inequilateral, elongate, thin anterior side short; posterior long and gaping at the extremity; beaks anterior, depressed; surface concentrically ridged or undulated; hinge edentulous; ligament external; dorsal margin inflected, forming a lanceolate depression along the cardinal border behind the beaks; anterior adductor scar occupy-ing a low position; pallial line faintly marked. Type A. sulcatum.

- marked. Type A. sulcatum. altirostratum, see Sedgwickia altirostrata. andrewsi, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 222, Kaskaskia Gr. antiquum, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 95, Kaskaskia Gr. capax, Newberry, 1861, Ives' Col. Ex. Exped., p. 120, Coal Meas. clavatum, McChesney, 1860, New Pal. Foss. p. 56 Kaskaskia Gr.

Foss., p. 56, Kaskaskia Gr.

cooperi, see Chaenomya cooperi.

costatum, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 171, and Geo. Sur. Ill., vol. 5, p. 585, Coal Meas.

cuneatum, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 210, Mid. Coal Meas,

curtum, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 194, Permian Gr.

- elegans, King, as identified by Geinitz. See A. geinitzi.
- elongatum, Morton, 1836, (Pholadomya elongata,) Am, Jour. Sci. and Arts, vol.

29, p. 153, Coal Meas. elongatum, Worthen, see A. worthenanum. ensiforme, Swallow, 1860, Trans. St. Louis

- Acad. Sci., vol. 1, p. 656, Coal. Meas. geinitzi, Meek, 1867, Am. Jour. Sci., vol.
- geinitzi, Meek, 1867, Am. Jour. Sci., vol. 44, 2d ser., p. 170, and Geo. Sur. Ill., vol. 5, p. 586, Coal Meas. gilberti, White, 1879, Bull. U. S. Geo. Sur., vol. 5, No. 2, p. 217, and Cont. to Pal., No. 6, p. 137, Carboniferous. granosum, Shumard, 1858, (Leptodomus granosus,) Trans. St. Louis Acad. Sci., vol. 1, p. 207, and Pal. F. Neb, p. 290
- vol. 1, p. 207, and Pal. E. Neb. p. 220, Coal Meas.
- hannibalense, see Grammysia hannibalensis.
- hybridum, Meek & Worthen, 1865, (Chænomya hybrida,) Proc. Acad. Nat. Sci. Phil., p. 250, and Geo. Sur. Ill., vol. 3, p. 538, Keokuk Gr.
- illinoisense, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 11, and Geo. Sur. Ill., vol. 8, p. 132, Keokuk Gr.
 lanceolatum, Swallow, 1858, Trans. St.
- Louis Acad. Sci., vol. 1, p. 194, Permian Gr.

459



Actinodesma subrectans, see Glyptodesma

ACTINOPTERIA, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, explanation of plate 17, fig. 6. [Ety. aktin, a ray; Pteria, a genus.] In the text published in 1884, pt. 1, p.

107, he wrote the word Actinopteria, which indicates he derived the name

from the genus Pteria. Distinguished

from Pterinea by strong cardinal and

lateral teeth, and no striations on the liga-

mental area; right valve convex. The

FIG. 766.—Actinopteria boydi. Right valve. ignated. auriculata, Hall, 1884, Pal. N.Y., vol. 5, pt. 1, p. 121, Chemung Gr.

1842, (Avicula boydi,) Jour. Acad. Nat. Sci. Phil., vol. 8, p. 237, and Pal. N. Y., vol. 5, p. 113, Ham. Gr. decussata, Hall,

boydi, Conrad,



- N. Y., p. 203, and Pal. N. Y., vol. 5, p. 111, Ham. Gr. delta, Hall, 1883, Pal. N. Y., vol. 5, p. 121,
- Chemung Gr. doris, Hall, 1884, Pal. N. Y., vol. 5, p. 109,
- Marcellus Shale.
- epsilon, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 122, Chemung Gr. eta, Hall, 1884, Pal. N. Y., vol. 5. pt. 1, p.
 - 124, Chemung Gr.
- eximia, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 107, Up. Held. Gr. iota, Hall, 1884, Pal. N. Y., vol. 5, pt. 1,
- p. 127, Chemung Gr.
- kappa, Hall, 1884, Pal. N. Y., vol. 5, pt. 1,
- p. 128, Chemung Gr. muricata, Hall, 1843, (Avicula muricata,) Geo. Sur. 4th Dist. N. Y., p. 181, and Pal. N. Y., vol. 5, p. 108, Marcellus Shale.
- perobliqua, Conrad, 1842, (Avicula perobliqua,) Jour. Acad. Nat. Sci. Phil., vol. 8, p. 235, and Pal. N. Y., vol. 5, p. 116, Ham. Gr.
- perstrialis, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 118, Chemung Gr.
- pleuroptera, Conrad, 1842, (Avicula pleuroptera,) Jour. Acad. Nat. Sci., vol. 8, p. 242, Ham. Gr.
- pusilla, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 117, Ham. Gr.
- subdecussata, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 110, Ham. Gr.

latum, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 210, Mid. Coal Meas. leawnworthense, see Chænomya leaven-

worthensis.



FIG. 768.--Allorisma subcuneatum.

marionense, White, 1876, Proc. Acad. Nat. Sci., p. 31, and Cont. to Pal., No. 8, p. 167, St. Louis Gr.

maxvillense, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 222, Kaskaskia Gr.

minnehaha, see Chænomya minnehaha. pleuropistha, Meek, 1871, Proc. Acad. Nat.

Sci. Phil., p. 70, and Ohio Pal., vol. 2, p. 309, Waverly Gr.

reflexum, Meek, 1872, Pal. E. Neb., p. 217, Coal Meas.

sinuatum, McChesney, 1860, New Pal. Foss., p. 56, Chester Gr.

subcuneatum, Meek & Hayden, 1858, Proc. Acad. Nat. Sci. Phil., p. 263, and Pal. E. Neb., p. 221, Coal Meas.

subelegans, Meek, 1872, Pal. E. Neb., p. 220, Coal Meas. terminale, Hall, 1852, Stans. Ex. to Gt. Salt Lake, p. 413, Coal Meas. ventricosum, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 168, and Ohio Pal., vol. 2, p. 312, Waverly Gr. winchelli, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 167, and Ohio Pal., vol. 2, p. 311, Waverly Gr. worthenanum, n.sp. Keokuk Gr. Proposed instead of A. elongatum in

Geo. Sur. Ill., vol. 8, p. 133, which was preoccupied.

AMBONYCHIA, Hall, 1847, Pal. N. Y., vol. 1, p. 163. [Ety. ambon, the boss of a shield; onyx, a claw or talon.] Equivalve, inequilateral, subalate posteriorly, abrupt or curving down anteriorly; umbones high; beak incurved, cardinal line oblique; sinuate on the anterior side for the passage of the byssus; muscular impression large;

cardinal tooth below the beak anteriorly; two or three remote lateral teeth, elongated and ranging parallel with the cardinal line posteriorly; surface radiately furrowed and concentrically lined. Type A. bellistriata.

acutirostra, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 383, Niagara Gr.

alata, see Anomalodonta alata. amygdalina, see Cypricardites amygdalinus.

aphæa, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 383, Niagara Gr. attenuata, Hall, 1861, Geo. Rep. Wis.

tenuata, Hall, 1861, Geo. Rep. Wis., p. 33, and Geo. Wis., vol. 4, p. 206, Trenton Gr.

bellistriata, Hall, 1847, Pal. N. Y., vol. 1, p. 163, Tren-

ton Gr. cancellosa, Hall, 1861, Geo. Rep. Wis., p. 31. Mistake for A. lamellosa.

carinata, Goldfuss, 1826, (Pterinea carinata,) Germ. Petref., p. 136, and

Petref., p. 136, and Pal. N. Y., vol. 1, p. FIG. 770.—Ambonychia 292, 294, Trenton and Hud. Riv. Gr. casii, Meek & Worteeth; *u*, lateral

then, 1866, Proc. Chi. Acad. Nat. Sci., p. 22, Hud.

Riv. Gr.

costata, Meek, 1873, Ohio Pal., vol. 1, p. 130, Hud. Riv. Gr.

erecta, Hall, 1861, Geo. Rep. Wis., p. 32, Trenton Gr.

illinoisensis, Worthen, 1875, Geo. Rep. Ill., vol. 6, p. 495, Hud. Riv. Gr. intermedia, Meek & Worthen, 1868, Geo.

intermedia, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 306, Galena Gr. jamesi, Meek, 1872, (Megambonia jamesi.)

Proc. Acad. Nat. Sci. Phil., p. 321, and Ohio Pal., vol. 1, p. 136, Hud., Riv. Gr.

lamellosa, Hall, 1861, Geo. Rep. Wis, p. 31, and Geo. Wis., vol. 4, p. 205, Trenton Gr.

maxima, Safford, 1869, Geo. of Tenn. Not defined.

mytiloides, Hall, 1847, Pal. N. Y., vol. 1, p. 315, Chazy Gr.

neglecta, see Amphicœlia neglecta.

nitida, Billings, 1866, Catal. Sil. Foss. Antic., p. 50, Anticosti Gr.

obtusa, see Cypricardites obtusus.

orbicularis, Emmons, 1842, (Pterinea orbicularis,) Geo. Rep. N. Y., p. 397, and Pal. N. Y., vol. 1, p. 164, Trenton Gr.



AMB.

planistriata, H p. 32, Trento



FIG 771.—Ambony radiata.

Soc. Nat. E Riv. Gr. robusta, S. A. Nat. Hist., v striacosta, see P superba, Billir Antic., p. 50, swanana, Saffor defined. undata, Emmol Geo. Rep. N. vol. 1, p. 165 Grs. Possib fined genus.



AMNIGENIA, Hall [Ety. amnis, Like Anodor characters; a sions large a willensis. catskillensis, V: dites catskille N. Y., p. 186, 516, Catskill (AMPHICCELIA, Hai Mus. Nat. H

Mus. Nat. H both; *koilos*, quilateral, su gibbous; beal external liga

ia I

FIG. 769.—Allorisma subcuneatum.

AMB.

ing down antebeak incurved. sinuate on the passage of the pression large; below the beak) or three remote elongated and el with the carteriorly; surface wed and cond. Type A. bel-

1867, 20th Rep. t. Hist., p. 383,

lodonta alata. Cypricardites

20th Rep. N. Y. Niagara Gr. eo. Rep. Wis. vol. 4, p. 206,



70.-Ambonychia istriata. h, Byssal 18: cardinal 1. h; U, lateral

- , p. 22, Hud.
- Pal., vol. 1, p.

ep. Wis., p. 32,

875, Geo. Rep. Riv. Gr. hen, 1868, Geo. dalena Gr. mbonia jamesi, hil., p. 321, and Hud, Riv. Gr.). Rep. Wis. p. 4, p. 205, Tren-

o. of Tenn. Not

l. N. Y., vol. 1,

reglecta. atal. Sil. Foss. Gr. btusus. 2, (Pterinea or-N. Y., p. 397, p. 164, TrenLAMELLIBRANCHIATA.

planistriata, Hall, 1861, Geo. Rep. Wis., p. 32, Trenton Gr.

radiata, Hall, 1847, Pal. N. Y., vol. 1, p. 292, Trenton, Hud. Riv. Grs., and Mid. Sil. Probably a syn. for A. carinata. rauchi, McChesney, 1860, New Pal. Foss., p. 89, Hud. Riv. Gr. Not rec-

ognized. Ambonychia FIG 771.radiata.

AMN.-ANA.]

retrorsa, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 104, Hud. Riv. Gr.

robusta, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 315, Hud. Riv. Gr. striæcosta, see Pterinea striæcosta.

superba, Billings, 1866, Catal. Sil. Foss. Antic., p. 50, Anticosti Gr.

swanana, Safford, 1869, Geo. of Tenn. Not defined.

undata, Emmons, 1842, (Pterinea undata,) Geo. Rep. N. Y., p. 395, and Pal. N. Y., vol. 1, p. 165, Black Riv. and Trenton (irs. Possibly belonging to an undefined genus.

large triangular cartilage pit beneath the beaks, and smaller pit just anterior. Type A. leidyi.



FIG. 773.—Amphiccelia costata

costata, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 140, Niagara Gr. leidyi, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 387, Niagara Gr.



FIG. 772.-- Amnigenia catskillensis.

- AMNIGENIA, Hall, 1883, Pal. N. Y., vol. 5. [Ety. amnis, a river; gigno, to bear.] Like Anodonta in form and external characters; anterior muscular impressions large and prominent; posterior ones large and shallow. Type A. catskillensis.
 - catskillensis, Vanuxem, 1842, (Cypricardites catskillensis,) Geo. Rep. 3d Dist. N. Y., p. 186, and Pal. N. Y., vol. 5, p. 516, Catskill Gr.
- AMPHICCELIA, Hall, 1868, 20th Rep. N. Y. Mus. Nat. Hist., p. 386. [Ety. amphi, both; koilos, hollow.] Equivalve, inequilateral, subrhomboidal; umbones gibbous; beaks elevated and incurved; external ligamental area flattened;
- neglecta, McChesney, 1861, (Ambo-nychia neglecta,) Pal. Foss., p. 88, and Geo. Sur. Ill., vol. 3, p. 358, Niagara Gr.
- Amphidesma delafieldi, Castelnau, 1843, Syst. Sil., p. 44. Not recognized.
- Anatina, Lamarck, 1809, Phil. Zool." [Ety. pertaining to the duck, or like the duck's bill.] Oblong, ventricose, attenuated, and gaping posteriorly: umbones fissured; spoon-shaped cardinal process in each valve. Type A. rostrata. Not a Palæozoic genus.
- leda, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 110, Ham. Gr. Not properly defined.

sinuata, see Ilionia sinuata.9

461

N.

ridge to the termination of the poste-

rior wing, and also from the cardinal

FIG. 776.--Anomalodonta gigantea Hinge-line of right valve

ridge to the byssal sinus; anterior muscular scar be-

low the byssal sinus: sur-

face radiately furrowed

and concentrically lined.

Type A. gigantea.

alata, Meek, 1872, (Ambo-nychia alata,) Proc. Acad. Nat. Sci.

Phil., p. 319, and Ohio Pal., vol. 1, p. 131, Hud. Riv. Gr.

FIG. 777.-Anomalodonta gigantea. Left valve, showing hinge-line and muscular impression.

gigantea, S. A. Miller, 1874, Cin.

ANTHBACOMYA, Salter, 1861, Mem. Geo. Sur.

Gr. Brit. Iron Ores, pt. 3, p. 229. anthrax, coal; Mya, a genus.] Equivalve, inequilateral, mytiliform; liga-

Riv. Gr.

elongata.

Quar. Jour. Sci., vol. 1, p. 17, Hud.

ment external; beak anterior; hinge-

line straight; no teeth; surface concentrically marked; shell composed

of an internal, lamellar, and subnacre-

ous layer, a thin layer of vertical pris-matic shell, and an epidermis; struc-

ture similar to the Unionidæ. Type A.

[Ety.

ANT. AVI.]

angulata, Daws latus,) Acad Meas.



Fig. 778.-Anom

arenacea, Daw naceus,) Aca Meas. carbonaria, Da bonarius,)Ac Meas.

elongata, Daws





FIG. 779. - Anthra mya elongata.

ovalis, Dawson Acadian Geo ANTHRACOPTERA, Sur. Country Etv. anthra Shells small, than width

short, hinge trically mark carbonaria, see (?) fragilis, M

Proc. Chi. kuk Gr. lævis, see Anthr polita, White,

Geo. Sur. Ter ANTHRACOSIA, Ki Nat. Hist., p. Equivalve, in valve below t of right val and ridged tooth of left and sloped hinge-plate, b scars of ante the anterior Type A. bea

ANGELLUM, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 105. [Ety.

cuneatum.

aggos, a pail; ellus, diminutive.] Equivalve, hanging down; umbones prominent; beaks incurved, winged posteriorly; con-centrically lined. Type A. cuneatum. cuneatum, S. A. Mil-ler, 1878, Jour. Cin. Soc. Nat. Hist. vol. 1, p. 106, Hud. Riv. Gr.

ANODONTOPSIS, McCoy, 1851, Ann. and Mag. Nat. Hist., 2d series, vol. 7, p. 54. [Ety. from the resemblance to the shells of the genus Anodonta.] Equivalve, inequilateral, compressed; rotundato-quadrate or subtrigonal; posterior side wide, round, or obliquely subtruncate; anterior end slightly contracted in front of the beak; beaks small, prominent nearer the anterior than posterior end; hinge-line shorter than the length of the shell, with a posterior long, slender, lateral tooth extending just below it (double in the right valve), and another similar but shorter one in front of the beaks; anterior and posterior muscular impressions ovate; slight clavicular ridge between the beak and the adductor impressions; pallial impression entire; surface smooth or concentrically lined. Type A. angustifrons. Part of the generic definition is from A. milleri, as the

interior of the type is not known. amygdaliformis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 180, Devonian. concinna, Whiteaves, 1884, Pal. Foss., vol. 3, p. 12, Guelph Gr.



FIG. 775.-Anodontopsis milleri.

- (?) milleri, Meek, 1871, Am. Jour. Sei., 3d series, vol. 2, p. 297, and Ohio Pal., vol. 1, p. 140, Hud. Riv. Gr.
- unionoides, see Modiolopsis unionoides. ventricosa, Billings, 1874, Pal. Foss., vol. 2, p. 55, Gaspe limestone No. 8, Devo-
- nian.
- ANOMALODONTA, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 16. [Ety. anomalos, irregular; odous, tooth.] Equivalve, inequilateral, alate posteriorly, abrupt anteriorly; umbones high; beak incurved; deeply sinuate for the byssus; cardinal ridge beneath the umbone sloping posteriorly; cartilage grooves extending from the cardinal



ANG.-ANT.

ion of the posteom the cardinal



alodonta gigantea of right valve

he byssal sinus; nuscular scar beyssal sinus; suriately furrowed entrically lined. igantea.

Acad. Nat. Sci. o Pal., vol. 1, p.



ntea. Left valve, ular impression.

1874, Cin. 1, p. 17, Hud.

Mem. Geo. Sur. 3, p. 229. [Ety. genus.] Equiytiliform; liganterior; hingeeeth ; surface shell composed and subnacreof vertical prisidermis; strucnidæ. Type A. ANT. AVI.]

angulata, Dawson, 1860, (Naiadites angulatus,) Acadian Geology, p. 205, Coal Meas.



Fig. 778.—Anomalodonta gigantea, external surface

arenacea, Dawson, 1860, (Naiadites arenaceus,) Acadian Geology, p. 205, Coal Meas.

carbonaria, Dawson, 1860, (Naiadites carbonarius,)Acadian Geology, p. 204, Coal Meas.

elongata, Dawson, 1860, (Naiadites elongatus,) Acadian Geology, p. 204, Coal

Meas. lævis, Dawson, 1860,

(Naiadites lævis,) Acadian Geology, p. 204, Coal Meas. obtusa, Dawson, 1860, (Naiadites obtusus,) Acadian

Geology, p. 205,

Coal Meas.

FIG. 779. - Anthracomya elongata.

ovalis, Dawson, 1860, (Naiadites ovalis,) Acadian Geology, p. 205, Coal Meas.

ANTHRACOPTERA, Salter, 1862, Mem. Geo. Sur. Country Around Wigan, p. 37. [Etv. anthrax, coal; pteron, a wing.] Shells small, aviculoid; height greater than width; valves subequal, wing short, hinge straight; surface concentrically marked.

carbonaria, see Anthracomya carbonaria.

(?) fragilis, Meek & Worthen, 1866, Proc. Chi. Acad. Sci., p. 18, Keokuk Gr.

lævis, see Anthracomya lævis.

- polita, White, 1880, 12th Rep. U. S. Geo. Sur. Terr., p. 166, Coal Meas.
- ANTHRACOSIA, King, 1844, Ann. and Mag. Nat. Hist., p. 313. [Ety. anthrax, coal.] Equivalve, inequilateral; tooth in each valve below the umbo; crown of tooth of right valve excavated anteriorly and ridged posteriorly; crown of tooth of left valve ridged anteriorly and sloped posteriorly; furrow in hinge-plate, between umbone and tooth; scars of anterior pedal muscles above the anterior adductor impressions. Type A. beanana.

bradorica, Dawson, 1868, Acad. Geol., p. 314, Carb. Arca, Linne, 1758. This



carbonaria, Cox. See F16. 780.-Anthracosia bradorica. Macrodon carbonarius

genus is unknown in the Palæozoic rocks.

- cuspidata, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 209, Up. Coal Meas.
- Founded on a cast. Genus unknown. modesta, Winchell, 1863, Proc. Acad. Nat. Sci., p. 15, Marshall Gr. Not an Arca.

striata, Schlotheim, as identified by Geinitz, is Macrodon tenuistriatus.

punctifera, Dawson, 1868, Acad Geol., Carb. The name was preoccupied by

Deshayes in his work, 1824-1836. Astarte, Sowerby, 1818, Min. Conch., vol. 2, p. 85. Not a Palæozoic genus.

mortonensis, see Edmondia mortonensis. nebraskensis, see Edmondia nebraskensis. subtextilis, see Euthydesma subtextile.

- ASTARTELLA, Hall, 1858, Geo. Rep. Iowa, p. 715. [Ety. diminutive of Astarte.] Shell thick, smooth, or concentrically furrowed; lunule impressed, ligament external; hinge teeth, two in each valve; anterior tooth in right valve large and strong, with a longitudinal pit in the summit. Type A. vera.
- concentrica, McChesney, 1860, (Edmondia concentrica,) Descr. New Pal. Foss., p. 55, Coal Meas.
- gurleyi, White, 1878, Proc. Acad. Nat. Sci., p. 35, and Cont. to Pal., No. 8, p. 166, Coal Meas.
- newberryi, Meek, 1875, Ohio Pal., vol. 2, p. 340, Coal Meas.
- varica, McChesney, 1860, Descr. New Pal. Foss., p. 55, Coal Meas. vera, Hall, 1858, Geo. Rep. Iowa, p. 715,
- Coal Meas.
- AVICULA, Klein, 1753, Ostrac. [Ety. avicula, a little bird.] Very inequivalve, inequilateral, obliquely oval; hinge produced posteriorly into a flattened defined wing; the inferior or right valve flattened, notched for the passage of the byssus; anterior muscular impression very small and faintly marked; adductor large, superficial, a little behind the middle; cartilage external, linear, simple, placed on a narrow marginal facet, extending from the beak toward the cardinal angle; hinge edentulous, or with two small car-dinal teeth beneath the beak in one valve, and one in the other, and a long, slender, posterior bifid lateral tooth in each; substance corneo-calcareous, lamellar without, pearly within. Type A. hirundo. Not a Palæozoic genus. Species are left here for want of better material to determine their generic relations.
 - acanthoptera, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 263, Chemung Gr.

acosta, Cox. 1857, Geo. Sur. Ky., vol. 3, p. 572, Coal Meas. The correct etymology would make this word incosta. *æquilatera*, see Aviculopecten æquilaterus. æquiradiata, Hall, 1859, Pal. N. Y., vol. 3, p. 285, Low. Held. Gr.



FIG. 781.-Avicula hirundo. æsopus, Conrad, 1842, Jour. Acad. Nat-Sci., vol. 8, p. 238, Ham. Gr. angustirostra, Conrad, 1842, Jour. Acad. Nat. Sci., p. 236, Ham. Gr.

antiqua, see Bakevellia antiqua.

arenaria. Not American.

aviformis, see Pterinea aviformis.

bella, see Aviculopecten bellus.

b+llula, Hall, 1859, Pal. N. Y., vol. 3, p. 289, Low. Held. Gr.

boydi, see Actinopteria boydi. cancellata, see Pterinea cancellata. chemungensis, see Liopteria chemungensis. chemungensis, see Pterinea chemungensis. circulus, see Entolium circulus. communis, Hall, 1859, Pal. N. Y., vol. 3,

p. 286, Low. Held. Gr. comperensis see Pernopecten cooperensis. corrugata, see Pterinea corrugata. cruciformis, see Glyptodesma cruciforme.

damnoniensis, Sowerby, as identified in the early N. Y. Reports. See Liopteria chemungensis.

decussata, see Actinopteria decussata.

demissa, see Pterinea demissa.

desquamata, Hall, 1847. The dorsal valve of Obolella crassa.

elliptica, see Pterinea elliptica.

emacerata, Conrad, 1842, Jour. Acad. Nat. Sci., p. 241, and Pal. N. Y., vol. 2, p. 83

and 282, Clinton and Niagara Grs. erecta, see Glyptodesma erectum.

ferruginea, Conrad, 1848, Proc. Acad. Nat. Sei., vol. 3, p. 23, Up. Sil.

flabella, see Pterinea flabellum.

fragilis, see Lunulicardium (ragile.

gebhardi, Conrad, 1841, Ann. Rep. N. Y., p. 54, Oriskany sandstone.

hermione, Billings, 1862, Pal. Foss., vol. 1, p. 40, Trenton Gr.

honeymani, see Pterinea honeymani.

insueta, see Pterinea insueta.

lævis, see Liopteria lævis.

leptonoto, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 76, syn. for A. emacerata.

limiformis, Hall, 1852, Pal. N. Y., vol. 2, p. 332, Coralline limestone.

longa, Geinitz, 1866, (Gervillia longa,) Carb. und Dyas in Neb., p. 32, and Pal.

E. Neb., p. 199, Coal Meas longispina, see Leptodesma longispinum.

magna, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 98, Kaskaskia Gr.

manticula, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 241, and Pal. N. Y., vol. 3, p. 284, Low. Held. Gr.

- morganensis, Meek & Worthen, 1866, Pteria morganensis,) Proc. Acad. Nat. Sci., p. 259, and Geo. Sur. Ill., vel 5. p. 576, Coal Meas.
- multilineata, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 241, Chemung Gr. muricata, see Actinopteria muricata.
- naviformis, Conrad, 1842, Jour. Acad. Nat. Sci., p. 240, and Pal. N. Y., vol. 3, . 279, Low. Held. Gr.
- obliquata, Hall, 1859, Pal. N. Y., vol. 3, p. 285, Low. Held. Gr. oblonga, see Aviculopecten oblongus. obscura, Hall, 1859, Pal. N. Y., vol. 3, p.
- 280, Low. Held. Gr.
- orbicularis, Stevens, 1858, Am. Jour. Sci., vol. 25, 2d ser., Coal Meas. The name was preoccupied by Sowerby in 1839.

orbiculata. Hall, 1843, see Lyriopecten orbiculatus.

orbiculata, Hall, 1852, Pal. N. Y., vol. 2, p. 284, Niagara Gr.

parilis, see Aviculopecten parilis.

pauciradiata, Hall, 1859, Pal. N. Y., vol. 3, p. 287, Low. Held. Gr.

pectiniformis, see Aviculopecten pectiniformig.

perobliqua, see Actinopteria perobliqua.

pinniformis, Geinitz, 1848, (Solon pinna-formis,) Versteinerungen d. deutsch Zechsteingebirg, p. 8, and Carb. und Dyas in Neb., p. 31, Coal Meas.

pleuroptera, see Actinopteria pleuroptera.

- protexta, see Leptodesma protextum
- quadrula, syn. for Actinopteria boydi. rectilateraria, see Aviculopecten rectila-
- terarius. recticosta, Hall, 1859, Pal. N. Y., vol. 3,
- p. 466, Oriskany sandstone. rhomboidea, Hall, 1852, Pal N. Y., vol. 2,
- p. 84, Clinton Gr.
- rugosa, see Pterinea rugosa.
- schohariæ, Hall, 1859, Pal. N. Y., vol. 3, p. 283, Low. Held. Gr.
- securiformis, Hall, 1852, Pal. N. Y., vol. 2, p. 331, Coralline limestone
- securiformis, Hall, 1859, Pal. N. Y., vol. 3, p. 290. This name was preoccupied.
- semielliptica, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 210, Up. Coal Meas
- shawneensis, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 211, Up. Coal Meas.
- shumardi, see Entolium shumardi.

signata, s-e Aviculopecten signatus.

speciosa, see Panenka speciosa.

- spinigera, see Leptodesma spinigerum.
- spinulifera, Hall, 1859, Pal. N. Y., vol. 3, p. 282, Low. Held. Gr.
- subæquilatera, Hall, 1859, Pal. N. Y., vol. 3, p. 281, Low. Held. Gr.
- subfalcata, Conrad, 1842, Jour. Acad. Nat.
- Sci., vol. 8, p. 242, Ham. Gr. subplana, Hall, 1852, Pal. N. Y., vol. 2, p. 283, Niagara Gr.

subquadrans, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 236, Devonian. subrecta, see Aviculopecten subrectus

AVI.]

subrugosa, D'Or éont, t. 1, p rugosa. tenuilamellata,

vol. 3, p. 281 textilis, Hall, 1 288, Low. He textilis var. a N. Y., vol. 3, trentonensis, see tricostata, see L trilobata, Conra Sci., vol. 8, p. triplistriata, Ste vol. 25, p. 26 triquetra, Hall, 137, Onondag

tuberculata, C N. Y., p. 117 umbonata, Hal p. 284, Low. 1 undata, Hall, 10 283, Niagara

undosa, Ringu Soc. Nat. Sc ara Gr.

welchi, James, i vol. 1, p. 239, whitii, Winche Sci., p. 8, Mar AVICULOPECTEN, Nat. Hist., 20

from the ger Inequivalve, slightly exten posterior side smaller than deeply define right valve be the shell for posterior ear

as far as the fined or not narrow facet

or having a cartilage furr

pit; muscula scar as in Pec

acadicus, Hartt, Carb.

acutialatus, Swa tialata,) Trana 185, Permian

æquilateralis, H

5, pt. 1, p. 19 æquilaterus, Ha

tera,) Geo. Re

Up. Held. Gr.

affinis, Walcott, Sur., vol. 8, p.

amplus, Meek

Acad. Nat. Sc

Sur. Ill., vol. 2 armigerus, Conr rus,) Trans.

Coal Meas. bellus, Conrad,

Ann. Rep. N. vol. 5, pt. 1, p

AVI.

AVI.

AVI.]

rugosa.

288, Low. Held. Gr.

137, Onondaga Gr.

Sci., p. 8, Marshall Gr.

ara Gr.

Carb.

185, Permian Gr.

Coal Meas.

subrugosa, D'Orbigny, 1850, Prodr. d. Pal-eont, t. 1, p. 33. Syn. for Pterinea

tenuilamellata, Hall, 1859, Pal. N. Y., vol. 3, p. 281, Low. Held. Gr. textilis, Hall, 1859, Pal. N. Y., vol. 3, p.

textilis var. arenaria, Hall, 1859, Pal. N. Y., vol. 3, p. 465, Oriskany Gr. trentonensis, see Pterinea trentonensis.

tricostata, see Lyriopecten tricostatus. trilobata, Conrad, 1842, Jour. Acad. Nat.

triplistriata, Stevens, 1858, Am. Jour. Sci., vol. 25, p. 265, Coal Meas. triquetra, Hall, 1843, Geo. Rep. N. Y., p.

tuberculata, Conrad, 1838, Ann. Rep. N. Y., p. 117, Corniferous Gr. umbonata, Hall, 1859, Pal. N. Y., vol. 3,

p. 284, Low. Held. Gr. undata, Hall, 1852, Pal. N. Y., vol. 2, p. 283, Niagara Gr.

undosa, Ringueberg, 1886, Bull. Buf. Soc. Nat. Sci., vol. 5, p. 18, Niag-

welchi, James, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 239, Hud. Riv. Gr.

whitii, Winchell, 1863, Proc. Acad. Nat.

Aviculorescraw, McCoy, 1851, Ann. Mag. Nat. Hist., 2d ser., vol. 7, p. 171. [Ety. from the genera Avicula and Pecten.]

Inequivalve, inequilateral; straight or slightly extended obliquely toward the

posterior side; anterior ear flattened smaller than the posterior, sharply and

deeply defined, with a notch in the

right valve between it and the body of

the shell for the passage of the byssus; posterior ear pointed, extending about

as far as the margin of the shell, de-

fined or not; ligament confined to a narrow facet along the hinge margin,

or having a wider cardinal area with

cartilage furrows; no medial cartilage

pit; muscular impression and pallial scar as in *Pecten*. Type A. docens. acadicus, Hartt, 1868, Acad. Geol., p. 307,

acutialatus, Swallow, 1858, (Avicula acu-tialata,) Trans. St. Louis Acad. Sci., p.

æquilateralis, Hall, 1883, Pal. N. Y., vol.

5, pt. 1, p. 19, Chemung Gr. æquilaterus, Hall, 1843. (Avicula æquila-tera,) Geo. Rep. 4th Dist. N. Y., p. 181,

Up. Held. Gr. and Marcellus Shale.

affinis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 229, Subcarboniferous.

amplus, Meek & Worthen, 1860, Proc.

armigerus, Conrad, 1835, (Pecten armige-rus,) Trans. Geo. Soc. Penn., p. 268,

bellus, Conrad, 1841, (Avicula bella,) Ann. Rep. N. Y., p. 54, and Pal. N. Y., vol. 5, pt. 1, p. 35, Ham. Gr.

Acad. Nat. Sci. Phil., p. 454, and Geo. Sur. Ill., vol. 2, p. 257, Keokuk Gr.

Sci., vol. 8, p. 240, Ham. Gr.

Worthen, 1866, Proc. Acad. Nat. Sur. Ill., vel 5,

42, Jour. Acad. Chemung Gr. a muricata. 2, Jour. Acad. al. N. Y., vol. 3,

l. N. Y., vol 3,

n oblongus N. Y., vol. 3, p.

Am. Jour. Sci., as. The name werby in 1839

Lyriopecten or-1. N. Y., vol. 2,

parilis. Pal. N. Y., vol.

pecten pectini-

a perobliqua. (Solon pinnæen d. deutsch Carb. und Dyas 18 ia pleuroptera. protextum.

teria boydi. pecten rectila-

. N. Y., vol. 3, ne. d N. Y., vol. 2,

N. Y., vol. 3,

Pal. N. Y., vol. stone. l. N. Y., vol. 3,

preoccupied. 858, Trans. St.). 210, Up. Coal

858, Trans. St.). 211, Up. Coal

umardi. signatus. 088. pinigerum.

. N. Y., vol. 3,

Pal. N. Y., vol.

ur. Acad. Nat. Gr. N. Y., vol. 2,

?. Jour. Acad. Devonian. subrectus.

- burlingtonensis, Meek & Worthen 1860,
- Proc. Acad. Nat. Sci., p. 453, and Geo. Sur. Ill., vol. 2, p. 231, Burlington Gr. cancellatus, Hall, 1843, (Pecten cancel-latus,) Geo. Rep. 4th Dist. N. Y., p. 264, and Pal. N. Y., vol. 5, pt. 1, p. 18, Chemung Gr.
- carboniferus, Stevens, 1858, (Pecten carboniferus,) Am. Jour. Sci. and Arts, vol. 25, p. 261, and Pal. E. Neb., p. 193, Coal Meas.
- caroli, Winchell, 1863, Proc. Acad. Nat. Sci., p. 9, and Pal. N. Y., vol. 5, pt. 1, p. 29, Waverly Gr.
- catactus, Meek, 1877, U. S. Geo. Expl. 40th parallel, vol. 4, p. 93, Carboniferous.
- celsus, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 23, Chemung Gr.
- chesterensis, Worthen, 1884, Bull. No. 2. Ill. St. Mus. Nat. Hist., p. 20, and Geo. Sur. Ill., vol. 8, p. 115, Kaskaskia Gr. cleon, Hall, 1883, Pal. N. Y., vol. 5, pt. 1,
- p. 6, Up. Held. Gr.
- clevelandicus, Swallow, 1858, (Pecten clevelandicus,) Trans. St. Louis Acad.

- clevelandicus,) Trans. St. Louis Acad. Sci., vol. 1, p. 184, Permian Gr. colletti, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 21, and Geo. Sur. Ill., vol. 8, p. 119, Keokuk Gr. coloradoensis, Newberry, 1861, Ives' Col. Ex. Exped., p. 129, Coal Meas. convexus, Hall, 1843, (Pecten convexus,) Geo. Rep. 4th Dist. N. Y., p. 265, and Pal. N. Y., vol. 5, pt. 1, p. 28, Che-mung Gr. mung Gr. cora, Dawson, 1868, Acad. Geol., p. 307,
- Carb.
- coreyanus, White, 1874, Rep. Invert. Foss., p. 21, and Geo. Sur. W. 100th Mer., vol. 4, p. 147, Coal Meas. coxanus,⁶ Meek & Worthen, 1860, Proc.
- Acad. Nat. Sci. Phil., p. 453, and Geo. Sur. Ill., vol. 2, p. 326, Low. Coal Meas
- crassicostatus, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 188, Up. Held. Gr.
- crenistriatus, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 60, and Ohio Pal., vol. 2, p. 295, Waverly Gr.
- curticardinalis, Hall & Whitfield, 1877. U. S. Geo. Expl. 40th parallel, vol. 4, p. 273, Coal Meas.
- debertanus, Dawson, 1868, Acad. Geol., p. 307, Carboniferous.
- dolabriformis, Hall, 1843, (Pecten (?) dolabriformis,) Geo. Rep. 4th Dist. N. Y., p. 265, and Pal. N. Y., vol. 5, pt. 1, p. 26, Chemung Gr.
- duplicatus, Hall, 1843, (Pecten duplicatus,) Geo. Rep. 4th Dist. N. Y., p. 264, and Pal. N. Y., vol. 5, pt. 1, p. 17, Chemung Gr.
- edwardsi, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 22, and Geo. Sur. Ill., vol. 8, p. 119, Keokuk Gr. ellipticus, Hall, 1883, Pal. N. Y., vol. 5,
- pt. 1, p. 25, Chemung Gr.

- elsahensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 19, and Geo. Sur. Ill., vol. 8, p. 115, Kinderhook Gr.
- eurekensis, Walcott, 1885, Monogr. U.S. Geo. Sur., vol. 8, p. 227, Subcarboniferons
- exacutus, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 8, Ham. Gr.
- fasciculatus, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 11, Ham. Gr. formio, Hall, 1883, Pal. N. Y., vol. 5, pt.
- 1, p. 9, Ham. Gr.
- glaber, see Pernopecten glaber.
- gradocostatus, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 31, Marshall Gr.

haguei, Walcott, 1885, Monogr. U.S. Geo. Sur., vol. 8, p. 226, Subcarboniferous. halli, Swallow, 1860, (Avicula halli,) Trans.

St. Louis Acad. Sci., vol. 1, p. 656, Coal Meas.



FIG. 782.- A viculopecten princeps.

- hardinensis, Worthen, (in press,) Geo.
- Sur. Ill., vol. 8, p. 117, St. Louis Gr. hertzeri, Meek, 1871, Proc. Acad. Nat. Sci. p. 61, and Ohio Pal., vol 2, p. 330, Coal Meas.
- idas, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 13, Ham. Gr.
- ignotus, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 33, Up. Held. Gr.
- incultus, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 30, Up. Chemung Gr.
- indianensis, Meek & Worthen, 1866, Proc. Chi. Acad. Sci., vol. 1, p. 14, Keokuk Gr.
- insignis, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 34, Ham. Gr.
- intercostalis, Winchell, 1866, Rep. Low. Peninsula Mich., p. 95, Ham. Gr. interlineatus, Meek & Worthen, 1860,
- Proc. Acad. Nat. Sci. Phil., p. 454, and Geo. Sur. Ill., vol. 2, p. 329, Low. Coal Meas.

- invalidus, Hall, 1883, (Pterinopecten in-validus,) Pal. N. Y., vol. 5, pt. 1, p. 31, Marcellus Shale.
- iowensis, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss., p. 310, Marshall or Kinderhook Gr., at Burlington, Iowa. Proposed instead of A. occidentalis of Winchell, in 1863, in Proc. Acad. Nat. Sci., Phil., p. 9, which was preoccupied by Shumard.
- itys, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 20, Chemung Gr.
- konincki, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 453, and Geo. Sur. Ill., vol. 2, p. 328, Low. Coal Meas. lantus, Hall, 1883, Pal. N. Y., vol. 5, pt. 1. p. 14, Ham. Gr.
- limaformis, see Pernopecten limiformis.
- lyelli, Dawson, 1868, Acad. Geol., p. 305. Carb.
- lyelli var. alternans, Dawson, 1883, Rep. on Redpath Mus., p. 12, Carboniferous.
 - maccoyi, Meek & Hayden, 1865, Pal. Up. Mo., p. 50, Permian Gr.
 - macwhorteri, Worthen, (in press,) Geo. Sur. Ill., vol.
 - 8, p. 118, Kinderhook Gr. mazonensis, Worthen, in press,) Geo. Sur. Ill., vol.
 - 8, p. 117, Coal Meas. menardi, Worthen, in press,) Geo. Sur. Ill., vol.
 - 8, p. 120, Coal Meas. missouriensis, Shumard,
 - 1855, (Pecten missouriensis,) Geo. Rep. Mo., p. 207. St. Louis Gr.
 - monroensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 21, and Geo. Sur. Ill., vol. 8, p. 114. St. Louis Gr.
 - mueronatus, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 38, Ham. Gr.
- newarkensis, Winchell, 1870, Notices and Desc. Foss. from Marshall Gr., Proc. Acad. Nat. Sci., p. 255, Marshall Gr.
- niotensis, Worthen, 1884, Bull. No. 2. Ill. St. Mus. Nat. Hist., p. 19, and Geo. Sur. Ill., vol. 8, p. 113, Keokuk Gr.
- nodocostatus, White & Whitfield, 1862. Proc. Bost. Soc. Nat. Hist., vol. 8, p. 296, Kinderhook Gr.
- oblongus, Meek & Worthen, 1860, (Avicula oblonga,) Proc. Acad. Nat. Sci. Phil., p. 454, and Geo. Sur. Ill., vol. 2. p. 258, Keokuk Gr.
- occidaneus, Meek, 1877, U. S. Geo. Expl. 40th parallel, vol. 4, p. 96, Carboniierous.
- occidentalis, Shumard, 1855, (Pecten occidentalis, Geo. Rep. Mo., p. 207, Carboniferous and Permian.
- occidentalis, Winchell, 1863, Proc. Acad. Nat. Sci., p. 9. This name was preoccupied.

AVL

orbiculatus, see orestes, Worth St. Mus. Nat. Ill., vol. 8, p. orestes, Hall, sy ornatus, Hall, 1 1, p. 37, Ham oweni, Meek Acad. Nat. S Sur. Ill., vol. parilis, Conrad Jour. Acad. N and Ohio Pal. parvulus, Hall Geo. Expl. 40 Coal Meas.



patulus, Hall, 18 1, p. 24, Up. C pecteniformis, pecteniformis, vol. 8, p. 240, a 1, p. 4, Up. H Shale.

pellucidus, Meek Acad. Nat. Sci Sur. Ill., vol. 2 peroccidens, Wal Geo. Sur., vol. erous.

phoreus, Hall, 18 1, p. 10, Ham. pintoensis, Walc Geo. Sur., vol. erous.

AVI.

AV1.]

Coal Meas.

orbiculatus, see Lyriopecten orbiculatus. orestes, Worthen, 1884, Bull. No. 2, Ill.

1, p. 37, Ham. Gr. oweni, Meek & Worthen, 1860, Proc.

Acad. Nat. Sci. Phil., p. 452, and Geo. Sur. Ill., vol. 2, p. 256, Keokuk Gr. parilis, Conrad, 1842, (Avicula parilis,) Jour. Acad. Nat. Sci. Phil., vol. 8, p. 239,

and Ohio Pal., vol. 1, p. 197, Cornif. Gr. parvulus, Hall & Whitfield, 1877, U. S.

Geo. Expl. 40th parallel, vol. 4, p. 274,

orestes, Hall, syn. for A. fasciculatus. ornatus, Hall, 1883, Pal. N. Y., vol. 5, pt.

St. Mus. Nat. Hist., p. 18, and Geo. Sur. Ill., vol. 8, p. 112, Keokuk Gr.

83, 2d Ed. Am. shall or Kinderon, Iowa. Proidentalis of Win-Acad. Nat. Sei., preoccupied by

Y., vol. 5, pt. 1,

hen, 1860, Proc. b. 453, and Geo. Low. Coal Meas. Y., vol. 5, pt. 1,

en limiformis. d. Geol., p. 305,

vson, 1883, Rep. th Mus., p. 12, rous. sek & Hayden,

Up. Mo., p. 50, **Fr. i, Worthen**, (in **o. Sur.** Ill., vol.

Kinderhook Gr. Worthen, in o. Sur. Ill., vol.

Coal Meas. Worthen, (in

o. Sur. Ill., vol. Coal Meas. s, Shumard,

ten missourien-Rep. Mo., p. 207, Fr. Worthen, 1884,

2, **1**11. St. Mus. **p**. 21, and Geo. **rol.** 8, **p**. 114. St.

Hall, 1883, Pal. 5, pt. 1, p. 38.

Notices and hall Gr., Proc.
Marshall Gr.
Bull. No. 2, Ill.
p. 19, and Geo.
Keokuk Gr.
Whitfield, 1862.
Hist., vol. 8, p.

en, 1860, (Aviclead. Nat. Sci. Sur. Ill., vol. 2.

J. S. Geo. Expl. . 96, Carbonif-

355, (Pecten oc-Io., p. 207, Car-

33, Proc. Acad.

plenus, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 21, Chemung Gr.



FIG. 783.—Aviculopecten princeps. Cardinal part showing ligamental area.

princeps, Conrad, 1838, (Monotis princeps,) Ann. Rep. N. Y., p. 117, and Pal. N. Y., vol. 5, pt. 1, p. 1, Ham. Gr.



FIG. 784.—Aviculopecten varsoviensis.

- patulus, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 24, Up. Chemung Gr.
- pecteniformis, Conrad, 1842, (Avicula pecteniformis,) Jour. Acad. Nat. Sci., vol. 8, p. 240, and Pal. N. Y., vol. 5, pt. l, p. 4, Up. Held. Gr. and Marcellus Shale.
- pellucidus, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 455, and Geo. Sur. Ill., vol. 2, p. 327, Low. Coal Meas. peroceidens, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 227, Subcarbonif-
- erous. phoreus, Hall, 1883, Pal. N. Y., vol. 5, pt. l, p. 10, Ham. Gr.
- pintoensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 228, Subcarboniferous.

- providencensis, Cox, 1857, (Petten providencensis,) Geo. Sur. Ky., vol. 3, p, 566, Coal Meas.
- rectilaterarius, Cox, 1857, (Avicula recti-1 lateraria,) Geo. Sur. Ky., vol. 3, p. 571, Coal Meas.
- repletus, Hall, syn. for A. fasciculatus. F reticulatus, Dawson, 1868, Acad. Geol., p.
- 306, Carboniferous. ringens, Swallow, 1858, (Pecten ringens,)
- Trans. St. Louis Acad. Sci., p. 184, Permian Gr.
- rugistriatus, Hall, 1843, (Lima rugæstriata,) Geo. Rep. 4th Dist. N. Y., p. 264, and Pal. N. Y., vol. 5, pt. 1, p. 15, Chemung Gr.
- sanduskiensis, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 161, Up. Held. Gr.

scabridus, Hall, 1883, Pal. N.Y., vol. 5, pt.

1, p. 7, Ham. Gr. signatus, Hall, 1843, (Avicula signata,) Geo. Rep. 4th Dist. N. Y., p. 265, and Pal. N. Y., vol. 5, pt. 1, p. 29, Chemung Gr.

simplex, Dawson, 1868, Acad. Geol., p. 306, Carboniferous.

spinuliferus, Meek & Worthen, 1870, Proc. Acad. Nat. Sci., p. 39, and Geo. Sur. Ill., vol. 8, p. 116, Keokuk Gr. squama, Hall, 1883, Pal. N. Y., vol. 5, pt.

1, p. 27, Chemung Gr.

striatus, Hall, 1843, (Pecten striatus,) Geo. Rep. 4th Dist. N. Y., p. 264, and Pal. N. V., vol. 5, pt. 1, p. 22, Chemung Gr.

subcancellatus, Hall, 1883, syn. for A. cancellatus.

subrectus, Hall, 1852, (Avicula subrecta,) Pal. N. Y., vol. 2, p. 331, Coralline limestone.

talboti, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist, p. 21, St. Louis Gr. tenuicostus, Winchell, 1863, Proc. Acad.

Nat. Sci., p. 10, Marshall Gr. tenuis, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 39, Up. Chemung Gr.

terminalis, Hall, 1883, (Pterinopecten ter-minalis,) Pal. N. Y., vol. 5, pt. 1, p. 32,

Up. Held. Gr. unionensis, Worthen, 1875, Geo. Sur. Ill.,

vol. 6, p. 511, Corniferous Gr. utahensis, Meek, 1860, (Pecten utahensis,) Proc. Acad. Nat. Sci., p. 310, Coal Meas. varsoviensis, Worthen, 1883, Geo. Sur. Ill.,

vol. 7, p. 321, Keokuk Gr.

weberensis, Hall & Whitfield, 1877, U.S. Geo. Sur., 40th parallel, vol. 4, p. 273, Coal Meas.

whitii, Meek, 1872, Pal. E. Neb., p. 195, Coal Meas.

williamsi, Meek, 1871, Proc. Acad. Nat. Sci., p. 178, Choteau limestone.

winchelli, see Crenipecten Winchelli.

- AVICULOPINNA, Meek, 1867, Am. Jour. Sci., vol. 44, 2d ser., p. 282. [Ety. the genera Avicula and Pinna.] Compressed, slender, elongated, subtrigonal, or nearly in the form of a Pinna; beaks nearly obsolete, extremely oblique, and slightly behind the anterior extremity. Type A. americana.
 - americana, Meek, 1867, Am. Jour. Sci., vol. 44, 2d ser., p. 282, and Pal. E. Neb., p. 197, Coal Meas.



FIG. 785.—Aviculopinna americana.

illinoisensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 13, and Geo. Sur. Ill., vol. 8, p. 128, Coal Meas. Axinus, Sowerby, 1821, Min. Conch., vol. 3. [Ety. axine, battle-axe.] This genus is unknown in Palæozoic rocks.

ovatus, see Schizodus ovatus.

securis, Shumard, 1859, Trans. St. Louis Acad. Sci., Permian Gr. Not recognized.

BAKEVELLIA, King, 1849, Perm. Foss., p. 166. [Ety. proper name.] Shell aviculiform, subequivalve; valves sinuous, gaping in front for the passage of the byssus; umbones depressed, oblique; surface with concentric striæ; hinge with linear anterior and posterior lateral teeth parallel to the cardinal margin; muscular scars as in Pteria; cardinal area in both valves; two to five cartilage furrows in each valve. Type B. antiqua.

antiqua, Munster, 1826, (Avicula antiqua,) Goldfuss Germ. Petref. Not American. illinoisensis, Worthen, 1884, Bull. No. 2,

Ill. St. Mus. Nat. Hist., p. 14, and Geo. Sur. Ill., vol. 8, p. 126, Up. Coal Meas. parva, Meek & Hayden, 1858, Trans. Alb. Inst., vol. 4, p. 78, and Pal. Up. Mo., p. 57,



Permian Gr. FIG. 786. (?) pulchra, Swallow, 1858, Trans. St. Louis Acad. Sci., Bakevellia parva. vol. 1, p. 189, Permian Gr.

sulcata, Geinitz, 1866, (Gervillia sulcata,) Carb. und Dyas in Neb., p. 33, Coal Meas. BYSSOPTERIA, Hall, 1883, Pal. N. Y., vol. 5,

pt. 1, p. 4. [Ety. byssos, byssus; Pteria, a genus.] Shell erect, equivalve, alate posteriorly, truncate, with a nasute projection in front; surface radiately furrowed and concentrically lined. Type B. radiata.



FIG. 787.-Byssopteria radiata.

radiata, Hall. 1883, Pal. N. Y., vol. 5, pt. 1, p. 252, Up. Chemung Gr. CARBONABCA. Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 39. [Ety.



carbo, coa

valve, inec

FIG. 788.-Car listeri.

teeth obs nent; add lial line si æquimargina ginalis. antigonesen p. 304, Ca complanata, Nat. Sci., concentrica, s cordata, Swi Acad. Sci. (?) fragilis, (3, p. 570, occidentalis, Louis Ac Choteau (subangulata Louis Ac mian Gr. subangulata, 304. This CARDIOLA, Bro 1844, **T**r Geo. Soc. Тr kardia. heart.] Ob ly oval or circular, t equivalve, equilat beaks promin obliquely subequal, convex; shell, wit widest be its whole ribbed. 7 equilatera, se dichotoma, se doris, see Pa elevata, see I erecta, see Pa filicostata, W Sur., vol. !

CAR.]

[AVI.-CAR.
AVI.-CAR.

vatus.

Trans. St. Louis r. Not recognized. Perm. Foss., p. 166. Shell aviculiform, s sinuous, gaping in ge of the byssus; oblique; surface ; hinge with linear or lateral teeth parmargin; muscular rdinal area in both cartilage furrows in

. antiqua. , (Avicula antiqua,) ef. Not American. , 1884, Bull. No. 2. st., p. 14, and Geo. 26, Up. Coal Meas. 1, 1858,



FIG. 786. Bakevellia 1858, parva. d. Sci., ian Gr.

(Gervillia sulcata,) eb., p. 33, Coal Meas. , Pal. N. Y., vol. 5, 18808, byssus; Pteria, ct, equivalve, alate , with a nasute prorface radiately furrically lined. Type



pteria radiata.

Pal. N. Y., vol. 5, pt. nung Gr. Worthen, 1870, Proc. Phil., p. 39. [Ety.

CAR.]

carbo, coal; Arca, a genus.] Inequi-valve, inequilateral, very convex, transversely oblong or oval; umbones gibbous, prominent, strongly incurved, with subangular posterior slopes; valves closed all around with smooth margins; ligament external; cardinal margin arched; two anterior oblique teeth, and behind these minute crenulations, as in Arca. Type C. gibbosa. gibbosa, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 40, and Geo. Sur. Ill., vol. 6, p. 531, Coal Meas.

CARDINIA, Agassiz.

1838, in Societ. Basil. [Etv. cardo. the hinge of a Oblong, door.] attenuated posteriorly, com-pressed; ligament external; cardinal

FIG. 788.-Cardinia listeri.

teeth obscure, lateral, remote, prominent; adductor impressions deep; pallial line simple. Type C. listeri. xquimarginalis, see Edmondia æquimar-

ginalis.

antigonesensis, Dawson, 1868, Acad. Geo., p. 304, Carb

complanata, Winchell, 1862, Proc. Acad.

Nat. Sci., p. 413, Portage Gr. concentrica, see Sanguinolites concentricus. cordata, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 191, Permian Gr. (?) fragilis, Cox, 1857, Geo. Sur. Ky., vol.

3, p. 570, Coal Meas. occidentalis, Swallow, 1860, Trans. St. Louis Acad. Sci., p. 655, Waverly or Choteau Gr.

subangulata, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 192, Permian Gr.

subangulata, Dawson, 1868, Acad. Geol., p. 304. This name was preoccupied.

CARDIOLA, Broderip, 1844, Trans. Geo. Soc. [Ety. kardia, the heart.] Obliquely oval or subcircular, tumid, equivalve, inequilateral; beaks



large, FIG. 789.—Cardiola inprominent, terrupta.

obliquely incurved anteriorly; ends subequal, rounded; ventral margin convex; hinge-line shorter than the shell, with a flattened cardinal area, widest between the beaks, extending its whole length; surface radiately ribbed. Type C. interrupta.

equilatera, see Panenka equilatera. dichotoma, see Panenka dichotoma. doris, see Paracardium doris. elevata, see Panenka ventricosa. erecta, see Pararca erecta. filicostata, Walcott, 1885, Monogr. U. S. Geo.

Sur., vol. 8, p. 251, Subcarboniferous. 31 hero, see Panenka hero. lincklæni, see Panenka lincklæni. radians, see Panenka radians.

robusta, see Panenka robusta.

salteri, Haughton, 1857, Jour. Roy. Soc. Dub., vol. 1, Devonian.

sao, see Pararca sao.

speciosa, Hall, 1883, Pal. N. Y., vol. 5, pl. 70, fig. 2-9, and pl. 80, fig. 10, Genesee Slate.

transversa, see Pararca transversa.

CARDIOMORPHA, DeKoninck, 1844, Anim. Foss. Carb. Belg., p. 101. [Ety. kardia, heart; morphe, form.] Shell very thin, equivalve, inequilateral, margins closed, oblique, tumid; beaks tumid, produced, spirally inrolled to the anterior side; no hinge teeth; hinge margin inflected nearly at right angles to form a hollow lunette, running from the beak nearly to the cardinal angle; two adductor impressions in each valve; pallial scar simple, very faintly marked; a shallow anterior depression beneath the beaks, but the margin sharp and prominent. Type C. elongata.



FIG. 790.-Cardiomorpha cordata.

archiacana, DeKoninck, 1843, Desc. An. Foss. Belg., p. 104, Carboniferous. bellatula, Hall, 1870, Prelim. Notice Lam.

- Shells, p. 92, and Pal. N. Y., vol. 5, pl.
- 63, figs. 1-3, Ham. Gr. capuloides, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 416, Marshall Gr. concentrica, Hall, 1883, Pal. N. Y., vol. 5, pl. 63, fig. 4, syn. for C. zonata.
- cordata, Hall, 1883, Pal. N. Y., vol. 5, pl. 62, figs. 10-19, Ham. Gr.
- donaciformis, Hall, 1883, Pal. N. Y., vol.
- 5, pl. 63, fig. 6, Ham. Gr.
 eriopia, Hall, 1870, Prelim. Notice Lam. Shells, p. 92, and Pal. N. Y., vol. 5, pl. 63, figs. 7-8, Ham. Gr.
- julia, Winchell, 1862, Proc. Acad. Nat. Sci., p. 416, Marshall Gr.
- kansasensis, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 191, Permian Gr.
- missouriensis, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 2, p. 207, and Geo. Sur. Ill., vol. 5, p. 588, Coal-Meas.
- modiolaris, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 416, Marshall Gr. (?) obliquata, Meek, 1872, Proc. Acad. Nat. Sci. Phil., p. 327, and Ohio Pal., vol. 1, p. 146, Hud. Riv. Gr.

- oblonga, see Protomya oblonga.
- ovata, see Dexiobia ovata, parvirostris, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 31, syn. for Dexiobia ovata.
- pellensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 16, and Geo. Sur. Ill., vol. 8, p. 126, St. Louis Gr.
- radiata, see Cardiopsis radiata.
- rhomboidea, Hall, see Cardiomorpha subrhomboidea.
- rhomboidea, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 191, Permian Gr.
- rotunda, Hall, 1883, Pal. N. Y., vol. 5, pl. 63, figs. 17-20, refer figs. 18 and 19 to Paracyclas rotunda, fig. 17 to Schizodus degener, and fig. 20 to S. patulus.
- subglobosa, Meek, 1875, Ohio Pal., vol. 2, p. 304, Waverly Gr.
- suborbicularis, Hall, 1843, (Ungulina suborbicularis,) Geo. Rep. 4th Dist. N. Y., p. 244, and Pal. N. Y., vol. 5, pl. 63, figs. 9-10, Portage Gr.
- subrhomboidea, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 186, (proposed instead of Cypricardites rhomboidea, in Geo. Rep. Iowa, p. 523, which was preoccupied,) Kinderhook Gr.
- textilis, Hall, 1883, Pal. N. Y., vol. 5, pl. 63, figs. 11-15, Chemung Gr.
- triangulata, Swallow, 1860, Trans. St. Louia Acad. Sci., vol. 1, p. 655, Waverly or Choteau Gr.
- trigonalis, Winchell, 1863, Proc. Acad. Nat. Sci., p. 15, Marshall Gr.
- undulata, Hall, 1883, Pal. N. Y., vol. 5, pl. 63, fig. 16, Portage Gr.
- (?) vetusta, see Cypricardites vetustus. vindobonensis, Hartt, 1868, Acad. Geol.,
- p. 304, Carboniferous.
- zonata, Hall, 1883, Pal. N. Y., vol. 5, pl.
- 63, fig. 5, Ham. Gr. CARDIOPSIS, Meek & Worthen, 1861, Proc. Acad. Nat. Sci. Phil., p. 144. [Ety. kardia, the heart; opsis, appearance.] Equivalve, somewhat inequilateral, oblique, ovate or cordiform, entirely closed; beaks elevated, incurved, directed anteriorly; cardinal margin short; rounding into the posterior border; two anterior teeth in each valve, surface radiated. Type C. radiata.
 - crassicostata, Hall & Whitfield, 1873, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 188, Schoharie grit and Corniferous limestone.

crenistriata, see Pterinea crenistriata.

- jejuna, Winchell, 1862, Proc. Acad. Nat. Sci., p. 417, Marshall Gr.
- megambonata, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 417, Marshall Gr. parvirostris, White, 1862, Proc. Bost. Soc. Nat. Hist., vol. 9, p. 31, syn. for Dexiobia ovata.
- radiata, Meek & Worthen, 1860, (Cardiomorpha radiata,) Proc. Acad. Nat. Sci. Phil., p. 458, and Geo. Sur. Ill., vol. 2, p. 157, Kinderhook Gr.

Cardium, Linnæus, 1758, Syst. Nat., 10th Ed. [Ety. kardia, the heart.] Not a Palatozoic genus.

[CAR.-CHAL

- iowensis, see Cypricardites iowensis.
- lexingtonensis, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 207, Mid. Coal Meas.

nautiloides, Castelnau, 1843, Syst. Sil. Seneca Lake, N. Y. Not recognized.

vetustum, see Præcardium vetustum. CH ÆNOCAR-

DIA, Meek & Worthen,1869, Proc. Acad.Nat. Sci., p. 170. [Ety. chaino, to gape; kar-dia, the heart.] Ovate, ventricose, gapan-

ing teriorly, edge trun-

cated, FIG. 791.-Chænocardia ovata line short, beaks small, incurved; surface concentrically marked. Type C. ovata.

ovata, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil., p. 170, and Geo. Sur. Ill., vol. 5, p. 586, Coal Meas.

CHENOMYA, Meek, 1864, Pal. of Up. Mo., p. 42. [Ety. chaino, to open or gape; Mya, a genus of sherre.] Shell thin, equivalve, longitudinally oblong, subcylindrical; anterior side rounded, closed; posterior side long, truncated, gaping at the extremity; surface granulose and concentrically marked; cardinal margin inflected as in Allorisma; ligament external; hinge edentulous; posterior muscular impressions near the posterior extremity of the dorsal margin; scars of the anterior adductor and pedal muscles connected; pallial line with a broad shallow sinus. Type C. leavenworthensis.



FIG. 792.-Chænomya maria. Right ve

cooperi, Meek & Hayden, 1858, (Panopæa cooperi,) Trans. Alb. Inst., vol. 4, p. 83, and Pal. Up. Mo., p. 44, Coal Meas. hybrida, see Allorisma hybridum.



leavenworth (Allorism Acad. Nat Up. Mo., maria, Wor Mus. Nat. Ill., vol. 7



FIG. 793 -Chænc maria. Do view.

face conce curva. angulata, Ha 468, Chem corrugata, C corrugatus p. 244, and 1-4, Ham.



elongata, Co elongatus,) Pal. N. Y. Ham. Gr. recurva, Con curvus,) Jo 245, and Pa 9-16, Ham CLIDOPHORUS, I p. 300. [E bearing. hinge with cast marke

[CAR.-CHAL

CL1.]

lyst. Nat., 10th Ed. rt.] Not a Palaro-

tes iowensis. 1858, Trans. St. . 1, p. 207, Mid.

1843, Syst. Sil. Not recognized. n vetustum.



Thenocardia ovata all. incurved ; surmarked. Type C.

then, 1869, Proc. p. 170, and Geo. 3, Coal Meas.

Pal. of Up. Mo., p. to open or gape; ene.] Shell thin, ally oblong, sub-r side rounded, le long, truncated, ity : surface granully marked ; cardias in Allorisma; hinge edentulous; impressions near nity of the dorsal anterior adductor connected; pallial allow sinus. Type



tria. Right ve ve.

en, 1858, (Panopæa Inst., vol. 4, p. 83, 44, Coal Meas. hybridum.

LAMELLIBRANCHIATA.

leavenworthensis, Meek & Hayden, 1858, (Allorisma leavenworthense,) Proc. Acad. Nat. Sci. Phil., p. 263, and Pal. Up. Mo., p. 43, Coal Meas.

maria, Worthen, 1882, Bull. No. 1. Ill. St. Mus. Nat. Hist., p. 39, and Geo. Sur. Ill., vol. 7, p. 319, Up. Coal Meas.

minnehaha, Swallow, 1858, (Allorisma (?) minnehaha,) Trans. St. Louis Acad. Sci. vol. 1, p. 194, and Geo. Sur. Ill., vol. 5, p. 588, Coal Meas. rhomboidea, Meek & Worthen, 1865, Proc.

Acad. Nat. Sci. Phil., p. 250, and Geo. Sur. Ill., vol. 5, p. 540, St. Louis Gr.

CIMITARIA, Hall, 1870, Prelim. Notice Lam. Shells, p. 66. [Ety. from resemblance to a cimiter.] Equivalve, transversely elongated; valves depressed, with an antero-mesial constriction; beaks in-curved; cardinal line recurved; escutcheon and lunule; ligament external; sur-

face concentrically lined. Type C. recurva.

FIG. 793 -Chænomya

Dorsal

maria.

view.

angulata, Hall, 1885, Pal. N. Y., vol. 5, p. 468, Chemung Gr.

corrugata, Conrad, 1842, (Cypricardites corrugatus,) Jour. Acad. Nat. Sci., vol. 8, p. 244, and Pal. N. Y., vol. 5, pl. 77, figs. 1-4, Ham. Gr.



FIG. 794.-Cimitaria recurva.

elongata, Conrad, 1841, (Cypricardites elongatus,) Ann. Rep. N. Y., p. 51, and Pal. N. Y., vol. 5, pl: 77, figs. 5-8, Ham. Gr.

recurva, Conrad, 1842, (Cypricardites recurvus,) Jour. Acad. Nat. Sci., vol. 8, p. 245, and Pal. N. Y., vol. 5, pl. 77, figs. 9-16, Ham. Gr.

CLIDOPHORUS, Hall, 1847, Pal. N. Y., vol. 1, p. 300. [Ety. kleidos, a clavicle; phoros, bearing.] Equivalve, inequilateral; hinge without teeth or crenulations; cast marked by an oblique linear depression extending from the anterior cardinal margin toward the base, indicating the existence of a clavicle as in Solecurtus; surface concentrically lined. Type C. planulatus.

- chicagoensis, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 314, Niagara Gr.
- concentricus, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 149, Low. Sil.
- concentricus, Dawson, 1868. The name was preoccupied.
- cuneatus, Hall, 1860, Can. Nat. and Geo.
- vol. 5, p. 148, Low. Sil. ellipticus, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 25, Hud. Riv. Gr.

elongatus, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 150, Low. Sil. erectus, Hall, 1860, Can. Nat. and Geo.,

vol. 5. p. 149, and Acad. Geol., p. 600, Up. Sil.

erectus, Dawson, 1868. The name was proccupied.

faberi, n. sp. Shell small, smooth, subelliptical in outline, length greater than

height; anterior

end narrower



than the poste- FIG. 795.-Clidophorus fa-rior; basal mar- berl. Mag. 5 diam. gin a semi-

elliptic curve; beaks prominent, and but little in advance of the middle: umbonal slope rounded, and tapering to the postero-basal margin of the shell; cardinal line gently curving, reaching the highest point posterior to the middle of the shell; pallial line simple and well defined; furrow deep, and extending from immediately in front of

the beaks to the pallial line. Distinguished from C. fabula by the more prominent beaks and higher arch in the cardinal line posterior to the beaks and other minor particulars; beside it is generally a larger shell, though variable in size. Collected in the upper part of the Hud. Riv. Gr., near Versailles, Indiana, and in Butler County, Ohio.

fabula, Hall, 1845, (Nucula fabula,) Am. Jour. Sci.

and Arts, vol. 48, 295, and Ohio

Pal., vol. 1, p. 138, Hud. Riv. Gr. macchesneyanus, syn. Modiolopsis for recta.

major, Ulrich, 1879,

Jour. Cin. Soc. Nat. Hist., vol. 2, p. 25, Hud. Riv. Gr. Ð neglectus, Hall, 1862, Geo. Rep. Wis., p.

55, Hud. Riv. Gr.



ann

- nuculiformis, Hall, 1860, Can. Nat. and
- Geo., vol. 5, p. 150, Up. Sil. planulatus, Conrad, 1841, (Nuculites planulatus,) Ann. Rep. N. Y., p. 48, and Pal. N. Y., vol. 1, p. 300, Hud. Riv. Gr.
- semiradiatus, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 150, Arisaig series of Up. Sil.
- solenoides, see Solenopsis solenoides.
- subovatus, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 151, Arisaig series of Up. Sil.
- CLINOPISTHA, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 43. [Ety. klino, I lean; opisthe, backward.] Shell short, gibbous, subquadrate, beaks posterior. and muscular impressions immediately behind the beaks; muscular impres-

sions near the margins of the valves; ligament external. Type C. lævis. insularis, Walcott, 1885, (Dystactella insularis,) Monogr. U. S. Geo. Sur.,

FIG. 797.-Clinopistha antiqua.

vol. 8, p. 172, Devonian. antiqua, Meek, 1871, Proc.

Acad. Nat. Sci. Phil., p. 67, and Ohio Pal., vol. 1, p. 208, Corniferous Gr. lævis, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 44, and Geo. Sur. Ill., vol. 5, p. 584, Coal Meas. radiata, Hall, 1858,

Edmondia radiata,) Geo. Rep. Iowa, p. 716, Coal Meas.



mya subnasuta,) 24th Rep. N. Y. Mus. Fig. 798.-Clinopis-tha radatia. tha radatia.

Nat. Hist., p. 192,. and Pal. N. Y., vol. 5, p. 512, Ham. Gr.

- telliniformis, Hall, 1883, (Dystactella telliniformis,) Pal. N. Y., vol. 5, p. 513, Up. Held. Gr.
- CONOCARDIUM, Bronn, 1835, Leth. Geo., vol. 1, p. 92. [Ety. konos, a cone; kardia, the heart.] Equivalve, very incomilateral. hemifusiform; beaks prominent, incurved close to the an-terior end, which is broad, flattened, more or less truncate nearly at right angles to the straight/hinge-line, which is prolonged as an abruptly contracted, slender, tubular wing from the dorsal part of the anterior face; body of the shell diminishing conoidally from the edge of the anterior face toward the posterior end, which is attenuated, roundly and widely gaping; substance of the shell very thick, of a minute quadrangular cellular tissue, with strong internal ribs radiating from the beak, and often smaller external ones, strongest anteriorly. Type C. hibernicum.
 - acadianum, Hartt, 1868, Acad. Geol., p. 304. Carb.

æquilaterale, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 16, and Bull. Am. Mus. Nat. Hist., p. 62, Warsaw Gr.

CLI.-CON.

- altum, Keyes, 1888, Proc. Acad. Nat. Sci. Phil., pl. xii, figs. 4a, 4b, Ham. Gr. antiquum, Owen, 1852, (Pleurorhynchus antiqua,) Geo. Wis., Iowa, and Minn., pl. 2, fig. 19, Silurian.
- attenuatum, Conrad, 1842, (Pleurorhynchus attenuatus,) Jour. Acad. Nat. Sei., vol. 8, p. 252, Up. Held. Gr. bifarium, Winchell, 1856, Rep. Low. Pen-
- insula Mich., p. 95, Ham. Gr. blumenbachium, see Euchasma blumenbachi.
- bovipedale, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 419, Marshall Gr. carinatum, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 14, and Bull. Am. Mus. Nat. Hist., p. 59, Warsaw Gr.
- catastomum, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 13, and Bull. Am. Mus. Nat. Hist., p. 58, Warsaw Gr.
- concinnum, Hall, 1883, Pal. N. Y., vol. 5, pl. 68, figs. 26-27, Ham. Gr.
- crassifrons, Conrad, 1842, (Pleurorhynchus crassifrons,) Jour. Acad. Nat. Sci., vol. 8, p. 252, Ham. Gr.
- cuneatum, Hall. 1858, Trans. Alb. Inst., vol. 4, p. 14, and Bull. Am. Mus. Nat. Hist., p. 60, Warsaw Gr.
- cuneus, Conrad, 1840, (Pleurorhynchus cuneus,) Ann. Rep. N. Y., p. 206, and Pal. N. Y., vol. 5, pl. 67, figs. 21–32, Up. Held. Gr.
- denticulatum, Hall, 1883, Pal. N. Y., vol. 5, pl. 68, figs. 24-25, Ham. Gr.
- eboraceum, Hall, 1860, 13th Rep. N.Y. Mus. Nat. Hist., p. 91, and Pal. N. Y., vol. 5, p. 412, Ham. Gr.
- elegantulum, Billings, 1866, Catal. Sil. Foss., Antic., p. 53, Anticosti Gr. emmetense, Winchell, 1866, Rep. Low.
- Peninsula Mich., p. 95, Ham. Gr.
- immaturum, Billings, 1862, Pal. Foss., vol. 1, p. 41, Black Riv. Gr.
- inceptum, Hall, 1859, Pal. N. Y., vol. 3, p. 491, Low. Held. Gr. liratum, Hall, 1883, Pal. N. Y., vol. 5, pl.
- 68, figs. 28-29, Chemung Gr.
- meekanum, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 15, and Bull. Am. Mus. Nat.
- Hist., p. 61, Warsaw Gr. napoleonense, Winchell, 1862, Proc. Acad. Nat. Sci., p. 419, Marshall Gr.
- nasutum, Hall, 1883, Pal. N. Y., vol. 5, pl. 67, figs. 12-20, Schoharie grit.
- nevadense, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 177, Devonian.
- niagarense, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., p. 97, Niagara Gr.
- normale, Hall, 1883, Pal. N. Y., vol. 5, pl. 68, figs. 17-19, Ham. Gr.
- obliquum, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 249, and Geo. Sur. Ill., vol. 6, p. 529, Coal Meas.

CRE.-CUN.]

ohioense, 1 Sci. Phil.



799.-Cor F1G subtrigons view.

prattenanu vol. 4, p. Hist., p. pulchellum Whitfield Proc. Bos Hist., vol Kinderho reliquum, Pal. N. Y 68, fig. 33 Gr. rugosum, Pal. N. Y 68, fig. 32 subtrigonal bigny, 18 d. Paléon 80, Up. H C. trigona Dist., N. cupied.



FIG. 801.—Conor part of the a hiatus.

tegulum, H

68, figs. 30 trigonale, P trigonale. Devonian trigonale, Ha ventricosun Mus. Nat. vomer, Cor vomer,) J 253, Devo CRENIPECTEN, p. 3. (Pla crena, note like Avict pits throu C. crenula amplus, Ha 1, p. 81, C

CLI.-CON.

, Trans. Alb. Inst., ill. Am. Mus. Nat. Gr.

oc. Acad. Nat. Sci. 4b, Ham. Gr. (Pleurorhynchus Iowa, and Minn.,

1842, (Pleurorhynir. Acad. Nat. Sei.,

eld. Gr. 56, Rep. Low. Pen-

Ham. Gr. uchasma blumen-

1862, Proc. Acad. rshall Gr.

Trans. Alb. Inst., Ill. Am. Mus. Nat. Gr.

Trans. Alb. Inst., ill. Am. Mus. Nat. Gr.

, Pal. N. Y., vol. 5, am. Gr.

1842, (Pleurorhynur. Acad. Nat. Sci., Gr.

Trans. Alb. Inst., ill. Am. Mus. Nat. Gr

(Pleurorhynchus). N. Y., p. 206, and 67, figs. 21-32, Up.

383, Pal. N. Y., vol. Ham. Gr.

), 13th Rep. N. Y.)1, and Pal. N. Y.,

Gr 1866, Catal. Sil.

Anticosti Gr. 1866, Rep. Low.

95, Ham. Gr. 1862, Pal. Foss.,

Riv. Gr. Pal. N. Y., vol. 3,

I. N. Y., vol. 5, pl.

ung Gr.

3, Trans. Alb. Inst., all. Am. Mus. Nat.

v Gr. ell, 1862, Proc. Acad.

arshall Gr.

Pal. N. Y., vol. 5, pl. harie grit.

.885, Monogr. U. S. 177, Devonian.

& Marcy, 1865, Mem.

List., p. 97, Niag-'al. N. Y., vol. 5, pl.

1. Gr. orthen, 1865, Proc. Phil., p. 249, and d. 6, p. 529, Coal CRE.-CUN.]



799.-Conocardium F1G subtrigonale. Side view.

p. 112, Up. Coal Meas. prattenanum, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 15, and Bull. Am. Mus. Nat. Hist., p. 61, Warsaw Gr. pulchellum, White & J

1862, Whitfield, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 299, Kinderhook Gr. reliquum, Hall, 1883, Pal. N. Y., vol. 5, pl. 68, fig. 33, Chemung

Gr. rugosum, Hall, 1883, Pal. N. Y., vol. 5, pl. Fig. 800.

- Conocardium subtrigonale. b, Broken end; t, opening; a, con-68, fig. 32, Ham. Gr. subtrigonale, D'Orbibrigonale, D'Or-bigny, 1850, Prodr. 'nection of the ala-d. Paléont., t. 1, p. tions. 80, Up. Held. Gr. Proposed instead of C. trigonale, Hall, 1843, Geo. Rep. 4th

Dist., N. Y., p. 171, which was preoccupied.



FIG. 801.—Conocardium subtrigonale. a, Shows part of the alation; h, points to the posterior hiatus.

tegulum, Hall, 1883, Pal. N. Y., vol. 5, pl. 68, figs. 30-31, Niagara Gr.

trigonale, Phillips, 1836, (Pleurorhynchus trigonale,) Geol. Yorkshire, p. 211, Devonian

trigonale, Hall, see C. subtrigonale.

- ventricosum, Hall, 1860, 13th Rep. N. Y.
- Mus. Nat. Hist., p. 91, Ham. Gr. vomer, Conrad, 1842, (Pleurorhynchus vomer,) Jour. Acad. Nat. Sci., vol. 8. p. 253, Devonian.
- CRENIPECTEN, Hall, 1883, Pal. N. Y., vol. 5, p. 3. (Plates and Explanations.) [Ety. crena, notch; Pecten, a genus.] In form like Aviculopecten, but the hinge is fur-nished with a series of small cartilage pits throughout its entire length. Type C. crenulatus.
- amplus, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 81, Chemung Gr.

LAMELLIBRANCHIATA.

niferous Gr.

Niagara Gr.

parrishi, Worthen,

ornatum, Winchell

& Marcy, 1865, Mem. Bost. Soc.

Nat. Hist., p. 111,

(in press,) Geo.

Sur. Ill., vol. 8,

crenulatus, Hall, 1843, (Pecten crenulatus,) Geo. Sur. 4th Dist. N. Y., p. 265, and Pal. N. Y.,

vol. 5, pt. 1, p. 82, Chemung Gr. glaber, Hall, 1843, (Lima glabra,) Geo. Sur. 4th Dist. N. Y., 255, and Pal. N. Y., vol. 5, pt. 1, p. 85, Chemung Gr.



Walcott, FIG. 802.-Crenipecten hallanus, 1885, Monogr. U.S. crenulatus Geo. Sur., vol. 8, p. 231, Subcarboniferous.

impolitus. Hall, 1883, Pal. N. Y., vol. 5 pt. 1, p. 83, Chemung Gr.



FIG. 803.—Creniptecten crenulatus. Hinge-line.

leon, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 88, Chemung Gr.

liratus. Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 87, Chemung Gr.

micropterus, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 86, Chemung Gr.

obsoletus, Hall, 1843, (Lima obsoleta,) Geo. Sur. 4th Dist., N. Y., p. 265, and Pal. N. Y., vol. 5, pt. 1, p. 84, Chemung Gr.



FIG. 804.-Crenipecten retiferus.

winchelli, Meek, 1875, (Aviculopecten winchelli,) Ohio

Pal., vol. 2, p. 296, Waverly Gr. Ctenodonta, Salter, 1851, syn. for Tellinomya.

abrupta, see Tellinomya abrupta.

angela, see Tellinomya angela.

astartiformis, see Tellinomya astartiformis. contracta, see Tellinomya contracta. gibberula, see Tellinomya gibberula. hartsvillensis, see Tellinomya hartsvillensis. hubbardi, syn. for Nuculites sulcatinus. iphigenia, see Tellinomya iphigenia. logani, see Tellinomya logani.

- Cucullæa,-Lamarck, 1801, Syst. An. [Ety. Cucullus, a hood.] Not a Palæozoic genus.
- opima, Hall, 1843, syn. for Nucula lirata. CUNEAMYA, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 90. [Ety. cuneus, a wedge; Mya, a genus.] Shell large, equivalve, inequilateral ventricose; beaks prom-inent, incurved; cardinal line straight, ligament external; lunule and escutch-

LAMELLIBRANCHIATA.

eon; pallial line simple. Type C. miamiensis.

coriformis, n. sp. Shell large, having a length in some specimens of three inches, and a height of two inches; larger at the anterior end, and cuneiformly tapering to the posterior point; beaks large, high, pointed and inrolled above the cardinal line; cardinal line straight from the top of the lunule three-fourths of the length of the shell, the posterior part forming a wing-like appendage of the shell; escutcheon dis-



FIG. 805.-Cuneamya coriformis. Right valve, below medium size.

tinct and well marked; lunule heartshaped, very large, wide and deep, margins angular; the anterior end of the shell rapidly slopes backward from the lower extremity of the lunule to the basal line; an obtuse angle is formed at the base of the lunule (this is better shown in the illustrations by the figure of the right valve than by the anterior view); a cincture or furrow, arising at the point of the beaks, and very gradually widening, reaches the basal line anterior to the middle of the shell; anterior umbonal ridge very prominent; posterior umbonal slope promi-

nent, flattened on the outer face so as to form an obtuse angle toward posterior cardinal wing; basal line slightly curved, with a sinus at the cincture surface; concentrically lined. Distinguished from C. miamiensis by the remarkably large lunule, better defined cincture, and posterior cardinal wing.

Found in the Hudson River Group at Cincinnati, Ohio. The specific name is from the heart-shaped lunule. The specimen illustrated is from the collection of Charles Faber.

FIG. 806.-Cune-

amya corifor-mis. Anterior view, showing

lunule.



FIG. 807.-Cuneamya miamiensis. Right valve.

curta, Whitfield, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 138, Hud. Riv. Gr. elliptica, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 317, Hud. Riv. Gr.

[CYC.-CYP.

miamiensis, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 91, Hud. Riv. Gr.



FIG. 808.-Cuneamya miamiensis. Dorsal view

- neglecta, Meek, 1871, (Sedgwickia neg-lecta,) Proc. Acad. Nat. Sci. Phil., p. 325, and Ohig Pal., vol. 1, p. 142, Hud Riv. Gr.
- niv. Or. parva, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 316, Hud. Riv. Gr. scapha, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 92, Hud. Riv. Gr.
- CYCLOCONCHA, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 231. [Ety. in allusion to the nearly circular form of the shell.] Equivalve, subequilateral, subcircular, concentrically lined; cardinal teeth near the middle, with a long lateral tooth on each side. Type C. mediocardinalis.



FIG. 809.-Cycloconcha mediocardinalis.

mediocardinalis, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 231, Hud. Riv. Gr.

CYPRICARDELLA, Hall, 1858, Trans. Alb. Inst., vol. 4,

p. 17. [Ety. diminutive of Cypricardia.] Shell ovate. subellipti c a l or subquadrate, closed; surface concentric ally striated; two

1-



cardinal teeth in right valve, one beneath the beak, triangular, the posterior one more slender, and turned obliquely backward, leaving a triangular pit for the tooth from the other valve; long, narrow groove in the anterior cardinal margin apparently for a projection from the left valve; posterior side bev-eled from above, edge thin, ligament external, occupying a deep cavity; muscular impressions distinct, shallow; pallial impression simple. C. subelliptica.

bellistriata, Conrad, 1842, (Microdon bellistriatus,) Jour. Acad. Nat. Sci., vol. 8, p. 247, Ham. Gr.



FIG. 810.—Cypricardella bellistriata.



FIG. 811.-Cypri occidentalis

Great Sal

CYP.]

complanat

planatus

p. 33, ar

22, and

Sur., vol

Prelim. 1

N. Y., v

figs. 1–4,

U. S., (

vonian. major, Ha 307, Up.

vol. 4, p.

Warsaw

Hist., p.

Bost. Sc

Kinderh

tus.) Pre

and Pal.

Waverly

vol. 4, p.

Warsaw

uistriatu

p. 32, an

23 to 30, a

Vert. []

prina an

posterior

pressed ;

narrow s

lateral or

obscure;

oval, plac

and post

pallial lin

catskiller

Louis A

angusta, see

choteauens

CYPRICARDIA

subelliptic

tenuistriata

plicata, see

quadrata,

reservata,

oblonga, 1 vol. 4, p

macrostria

nocleata,

connata, W

gregaria, H

[CYC.-CYP.

CYP.]

1881, Jour. Cin. d. 4, p. 317, Hud.

hitfield, 1875, Ohio ud. Riv. Gr.



iensis. Dorsal view

(Sedgwickia neg-Nat. Sci. Phil., p. rol. 1, p. 142, Hud.

80, Jour. Cin. Soc. 316, Hud. Riv. Gr. eld, 1875, Ohio Pal., iv. Gr.

er, 1874, Cin. Quar. 231. [Ety. in alcircular form of the ubequilateral, sublly lined; cardinal ldle, with a long ch side. Type C.



mediocardinalis.

Miller, 1874, Cin. l. 1, p. 231, Hud.

Trans. Alb. 1858.



810.—Cypricardella bellistriata.

ght valve, one begular, the posterior id turned obliquely triangular pit for other valve; long, ie anterior cardinal for a projection posterior side bevlge thin, ligament ; a deep cavity; ion simple. Type

42, (Microdon belad. Nat. Sci., vol. 8, LAMELLIBRANCHIATA.

- complanata, Hall, 1870, (Microdon complanatus,) Prelim. Notice Lam. Shells, p. 33, and Pal. N. Y., vol. 5, pl. 42, fig. 22, and pl. 74, figs. 14 to 19, Ham. Gr. connata, Walcott, 1885, Monogr. U. S. Geo.
- Sur., vol. 8, p. 250, Subcarboniferous. gregaria, Hall, 1870, (Microdon gregarius,) Prelim. Not. Lam. Shells, p. 32, and Pal. N. Y., vol. 5, pl. 73, figs. 1-6, and pl. 74, figs. 1-4, Ham. Gr.
- macrostriata, Walcott, 1885, Monogr. U. S., Geo. Sur., vol. 8, p. 180, Devonian.
- major, Hall, 1885, Pal. N. Y., vol. 5, p. 307, Up. Held. Gr.
- nocleata, Hall, 1858, Trans. Alb. Inst. vol. 4, p. 17, and Geo. Sur. Iowa, p. 663, Warsaw Gr.
- oblonga, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 18, and Bull. Am. Mus. Nat. Hist., p. 65, Warsaw Gr. plicata, see Goniophora plicata.
- quadrata, White & Whitfield, 1862, Proc.
- Bost. Soc. Nat. Hist., vol. 8, p. 300, Kinderhook Gr.
- reservata, Hall, 1870, (Microdon reservatus,) Prelim. Notice Lam. Shells, p. 33, and Pal. N. Y., vol. 5, pl. 74, figs. 11-13, Waverly Gr.
- subelliptica, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 17, and Geo. Sur. Iowa, p. 664, Warsaw Gr.
- tenuistriata, Hall, 1870, (Microdon ten-uistriatus,) Prelim. Notice Lam. Shells, p. 32, and Pal. N. Y., vol. 5, pl. 73, figs. 23 to 30, and pl. 74, figs. 20, 21, Ham. Gr.
- CYPRICARDIA, Lamarck, 1801, Syst. An. sans Vert. [Ety. from the two genera Cyprina and Cardium.] Oblong, oblique posterior ridge; umbones anterior, depressed; ligament external, in deep, narrow grooves; cardinal teeth two, lateral one, in each valve, sometimes obscure; muscular impressions two, oval, placed below the extreme anterior and posterior ends of the cardinal line; pallial line simple. Typical C. obesa. angusta, see Cypricardites angustus.
- angustata, Vanuxem, syn. for Amnigenia catskillensis.
- choteauensis, Swallow. 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 96, Waverly or Choteau Gr.

indianensis, see

indianensis.

insecta, Dawson,

1868,

ous.

Cypricardinia

Geol., p. 303,

Carbo n i f e r-

leidyi, Lea, see

Acad.

contracta, see Sphenotus contractus.



Leaia, leidyi. obsoleta, see Cypricardite s FIG. 811.-Cypricardia obesa. obsoletus.

occidentalis, Hall, 1852, Stans. Ex. to Great Salt Lake, p. 412, Coal Meas.

occidentalis, Swallow, 1863, Trans. St. Louis Acad. Sci. This name was pre-occupied. See C. swallovana.

pikensis, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2. p. 95, Coal Meas.

- plicatula, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 4, p. 205, Mid. Coal Meas.
- primigenia, see Modiolopsis primigenia. randolphensis, see Sanguinolites randolphensis.

rhombea, see Cytherodon rhombeus.

rigida, see Sphenotus rigidus. shumardana, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 95, St. Gen-

evieve limestone.

subplana, see Edmondia subplana.

- swallovana, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss., p. 310, Coal Measures of Harrison County, Missouri. Proposed instead of C. occidentalis, Swallow, 1863, in Trans. St. Louis Acad. Sci., p. 96.
- undulata, Gurley, 1883, New. Carb. Foss., Coal Meas. Publication inp. 3, valid.
- ventricosa, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 110, Kinderhook Gr. wheeleri, see Schizodus wheeleri.
- CYPRICARDINIA, Hall, 1859, Pal. N. Y., vol. 3, p. 266. [Ety. Cypricardinia, from its resemblance to Cypricardia.] General form of Cypricardia; inequilateral; oblique posterior ridge; umbones anterior, elevated; concentrically grooved, sometimes cancellated; postero-cardinal margin sometimes alate. Type C. lamellosa.

arcuata, Hall, 1885, Pal. N. Y., vol. 5, p. 486, Chemung Gr.

Hall, arata, 1867, 20th Rep. N. Υ. Nat. Mus. Hist., p. 385,

Niagara Gr. carbonaria,

Meek, 1871, FIG. 812.—Cypricardinia dis-Proc. Acad. tincta. Left valve, long Nat.Sci.Phil., specimen. Nat.Sci.Phil.,

p. 163, and Ohio Pal., vol. 2, p. 342, Coal Meas.

concentrica, Hall, 1859, Pal. N. Y., vol. 3, p. 268, Low. Held. Gr. Hall,



FIG. 813. — Cypricardi-nia distincta. Left valve, short specimen.

(?) cylindrica, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 190,

Gr.

consimilis,

1885, Pal. N. Y., vol. 5, p. 486, Waverly Gr.

crassa, Hall, 1859, Pal. N. Y., vol. 3, p. 268, Low. Held.

Corniferous Gr. distincta, Billings, 1874, Pal. Foss., vol. 2, p. 56, Gaspe limestone, No. 8, Devonian.

dorsata, Hall, 1859, Pal. N. Y., vol. 3, p. 267. Low. Held. Gr.

476

indenta, Conrad, 1842, (Cypricardites in-dentus,) Jour. Acad. Nat. Sci., vol. 8, p. 244, Up. Held. Gr.

indianensis, Hall, 1858, (Cypricardia indianensis,) Trans. Alb. Inst., vol. 4, p. 18, and Bull. Am. Mus. Nat. Hist., p. 58, Warsaw Gr.

inflata var. subæquivalvis, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 189, Up. Held. Gr. lamellosa, Hall, 1859, Pal. N. Y., vol. 3,

p. 266, Up. Held. Gr.

planulata, Conrad, 1842, (Pterinea planu-lata,) Jour. Acad. Nat. Sci., vol. 8, p. 251, and Pal N.Y., vol. 5, p. 484, Low. Held. Gr. sublamellosa, Hall, 1859, Pal. N. Y., vol.

- subianienosa, fran, 1855, fai. N. 1., vol. 3, p. 267, Low. Held. Gr.
 subovata, Muler & Dyer, 1878, Cont. to Pal. No. 2, p. 10, Niagara Gr.
 sulcifera, Winchell, 1863, (Sanguinolites sulciferus,) Proc. Acad. Nat. Sci. Phil., p. 14, and Pal. N. Y., vol. 5, p. 487, Weavely Gr. p. 14, a. Waverly Gr.
- CYPRICARDITES, Conrad, 1841, Ann. Geo. Rep. N. Y., p. 51. [Ety. from resemblance to the genus Cypricardia.] Equivalve, profoundly inequilateral; external flattened ligamental area; hinge with four or five short oblique cardinal teeth; anterior one largest and most prominent; lateral teeth two, short and remote from the cardinal teeth; two muscular scars; surface concentrically lined with marks of growth. Type C. curtus. If the genus can stand, it must be based on this type (all other species are referred to other genera), because this species alone has a hingeline like the one Conrad made.

acutumbonus, Billings, 1866, (Cyrtodonta acutumbona,) Catal. Sil. Foss. Antic., p. 49, Anticosti Gr.

alta, see Modiomorpha alta.

alveatus, Conrad, 1843, Geo. Rep. 3d Dist. N. Y., Ham. Gr.

amygdalinus, Hall, 1847, (Ambonychia amygdalina,) Pal. N. Y., vol. 1, p. 165, Black Riv. and Trenton Grs.

angustus, Hall, 1843, (Cypricardia angusta,) Geo. Rep. 4th Dist. N. Y., p. 76, Clinton Gr.

angustatus, syn. for Amnigenia catskillensis.

angustifrons, syn. for Modiolopsis modiolaris.

anodontoides, see Modiolopsis anodontoides.

anticostiensis, Billings, 1866, (Cyrtodonta (?) anticostiensis,) Catal. Sil. Foss.

Antic., p. 14, Hud. Riv. Gr. bisulcata, see Grammysia bisulcata.

- breviusculus, Billings, 1859, (Cyrtodonta breviuscula,) Can. Nat. and Geo., vol. 4, p. 446, Chazy Gr.
- canadensis, Billings, 1858, (Cyrtodonta canadensis,) Can. Nat. and Geo., vol. 3, p. 434, Black Riv. and Trenton Grs.

carinatus, see Goniophora carinata.

- carinatus, Meek, 1872, (Dolabra carinata.) Proc. Acad. Nat. Sci. Phil., p. 326, and Ohio Pal., vol. 1, p. 135, Hud. Riv. Gr. This name was preoccupied.
- cariniferus, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 245, syn. for Goniophora chemungensis.

catskillensis, see Amnigenia catskillensis. chemungensis, see Goniophora chemungensis.

concentrica, see Modiomorpha concentrica. cordiformis, Billings, 1858, (Cyrtodonta cordiformis,) Can. Nat. and Geo., vol. 3,

p. 437, Black Riv. and Trenton Grs.

corrugatus, Conrad, 1842, Jour. Acad. Nat.

Sei., vol. 8, p. 244, Ham. Gr. curtus, Conrad, 1841, Ann. Rep. N. Y., p. 53, Hud. Riv. Gr.

elongatus, see Cimitaria elongata.

- emma, Billings, 1862, (Cyrotodonta emma,)
- Pal. Foss., vol. 1, p. 150, Hud. Riv. Gr. ferrugineus, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 116, Clinton Gr. ganti, Safford, 1869, (Cyrtodonta ganti,)
- Geo. of Tenn., p. 287, Trenton and Hud. Riv. Grs.

hainesi, S. A. Miller, 1874. Cin. Quar. Jour. Sci., vol. 1, p. 147, Hud. Riv. Gr. harrietta, Billings, 1862, (Cyrtodonta harrietta,) Pal. Foss., vol. 1, p. 149,

Hud. Riv. Gr.

haynanus, Safford, 1869, (Cyrtodonta hayniana,) Geo. of Tenn., p. 287, Trenton

and Hud. Riv. Grs. hindi. Billings,

IG. 815. — Cypricardites hainesi. Interior of left valve, two teeth injured

Hud, Riv. Gr.

FIG.

at t.

1862.

donta

(Cyrtohindi,)

Pal. Foss., vol. 1, FIG. 814. - Cypricardites D. 151, Hud. hainesi. Left valve. Riv. Gr.

huronensis, Billings, 1858, (Cyrtodonta huronensis,) Can. Nat. and Geo., vol. 3, p. 432, Black Riv. and Trenton Grs.

sularis,) Catal. Sil. Foss. Antic., p. 14,

Foss., p. 189. Proposed instead of

Cypricardites, ventricosus, Hall, 1859,

which was preoccupied, Low. Held. Gr.

islandicus, Hall, 1877, 1st Ed. Am. Pal.

indentus, see Cypricardinia indenta.

1842, Jour. Acad. Nat. Sci., vol. 8, p. 246, syn. for Cypricardinia indenta.

Eminflatus, 1842. mons. (Nuculites inflatus,) Geo. Rep. N. Y., p. 395, Trenton Gr. insularis, Billings, 1866, (Cyrtodonta in-

sigmoide p. 438, B sinuatus, see spiniferus, nifera.)

435, Blac sterlingensi (Dolabra



iowensis, O

Rep. on

Calciferon latus, Hall.

N. Y., vo

leucothea

Riv. Gr.

marcellensis.

megambon

Geo. Sur

vol. 4, p.

modiolaris,

nasuta.

mytiloides, s

nasutus, see niota, Hall, and Geo

ton Gr.

obliquus, 1

Sur. Ill., oblongus, Ć

concentri

leta,) Geo fig. 3, Cli

obtusus, H

tusa,) Pa

Riv. and

ovata, syn.

plebeius, B beia,) Ca

Hud. Riv

ponderos

Hud. Ri

Cin. Soc.

Riv. Gr.

Mus. Nat

quadrilater

radiatus, Co p. 53, Ha

rectus, Con

52, Úp. E rectirostris.

29, Trent

p. 29, an Trenton

rugosus, B

rugosus, see

saffordi, Ha

sectifrons, se

sigmoideus

Rep. N.

Geo. of T

gosa,) Ca Black Ri

recurvus, see rotundatus.

quadrangul

ponderosus

obsoletus,

lense.

leucothea.

CVP.

CVP.

ra carinata.

(Dolabra carinata,) . Phil., p. 326, and 135, Hud. Riv. Gr. cupied.

2, Jour. Acad. Nat. n. for Goniophora

nia catskillensis. iophora chemung-

orpha concentrica. 1858, (Cyrtodonta at. and Geo., vol. 3. d Trenton Grs.

12, Jour. Acad. Nat. am. Gr.

Ann. Rep. N. Y., p.

elongata.

- yrotodonta emma,) 150, Hud. Riv. Gr. hitfield, 1875, Ohio linton Gr.
- Cyrtodonta ganti,) 287, Trenton and

1874. Cin. Quar. 147, Hud. Riv. Gr. 1862, (Cyrtodonta ss., vol. 1, p. 149,



. 814. — Cypricardites ainesi. Left valve.

1858, (Cyrtodonta at. and Geo., vol. 3, nd Trenton Grs. dinia indenta.

- inflatus, Conrad, 1842, $J \circ ur$. Acad. Nat. Sci., vol. 8, p. 246, syn. for Cypricardinia indenta.
- Eminflatus. 1842, mons, (Nuculites inflatus,) Geo. Rep. N. Y., p. 395, Trenton Gr. 66, (Cyrtodonta in-

Foss. Antic., p. 14,

1st Ed. Am. Pal. oposed instead of ricosus, Hall, 1859, bied, Low. Held. Gr.

CYR.-CYT.]

- iowensis, Owen, 1840, (Cardium iowense,) Rep. on Mineral lands, pl. 17, fig. 8, Calciferous Gr.
- latus, Hall, 1847, (Modiolopsis latus,) Pal. N. Y., vol. 1, p. 160, Trenton Gr.
- leucothea, Billings, 1862, (Cyrtodonta leucothea,) Pal. Foss., vol. 1, p. 46, Black Riv. Gr.
- marcellensis, see Lunulicardium marcellense.
- megambonus, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 73, and Geo. Wis., vol. 4, p. 210, Trenton Gr.
- modiolaris, Emmons, syn. for Modiolopsis nasuta
- mytiloides, see Modiomorpha mytiloides. nasutus, see Modiolopsis nasuta.
- niota, Hall, 1861, Geo. Rep. Wis., p. 29, and Geo. Wis., vol. 4, p. 208, Trenton Gr.
- obliquus, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 311, Galena Gr.
- oblongus, Conrad, syn. for Modiomorpha concentrica.
- obsoletus, Hall, 1843, (Cypricardia obsoleta,) Geo. Rep. 4th Dist. N. Y., pl. 8, fig. 3, Clinton Gr.
- obtusus, Hall, 1847, (Ambonychia ob-tusa,) Pal. N. Y., vol. 1, p. 167, Black Riv. and Trenton Gr.
- ovata, syn. for Modiolopsis modiolaris.
- plebeius, Billings, 1866, (Cyrtodonta ple-beia,) Catal. Sil. Foss., Antic., p. 14, Hud. Riv. Gr.
- ponderosus, Billings, 1862, (Cyrtodonta ponderosa,) Pal. Foss., vol. 1, p. 150, Hud. Riv. Gr.
- quadrangularis, Whitfield, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 138, Hud. Riv. Gr.
- quadrilateralis, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 388, Niagara Gr. radiatus, Conrad, 1841, Ann. Rep. N. Y.,
- p. 53, Ham. Gr. Not recognized.
- rectus, Conrad, 1841, Ann. Rep. N. Y., p. 52, Up. Held. Gr.
- rectirostris, Hall, 1861, Geo. Rep. Wis., p. 29, Trenton Gr.
- recurvus, see Cimitaria recurva.
- rotundatus, Hall, 1861, Geo. Rep. Wis., p. 29, and Geo. Wis., vol. 4, p. 208, Trenton Gr.
- rugosus, Billings, 1858, (Cyrtodonta ru-gosa,) Can. Nat. and Geo., vol. 3, p. 432, Black Riv. Gr.
- rugosus, see Goniophora rugosa.
- saffordi, Hall, 1852, (Palæarca saffordi,)12th Rep. N. Y. Mus. Nat. Hist., p. 11, and Geo. of Tenn., p. 287, Low. Held. Gr.
- sectifrons, see Phthonia sectifrons.
- sigmoideus, Billings, 1858, (Cyrtodonta sigmoidea,) Can. Nat. and Geo., vol. 3, p. 438, Black Riv. Gr.
- sinuatus, see Modiolopsis sinuata.
- spiniferus, Billings, 1858, (Cyrtodonta spinifera,) Can. Nat. and Geo., vol. 3, p. 435, Black Riv. Gr.
- sterlingensis, Meek & Worthen, 1866, (Dolabra sterlingensis,) Proc. Acad.

Nat. Sci. Phil., p. 260, and Geo. Sur. Ill., vol. 3, p. 339, Hud. Riv. Gr.

- subalatus, see Modiomorpha subalata.
- subangulatus, Hall, 1847, (Edmondia sub-angulata,) Pal. N. Y., vol. 1, p. 156, Black Riv. and Trenton Grs.
- subcarinatus, Billings, 1858, (Cyrtodonta subcarinata,) Can. Nat. and Geo., vol. 3, p. 433, Black Riv. Gr.
- subspatulatus, Hall, 1847, (Modiolopsis subspatulata,) Pal. N. Y., vol. 1, p. 159, Black Riv. and Trenton Grs.
- truncatus, see Sphenotus truncatus.
- ungulatus, Billings, 1866, (Cyrtodonta ungulata,) Catal. Sil. Foss. Antic., p. 15, Hud. Riv. Gr.
- ventricosus, Hall, 1847, (Edmondia ventricosa,) Pal. N. Y., vol. 1, p. 155, Trenton Gr.
- ventricosus, Hall, 1859, (Palæarca ventri-cosa,) Pal. N. Y., vol. 3. This name was preoccupied. See Cypricardites islandicus.
- vetustus, Hall, 1847, (Cardiomorpha ve-* tusta,) Pal. N. Y., vol. 1, p. 154, Trenton Gr.
- winchelli, Safford, 1869, (Cyrtodonta winchelli,) Geo. Tenn., p. 287, Trenton and Hud. Riv. Grs.
- Cyrtodonta, syn. for Cypricardites.
 - acutumbona, see Cypricardites acutumbonus.

anticostiensis, see C. anticostiensis.

- breviuscula, see C. breviusculus.
- canadensis, see C. canadensis.

cordiformis, see C. cordiformis. emma, see C. emma.

ganti, see C. ganti.

- harrietta, see C. harrietta. hayniana, see C. haynanus.
- hindi, see C. hindi.
- huronensis, see C. huronensis.
- insularis, see C. insularis. leucothea, see C. leucothea.
- normanensis, Safford. Not defined.
- plebeia, see Cypricardites plebeius.

ponderosa, see C. ponderosus.

rugosa, see C. rugosus.

- saffordi, see C. saffordi.
- sigmoidea, see C. sigmoideus.
- spinifera, see C. spiniferus.

subcarinata, see C. subcarinatus.

ungulata, see C. ungulatus.

- winchelli, see C. winchelli.
- CYTHERODON, Hall & Whitfield, 1873, in 23d Rep. N. Y., pl. 14, figs. 19-21. [Ety. Cythere, a genus; odous, tooth.] Ovate, pointed posteriorly; beaks pointed sharp, oblique, umbonal ridge; cardinal line short; subcircular anterior and posterior muscular scars distinct; hinge area strong with angular teeth or crenulations beneath the beaks, pallial line simple, surface concentrically lined. Type C. nasutus.
 - appressus, Conrad, (Nuculites appressus,) 1842, Jour. Acad. Nat. Sci., vol. 8, p. 248, and Pal. N. Y., vol. 5, pl. 75, figs. 3-9, Ham. Gr.

chemungensis, Conrad, 1842, (Nuculites chemungensis,) Jour. Acad. Nat. Sci., vol. 8, p. 247, and Pal. N. Y., vol. 5, pl. 75, figs. 37-40, Chemung Gr. cuneus, Hall, 1883, Pal. N. Y., vol. 5, pl. 75, figs. 27-30, Waverly Gr.



FIG. 816. -Cytherodon rhombeus.

ellipticus, Hall, 1870, (Schizodus ellipti-cus,) Prelim. Notice Lam. Shells, p. 96, and Pal. N. Y., vol. 5, pl. 75, figa 13-15, Ham. Gr.

gregarius, Hall, 1883, Pal. N. Y., vol. 5, pl. 75, figs. 41-45, Chemung Gr.

nasutus, Hall, 1883, Pal. N. Y., vol. 5, pl.

75, figs. 10-12, Ham. Gr. oblatus, Hall, Pal. N. Y., vol. 5, pl. 75, figs. 41-45, Chemung Gr.

pauper, Hall, 1883, Pal. N.Y., vol. 5, pl. 75, figs. 24–26, Chemung Gr.

(?) placidus, Billings, 1874, Pal. Foss., vol. 2, p. 137, Up. Sil.

quadrangularis, Hall, 1870, (Schizodus quadrangularis,) Prelim. Notice Lam. Shells, p. 96, and Pal. N. Y., vol. 5, pl. 75, figs. 31-36, Chemung Gr.

rhombeus, Hall, 1843, (Cypricardia rhombea,) Geo. Rep. 4th Dist. N. Y., p. 291, and Pal. N. Y., vol. 5, pl. 75, figs. 19-23, Subcarboniferous.

socialis, Billings, 1874, Pal. Foss., vol. 2, p. 738, Up. Sil. tumidus, Hall, 1870, (Schizodus tumidus,)

Prelim# Notice Lam. Shells, p. 94, and Pal. N. W., vol. 5, pl. 75, figs. 1-2, Up. Held. Gr.

Winchell, 1863, Proc. Acad. Nat. Sci., p. 10. Ety. dexios. on, the right side; bia. strength.] Inequivalve, inequilateral, area undefined, right valve very ventricose. umbo prominent;

FIG. 817.-Dexiobia ovata. beak incurved forward; left valve less inflated; hinge-line having a thickened cartilage plate, bearing a linear posterior groove. Type D. ovata.

halli, Winchell, 1863, Proc. Acad. Nat. Sei. p. 11, Marshall Gr.

DEX.-EDM.

ovata, Hall, 1858, (Cardiomorpha ovata,) Geo. Rep. Iowa, p. 522, Kinderhook Gr. whitii, Winchell, 1863, Proc. Acad. Nat.

Sci., p. 11, Marshall Gr.

DOLABRA, McCoy, 1844, Syn. Carb. Foss. / Ireland, p. 64. [Ety. dolabra, a mattock or pickaxe.] Obliquely ovate, gibbous; left valve larger than the right; beaks large, obtuse, nearer the anterior than posterior end; hinge-line straight, shorter than the shell, not crenulated: a flat, narrow ligamental area the length of the hinge-line, widest between the beaks; anterior end narrower than the posterior, rounded; no byssal sinus or furrows; ventral margin slightly convex; posterior end obliquely truncated, slope flattened; surface smooth

or finely striated. alpina, Hall, 1858, Geo. Rep. Iowa, p. 716, Coal Meas.

carinata, see Cypricardites carinatus. sterlingensis, see Cypricardites sterlingensis.



FIG. 818.-Ectenodesma birostratum.

Dystactella, Hall, 1883, Pal. N. Y., vol. 5, p. 4, (Plates and Explanations,) synonymfor Clinopistha.

insularis, see Clinopistha insularis. subnasuta, see Clinopistha subnasuta.

telliniformis, see Clinopistha telliniformis. ECTENODESMA, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 4. (Plates and Explanations.) [Ety. ektenes, stretched out; desma, a ligament.] Body ovate, oblique; height greater than length; both valves more or less convex; hinge-line longer than the length of the shell; byssal sinus shallow; oblique lateral tooth; ligamental area narrow, striated; surface rayed; distinguished from Glyptodesma by having the anterior wing more produced, and both wings more acute at their extremities. Type E. birostratum. birostratum, Hall, 1883, Pal. N. Y., vol.5,

pt. 1, p. 242, Chemung Gr. EDMONDIA, DeKoninck, 1844, Desc. Anim. Foss., Carb. Belg., p. 66. [Ety. proper EDM.]

name.] tumid, sh all around slightly c impressed face with an intern much dila beaks, the in casts co anterior 1 running within t erect and impressio impressio

ple, entire



FIG. 819.-Edmo ensis. R

1868, Aca aspenwallen Rep. Sur. Neb., p. 2 bicarinata, Nat. Sci., regards th rigidus. binumbonat 1862, Pro Sci., p. 41 burlingtone Whitfield, Bost. Soc. 8, p. 301, a vol. 5, p. hook Gr. calhouni, see calhouni. circularis, V Monogr. U vol. 8, p. erous. concentrica, concentric depressa, Ha Shells, p. 64, fig. 32, ellipsis, Hal 392, Wave elliptica, Wi Sci., p. 13, gibbosa, Swa Acad. Sci. glabra, Meel Coal Meas hartti, Daws

Carb.





DEX.-EDM.

EDM.]

Proc. Acad. Nat. Sei.

diomorpha ovata,) 22, Kinderhook Gr. Proc. Acad. Nat. Gr.

\$,

I, Syn. Carb. Foss. dolabra, a mattock ely ovate, gibbous: n the right; beaks the anterior than inge-line straight. ell, not crenulated amental area the ine, widest between end narrower than ed; no byssal sinus Il margin' slightly nd obliquely trund; surface smooth

. Rep. Iowa, p. 716,

ites carinatus. ricardites sterling-



ratum.

al. N. Y., vol. 5, p. inations,) synonym

ha insularis. tha subnasuta.

istha telliniformis. , Pal. N. Y., vol. 5, and Explanations.) :hed out; desma, a ate, oblique; height both valves more re-line longer than shell; byssal sinus steral tooth; ligastriated; surface l from Glyptodesma or wing more prongs more acute at 'ype E. birostratum. 3, Pal. N. Y., vol.5, ng Gr.

1844, Desc. Anim.). 66. [Ety. proper LAMELLIBRANCHIATA.

alis, Win-chell, 1862,

(Cardin i a

æquim a rginalis,) Proc. Acad. Nat.

Sci., p. 413, Marshall Gr.

anomála,

- Ed-

name.] Shell equivalve, inequilateral, tumid, short, oblong or rounded, closed all around; dorsal and ventral margins slightly convex; beaks tumid, with an impressed lunette between them; surface with concentric striæ; no teeth, but an internal lamellar cartilage support, much dilated within the cavity of the beaks, the broad end forming the slits in casts coinciding with the edges of the anterior lunette, and the posterior end running nearly parallel to and close within the hinge-line; dorsal margins erect and simple; two simple adductor impressions, often with an accessory impression over each, pallial scar simple, entire. Type E. unioniformis. æquimargin-



FIG. 819.-Edmondia aspenwall-ensis. Right valve.

Dawson, 1868, Acad. Geo., p. 303, Carb. aspenwallensis, Meek, 1871, Havden's

- Rep. Sur. Wyoming, p. 299, and Pal. E. Neb., p. 216, Coal Meas.
- bicarinata, Winchell, 1863, Proc. Acad. Nat. Sci., p. 13, Marshall Gr. Prof. Hall regards this as a syn. for Sanguinolites rigidus.
- binumbonata, Winchell, 1862, Proc. Acad. Nat.
- Sci., p. 414, Marshall Gr. burlingtonensis, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 301, and Pal. N. Y., vol. 5, p. 390, Kinderhook Gr.
- calhouni, see Pleurophorus calhouni.
- circularis, Walcott, 1885, Monogr. U. S. Geo. Sur.
- vol. 8, p. 246, Carbonif- FIG. 820. erous.
- mondia aspen-wallensis. Cardinal view. concentrica, see Astartella concentrica.
- depressa, Hall, 1870, Prelim. Notice Lam. Shells, p. 91, and Pal. N. Y., vol. 5, pl. 64, fig. 32, Waverly Gr.
- ellipsis, Hall, 1885, Pal. N. Y., vol. 5, p. 392, Waverly Gr.
- elliptica, Winchell, 1863, Proc. Acad. Nat. Sci., p. 13, Marshall Gr.
- gibbosa, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 189, Permian Gr.
- glabra, Meek, 1872, Pal. E. Neb. p. 214, Coal Meas.
- hartti, Dawson, 1868, Acad. Geol., p. 303, Carb.

- hawni, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 209, Coal Meas. illinoisensis, Worthen, 1884, Bull. No. 2
- Ill. St. Mus. Nat. Hist., p. 18, and Geo. Sur. Ill., vol. 8, p. 122, Keokuk Gr. ledoides, Winchell, 1866, Rep. Low. Pen-
- insula Mich., p. 96, Ham. Gr.
- mactroides, Winchell, 1866, Rep. Low. Peninsula Mich., p. 96, Ham. Gr.
- marionensis, Swallow, 1860, Trans. St. Louis Acad. Sci., vol. 1, p. 654, Choteau Gr.
- medon, Walcott, 1884, Monogr. U. S. Geo. Sur., vol. 8, p. 245, Subcarboniferous.
- mortonensis, Geinitz, 1866, (Astarte mortonensis,) Carb. und Dyas in Neb., p. 17, Coal Meas.
- nebraskensis, Geinitz, 1866, (Astarte nebraskensis,)Carb. und Dyas in Neb., p 16,
- and Pal. E. Neb., p. 214, Coal Meas. nilesi, Winchell & Marcy, 1865, Proc. Bost. Soc. Nat. Hist., p. 97, Niagara Gr. nitida, Winchell, 1863, Proc. Acad. Nat.
- Sci., p. 12, Marshall Gr. nuptialis, Winchell, 1863, Proc. Acad. Nat.
- Sci., p. 12, Marshall Gr. obliqua, Hall, 1885, Pal. N. Y., vol. 5, p. 38, Chemung Gr.
- otoensis, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 189, Permian Gr. peroblonga, Meek & Worthen, 1866, Proc.
- Acad. Nat. Sci. Phil., p. 249, and Geo. Sur. Ill., vol. 5, p. 583, Coal Meas.
- philipi, Hall, 1870, Prelim. Notice Lam. Shells, p. 90, and Pal. N. Y., vol. 5, pl. 64, figs. 9-18, Chemung Gr.
- pinonensis, Meek, 1877, U.S. Geo. Expl. 40th parallel, vol. 4, p. 46, Devonian.
- radiata, see Clinopistha radiata.
- reflexa, Meek, 1872, Pal. E. Neb., p. 213, Coal Meas.
- rhomboidea, Hall, 1883, Pal. N. Y., vol. 5, pl. 64, figs. 7-8, Chemung Gr.
- semiorbiculata, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 190, Permian Gr.
- strigillata, Winchell, 1863, Proc. Acad. Nat. Sci., p. 12, Marshall Gr.
- subangulata, see Cypricardites subangulatus.
- subcarinata, Hall, 1885, Pal. N. Y., vol. 5,
- pl. 64, fig. 31, Chemung Gr. subnasuta, Hall, 1883, Pal. N. Y., vol. 5, pl. 64, figs. 5-6, Chemung Gr.
- subovata, Hall, 1885, Pal. N. Y., vol. 5, p.
- 389, Chemung Gr. subplana, Hall, 1858, Cypricardia sub-plana,) Trans. Alb. Inst., vol. 4, p. 19, and Bull, Am. Mus. Nat. Hist., p. 66, Warsaw Gr.
- subtruncata, see Cuneamya subtruncata.
- subtruncata, Meek, 1872, Pal. E. Neb., p. 215, Coal Meas.
- tapetiformis, Meek, 1875, (E. tapesiformis,) Ohio Pal., vol. 2, p. 304, Waverly Gr. tenuistriata, Hall, 1885, Pal. N. Y., vol. 5,
 - p. 393, Chemung Gr.
- transversa, Hall, 1885, Pal. N. Y., vol. 5, p. 389, Chemung Gr.

undata, see Grammysia undata.

- undulata, Hall, 1870, Prelim. Notice Lam. Shells, p. 91, and Pal. N. Y., vol. 5, pl.
- 64, figs. 1-4, Chemung Gr. unioniformis, Phillips, 1836, (Isocardia unioniformis,) Geol. Yorkshire, vol. 2, p. 209, and Geo. Sur. Ill., vol. 2, p. 346, Coal Meas.
- varsoviensis, Worthen, 1884, Bull. No. 2 Ill. St. Mus. Nat. Hist., p. 18, and Geo. Sur. Ill., vol. 8, p. 121, Keokuk Gr.
- ventricosa, see Cypricardites ventricosus. ELYMELLA, Hall, 1885, Pal. N. Y., vol. 5, p. 50. [Ety. elymos, a case.] Equivalve,
 - inequilateral, ovate, elliptical; anterior end short, rounded; posterior end narrower, rounded; beaks closely incurved; umbo prominent; cardinal line short; umbonal slope prominent in the upper part, not defined below; surface concentrically lined. Type É. nuculoides.
- fabalis, Hall, 1885, Pal. N. Y., vol. 5, p. 502, Ham. Gr.
- levata, Hall, 1885, Pal. N. Y., vol. 5, p. 504, Ham. Gr.
- nuculoides, Hall, 1885, Pal. N. Y., vol. 5, p. 503, Ham. Gr.
- patula, Hall, 1885, Pal. N. Y., vol. 5, p. 505, Waverly Gr.
- Entolium, Meek, 1865, Cal. Geo. Sur., vol. 2. [Ety. entos, inside; leion, smooth.] If synonymous with Pernopecten, then the latter has priority; but if distinct, then probably it is not a Palæozoic genus, as the type is from rocks of Jurassic age.
- Eodon, Hall, 1877, 1st Ed. Am. Pal. Foss., p. 244. Proposed instead of Microdon, Conrad, which was preoccupied.
- EOPTERIA, Billings, 1865, Pal. Foss., vol. 1, p. 221. [Ety. eos, dawn; pteron, a wing.] Prof. Billings said if Euchasma is the 221.same as Eopteria, then he desired Eopteria to be withdrawn from science. Winged as in Pterinea, both valves equally convex and gaping; ligament
- external. Type E. typica. (?) ornata, Billings, 1865, Pal. Foss., vol. 1, p. 307, Quebec Gr.
- richardsoni, Billings, 1865, Pal. Foss., vol. 1, p. 306, Quebec Gr.



FIG. 821.-Eopteria richardsoni.

typica, Billings, 1865, Pal. Foss., vol. 1, p. 221, Quebec Gr.

EUCHASMA, Billings, 1865, Pal. Foss., vol. 1, p. 360. [Ety. eu, well; chasma, a hollow.] Strongly convex, triangular, inequilateral, equivalve, subcordiform, gaping, posterior extremity flattened, hinge short, ligament external. Type

ENT.-FOR.

822. - Eu-

chondria neg-lecta. Right valve enlarged

two diameters.

(Pecten neglec-

tus,) Carb. und

Dyas in Neb., p.

p. 33, and Geo.

Sur. Ill., vol. 5, p.

589, Coal Meas.

E. blumenbachi. blumenbachi, Billings, 1859, (Conocar-dium blumenbachi,) Can. Nat. and Geo.,

vol. 4, p. 850, Quebec Gr. EUCHONDRIA Meek, 1874, Am. Johr. Sci., 3d series, vol. 7, p. 445. Like Aviculopecten in form, but with an unsymmetrical subrostral cartilage pit and un-equal crenulations on chon

the two sides. Type H. neglecta. neglecta, Geinitz, 1866,

O LIFERING INANE ILLO

- FIG. 823. Euchondria neglecta Hinge-line enlarged.
- Meek, 1864, syn. for Pseudo-Eumicrotus, monotis.
- hawni, see Pseudomonotis hawni.
- hawni var. ovata, see Pseudomonotis hawni var. ovata.
- hawni var. sinuata, see Pseudomonotis hawni var. sinuata.

EUTHYDESMA, Hall, 1885, Pal. N. Y., Hall, vol. 5, p. 32. [Ety. euthus, straight; desma, a ligament.] Equivalve, inequilateral,

broadlysubovate. with a subalate Fig. 824.-Euthydesma subtexti cardinal expansion; cardinal line straight; interior end short; surface concentrically lined; hinge-line marked by a continuous lig-

- amental groove. Type E. subtextile. subtextile, Hall, 1843, (Astarte subtextilis,) Geo. Sur. 4th Dist. N. Y., p. 245, Portage Gr.
- Exochorhynchus, Meek, 1864, Pal. Up. Mo. [Ety. exochos, prominent; rhynchos, beak.] This name was suggested as a probable genus or subgenus to include Sedgwickia altirostrata.

FORDILLA, Barrande, 1881, Acephales. Etudes Loc. et Comp., pl. 361, and Bull. U. S. Sur., Geo. No. 30, p. 123.

A minute bi-

FIG. 825.-Fordilla troyensis.

valve, somewhat resembling a Modio-lopsis or an Orthonotella. Type F. troyensis.

troyensis, Barrande, 1886, Bull. U. S. Geo. Sur., vol. 30, p. 125, Up. Taconic.



longispina, s strigosa, see sulcata, see GLOSSITES, Ha 49. [Ety valve, ine end shor beak and large, br appressed arcuate; surface m external; pressions amygdalinu lites amy Sci. Phil. p. 501, W depressus, l 496. Chen ellipticus, H 498, Chen lingualis, H 497, Chen patulus, Ha 501, Chen procerus, H 499, Chen rudicula, H

p. 500, Ch subtenuis, H 495, Ham teretis, Hal 494, Up. 1

498, Chen subnasutus. FIG. 826. Glyptocardia speciosa. or subcir face plica tric striæ

Type G. s speciosa, H Geo. Sur. Pal. N. Y Portage G GLYPTODESMA, pt. 1, p. 4 [Ety. glyp ment.] A striated, strong lat regular tr cardinal n striated. cruciforme,

> formis,) Ham. Gr.

480

GER.-GON.]

ENT.-FOR.

ve, subcordiform. stremity flattened. nt external. Type

1859, (Conocar-3, 1859, (Conocar-Can. Nat. and Geo., c Gr.



FIG. 822. - Euon chondria neg lecta. Right valve enlarged two diameters. pe 66,

(Pecten neglectus,) Carb. und Dyas in Neb., p. p. 33, and Geo. Sur. Ill., vol. 5, p. 589, Coal Meas. syn. for Pseudo-

otis hawni. eudomonotis hawni

ee Pseudomonotis



G. 824.—Euthydesma subtextile

straight; interior oncentrically lined; y a continuous ligpe E. subtextile. **Astarte subtextilis.**) N. Y., p. 245, Port-

1864, Pal. Up. Mo. minent; rhynchos, was suggested as a ubgenus to include ita.

FORDILLA, Bar-rande, 1881, Acephales. Etudes Loc. et Comp. pl. 361, and Bull. U. S. Sur., Geo. No. 30, p. 123. is. A minute bi-

sembling a Modioonotella. Type F.

386, Bull. U. S. Geo. Up. Taconic.

GER.-GON.]

Gervillia, DeFrance, 1820, Dict. Sci. Nat., xviii. [Ety. proper name.] Type G. anceps. This genus is probably unknown in the American Palæozoic rocks.

auricula, see Monopteria auricula. longa, see Avicula longa. longispina, see Monopteria longispina. strigosa, see Pterinea strigosa.

sulcata, see Bakevellia sulcata.

- GLOSSITES, Hall, 1885, Pal. N. Y., vol. 5, p.
 49. [Ety. glosse, the tongue.] Equivalve, inequilateral, elliptical; anterior end short, margin declining from the beak and curving below; posterior end large, broadly rounded; beaks small, appressed; cardinal line long, gently arcuate; umbonal slope not defined; surface marked concentrically; ligament external; lunule distinct; muscular impressions shallow. Type G. lingualis. amygdalinus, Winchell, 1863, (Sanguino-
- lites amygdalinus,) Proc. Acad. Nat. Sci. Phil., p. 13, and Pal. N. Y., vol. 5, p. 501, Waverly Gr.
- depressus, Hall, 1885, Pal. N. Y., vol. 5, p. 496, Chemung Gr.
- ellipticus, Hall, 1885, Pal. N. Y., vol. 5, p. 498, Chemung Gr.
- lingualis, Hall, 1885, Pal. N. Y., vol. 5, p. 497, Chemung Gr.
- patulys, Hall, 1885, Pal. N. Y., vol. 5, p. 501, Chemung Gr.
- procerus, Hall, 1885, Pal. N. Y., vol. 5, p. 499, Chemung Gr.
- rudicula, Hall, 1885, Pal. N. Y., vol. 5, p. 498, Chemung Gr.
- subhasutus, Hall, 1885, Pal. N. Y., vol. 5, p. 500, Chemung Gr.
- subtenuis, Hall, 1885, Pal. N. Y., vol. 5, p. 495, Ham. Gr.
- teretis, Hall, 1885, Pal. N. Y., vol. 5, p. 494, Up. Held. Gr.



speciosa.

GLYPTOCARDIA, Hall, 1885, Pal. N. Y., vol. 5, p. 35. [Ety. glyptos, sculptured; cardia, the heart.] Shell small, equivalve, inequi-lateral, broadly elliptical

- or subcircular; beaks incurved; surface plicated and marked with concentric striæ; no area beneath the beaks. Type G. speciosa.
- speciosa, Hall, 1843, (Avicula speciosa,) Geo. Sur. 4th Dist. N. Y., p. 243, and Pal. N. Y., vol. 5, p. 426, Ham. and Portage Grs.
- GLYPTODESMA, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 4. (Plates and Explanations.) [Ety. glyptos, sculptured; desma, a ligament.] Aviculiform, ligamental area striated, continuous, hinge with two strong lateral teeth, and numerous irregular transverse plications along the cardinal margin; surface concentrically striated. Type G. erectum.
- cruciforme, Conrad, 1841, (Avicula cruci-formis,) Ann. Rep. N. Y., p. 54, Ham. Gr.

erectum, Conrad, 1842, (Avicula erecta,) Jour. Acad. Nat. Sci., vol. 8, p. 238, and Pak N. Y., vol. 5, p. 153, Ham. Gr. erectum var. obliquum, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 155, Ham. Gr. occidentale, Hall, 1883, Pal.



- N. Y., vol. 5, pt. 1, p. 157, FIG. 827. Up. Held Gr. Glyptodesma erectum. subrectum, Whitfield, 1882,
- (Actinodesma subrectum,) Ann. N. Y. Acad. Sci., vol. 2, p. 215, Ham. Gr.



FIG. 828.—Glytodesma erectum. Mold of left valve, showing pallial line, muscular scar, tu-bercles in the interpallial area representing points of muscular attachment.

- GONIOPHORA, Phillips, 1848, Mem. Geo. Sur. Gt. Brit., vol. 2, p. 264. [Ety. gonia, an angle; phoros, bearing.] Goniophorus was used by Agassiz for a genus of Echinoderms in 1840. Equivalve, very inequilateral, rhomboidal or trapezoidal, obliquely truncate behind, rounded in front; cardinal line straight; beaks small, umbo prominent, and slope continued as a ridge to the post-inferior margin; oblique, undefined sinus from anterior to the beaks to basal margin; surface concentrically lined; hinge with an oblique fold or tooth in the left valve beneath the beak, and a corresponding depression in the right valve; ligament external, attached by one or more grooves; anterior muscular impression deep, situated anterior to the beak; posterior muscular impression shallow, situated on the posterior cardinal slope; pallial line simple. Type G. cymbiformis.
 - acuta, Hall, 1870, (Sanguinolites acutus.) Prelim. Notice Lam. Shells, p. 37, and Pal. N. Y., vol. 5, pl. 43, figs. 1-3, Ham. Gr.
 - alata, Hall, 1885, Pal. N. Y., vol. 5, p. 294, Schoharie grit.
 - bellula, Billings, 1874, Pal. Foss., vol. 2, p. 136, Up. Sil.

LAMELLIBRANCHIATA.

carinata, Conrad, 1841, (Cypricardites carinatus,) Ann. Rep. Geo. Sur. N. Y., p. 53, and Pal. N. Y., vol. 5, pl. 44, figs. 6-8, Ham. Gr. chemungensis, Vanuxem, 1842, Cypri-

482

- cardites chemungensis,) Geo. Rep. N. Y., p. 181, and Pal. N. Y., vol. 5, pl. 44, figs. 18-22, Chemung Gr.
- consimilis, Billings, 1874, Pal. Foss., vol. 2, p. 135, Up. Sil.
- crassa, Whiteaves, 1888, Pal. Foss., vol. 3,
- p. 9, Guelph Gr. glabra, Hall, 1883, Pal. N. Y., vol. 5, pl. 44, figs. 9-17, syn. for G. glaucus.
- glaucus, Hall, 1870, (Sanguinolites glau-cus,) Prelim. Notice Lam. Shells, p. 38,
- and Pal. N. Y., vol. 5, p. 299, Ham. Gr. hamiltonensis, Hall, 1870, (Sanguinolites hamiltonensis,) Prelim. Notice Lam. Shells, p. 30, and Pal. N. Y., vol. 5, pl. 43, figs. 8–21, Ham. Gr. mediocris, Billings, 1874, Pal. Foss., vol. 2,
- p. 137, Up. Sil. minor, Hall, 1885, Pal. N. Y., vol. 5, p. 305, Chemung Gr
- perangulata, Hall, 1870, (Sanguinolites perangulatus,) Prelim. Notice Lam. Shells, and Pal. N. Y., vol. 5, pl. 34, figs. 1-7, Up. Held. Gr.



FIG. 829.-Goniophora chemungensis.

- plicata, Hall, 1858, (Cypricardella plicata,) Trans. Alb. Inst., vol. 4, p. 18, and Bull. Am. Mus. Nat. Hist., p. 66, Warsaw Gr.
 rugosa, Conrad, 1841, (Cypricardites ru-gosus,) Ann. Rep. N. Y., p. 53, and Pal. N. Y., vol. 5, p. 297, Ham. Gr.
 speciosa, Hall, 1879, Desc. New. Spec. Foss, p. 17, and 11th Pap. Goal. Indi
- Foss., p. 17, and 11th Rep. Geol. Indi-ana, p. 317, Niagara Gr.
- subrecta, Hall, 1885, Pal. N. Y., vol. 5, p. 304, Chemung Gr.
- transiens, Billings, 1874, Pal. Foss., vol. 2, p. 134, Up. Sil. trigona, Hall, 1885, Pal N. Y., vol. 5, p.
- 302, Chemung Gr.
- truncata, Hall, 1883, Pal. N. Y., vol. 5, pl. 44, fig. 15, Ham. Gr.
- GOSSELETTIA, Barrois, 1881, Ann. Soc. Geol. du Nord, vol. 8, p. 176. [Ety. proper name.] Shell subtriangular, truncate on the anterior side, subalate posteriorly; ligamental area wide, longitudinally striate; cardinal teeth below the beak strong; lateral teeth elongate; surface with concentric striæ.

retusa, Hall, 1883, Pal. N. Y., vol. 5, pt. 1. p. 266, Ham. Gr.

GOS.—GRA.



FIG. 830.-Gosselettia triquetra. Right valve.

- triquetra, Conrad, 1838, (Pterinea triquetra,) Ann. Rep. Geo. N. Y., p. 116, and Pal. N. Y., vol. 5, pt. 1, p. 265, Ham. Gr.
- GRAMMYSIA, DeVerneuil, 1847, Bull. Soc. Geo. France, 2d ser., vol. 4, p. 696. [Ety. gramme, a line of writing; Mys, a mussel shell, in allusion to the transverse furrows which cross the valves from the umbones to the middle of the ventral margin.] Equivalve, inequilateral; shell thick, oblong; anterior side short, contracted by a deep oval lunette beneath the beak; posterior end elliptically

in each valve, anterior rounded, posterior pear-shaped; pallial scar entire; cartilage external, short, in the anterior part of a deep depression formed by the inflexion of the hinge margins; an oblique furrow extends from the beak to about the middle of the ventral margin. Type G. bisulcata. acadica, Billings, 1874, Pal. Foss., vol 2,

rounded;

hinge-line straight; two

large adductor impressions

- p. 140, Up. Sil.
- alveata, Conrad, 1841, (Posidonia alveata,) Ann. Rep. N. Y., p. 53, and Pal. N. Y., vol. 5, pl. 57, figs. 1–2, and pl. 60, Ham. Gr.
- arcuata, Conrad, 1841, (Posidonia arcuata,) Ann. Rep. N. Y., p. 53, and Pal. N. Y.,
- Ann. Kep. N. I., p. 55, and Fai. M. F., vol. 5, p. 373, Ham. Gr. bisulcata, Conrad, 1838, (Pterinea bisul-cata,) 1841, (Cypricardites bisulcata,) Ann. Rep. N. Y., p. 116, and Pal, N. Y., vol. 5, pl. 51, figs. 1-16, Ham. Gr. canadensis, Billings, 1874, Pal. Foss., vol.
- 2, p. 51, Gaspe sandstone, Up. Sil.
- caswelli, Foerste, 1885, Bull. Sci. Lab. Denison University, p. 92. Not properly defined.

R)

Nat. Hist., circularis, Ha Shells, p. l 57, figs. 3-6 communis, H p. 378, Che constricta, H Shells, p. l 59, figs. 13 cuneata, Hal 62, figs. 1-8 duplicata, He 380, Chemi elliptica, Hal Shells, p. 5 58, figs. 1-1 erecta, Hall, Shells, p. 5 363, Ham. glabra, Hall, 369. Chemi globosa, Hall Shells, p. 5 372, Ham. hamiltonensis,



FIG. 831.-Gramm balensis. Dor

lirata, Hall, Shells, p. 5 59, figs. 6-1 magna, Hall, Shells, p. and Pal. N. vol. 5, p. Ham. Gr. minor, Walc 1885, Mone U. S. Geo. S vol. 8, p. Up. Devoni nodocostata, H 1870, Prelim Pal. N.Y.,vo obsoleta, Hall Shells, p. 60 59, figs. 21-2 ovata, Hall, 1 358, Up. He parallela, Hall Shells, p. 59 plena, Hall, 382, Waverl præcursor, Ha Shells, p. 54 59, fig. 1, Scl remota, Billin p. 139, Up. rhomboidalis, Proc. Acad.

Geo. Sur. Ill

GRY.-150.]

chemungens

[GOS.-GRA.



stra. Right valve

(Pterinea trique-N. Y., p. 116, 5, pt. 1, p. 265,

1847, Bull. Soc. , vol. 4, p. 696. of writing; Mys, a shell, in allusion ransverse furrows cross the valves e umbones to the of the ventral Equivalve, inral; shell thick, anterior side contracted by a I lunette beneath k; posterior end rounded; llv ne straight; two uctor impressions 1 valve, anterior ar-shaped; pallial external, short, a deep depression ion of the hinge

furrow extends ut the middle of ype G. bisulcata. Pal. Foss., vol 2,

osidonia alveata,) 3, and Pal. N. Y., 1-2, and pl. 60,

osidonia arcuata,) 3, and Pal. N. Y.,

(Pterinea bisuldites bisulcata,) 6, and Pal, N.Y.,

), Ham. Gr. 4, Pal. Foss., vol.

one, Up. Sil. Il. Sci. Lab. Deni-

Not properly de-

21

GRY.-150.]

- chemungensis, Pitt, 1874, Bul. Buff. Soc. Nat. Hist., Chemung Gr.
- circularis, Hall, 1870, Prelim. Notice Lam. Shells, p. 51, and Pal. N. Y., vol. 5, pl. 57, figs. 3-6, Ham. and Chemung Grs.
- communis, Hall, 1885, Pal. N. Y., vol. 5, p. 378, Chemung Gr.
- constricta, Hall, 1870, Prelim. Notice Lam. Shells, p. 58, and Pal. N. Y., vol. 5, pl. 59, figs. 13-20, Ham. Gr.
- cuneata, Hall, 1883, Pal. N. Y., vol. 5, pl. 62, figs. 1-9, Ham. Gr.
- duplicata, Hall, 1885, Pal. N. Y., vol. 5, p. 380, Chemung Gr.
- elliptica, Hall, 1870, Prelim. Notice Lam. Shells, p. 53, and Pal. N. Y., vol. 5, pl. 58, figs. 1-12, Chemung Gr.
- erecta, Hall, 1870, Prelim. Notice Lam. Shells, p. 52, and Pal. N. Y., vol. 5, p. 363, Ham. Gr.
- glabra, Hall, 1885, Pal. N. Y., vol. 5, p.
- 369. Chemung Gr. globosa, Hall, 1870, Prelim. Notice Lam. Shells, p. 57, and Pal. N. Y., vol. 5, p. 372, Ham. Gr.

hamiltonensis, syn. for G. bisculcata.



FIG. 831.-Grammysia hannibalensis. Dorsal view

lirata, Hall, 1870, Prelim. Notice Lam. Shells, p. 57, and Pal. N. Y., vol. 5, pl. 59, figs. 6-12, Ham. Gr.

magna, Hall, 1870, Prelim. Notice Lam.

Shells, p. 50, and Pal. N. Y., vol. 5, p. 362, Ham. Gr. minor, Walcott, 1885, Monogr. U. S. Geo. Sur.,



Shumard,

1855, (Allo-

risma han-

n i b alense,)

Geo. Sur.

Mo., p. 206,

Choteau

and Kinder-

hook Grs.

vol. 8, p. 174, Fig. 832.—Grammysia han-Up. Devonian. nibalensis. Right side Up. Devonian. view.

- nodocostata, Hall, 1870, Prelim. Notice Lam. Shells, p. 50, and Pal. N.Y., vol. 5, pl. 55, figs. 1-11, Ham. Gr. obsoleta, Hall, 1870, Prelim. Notice Lam.
- Shells, p. 60, and Pal. N. Y., vol. 5, pl. 59, figs. 21-27, Ham. Gr.
- ovata, Hall, 1885, Pal. N. Y., vol. 5, p. 358, Up. Held. Gr.
- parallela, Hall, 1870, Prelim. Notice Lam. Shells, p. 59, Ham. Gr.
- plena, Hall, 1885; Pal. N. Y., vol. 5, p. 382, Waverly Gr.
- præcursor, Hall, 1870, Prelim. Notice Lam. Shells, p. 54, and Pal. N. Y., vol. 5, pl. 59, fig. 1, Schoharie grit.
- remota, Billings, 1874, Pal. Foss., vol. 2, p. 139, Up. Sil.
- rhomboidalis, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 248, and Geo. Sur. Ill., vol. 3, p. 439, Ham. Gr.

rhomboides, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 72, and Ohio Pal., vol. 2, p. 302, Waverly Gr.

- rustica, Billings, 1874, Pal. Foss., vol. 2. p. 139, Up. Šil. secunda, Hall, 1870, Prelim. Notice Lam.
- Shells, p. 54, and Pal. N. Y., vol. 5, pl. 59, figs. 2-5, Up. Held. Gr. subarcuata, Hall, 1870, Prelim. Notice
- Lam. Shells, p. 61, and Pal. N., vol. 5, pl. 61, figs. 10-22, Chemung Gr.
- undata, Hall, 1883, Pal. N. Y., vol. 5, p. 379, Chemung Gr.
- ventricosa, Meek, 1871, Proc. Acad. Nat. Sci. Phil., p. 73, and Ohio Pal., vol. 2, p. 303, Waverly Gr.
- Gryphorhynchus, Meek, 1864, Am. Jour. Sci. and Arts. Not. defined.
- ILIONIA, Billings, 1875, Can. Nat. and Geol., vol. 8, p. 301. [Ety. proper name.] Irregularly ovate, compressed; one ex-tremity larger than the other, with beaks turned toward the larger end; concave depression from the umbones to the posterior ventral margin; subovate muscular impression in the upper half of the posterior extremity. Type I. canadensis.
 - canadensis, Billings, 1875, Can. Nat. and Geol., vol. 8, p. 301, Corniferous Gr.

costulata, Whiteaves, 1884, Pal. Foss., vol. 3, p. 15, Guelph

Gr. galtensis, Whit-

eaves, 1884, Pal. Foss., vol. 3, p. 15, Guelph

FIG. 833 .- Ilionia galtensis. Gr.

sinuata, Hall, 1859, (Anatina sinuata,) Pal. N. Y., vol. 3, p. 265, Low. Held. Gr. Inoceramus, Sowerby, 1818, Min. Conch., vol.

2. This genus is unknown in American Palæozoic rocks.

chemungensis, see Mytilarca chemungensis. mytilimeris, see Plethomytilus mytilimeris. oviformis, see Plethomytilus oviformis.

ISCHYRINIA, Billings, 1866, Catal. Sil. Foss. Antic., p. 16. [Ety. ischyros, strong.] Equivalve, inequilateral; two strong ridges radiating from the beak in the interior of each valve. Type I. winchelli.



plicata, Bill-ings, 1866, Catal. Sil. Foss. Antic., p. 52, Anticosti Gr. winchelli, Billings, 1866, Catal. Sil. Foss. Antic., 16, Hud. Riv. Gr.

FIG. 834.—Ischyrinia win-chelli.

Isocardia, Klein, 1753, Tent. Meth. Ostr. [Ety. isos, like; kardia, the heart.] This

is an existing littoral genus that burrows in the sand. It is not known in the Palæozoic rocks.

- (?) curta, Shumard, 1858, Trans. St. Louis Acad. Nat. Sci., vol. 1, p. 206, Choteau Gr.
- jennæ, Winchell, 1863, Proc. Acad. Nat. Sci., p. 17, Marshall Gr.

unioniformis, see Edmondia unioniformis. Leda, Schumacher, 1817, syn. for Nuculana. barrisi, White & Whitfield, syn. for Palæo-

neilo nuculiformis. bellistriata, see Nuculana bellistriata. brevirostris, see Nuculana brevirostris.

curta, see Nuculana curta.

dens-mamillata, see Nuculana dens-mamillata.

gibbosa, see Yoldia gibbosa.

knoxensis, see Yoldia knoxensis,

levistriata, see Yoldia levistriata.

nuculiformis, see Palæoneilo nuculiformis. obscura, see Nuculana obscura.

ohioensis, Hall, syn for Nuculana pandoriformis.

oweni, see Yoldia oweni.

pandoriformis, see Nuculana pandoriformis.

polita, see Nuculana polita. rushensis, see Yoldia rushensis. saccata, see Nuculana saccata.

subscitula, see Yoldia subscitula.

LIOPTERIA, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 4. (Plates and Explanations.) [Ety. leios, smooth; Pteria, a genus.] Aviculoid, resembling in form Actinopteria; anterior extremity auriculate; wing large, extremity produced; test without proper rays; ligament ex-ternal; ligamental area marked by fine parallel longitudinal striæ; hinge with one or two oblique, slender, lateral teeth; the cavity of the beak partially separated from the anterior end

by a short partition. Type L. dekayi. bigsbyi, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 165, Ham. Gr.

chemungensis, Vanuxem, 1842, (Avicula chemungensis,) Geo. Rep. 3d Dist. N. Y., p. 182, and Pal. N. Y., vol. 5, p. 172,

Chemung Gr. conradi, Hall, 1883, Pal. N. Y., vol. 5, pt.

1, p. 159, Ham. Gr.

dekayi, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 164, Ham. Gr. gabbi, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 169, Ham. Gr. greeni, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 160,

Ham. Gr. lævis, Hall, 1843. (Avicula lævis,) Geo. Rep. 4th

Dist. N. Y., p. 181, and Pal. N. Y., vol. 5, p. 158, Marcellus Shale.

FIG. 885. - Liopteria de-

the beaks.

kayi. Cast showing ver-tical plate anterior to

leai, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 168, Ham. Gr.

LED.-LEP.

linguiformis, Hall, 1884, Pal. N. Y., vol. 5.

mitchelli, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 166, Ham. Gr. nitida, Hall, 1883, syn. for L. chemung-

ensis. oweni, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 170, Ham. Gr.

rafinesquii, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 161, Ham.

Gr. savi, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 162,

Ham. Gr.

- torreyi, Hall, Fig. 836. Liopteria rafin-1924 Pol N V esquii. 1884, Pal. N.Y.,
- vol. 5, pt. 1, p. 174, Chemung Gr. troosti, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 167, Ham. Gr.
- LEPTODESMA, Hall, 1883, Pal. N. Y., vol. 5. pt. 1, p. 4. (Plates and Explanations.) Ety. leptos, slender; desma, a ligament.] Like Liopteria, except the anterior end is nasute and acute, instead of auricu-late and rounded; hinge-line narrow, with a slender, lateral tooth posterior to the beak; ligament external; test with concentric striæ. Type L. potens. acutirostrum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 234, Chemung Gr.

- agassizi, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 182, Chemung Gr.
- alatum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 218, Chemung Gr. aliforme, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 220, Chemung Gr.
- arciforme, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 229, Chemung Gr. aviforme, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 224, Chemung Gr. becki, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 185, Chemung Gr.
- billingsi, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 192, Chemung Gr.
- biton, Hall, 1884, Pal. N. Y., vol. 5, pt. 1,
- p. 222, Chemung Gr. cadmus, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 201, Chemung Gr. clitus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 210, Chemung Gr.
- complanatum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 227, Chemung Gr. corydon, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 212, Chemung Gr.
- creon, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 202, Chemung Gr.
- curvatum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 196, Up. Chemung Gr. demus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 203, Chemung Gr.
- disparile, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 186, Up. Chemung Gr. extenuatum, Hall, 1884, Pal. N. Y., vol. 5,
- pt. 1, p. 207, Chemung Gr.

flaccidum, H pt. 1, p. 22 hector, Hall, p. 209, Ch jason, Hall,

pt. 1, p. 2

LEP]



FIG. 837.-Lep hector

lesleyi, Hall 1, p. 223, (lichas, Hall, 1 Pal. N. Y. 5. pt. 1, p.

Chemung longispin Hall, 18 (Avicula gispina,)

Rep. 4th I N. Y., p and Pal. N Chemung (loxias, Hall,

p. 204, Che lysander, Hal 1, p. 216, C

maclurii, Ha 1, p. 228, C marcellense,

5, pt. 1, p. matheri, Hall 1, p. 193, C

medon, Hall, 1, p. 197, Cl mentor, Hall,

1, p. 205₄ C mortoni, Hall 1, p. 190, Cl

mytiliforme, 1 🖉 pt. 1, p. 235 naviforme, H

pt. 1, p. 200 nereus, Hall, 1, p. 217, C

orcus, Hall, 1, p. 215, Cl

orodes, Hall, 1, p. 206, U orus, Hall, 1 p. 219, Cher

parallela, Sin Foss., p. 33 patulum, Hall

1, p. 226, Ch pelops, Hall, 1 p. 214, Up. (phaon, Hall, 1, p. 230, Cł potens, Hall, 1 p. 188, Up.

LED.-LEP.

Y., vol. 5, pt. 1, p.

1, Pal. N. Y., vol. 5, ng Gr. Pal. N. Y., vol. 5, ir. . for L. chemung-

J. Y., vol. 5, pt. 1, p.



- Liopteria rafin-esquii.

Jhemung Gr. N. Y., vol. 5, pt. 1,

Pal. N. Y., vol. 5, and Explanations.) desma, a ligament.] ot the anterior end instead of auricuhinge-line narrow, eral tooth posterior ent external; test **. Type L.** potens. 84, Pal. N. Y., vol. ung Gr. l. N. Y., vol. 5, pt. l. N. Y., vol. 5, pt. Gr. al. N. Y., vol. 5, pt. Эr. Pal. N. Y., vol. 5, ng Gr. 'al. N. Y., vol. 5, pt. N. Y., vol. 5, pt. 1, 1. N. Y., vol. 5, pt. Gr. N. Y., vol. 5, pt. 1, Il. N. Y., vol. 5, pt. N. Y., vol. 5, pt. 1, 34, Pal. N. Y., vol. 5, ng Gr. 1. N. Y., vol. 5, pt. N. Y., vol. 5, pt. 1, Pal. N. Y., vol. 5, emung Gr. . N. Y., vol. 5, pt.

Gr. Pal. N. Y., vol. 5, emung Gr. 4, Pal. N. Y., vol. 5,

ng Gr.

LAMELLIBRANCHIATA.

flaccidum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 225, Chemung Gr. hector, Hall, 1884, Pal. N. Y., vol. 5, pt. 1,

p. 209, Chemung Gr.

jason, Hall, 1884, Hall; Pal. N. Y., vol. 5, pt. 1, p. 213, Chemung Gr. liopteroides,



LEP]

Simpson, 1889, Dict. of Pa. Foss., p. 331, Chemung Gr. pidum, Hall, lepidum, 1884, Pal. N.Y., vol. 5, pt. 1, p. 195, Chemung Gr.

lesleyi, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 223, Up. Chemung Gr.

lichas, Hall, 1884, 5 Pal. N. Y., vol. 5, pt. 1, p. 232, Chemung Gr. longispinum, Hall, 1843, (Avicula lon-

gispina,) Geo.

- Rep. 4th Dist. Frg. 838.—Leptodesma N. Y., p 262, and Pal. N. Y., vol. 5, pt. 1, p. 179,
- Chemung Gr. loxias, Hall, 1884, Pal. N. Y., vol. 5, pt. 1,
- p. 204, Chemung Gr.
- lysander, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 216, Chemung Gr. maclurii, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 228, Chemung Gr.
- marcellense, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 175, Marcellus Shale.
- matheri, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 193, Chemung Gr.
- medon, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 197, Chemung Gr. mentor, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 205, Chemung Gr.
- mortoni, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 190, Chemung Gr.
- mytiliforme, Hall, 1884, Pal. N. Y., vol. 5,
- mythiforme, Hall, 1884, Fai. N. 1., vol. 5, pt. 1, p. 235, Chemung Gr. naviforme, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 200, Chemung Gr. nereus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 217, Chemung Gr. orcus, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 215, Chemung Gr. orodes, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 206, Up. Chemung Gr. orus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 219, Chemung Gr.
- parallela, Simpson, 1889, Dict. of Pa. Foss., p. 332, Chemung Gr.
- patulum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 226, Chemung Gr.
- pelops, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 214, Up. Chemung Gr.
- phaon, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 230, Chemung Gr.
- potens, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 188, Up. Chemung Gr.

potens var. juvene, Hall, 1884, Pal. N. Y.,

- potens var. juvene, Hall, 1884, Fal. N. Y., vol. 5, pt. 1, p. 189, Chemung Gr. propinquum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 231, Chemung Gr. protextum, Conrad, 1842, (Avicula pro-texta,) Jour. Acad. Nat. Sci. Phil., vol. 8, p. 238, and Pal. N. Y., vol. 5, pt. 1, p. 182, Chemung Gr. p. 183, Chemung Gr.
- quadratum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 233, Chemung Gr.
- robustum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 181, Chemung Gr.
- rogersi, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p 176, Ham. Gr.
- rude, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 221, Chemung Gr.
- shumardi, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 180, Chemung Gr.
- sociale, Hall, 1884, Pal. N. Y., vol. 5, pt.
- boltade, Hall, 1004, Jak. H. T., Vol. 9, pl. 1, p. 187, Chemung Gr. spinigerum, Conrad, 1842, (Avicula spi-nigera,) Jour. Acad. Nat. Sci. Phil., vol. 8, p. 237, and Pal. N. Y., vol. 5, pt. 1, p. 177, Chemung Gr.
- stephani, Hall, 1884, Pal. N. Y., vol. 5, pt.
- Stephani, Hali, 1884, Fai. N. Y., Vol. 5, pt. 1, p. 194, Up. Chemung Gr. transversum, Walcott, 1885, Monogr. U.S. Geo. Sur., vol. 8, p. 167, Chemung Gr. truncatum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 211, Chemung Gr. umbonatum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 202, Chemung Gr.
- pt. 1, p. 198, Chemung Gr.
- umbonatum var. depressum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 199, Chemung Gr.
- LEPTODOMUS, McCoy, 1844, Synopsis Carb. Foss. Ireland, p. 66. [Ety. *leptos*, slender; *domus*, house.] Shell thin, short, oblong, tumid, subequivalve, inequilateral; beaks large, incurved; anterior side short, obtusely rounded, slightly gaping; deep ovate lunette between the beaks; posterior end broad, rounded, gaping, slope compressed, sides sulcated parallel with the ventral margin ; dorsal margin inflected so as to form a lunette as long as the hinge-line; no hinge teeth; muscular impressions faint.

arata, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 152, Up. Silurian.



FIG. 839.-Leptodomus canadensis,

canadensis, Billings, 1874, Pal. Foss., vol. 2, p. 54, Gaspe limestone No. 8, Devonian.

clavata, Winchell, 1862, Proc. Acad. Nat. Sci., p. 415, Portage Gr.

granosus, see Allorisma granosum.

- topekensis, see Sedgwickia topekensis. undulatus, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis, p. 81, and Geo. Wis., vol. 4, p. 293, Niagara Gr.
- mainensis, Billings, 1863, Proc. Port. Soc.
- Nat. Hist., vol. 1, p. 118, Low. Held. Gr. pembrokensis, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 118, Low. Held. Gr.
- percingulatus, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 119, Low Held. Gr.
- Lima, Brugueire, 1791, Encycl. Meth. and Deshaves, 1824, Descrip. de Coquilles fossiles des environs de Paris. [Ety. lima, a file.] Not a Palæozoic genus. chesterensis Worthen, not recognized.

glabra, see Crenipecten glaber. macroptera, see Limoptera macroptera. obsoleta, see Crenipecten obsoletus. retifera, see Crenipecten retiferus.

rugæstriata, see Aviculopecten rugistriatus. LIMOPTERA, Hall, 1870, Prelim. Notice Lam. Shells, p. 15, Up. Held. Gr. [Ety. Lima, a genus; pteron, a wing.] Large, inequivalve, inequilateral, subquadrate, alate posterior, auriculate anterior; ligamental area large, common, longitudinally striate; hinge with an ob-lique posterior tooth and cardinal folds beneath the beak; anterior impression deep, posterior large, pallial line simple formed of a series of small pits; interpallial area pitted for the attachment of umbonal muscles; test radiated.

Type L. pauperata. cancellata, Hall, 1870, Prelim. Notice Lam. Shells, p. 16, and Pal. N. Y., vol. 5, pt. 1, p. 244, Ham. Gr.

curvata, Hall, 1870, Prelim. Notice Lam. Shells, p. 18, and Pal. N. Y., vol 5, pt. 1, p. 250, Ham. Gr.



FIG. 840.-Limoptera macroptera.

macroptera, Conrad, 1838, (Lima macrop-tera,) Ann. Rep. N. Y., p. 117, and Pal. N. Y., vol. 5, pt. 1, p. 246, Ham. Gr. obsoleta, Hall, 1870, Prelim. Notice Lam.

Shells, p. 18, and Pal N. Y., vol. 5, pt. 1, p. 249, Ham. Gr.

- pauperata, Hall, 1870, Prelim. Notice Lam. Shells, p. 16, and Pal. N. Y., vol. 5, pt. 1, p. 243, Up. Held. Gr.
- sarmenticia, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 167, Devonian.

- LITHOPHAGA, Lamarck, 1812, Hist. An. sans Vert. [Ety. lithos, stone; phago, I eat.] Not American Palæozoic.
 - illinoisensis, Worthen, 1882, Bull. No. 1. Ill. St. Mus. Nat. Hist., p. 38, Keokuk Gr. Proposed instead of the form identified as L. lingualis of Phillips.
 - lingualis, Phillips, 1836, (Modiola lin-gualis,) Geol. Yorkshire, vol. 2, p. 209. Not American.
 - pertenuis, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 245, and Geo. Sur. Ill., vol. 5, p. 539, St. Louis Gr.

Littorina wheeleri, see Schizodus wheeleri. Lucina, Bruguiere, 1792, Encyclop. Meth.

[Ety. mythological name.] Type L. pennsylvanica. Notan American Palæozoic genus.

billingsana, see Paracyclas billingsana.

elliptica, see Paracyclas elliptica. elliptica var. occidentalis, see Paracyclas

elliptica var. occidentalis. hamiltonensis, see Paracyclas hamiltonensis.

lirata, see Paracyclas lirata. occidentalis, Billings, 1859, Assiniboine and Saskatchewan Ex. Exped. This name was preoccupied by Morton for an Eocene species, see Paracyclas billingsana.

ohioensis, see Paracyclas ohioensis.

retusa, see Paracyclas retusa.

- varysburgia, see Paracyclas varysburgen sis.
- wyomingensis, see Paracyclas wyomingensis.
- LUNULICARDIUM, Munster, 1840, Beitrage zur Petrefaktenkunde, 3d heft, p. 69. [Ety. lunula, a little moon ; Cardium, a genus.] Equivalve, inequilateral, subelliptical, subcircular, or trigonal; posterior side obliquely truncate, margin often reflexed and produced; beaks pointed; cardinal line marked by a lunate hiatus; surface radiated and concentrically marked; ligament external. acutirostrum, syn. for L. ornatum.





FIG. 841.-Lunulicardium curtum

curtum, Hall, 1884, Pal. N. Y., vol. 5, pl.71, figs. 18-23, Up. Held. Gr.





FIG. 842.—Lunul

vol. 5, p. 436. ornatum, Hall Geo. Rep. 4 Pal. N. Y., rude, Hall, 18 fig. 17, Marc transversum,] p. 439, Chen

Lyonsia, Turton, zoic rocks. concava, see Se

LYRIOPECTEN, HE p. 3. (Plates lyrion, a lyri tinguished f shorter hing terior wing; Type L. mag alternatus, Sim

p. 366, and 446, Chemur anomiiformis,

5, pt. 1, p. 53 cymbalon, Hal pt. 1, p. 47,

dardanus, Hall pt. 1, p. 41, 1 fasciatus, Hall,

ulatus,) Pal. Chemung Gr interradiatus, H

5, pt. 1, p. 44



FIG. 843.-Ly macrodontus, H 5, pt. 1, p. 46 magnificus, Hal pt. 1, p. 51, U

LYO. -MAC.]

[LIM.-LUN.

[LIM.-LUN.

1812. Hist. An. sans tone; phago, I eat.] ozoic.

1, 1882, Bull. No. 1. Hist., p. 38, Keokuk stead of the form ualis of Phillips. 836, (Modiola linshire, vol. 2, p. 209.

orthen, 1865, Proc. 1., p. 245, and Geo. 39, St. Louis Gr.

hizodus wheeleri. 2, Encyclop. Meth. name.] Type L.

an American Palæo-

clas billingsana.

s elliptica. alis, see Paracyclas ntalis.

vclashamiltonensis. lirata.

859, Assiniboine and Exped. This name by Morton for an ee Paracyclas bill-

as ohioensis. retusa.

cyclas varysburgen.

aracyclas wyoming-

er, 1840, Beitrage zur 3d heft, p. 69. [Ety. 1; Cardium, a genus.] lateral, subelliptical, onal; posterior side margin often reed; beaks pointed; d by a lunate hiatus; and concentrically external.

L. ornatum.



ardium curtum.

al. N. Y., vol. 5, pl. 71, eld. Gr.

LYO.-MAC.]

fragile, Hall, 1843, agile, Hall, 1843, (uncula fragilis,) Geo. Rep. 4th Dist. N. Y., p. 222, and Pal. N. Y., vol. 5, pl. 71, figs. 1-14, Genesee Shale.

fragosum, Meek, 1877, (Posidonomya fra-gosa,) U. S. Geo. Expl. 40th Parallel, vol. 4, p. 92, Carboniferous.

marcellense, Van-uxem, 1842, (Cypricardites marcellensis,) Geo. Rep. 3d Dist. N. Y., p. 146, and Pal. N. Y., vol. 5, pl. 71, figs. 15–16.

Marcellus Shale.

LAMELLIBRNACHIATA.

FIG. 842.-Lunulicarorbiculare, Hall, 1885, Pal. N. Y., dium marcellense.

vol. 5, p. 436, Marcellus Shale. ornatum, Hall, 1843, (Pinnopsis ornata,) Geo. Rep. 4th Dist. N. Y., p. 244, and Pal. N. Y., vol. 5, p. 437, Portage Gr. rude, Hall, 1884, Pal. N. Y., vol. 5, pl. 71,

fig. 17, Marcellus Shale.

transversum, Hall, 1885, Pal. N. Y., vol. 5, p. 439, Chemung Gr.

Lyonsia, Turton, 1822. Not found in Palæozoic rocks.

concava, see Sedgwickia concava. LYRIOPECTEN, Hall, 1884, Pal. N. Y., vol. 5,

- b) B (Plates and Explanations.) [Ety. lyrion, a lyre; Pecten, a genus.] Dis-tinguished from Aviculopecten by the shorter hinge-line and very small anterior wing; surface with strong rays. Type L. magnificus.
- alternatus, Simpson, 1889, Dict. Foss. Pa., p. 366, and Trans. Am. Phil. Soc., p. 446, Chemung Gr. anomiiformis, Hall, 1884, Pal. N. Y., vol.
- 5, pt. 1, p. 53, Up. Held. Gr.

cymbalon, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 47, Ham. Gr. dardanus, Hall, 1884, Pal. N. Y., vol. 5,

pt. 1, p. 41, Up. Held. Gr. fasciatus, Hall, 1884, (Pernopecten fascic-ulatus,) Pal. N. Y., vol. 5, pt. 1, p. 55, Chemung Gr.

interradiatus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 44, Ham. Gr.



FIG. 848.-Lyriopecten orbiculatus. macrodontus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 46, Up. Held. Gr. magnificus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 51, Up. Chemung Gr.

orbiculatus, Hall, 1843, (Avicula orbiculata,) Geo. Rep. 4th Dist., N. Y., p. 202,

- and Pal. N. Y., vol. 5, pt. 1, p. 42, Ham. Gr.
- parallelodontus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 40, Up. Held. Gr. polydorus, Hall, 1884, Pal. N. Y., vol. 5,
- pt. 1, p. 50, Chemung Gr.
- priamus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 54, Chemung Gr.
- solox, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 56, Up. Chemung Gr.
- tricostatus, Vanuxem, 1842, (Avicula tricostatus) Geo. Sur. 3d Dist. N. Y., p. 179, and Pal. N. Y., vol. 5, pt. 1, p. 48, Chemung Gr.
- Lyrodesma, Conrad, 1841, Ann. Geo. Rep. N. Y., p. 51. [Ety. lyra, a harp; desma, A ligament.] Equivalve, inequilateral, semicircular; hinge plate with 6 to 8 angular, crenulated teeth radiating from beneath the beak upon a more or less rounded platform. Type L. planum.
 - cincinnatiense, Hall, 1871, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 227, Hud. Riv. Gr.

planum, Conrad, 1841, Ann. Geo. Rep. p. 51, Hud. Riv. Gr.



striatum.

poststriatum, Emmons, 1842, (Nuculana poststriata,) Geo. Rep. N. Y., p. 399, and Pal. N.Y.,

vol. 1, p. 151, Black Riv. Gr. pulchellum, Hall, 1847, Pal. N. Y., vol. 1, p. 302, Hud. Riv. Gr.

MACRODON, Lycett, 1845, Murch. Geo. Chelt. [Ety. macros, long; odous, a tooth.] Shell oblong, very inequilateral, moderately tumid, a byssal sinus in the anterior third of the ventral margin anterior edges of the adductor impressions prominent; hinge teeth at the an. terior end

few, slightly oblique or nearly at right angles to the hingeline be-



neath the FIG. 845.-Macrodon obsoletus. coming more oblique toward the an-

- terior end; posterior part of the hingeline, from beak to anal angle, occupied by one to three long lateral teeth.
- carbonarius, Cox, 1857, (Arca carbonarius,) Geo. Sur. Ky., vol. 3, p. 567, Coal Meas.
- chemungensis, Hall, 1870, Prelim. Notice Lam. Shells, p. 14, and Pal. N. Y.,
- vol. 5, pl. 51, figs. 11-16, Chemung Gr. cochlearis, Winchell, 1863, Proc. Acad. Nat. Sci., p. 16, Marshall Gr. Prof. Hall suggests that it is a syn. for M. parvus.

LAMELLIBRANCHIATA.

curtus, Hartt, 1868, Acad. Geol., p. 302, Carb.

delicatus, Meek & Worthen, 1870, Proc.

Acad. Nat. Sci., p. 40, and Geo. Sur. Ill., vol. 5, p. 575, Up. Coal Meas. hamiltoniæ, Hall, 1870, Prelim. Notice Lam. Shells, p. 13, and Pal. N. Y., vol. 5, pl. 51, figs. 1-10, Ham. Gr.

hardingi, Hartt, 1868, Acad. Geol., p. 302, Carb.

micronema, Meek & Worthen, 1866, Proc. Acad. Nat. Sci., p. 261, Kaskaskia Gr.

obsoletus, Meek, 1871, Reg. Rep. Univer-sity W. Va., p. 5, and Pal. Ohio, vol. 2, p. 334, Coal Meas.



FIG. 846.--Matheria tener

ovatus, Hall, 1870, Prelim. Notice Lam. Shells, p. 15, and Pal. N. Y., vol. 5, p. 351, Waverly Gr.

parvus, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., vol. 8, p. 299, Kinderhook Gr.

sangamonensis, Worthen, (in press,) Geo. Sur. 111., vol. 8, p. 123 Coal Meas.

shubenacadiensis, Hartt, 1868, Acad. Geo. p. 302, Carb. tenuistriatus, Meek & Worthen, 1867,

Proc. Chi. Acad. Sci., vol. 1, p. 17, Up. Coal Meas.

truncatus, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 243, Carboniferous.

MATHERIA, Billings, 1858, Can. Nat. and Geo., vol. 3, p. 440. [Ety. proper Equivalve, " inequilateral ; name.] beaks anterior; two small, obtuse. cardinal teeth in the left valve, and one in the right; no lateral teeth; two muscular impressions; ligament external. Type M. tener.

tener, Billings, 1858, Can. Nat. and Geo., vol. 3, p. 440, Trenton Gr. MEGALOMUS, Hall, 1852, Pal. N. Y., vol. 2,

p. 343. [Ety. megas. great; omos, shoulder.] Large, equivalve, concentrically lined, longitudinal; umbones anterior incurved; shell thick and along the hinge-line thickened on the interior; muscular impression large and deep, with two small circular

pits above. Type M. canadensis. canadensis, Hall, 1852, Pal. N. Y., vol. 2, p. 343, Guelph Gr.

compressus, Nicholson & Hinde, 1874, Can. Jour., vol. 14, p. 159, Niagara Gr. MEGAMBONIA, Hall, 1859, Pal. N. Y., vol. 3,

p. 273. [Ety. megas, great; ambon, the boss of a shield.] Equivalve, inequi-lateral, subovoid, gibbous in the middle and toward the umbones; anterior side lobed or late; muscular impression large. posterior cardinal margin expanded or alate; hinge-line crenulated anteriorly; teeth numerous; surface concentrically lined, and sometimes with radiating striæ. Type M. suborbicularis.



FIG. 847.-Megalomus canadensis.

- aviculoidea, Hall, 1859, Pal. N. Y., vol. 3, p. 274, Low. Held. Gr.
- bellistriata, Hall, 1859, Pal. N. Y., vol. 3, p. 467, Oriskany sandstone.
- cancellata, Hall, 1860, Can. Nat. and Geo.,
- vol. 5, p. 153, Up. Silurian. cardiiformis, Hall, 1843, (Pterinea cardiiformis,) Geo. Rep. 4th Dist. N. Y., p.

172, and Pal. N. Y., vol. 5, p. 515, Cornif. Gr.



FIG. 848.-Megambonia cardiiformis.

cordiformis, see Mytilarca cordiformis.

- jamesi, see Ambonychia jamesi.
- lamellosa, Hall, 1859, Pal. N. Y., vol. 3, p. 467, Oriskany sandstone.
- lata, Hall, 1859, Pal. N. Y., vol. 3, p. 277,
- Low. Held. Gr.
- lyoni, syn. for Cardiopsis radiata. mytiloidea, Hall, 1859, Pal. N. Y., vol. 3, p. 276, Low. Held. Gr.

MEG.-MOD.]

oblonga, Hal 277, Low. obscura, Hal 277, Low.] occidualis, V Geo. Sur., ovala, Hall, 1

limeris. ovoidea, Hall. tilimeris. rhomboidea, p. 275, Lov spinneri, Ha

274, Low. striata, Hall, 5, p. 153, J subcardiformi

formis. suborbicular 3, p. 273, I Megaptera, Me

name was Microdon, Conr. vol. 8, p. 2 by Agassiz and was al insects. Ŧ but Whitf striatus is a latter nam bellistriatus, s

complanatus, s gregarius, see reservatus, see tenuistriatus,



FIG. 849. - Modi pygmæa. panding po

muscular i simple pal ating striæ. pygmæa, Co mæa,) Jou 251, and P. 9-20, Ham. Modiola, Lamar Eto. modio ing vessel. umbones i pedal imp one elong: Not a Pal only left l properly de avonia, Daws Subcarboni concentrica, se illinoisensis, Ill. St. Mus Sur. Ill., vc lingualis, see metella, see M

MAT.- MEG.

MAT.- MEG.

te; muscular impresrior cardinal margin e; hinge-line crenuteeth numerous; surlined, and sometimes riæ. Type M. subor-



mus canadensis

- 859, Pal. N. Y., vol. 3, 1. Gr. 59, Pal. N. Y., vol. 3.
- sandstone.
- 0, Can. Nat. and Geo., Silurian.
- 1843, (Pterinea cardii-

p. 4th Dist. N. Y., p. Y., vol. 5, p. 515, Cor-



nia cardiiformis

tilarca cordiformis. ychia jamesi. 359, Pal. N. Y., vol. 3, sandstone. l. N. Y., vol. 3, p. 277,

liopsis radiata. 859, Pal. N. Y., vol. 3, d. Gr.

MEG.-MOD.]

- oblonga, Hall, 1859, F Y., vol. 3, p.
- 277, Low. Held. Gr. obscura, Hall, 1859, Pal. N. Y., vol. 3, p. 277, Low. Held. Gr.

LAMELLIBRANCHIATA.

- occidualis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 173, Devonian.
- ovata, Hall, syn. for Plethomytilus mytilimeris.
- ovoidea, Hall, syn. for Plethomytilus mytilimeris.
- rhomboidea, Hall, 1859, Pal. N. Y., vol. 3,
- p. 275, Low. Held. Gr. spinneri, Hall, 1859, Pal. N. Y., vol. 3, p. 274, Low. Held. Gr.
- striata, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 153, Up. Silurian.
- subcardiformis, Hall, syn. for M. cardiiformis.
- suborbicularis, Hall, 1859, Pal. N. Y., vol. 3, p. 273, Low. Held. Gr.
- Megaptera, Meek & Worthen, 1866. The name was preoccupied.
- Microdon, Conrad, 1842, Jour. Acad. Nat. Sci. vol. 8, p. 247. This name was applied by Agassiz to a genus of fish in 1833, and was also preoccupied for a genus of insects. Hall proposed Eodon, in 1877, but Whitfield has shown that M. bellistriatus is a Cypricardella, and hence the latter name has priority.
- bellistriatus, see Cypricardella bellistriata. complanatus, see Cypricardella complanata. gregarius, see Cypricardella gregaria. reservatus, see Cypricardella reservata.

tenuistriatus, see Cyricardella tenuistriata. Modiella, Hall, 1884, Pal. N. Y., vol. 5, p. 4. (Plates and Ex-

modus, a measure;

Subrhomboidal, nar-

rowed and auriculate

diminutive.

[Ety.

planations.)

ellus,



FIG. 849. - Modiella pygmæa.

in front, broadly expanding posteriorly; two well-marked muscular impressions connected by a

- simple pallial line; surface with radi-ating striæ. Tppe M. pygmæa. pygmæa, Conrad, 1842, (Pterinea pyg-mæa,) Jour. Acad. Nat. Sci., vol. 8, p. 251, and Pal. N. Y., vol. 5, pl. 76, figs. 9-20, Ham. Gr.
- Modiola, Lamarck, 1801, Syst. An. sans Vert. Eto. modiolus, a small measure or drinking vessel.] Oblong, inflated in front, umbones anterior, obtuse, no teeth; pedal impressions three, the central one elongated. Type M. modiolus. Not a Palæozoic genus. Species are only left here for want of material to properly determine the generic relations. avonia, Dawson, 1868, Acad. Geol., p. 301, Subcarboniferous.
- concentrica, see Modiomorpha concentrica. illinoisensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 16, and Geo. Sur. Ill., vol. 8, p. 125, St. Louis Gr. lingualis, see Lithophaga lingualis. metella, see Mytilops metella.

minor, Lea, 1852, Jour. Acad. Nat. Sci., 2d. series, vol. 2, Coal Meas. Not determinable.



FIG. 850.-Modiola modiolus. aa, Anterior adductors; a'a', posterior adductors; uu, p'p', pedal muscles; pp, byssal muscles; f, foot; b, byssus; m, pallial line.

nevadensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 239, Subcarboniferous.

obtusa, see Modiolopsis obtusa.

- pooli, Dawson, 1868, Acad. Geol., p. 301. Low. Carb. Founded upon a small cast destitute of characters.
- præcedens, see Mytilops præcedens.
- wyomingensis, Lea, 1852, Jour. Acad. Nat. Sci., 2d series, vol. 2, p. 205, Coal Meas. Not recognized, but probably an Anthracomya.
- MODIOLOPSIS, Hall, 1847, Pal. N. Y., vol. 1, p. 157. [Ety. Modiola, a genus of shells; opsis, appearance; from its resemblance to Modiola.] Equivalve, inequilateral, elongated, broader posteriorly; um-bones anterior; cardinal teeth short, oblique; single, deep, subcircular anterior muscular impression; ligament external; no area; surface concentrically lined. Type M. modiolaris. adrastia, Billings, 1862, Pal. Foss., vol. 1,
 - p. 45, Black Riv. Gr.
 - anodontoides, Conrad, 1847, (Cypricardites anodontoides,) Pal. N. Y., vol. 1, syn. for M. sinuata.
 - arcuata, Hall, 1847, Pal. N. Y., vol. 1, p.
 - 159, Trenton Gr. aviculoides, Hall, 1847, Pal. N. Y., vol. 1, p. 161, Trenton Gr.
 - cancellata, Walcott, 1879, Trans. Alb. Inst., vol. 10, p. 22, Utica Slate Gr. capax, n. sp. Shell very large, oblong;
 - cardinal and basal lines behind the beaks subparallel; basal margin slightly contracted by an undefined cincture arising below the beaks; posterior end broadly rounded; depressed in front of

LAMELLIBRANCHIATA.

the beaks; anterior end rounded; beaks large, obtuse, and extending beyond the hinge-line; umbones large; surface marked with concentric lines of growth, and with strong transverse lines over the umbonal region, some of which extend nearly to the basal line, the anterior ones curve a little forward in passing over the umbones. Collected by the author in the Hud. Riv. Gr. at Versailles, Indiana.

carinata, Hall, 1847, Pal. N. Y., vol. 1, p. 160, Trenton Gr.

carrollensis, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., Galena Gr. Pro-posed instead of M. subnasuta of Meek & Worthen, 1870, Proc.Acad. Nat. Sci., p. 41, which was preoccupied.

cincinnatiensis, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 88, Utica Slate.



FIG. 851.-Modiolopsis capax.

concentrica, Hall & Whitfield, 1872, Ohio Pal., vol. 2, p. 86, Hud. Riv. Gr. curta, Hall, 1847, Pal. N. Y., vol. 1, p. 297,

Hud. Riv. Gr. dicteus, Hall, 1867, 20th Rep. N. Y. Mus.

Nat. Hist., p. 385, Niagara Gr. (?) dubia, Hall, 1859, Pal. N. Y., vol. 3, p.

264, Low. Held. Gr. exilis, Billings, 1874, Pal. Foss., vol. 2, p.

132, Up. Sil. faba, Emmons, 1842, Geo. Rep. 2d Dist.

N. Y., p. 395, and Pal. N. Y., vol. 1, p. 158, Black Riv., Trenton, and Hud. Riv. Grs.

faberi, n. sp. Shell elongate, nearly twice as long as high; below the average size of species in this genus;

broadest be-

FIG. 852.-Modiolopsis faberi. Left valve.

> hind the middle, and much contracted in front of the beaks; hinge-line nearly straight from the anterior end to the middle it then becomes arcuate to near the posterior end, which is abruptly rounded; basal line slightly sinuate at the anterior third from the cincture, directed downward and backward from the anterior part of the umbo; beaks

strong, proj ing anteriorly beyond the nbones high, subangular, hinge-line

and gradu-ally declining toward the posterobasal line; anterior muscular very large,

deep, and

impression Fig. 853.-Modiolopsis faberi. Cardinal view, showing greatest thickness of shell toward the posterior. circular,

situate at the anterior end, in front of and below the beaks; dorsal ligament very large. Distinguished from M. concentrica in its general outline, more elongate form, more prominent beaks, and higher and more angular umbones. Hud. Riv. Gr., at Cincinnati, O. The

specimen figured is from the collection of Charles Faber.

gesneri, Billings, 1862, Pal. Foss, vol. 1, p. 43, Tren-ton and Black Riv. Grs. see Cypricardites latus, latus.

maia, Billings, 1862, Pal. Foss., vol. 1, p. 44, Trenton Gr.

meyeri, Billings, 1862, Pal. Foss., vol. 1, p. 42, Trenton Gr.

modiolaris, Conrad, 1838, (Pterinea modiolaris,)

Ann. Geo. Rep. N. Y., p. 118, and Pal. N. Y., vol. 1, p. 294, Hud. Riv. Gr. modioliformis, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 294, Trenton Gr.

mytiloides, Hall, 1847, Pal. N. Y., vol. 1, p. 157, Black Riv. and Trenton Grs.

nais, Billings, 1862, Pal. Foss., vol. 1, p. 45, Black Riv. Gr.



FIG. 854.—Modiolopsis modiolaris. Hinge and pallial line and muscular impression.

nasuta, Conrad, 1841, (Cypricardites naf sutus,) Ann. Rep. N. Y., p. 52, and Pal. N. Y., vol. 1, p. 159, Trenton and Hud. Riv. Grs.

nuculiformis, see Tellinomya nuculiformis. obtusa, Hall, 1847, (Modiola obtusa,) Pal.

N. Y., vol. 1, p. 40, Birdseye Gr. occidens, Walcott, 1885, Monogr. U. 8. Geo. Sur., vol. 8, p. 77, Trenton Gr.

MOD.]

MOD.

orthonota, C tus,) Ann. Rep. 4th D Medina sar orthonota, Me Sur. Ill., vo cupied. Se ovata, Hall, 101, Clinton

parallela, see parviuscula, Geo., vol. 4 perlata, Hall, Nat. Hist.,

perovata, see pholadiformi Dist., vol. 2 plana, Hall,

Trenton G pogonipensis, Geo. Sur., v prisca, Walco

Arts, 3d se conic. No primigenia, (

genius,) A Geo. Rep. Medina sar recta, Hall,

Nat. Hist., rectiformis, Ill. St. Mu ton Gr. P nota, Meek

Ill., vol. 3 cupied. rhomboidea,

Geo., vol. & rudis, Billing 133, Up. Sil sinuata, Em

sinuatus,) 399, and Pa Riv. Gr.

striata, Billi Antic., p. 4 subalata, Hal 84, Clinton subcarinata, 2, p. 601, C

subnasuta, H vol. 5, p. 1 subnasuta, Me cellata. subrhomboid

Am. Phil. Pa., p. 411, subspatulata, latus.

superba, Ha 31, Trentor terminalis, I p. 318, Hu trentonensis,

p. 161, Tre truncata. Ha 296, Hud. 1 undulostriata 2, p. 284, N



MOD.

MOD.]

nteriorly beyond the es high, subangular,



3.-Modiolopsis faberi. nal view, showing est thickness of shell d the posterior.

rior end, in front of aks; dorsal ligament guished from M. conneral outline, more re prominent beaks, ore angular umbones. Cincinnati, O. The imen figured is from collection of Charles er.

i, Billings, 1862, Pal. s, vol. 1, p. 43, Trenand Black Riv. Grs. Cypricardites see

Billings, 1862, Pal. s., vol. 1, p. 44, Tren-Ġr.

i, Billings, 1862, Pal. s., vol. 1, p. 42, Tren-Gr.

olaris, Conrad, 1838, erinea modiolaris, N. Y., p. 118, and p. 294, Hud. Riv. Gr. k & Worthen, 1868, ol. 3, p. 294, Tren-

47, Pal. N. Y., vol. 1, and Trenton Grs. Pal. Foss., vol. 1, p.



nodiolaris. Hinge and scular impression

1, (Cypricardites na/ N.Y., p. 52, and Pal. 59, Trenton and Hud

linomya nuculiformis. (Modiola obtusa,) Pal. **b. Birdseye Gr.** 1885, Monogr. U. S. p. 77, Trenton Gr.

LAMELLIBRANCHIATA.

orthonota, Conrad, 1839, (Unio orthonotus,) Ann. Rep. N. Y., p. 66, and Geo. Rep. 4th Dist. N. Y., pl. 2, figs. 8 and 9, Medina sandstone.

- orthonota, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3. This name was preoc-cupied. See M. rectiformis.
- ovata, Hall, 1852, Pal. N. Y., vol. 2, p. 101, Clinton Gr.

parallela, see Orthodesma parallelum.

- parviuscula, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 446, Chazy Gr. perlata, Hall, 1876, 28th Rep. N. Y. Mus.
- Nat. Hist., p. 172, Niagara Gr. perovata, see Modiomorpha perovata.
- pholadiformis, Hall, 1851, Lake Sup. Land
- Dist., vol. 2, p. 213, Hud. Riv. Gr. plana, Hall, 1861, Geo. Rep. Wis., p. 30, Trenton Gr.
- pogonipensis, Walcott, 1885, Monogr. U.S.
- Geo. Sur., vol. 8, p. 78, Trenton Gr. prisca, Walcott, 1887, Am. Jour. Sci. and Arts, 3d ser., vol. 34, p. 191, Up. Ta-conic. Not a Modiolopsis.
- primigenia, Conrad, 1838, (Unio primi-genius,) Ann. Rep. N. Y., p. 66, and Geo. Rep. 4th Dist. N. Y., pl. 2, fig. 3, Medina sandstone.
- recta, Hall, 1867, 20th Rep. N. Y. Mus.
- Nat. Hist., p. 386, Niagara Gr. rectiformis, Worthen, 1882, Bull. No. 1, Ill. St. Mus. Nat. Hist., p. 38, Trenton Gr. Proposed instead of M. orthonota, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 295, which was preoccupied.
- rhomboidea, Hall, 1860, Can. Nat. and
- Geo., vol. 5, p. 148, Up. Sil. rudis, Billings, 1874, Pal. Foss., vol. 2, p. 133, Up. Sil.
- sinuata, Emmons, 1842, (Cypricardites sinuatus,) Geo. Rep. 2d Dist. N. Y., p. 399, and Pal. N. Y., vol. 1, p. 298, Hud. Riv. Gr.
- striata, Billings, 1866, Catal. Sil. Foss. Antic., p. 48, Anticosti Gr. subalata, Hall, 1852, Pal. N. Y., vol. 2, p.
- 84, Clinton and Niagara Grs.
- subcarinata, Hall, 1852, Pal. N. Y., vol. 2, p. 601, Clinton Gr.
- subnasuta, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 148, Up. Sil. subnasuta, Meek & Worthen. See M. can-
- cellata.
- subrhomboidea, Simpson, 1889, Trans. Am. Phil. Soc., p. 450, and Dict. Foss., Pa., p. 411, Clinton Gr.
- subspatulata, see Cypricardites subspatulatus.
- superba, Hall, 1861, Geo. Rep. Wis., p. 31, Trenton Gr.
- terminalis, Hall, 1847, Pal. N. Y., vol. 1, p. 318, Hud. Riv. Gr.
- trentonensis, Hall, 1847, Pal. N. Y., vol. 1, p. 161, Trenton Gr. truncata, Hall, 1847, Pal. N. Y., vol. 1, p.
- 296, Hud. Riv. Gr.
- undulostriata, Hall, 1852, Pal. N. Y., vol. 2, p. 284, Niagara Gr.

unionoides, Meek, 1871, (Anodontopsis unionoides,) Am. Jour. Sci. and Arts, 3d ser., vol. 2, p. 299, and Ohio Pal., vol. 1, p. 141, Hud. Riv. Gr. varia, Billings, 1874, Pal. Foss., vol. 2, p.

56, Low. Held. Gr.



FIG. 855.-Modiolopsis versaillesensis. Left valve

versaillesensis, S. A. Miller, 1874, Cin. Quar. Jour. Sci., p. 150, Hud. Riv. Gr.



F'1G. 856. -Modiolopsis versaillesensis. Hingeline and muscular impression.

- MODIOMORPHA, Hall, 1870, Prelim. Notice Lam. Shells, p. 72. [Ety. contracted from Modiola, a genus; morphe, form.] Equivalve, subovate, larger posteriorly, compressed; beaks small; sinus oblique and constricting the base; surface concentrically undulated; single tooth in the left valve, and corresponding socket in the other; no lateral teeth; ligament external. Type M. concentrica.
 - affinis, Hall, 1885, Pal. N. Y., vol. 5, p. 284, Ham. Gr.
 - alta, Conrad, 1841, (Cypricardites alta,) Ann. Rep. N. Y., p. 52, and Pal. N. Y., vol. 5, pl. 37, figs. 1-16, Ham. Gr.
 altiformis, Walcott, 1885, Monogr. U. S.
 - Geo. Sur., vol. 8, p. 169, Devonian.
 - ambigua, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 239, Carboniferous. arcuata, Hall, 1884, Pal. N. Y., vol. 5, pl.
 - 36, fig. 21, Ham. Gr.

 - chemos, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 30, Genesee shales. clarens, Hall, 1885, Pal. N. Y., vol. 5, p. 273, Up. Held. Gr.

complanata,

Hall, 1870 Prelim. Notice



concentrica, Conconcentrica.

rad, 1838, (Pterinea concentrica,) Ann. Rep. Geo. Sur. N. Y., p. 116, and Pal. N. Y., vol. 5, pl. 34, figs. 9-10, Ham. Gr. cymbula, Hall, 1870, Prelim. Notice Lam. Shells, p. 75, and Pal. N. Y., vol. 5, pl. 36, figs. 19-20, Ham. Gr.

desiderata, Walcott, 1885, Monogr. U. S.

Geo. Sur., vol. 8, p. 240, Carboniferous. hyalea, Hall, 1870, Prelim. Notice Lam. Shells, p. 79, and Pal. N. Y., vol. 5, pl. 41, figs. 28-30, Waverly Gr.

inornata, Billings, 1874, Pal. Foss., vol. 2, p. 52, Devonian.

linguiformis, Hall, 1883, Pal. N. Y., vol. 5, pl. 34, figs. 15-17, Up. Held. Gr. macilenta, Hall, 1870, Prelim. Notice Lam.

- Shells, p. 76, and Pal. N. Y., vol. 5, pl. 37, fig. 17, and pl. 39, figs. 17-21,
- Ham. Gr. mytiloides, Conrad, 1841, (Cypricardites mytiloides,) Ann. Rep. Geo. N. Y., p. 52, and Pal. N. Y., vol. 5, p. 277, Ham. Gr. neglecta, Hall, 1883, Pal. N. Y., vol. 5, pl.

41, figs. 12-13, Chemung Gr.

oblonga, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 170, Devonian.

obtusa, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 171, Devonian. perovata, Meek & Worthen, 1865, (Modi-

olopsis perovata,) Proc. Acad. Nat. Sci.

Phil., p. 246, and Geo. Sur. Ill., vol. 3, p. 438, Ham. Gr. pintoensis, Walcott, 1885, Monogr. U. S.

Geo. Sur., vol. 8, p. 240, Carboniferous. planulata, Hall, 1870, Prelim. Notice Lam.

Shells, p. 74, syn. for M. mytiloides.

ponderosa, Hall, 1870, (Sanguinolites pon-derosus,) Prelim. Not. Lam. Shells, p. 35, and Pal. N. Y., vol. 5, pl. 34, fig. 11, Up. Held Gr.

putillus, Hall, 1883, Pal. N. Y., vol, 5, pl. 41, figs. 1-2, Schoharie grit.

quadrula, Hall, 1870, Prelim. Notice Lam. Shells, p. 77, and Pal. N. Y., vol. 5, pl. 41, figs. 18-26, Chemung Gr.

recta, Hall, 1885, Pal. N. Y., vol. 5, p. 286, Ham. Gr.

recurva, Hall, 1883, Pal. N. Y., vol. 5, pl. 41, fig. 17, Chemung Gr.

regularis, Hall, 1885, Pal. N. Y., vol. 5, p. 270, Schoharie grit.

rigida, Hall, 1883, Pal. N. Y., vol. 5, pl. 41,

figs. 10, 11, 14–16, Chemung Gr. rigidula, Simpson, 1889, Trans. Am. Phil. Soc., p. 449, and Dict. Foss. Pa., p. 415,

Chemung Gr. schoharie, Hall, 1884, Pal. N. Y., vol. 5, p. 269, pl. 34, fig. 13, Schoharie grit.

subalata, Conrad, 1841, Cypricardites subalatus,) Ann. Rep. N. Y., p. 83, and Pal. N. Y., vol. 5, pl. 39, figs. 1-16, Ham. Gr.

subalata var. chemungensis, Hall, 1885, Pal. N. Y., vol. 5, p. 284, Chemung Gr. subangulata, Hall, 1885, Pal. N. Y., vol. 5,

p. 287, Chemung Gr. tioga, Hall, 1885, Pal. N. Y., vol. 5, p. 291, Chemung Gr.

MONOPTERIA, Meek & Worthen, 1866, Proc. Chi. Acad. Nat. Sci., vol. 1, p. 20. [Ety. monos, single; pteron, a wing.] Aviculoid, obliquely produced, angular posteriorly, rounded in front, subequivalve. both valves convex; posterior wing slender, produced, anterior one obsolete or drawn back between the beaks, in a deep lunule; no byssal emargination, but a little gaping in the lunule; muscular impressions faint; cardinal area narrow, with few longitudinal cartilage furrows; hinge edentulous. Type M. longispina.

auricula, Stevens, 1858, (Gervillia auricula,) Am. Jour. Sci. and Arts, 2d ser., vol. 25, p. 265, Coal Meas.

Worthen, 1866, Proc. Chi. Acad. Sci., p. 20, Coal Meas. Cox. longispina, 1857, (Gervillia longispina,) Geo. Sur. Ky.,



vol. 3, p. 568, Fie. 858.—Monopteria gibbosa. Coal Meas. marian, White, 1874, Rep. Invert. Foss., p. 22, and Geo. Sur. W. 100th Mer.,

vol. 4, p. 151, Carboniferous. Monotis, Bronn, 1824, System Urweltlicher

Konchylien. [Ety. monos, one; ous, otos, ear.] Obliquely oval, compressed, radiated; anterior side short, rounded; posterior slighty eared. Type M. salinaria.



elevata, see Panenka elevata. gregaria, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 38, and Geo. Sur. Ill., vol. 5, p. 573, Coal Meas.

FIG. 859.-MOnotis gregaria.

halli, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 185, Permian Gr.

hawni, see Pseudomonotis hawni.

poulsoni, see Panenka poulsoni.

princeps, see Aviculopecten princeps. radialis, Phillips, 1834, (Pecten radialis,)

see Pseudomonotis radialis. radians, see Panenka radians.

- septentrionalis, Haughton, 1857, Jour. Roy. Dub. Soc., vol. 1, (?) Gr. speluncaria, Schlotheim, 1816, Denkschrif-
- ten d. k. Ac. d. Wiss. zu Munchen, p. 30, (Gryphites speluncarius,) Permian Probably not American. Gr.

variabilis, Swallow, 1858, Trans. St. Louis

Acad. Sci., vol. 1, p. 187, Permian Gr. MYALINA, DeKoninck, 1844, Desc. Anim. Foss. Carb. Belg., p. 125. [Ety. Mya, a genus of shells; *inus*, like.] Subrhomboidal, inequilateral, inequivalve, oblique, slightly sinuous in front for the passage of the byssus; beaks pointed, nearly terminal; surface smooth or concentrically marked; hinge edentulous; ligamental area broad and furrowed parallel to the hinge-line; muscular and pallial impressions apparently as in Pteria; shell structure prismatic. Type M. lamellosa.

MYT.]

MON.-MYA.

angulata, M Acad. Nat Sur. Ill., v apachesi, M

Ameriga, aviculoides, Acad. Nat Up. Mo., 1

aviculoides, concava, Sw cavus,) Tr 1, p. 188, 1

concentrica, Acad. Nat Sur. Ill., v

congeneris, vol. 8, p. 5 cuneiformis. (p. 4. Pub deltoidea, G Sci. Phil.,

imbricaria, Nat. Sci., iowensis, Nat. Sci., 1

kansasensis, Louis Aca Meas. keokuk, Wor

6, p. 524, meliniformis Proc. Chi.

Meas. michiganens Acad. Nat. monroensis,

Ill. St. M Geo. Sur. Louis Gr. mytiliformis

2, p. 100, (nemesis, W Geo. Sur.,

erqus.

nessus, Wa Geo. Sur., erous. perattenuata Trans. Al Geo. Sur. Meas.

permiana, S mianus,) vol. 1, p. Permian (perniformis, vol. 3, p. pterineiform Acad. Nat. rara, Winch

Soc., p. 3 instead of 1862, whic recta, Shum Acad. Sci., recurvirostri Proc. Acad Geo. Sur. Meas.

[MON.-MYA.

MYT.]

front, subequivalve, ex; posterior wing anterior one obsolete ween the beaks, in a oyseal emargination, in the lunule; musfaint; cardinal area ongitudinal cartilage entulous. Type M.

58, (Gervillia aurici. and Arts, 2d ser., l Meas.



Fig. 858.—Monopteria gibbosa.

Rep. Invert. Foss., Sur. W. 100th Mer., oniferous. System Urweltlicher

monos, one; ous, otos. val, compressed, raide short, rounded; eared. Type M. sa-

ee Panenka elevata. Meek & Worthen, Proc. Acad. Nat. Sci. **p. 38, and** Geo. Sur. ol. 5, p. 573, Coal

- wallow, 1858, Trans. uis Acad. Sci., vol. 1, , Permian Gr.
- notis hawni.
- a poulsoni.
- pecten princeps. 4, (Pecten radialis,) radialis.
- radians. ighton, 1857, Jour. J. 1, (?) Gr. m, 1816, Denkschrif-
- iss. zu Munchen, p. eluncarius,) Permian
- American. 858. Trans. St. Louis o. 187, Permian Gr. , 1844, Desc. Anim. p. 125. [Ety. Mya, a us, like.] Subrhomal, inequivalve, obious in front for the ssus; beaks pointed, urface smooth or con-; hinge edentulous; broad and furrowed
- inge-line; muscular ssions apparently as structure prismatic.

- angulata, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 455 and Geo. Sur. Ill., vol. 2, p. 300, Kaskaskia Gr. apachesi, Marcou, 1858, Geol. North
- America, p. 44, Subcarboniferous.
- aviculoides, Meek & Hayden, 1860, Proc. Acad. Nat. Sci. Phil., p. 184, and Pal.
- Up. Mo., p. 51, Permian Gr. aviculoides, Winchell, see M. rara. concava, Swallow, 1858, (Mytilus con-cavus,) Trans. St. Louis Acad. Sci., vol. 1, p. 188, Permian Gr. concentrica, Meek & Worthen, 1860, Proc.
- Acad. Nat. Sci. Phil., p. 456, and Geo. Sur. Ill., vol. 2, p. 281, Warsaw Gr. congeneris, Walcott, 1885, U. S. Geo. Sur.,
- vol. 8, p. 237, Subcarboniferous.
- cuneiformis, Gurley, 1883, New Carb. Foss., p. 4. Publication invalid.
- deltoidea, Gabb, 1859, Proc. Acad. Nat.
- Sci. Phil., p. 297, Subcarboniferous. imbricaria, Winchell, 1862, Proc. Acad. Nat. Sci., p. 412, Marshall Gr. iowensis, Winchell, 1865, Proc. Acad.
- Nat. Sci., p. 127, Chemung Gr.
- kansasensis, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 213, Coal Meas.
- keokuk, Worthen, 1875, Geo. Sur. Ill., w. 6, p. 524, Keokuk Gr.
- meliniformis, Meek & Worthen, 1866, Proc. Chi. Acad. Sci., vol. 1, p. 19, Coal Meas.
- michiganensis, Winchell, 1862, Proc. Acad. Nat. Sci., p. 411, Marshall Gr.
- monroensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 15, and Geo. Sur. Ill., vol. 8, p. 127, St. Louis Gr.
- mytiliformis, Hall, 1852, Pal. N. Y., vol. 2, p. 100, Clinton Gr.
- nemesis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 237, Subcarboniferous.
- nesses Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 238, Subcarboniferous.
- perattenuata, Meek & Hayden, 1858, Trans. Alb. Inst., vol. 4, p. 77, and Geo. Sur. Ill., vol. 5, p. 582, Coal Meas.
- permiana, Swallow, 1858, (Mytilus per-mianus,) Trans. St. Louis Acad. Sci., vol. 1, p. 187, and Pal. Up. Mo., p. 52, Permian Gr.

- Permian Gr.
 permian Gr.
 permiformis, Cox, 1857, Geo. Sur. Ky., vol. 3, p. 569, Coal Meas.
 pterineiformis, Winchell, 1862, Proc.
 Acad. Nat. Sci., p. 412, Marshall Gr.
 rara, Winchell, 1870, Proc. Am. Phil.
 Soc., p. 390, Marshall Gr.
 Proposed instead of M. aviculoides, Winchell, 1862, which was preoccupied.
 reata Shumaet 1858, Trans St. Louis
- recta, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 212, Permian Gr. recurvirostris, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 456, and Geo. Sur. Ill., vol. 2, p. 344, Up. Coal Meas.

squamosa, Sowerby, 1827, Trans. Geo. Soc. Lond., 2d ser., vol. 3, Permian Gr. subquadrata, Shumard, 1855, Geo. Rep. Mo., p. 207, Coal Meas.



FIG. 860.—Myalina recurvirostris.

stludovici, Worthen, 1873, Geo. Sur. Ill., vol. 5, p. 540, St. Louis Gr. swallovi, McChesney, 1860, New Pal. Foss.,

p. 57, and Geo. Sur. Ill., vol. 2, p. 341, Coal Meas.



FIG. 861.-Myalina subquadrata.

MYTILARCA, Hall, 1870, Prelim. Notice Lam. Shells, p. 19. [Ety. from the two genera Mytilus and Arca.] Equivalve, in-equilateral, mytiliform; beaks terminal; hinge short; ligamental area striated; cardinal teeth beneath the beak small, oblique; posterior teeth small, oblique, and at the extremity of the hinge ; anterior muscular scar umbonal, and posterior one near the postero-basal margin; pallial line entire, simple; surface not unfrequently with fine, obscure radiating striæ. Type M. chemungensis.

LAMELLIBRANCHIATA.

arenacea, see Plethomytilus arenaceus. attenuata, Hall, 1870, Prelim. Notice Lam. Shells, p. 23, and Pal. N. Y., vol. 5, pt. 1, p. 260, Chemung Gr.

494

- canadensis, Billings, 1874, Pal. Foss., vol. 2, p. 52, Gaspe limestone No. 8, Devonian.
- carinata, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 259, Chemung Gr.
- chemungensis, Conrad, 1842, (Inoceramus chemungensis,) Jour. Acad. Nat. Sci. Phil., vol. 8, p. 246, and Pal. N. Y., vol. 5, pt. 1, p. 258, Chemung Gr.



FIG. 862.-Mytilarca chemungensis.

- cordiformis, Hall, 1859, (Megambonia cor-diformis,) Pal. N. Y., vol. 3, p. 278, Low. Held. Gr.
- dubia, Walcott, 1885, Monogr. U. S. Geo. Sur, vol. 8, p. 168, Devonian. fibristriata, White & Whitfield, 1862, (Mytilus fibristriatus,) Proc. Bost. Soc. Nat. Hist., vol. 8, p. 296, and Pal. N. Y., vol. 5, pt. 1, p. 264, Kinderhook Gr.
- gibbosa, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 262, Up. Chemung Gr. knappi, see Plethomytilus knappi.
- lata, Hall, 1884, (Mytilops lata,) Pal. N. Y., vol. 5, pt. 1, p. 262, Chemung Gr. mytilimeris, see Plethomytilus mytilimeris.
- nitida, Billings, 1874, Pal. Foss., vol. 2, p.
- 53, Gaspe limestone No. 8, Devonian. occidentalis, White & Whitfield, 1862, Mytilus occidentalis,) Proc. Bost. Soc.
- Nat. Hist., vol. 8, p. 297, and Pal. N. Y., vol. 5, pt. 1, p. 263, Kinderhook Gr. oviformis, see Plethomytilus oviformis. percarinata, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 202, Up. Held. Gr.
- ponderosa, see Plethomytilus ponderosus. pyramidata, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 256, Schoharie grit.
- radiata, see Byssopteria radiata.
- regularis, Hall, 1884, Pal. N. Y., vol. 5,
- pt. 1, p. 260, Chemung Gr. sigillum, Hall, 1876, 28th Rep. N. Y. Mus.
- Nat. Hist., p. 174, Niagara Gr. simplex, Hall, 1884, (Mytilops simplex,) Pal. N. Y., vol. 5, pt. 1, p. 261, Chemung Gr.
- umbonata, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 257, Chemung Gr. MYTLIOPS, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 4. [Ety. from resemblance to

Mytilus.] Resembles externally Modiola and Lithodomus. Hinge-line narrow, oblique, extending about balf the length of the shell, beaks terminal. Type M. præcedens.



FIG. 863.-Mytilops præcedens. Left valve

lata, see Mytilarca lata. metella, Hall, 1870, Prelim. Notice Lam. Shells, p. 1, and Pal. N. Y., vol 5, pt. 1, p. 268, Chemung Gr.



FIG. 864.-Mytilops præcedens.

- præcedens, Hall, 1870, (Modiola præcedens,) Prelim. Not. of Lam. Shells, p. 1, and Pal N. Y., vol. 5, pt. 1, p. 267, Chemung Gr.
- simplex, see Mytilarca simplex.
- Mytilus, Linnæus, 1758, Syst. Nat., 10th ed. [Ety. Mytilus, the fish mussel,] This genus does not, so far as known, exist in Palæozoic rocks. Most of the species referred to it belong to Myalina and Mytilarca.

concavus, see Myalina concava.

- fibristriatus, see Mytilarca fibristriata. occidentalis, see Mytilarca occidentalis.
- ottawensis, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 211, Up. Coal Meas.

permianus, see Myalina permiana.

- squamosus, Sowerby, 1839, Trans. Geol. Soc. Lond., vol. 4, Permian Gr. Probably not American.
- tenuiradiatus, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 211, Up. Coal Meas
- whitfieldanus, Winchell, 1862, Proc. Acad. Nat. Sci., p. 413, syn. for Mytilarca fibristriata.
- Naiadites, Dawson, 1860, Acad. Geol., but not defined. The name was used for a genus of plants by Buckman in 1843. The fossils were defined by Salter in 1861, under the name of Anthracomya.

angulatus, see Anthracomya angulata. arenaceus, see A. arenacea.

carbonarius, see A. carbonaria.

elongatus, see A. elongata.

- lævis, see A. lævis.
- obtusus, see A. obtusa.
- ovalis, see A. ovalis.
- NUCULA, Lamarck, 1801, Syst. An. sans Vert., p. 87. [Ety. nucula, a little nut.] Equivalve, inequilateral oval, or oblong

NUC.]

[MYT.-NUC.

closed all r mentary fa ward; car pit under t very long. anodontoides versity W. arata, see Nu bellatula, Ha striata. bellistriata. bellistriatu and Geo. I Ham. Gr. beyrichia, Scl Geinitz. S corbuliformis Lam. Shell pl. 46, fig mung Grs.

FIG. 865.—Nucul cobboldiæ.

fabula, see Cl hians, Hall, Nat. Hist., houghtoni, see hubbardi. W Nat. Sci., p. Nuculites s illinoisensis, Ill. St. Mus Sur. Ill., vo insularis, Wa Geo. Sur., ous. iowensis, Whi Acad. Nat.

Tellinomya kazanensis, as culana bell lamellata, Ha pl. 51, figs. levata, see Tel levatiformis, Geo. Sur.,

ous. lineata, see Te lineolata, Hal N. Y., p. 24 lirata, Conrac Jour. Acad Pal. N. Y.

Ham. Gr. machæriformis.

formis. mactriformis, s mercerensis, s

souriensis. microdonta, V Nat. Sci., p. [MYT.-NUC.

NUC.]

externally Modiola linge-line narrow, out balf the length erminal. Type M.



edens. Left valve

relim. Notice Lam. l. N. Y., vol 5, pt. dr.



s præcedens.

.(Modiola praceof Lam. Shells, p. 1, . 5, pt. 1, p. 267,

simplex. Syst. Nat., 10th ed. ish mussel,] This ar as known, exist Most of the species ng to Myalina and

concava. rca fibristriata. rca occidentalis.

1858, Trans. St. . 1, p. 211, Up. Coal

a permiana. 1839, Trans. Geol. 'ermian Gr. Prob-

rd, 1858, Trans. St. . 1, p. 211, Up. Coal

1862, Proc. Acad. for Mytilarca fibri-

, Acad. Geol., but ame was used for a Buckman in 1843. efined by Salter in ne of Anthracomya. comya angulata. icea. bonaria.

ata.

Syst. An. sans Vert., ula, a little nut.] teral oval, or oblong closed all round, without external ligamentary facets; beak directed back-ward; cartilage internal, placed in a pit under the beak; teeth numerous,

anodontoides, Meek, 1871, Reg. Rep. University W. Va., Coal Meas.

arata, see Nuculana arata.

bellatula, Hall, 1843, syn. for N. bellistriata.

- bellistriata, Conrad. 1841, (Nuculites bellistriatus,) Ann. Rep. N. Y., p. 40, and Geo. Rep. 4th Dist. N. Y., p. 197, Ham. Gr.
- beyrichia, Schlotheim, as identified by Geinitz. See Nucula parva.

corbuliformis, Hall, 1870, Prelim. Notice Lam. Shells, p. 2, and Pal. N. Y., vol. 5,

- pl. 46, figs. 24-37, Ham. and Chemung Grs.
 - cylindricus, syn. for Cardiomorpha missouriensis.

diffidens, Hall, 1885, Pal. N. Y., vol. 5, p. 322, Chemung Gr. donaciformis, see Tellin-

omya donaciformis. globularis, Hall, 1885, Pal. N. Y., vol. 5, p.

322, Chemung Gr.

fabula, see Clidophorus fabula.

-Nucula

5

cobboldiæ.

FIG. 865.

- hians, Hall, 1860, 13th Rep. N. Y. Mus. Nat. Hist., p. 110, Kinderhook Gr. houghtoni, see Tellinomya houghtoni. hubbardi, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 417, Marshall Gr. Syn. for Nuculites sulcatinus.
- illinoisensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 15, and Geo. Sur. Ill., vol. 8, p. 128, St. Louis Gr. insularis, Walcott, 1885, Monogr. U. S.
- Geo. Sur., vol. 8, p. 241, Carbonifer-0118.
- iowensis, White & Whitfield, 1862, Proc. Acad. Nat. Sci., vol. 8, p. 298. Syn. for Tellinomya houghtoni.
- kazanensis, as identified by Geinitz is Nuculana bellistriata.
- lamellata, Hall, 1883, Pal. N. Y., vol. 5, pl. 51, figs. 18-20, Ham. Gr.
- levata, see Tellinomya levata.
- levatiformis, Walcott, 1885, Monogr. U.S. Geo. Sur., vol. 8, p. 241, Carboniferous.
- lineata, see Tellinomya lineata.
- lineolata, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 246, Portage Gr. lirata, Conrad, 1842, (Nuculites liratus,) Jour. Acad. Nat. Sci., vol. 8, p. 250, and Pol. N. Y. vol. 5, p. 145, 67, 17, 200, and Pal. N. Y., vol. 5, pl. 45, figs. 17-27, Ham. Gr.
- machæriformis, see Tellinomya machæriformis.
- mactriformis, see Tellinomya mactriformis. mercerensis, syn. for Cardiomorpha missouriensis.
- microdonta, Winchell, 1863, Proc. Acad. Nat. Sci., p. 16, Marshall Gr.

minima, Foerste, 1885, Bull. Sci. Lab. Denison Univ., p. 93. Not properly defined.

minuta, Owen, 1840, Rep. on Min. Lands, Devonian. The name was preoccupied by De France in 1825.

nasuta, see Nuculana nasuta.

- neda, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 191, Up. Held. Gr.
- niotica, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 190, Ham. Gr.
- obliqua, see Palæoconcha obliqua.
- oblonga, Hall, syn. for Nuculites oblongatus.
- obsoleta, McChesney, 1860, Pal. Foss., p. 89, Coal Meas. Not recognized.
- parva, McChesney, 1860, New Pal. Foss., p. 54, and Geo. Sur. Ill., vol. 5, p. 589, Coal Meas.
- perumbonata, White, 1879, Bull. U. S. Geo. Sur., vol. 5, No. 2, p. 217, and Cont. to Pal., No. 6, p. 136, Carboniferous.
- poststriata, see Lyrodesma poststriatum.
- randalli, Hall, 1870, Prelim. Notice Lam. Shells, p. 3, and Pál. N. Y., vol. 5, pl. 45, figs. 5-16, Ham. and Ohemung Grs.
- rectangula, McChesney, 1860, Desc. New
- Pal. Foss., p. 74, Ham. Gr. rescuensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 172, Devonian. sectoralis, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 418, Marshall Gr. shumardana, Hall, 1858, Trans. Alb. Inst.,
- vol. 4, p. 16, and Bull. Am. Mus. Nat. Hist., p. 57, Warsaw Gr. stella, see Tellinomya stella.

subelliptica, Hall, 1883, Pal. N. Y., vol. 5, pl. 45, fig. 28, Ham. Gr. mbonata, Hall,

umbonata, Hall, 1883, Pal. N. Y.,



vol. 5, pl. 47, figs. 51 and 52, Che-



- varicosa, Hall, 1870, FIG. 866.-Nucula ventrimung Gr. Prelim. Notice
- Lam. Shells, p. 2, and Pal. N. Y., vol. 5, pl. 46, figs. 12-23, Ham. Gr.
- ventricosa, Hall, 1858, Geo. Sur. Iowa, p. 716, Coal Meas.
- NUCULANA, Link, 1807, Rost. Samml., vol. 3, p. 155. [Ety. like a shell of the genus Nucula.] Equivalve, inequilateral, produced behind; beaks sometimes di-rected posteriorly; lunule often present; rounded in front; post-umbonal slope defined; surface concentrically lined; hinge with a line of small teeth inter rupted by a triangular cartilage pit betwo, small; pallial line, simple, or slightly sinuous. Type N. emarginata.
 - arata, Hall, 1852, (Nucula arata,) Stansb. Exped. to Gt. Salt Lake, p. 413, Coal Meas.



bellistriata, Stevens, 1858, (Leda bellistriata,) Am. Jour. Sci., vol. 25, p. 261, and Geo. Sur. Iowa, p. 717, Coal Meas.

bellistriata var. attenuata, Meek, 1872, Pal. E. Neb., p. Coal Meas. 206,

brevirostris, Hall 1870. (Leda (?) breviro stris,

Prelim. Notice Lam. Shells, p. 6, and Pal. N. Y., vol. 5, pls. 38, 39, Ham. Gr. curta, Meek, 1861.

(Leda curta.

FIG. 867.-Nuculana belli-

Left valve

striata.

496

Proc. Acad. Nat. Sci. Phil., p. 144, and Geo.



Sur. Ill., [vol. 2, FIG. 868.-Nuculana bellip. 283, St. Louis striata. Cardinal view. Gr.

- densmamillata, Stevens, 1858, (Leda densmamillata,) Am. Jour. Sci., vol. 25, p. 261, Marshall Gr.
- diversa, Hall, 1883, Pal. N. Y., vol. 5, pl.
- 47, figs. 31–37, Ham. Gr. nasuta, Hall, 1858, (Nucula nasuta,) Trans. Alb. Inst., vol. 4, p. 17, and Bull. Am. Mus. Nat. Hist., p. 57, Warsaw Gr.

nuculiform's, see Palæoneilo nuculiformis. obesa, White, 1879, Bull. U. S. Geo. Sur.,

vol. 5, No. 2, p. 216, and Cont. to Pal., No. 6, p. 136, Carboniferous.

ohioensis, Hall, syn. for N. pandoriformis. obscura, Hall, 1885, (Leda obscura,) Pal.

- N. Y., vol. 5, p. 331, Ham. Gr. pandoriformis, Stevens, 1858, (Leda pandoriformis,) Am. Jour. Sci., vol. 25, p. 261. Waverly Gr.
- perstriata, Hall, 1883, Pal. N. Y., vol. 5, pl. 47, figs. 42-44, syn. for N. rostellata.
- rostellata, Conrad, 1841, (Nuculites/rostellatus.) Ann. Rep. Geo. N. Y., /p. 50, Ham. Gr.
- saccata, Winchell, 1863, (Leda saccata,) Proc. Acad. Nat. Sci., p. 16, Marshall Gr.
- vaseyana, McChesney, 1860, (Nuculites vaseyanus,) Desc. New. Pal., Foss., p. 73. Ham. Gr.
- NUCULITES, Conrad, 1841, Ann. Geo. Rep. N. Y., p. 49. [Ety. Nucula, a genus of shells.] Equivalve, inequilateral, .transverse; anterior end rounded; posterior truncate or pointed; beak, anterior; cardinal line arcuate; postumbonal slope rounded or angular; surface concentrically lined, hinge with a row of transverse narrow teeth from the anterior to the posterior muscular scar; ligament external; anterior scar deep and separated from the cavity of the shell by a clavicle; posterior scar elongate; pallial line simple. Type N. oblongatus.
 - altus, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 251, Devonian.

appressus, see Cytherodon appressus.

bellistriatus, see Nucula bellistriata. carinatus, Hall, 1860, Can. Nat. and Geol

NUC .-- NYA.

vol. 5, p. 151, Up. Sil. chemungensis, see Cytherodon chemungengig

concentricus, Conrad, 1842, Jour, Acad Nat. Sci., vol. 8, p. 248, Coal Meas.

constrictus, see Palæoneilo constricta. cuneiformis, Conrad, 1841, Ann. Rep. N. Y., p. 50, and Pal. N. Y., vol. 5, pl.

47, figs. 13–16, Ham. Gr. emarginatus, see Palæoneilo emarginata.

faba, see Modiolopsis faba. filosus, see Palæoneilo filosa.

inflatus, see Cypricardites inflatus. lamellosus, Conrad, 1841, Ann. Geo. Rep.

N. Y., p. 50, Up. Sil. liratus, see Nu-

cula lirata. mactroides. Conrad, 1842, Jour. Acad. Nat. Sci., vol. 249, p. Marshall Gr.

FIG. 870.—Nuculites oblon-gatus. Cast of interior of

right valve, showing mus-



aximus, see Fig. 869. — Nuculites oblon Palæoneilo gatus. Interior of large left valve. maximus, maxima.

multilineatus, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 251, Ham. Gr.

nyssa, Hall, 1870. Prelim. Notice Lam. Shells, p. 5, and Pal. N. Y., vol. 5, pl. 47, figs. 25-30, Ham. Gr.

oblongus, see Clidophorus oblongus.

cular scars and pallial oblongatus, Conrad, 1841, Ann. Geo. Rep. N. Y., p. 50,

and Pal. N. Y., vol. 5, pl. 47, figs. 1-12, Ham. Gr.

planulatus, see Clidophorus planulatus. poststriatus, see Lyrodesma poststriatum. radiatus, see Pholadella radiata. rostellatus, see Nuculana rostellata.

scitula, syn. for Clidophorus planulatus. subemarginatus, see Tellinopsis, subemarginata

- sulcatinus, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 250, Marshall Gr. triangularis, Hall & Whitfield, 1877, U. S.
- Geo. Expl., 40th parallel, vol. 4, p. 248, Devonian.
- triqueter, Conrad, 1841, Ann. Rep. N. Y., p. 50, and Pal. N. Y., vol. 5, pl. 47, figs. 17-24, Ham. Gr.

vaseyanus, see Nuculana vaseyana.

- yoldiiformis, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 24, Hud. Riv. Gr. It is not a Nuculites.
- NYASSA, Hall, 1870, Prelim. Notice Lam. Shells, but defined by Whitfield, 1882, Ann. N. Y., Acad. Sci., vol. 2, p. 244. [Ety. mythological name.] Shell bivalve, very oblique and transversely ovate in form; posterior hinge plate

slender, rid broad, ma point-like pressions. from the adductor n tremity; p internal.



OPI.-ORT.]

narrow, be



arguta, Hall,

elliptica, Hal Shells, p. 3 34, fig. 8, U

FIG. 872.-Nyassa

parva, Walco

recta, Hall.

Sur., vol. 8,

Shells, p. 2

53. figs. 1-8

Shells, p. 2

53, figs. 21-

Pal., vol. 2,

desma, a lig

cose; card

to the beal

ligament e

gate, anteri

ple; surfac

O. rectum.

Nat. Hist.,

tracta.) Pal

byrnesi, S. A

contractum,

Riv. Gr.

cuneiforme, 8

Soc. Nat.

Riv. Gr.

curvatum, H

faberi, n. sp

Pal., vol. 2.

of the card

vated, and

rounded, p

front of

Opisthoptera, Mo

ORTHODESMA, H

subalata, Hal

Shells, p. 2

53, figs. 9-2

[NUC .-- NYA.

bellistriata. Jan. Nat. and Geol.

۱. herodon chemung-

1842, Jour. Acad. 48, Coal Meas. ilo constricta. 1841, Ann. Rep. d. N. Y., vol. 5, pl. Gr.

neilo emarginata. aba. ilosa.

tes inflatus. 41, Ann. Geo. Rep.



Nuculites oblon Interior of large left

1842, Jour. Acad. 251, Ham. Gr. nyssa, Hall, 1870, Prelim. Notice

Lam. Shells, p. 5, and Pal. N. Y., vol. 5, pl. 47, figs. 25-30, Ham. Gr. oblongus, see Clidophorus oblongus. oblongatus, Con-

Rep. N. Y., p. 50, 5, pl. 47, figs. 1-12,

iorus planulatus. sma poststriatum. la radiata. ia rostellata. horus planulatus. linopsis, subemargi-

42, Jour. Acad. Nat. Iarshall Gr. 'hitfield, 1877, U.S. rallel, vol. 4, p. 248,

1, Ann. Rep. N. Y., ., vol. 5, pl. 47, figs.

a vasevana. 879, Jour. Cin. Soc. . 24, Hud. Riv. Gr.

elim. Notice Lam. by Whitfield, 1882, Sci., vol. 2, p. 244. name.] Shell bie and transversely sterior hinge plate 0PI.-ORT.]

LAMELLIBRANCHIATA.

narrow, bearing from one to four long, slender, ridge-like teeth ; anterior plate broad, marked by numerous, small, point-like teeth, with intermediate depressions, arranged somewhat radiating from the middle of its inner border; adductor muscles two, one at each extremity; pallial line entire; ligament internal. Type N. arguta.



FIG. 871.--- Nyassa arguta. Left valve.

arguta, Hall, 1870, Prelim. Notice Lam. Shells, p. 28, and Pal. N. Y., vol. 5, pl. 53, figs. 9-20, Ham. Gr.

elliptica, Hall, 1870, Prelim. Notice. Lam. Shells, p. 30, and Pal. N. Y., vol. 5, pl. 34, fig. 8, Up. Held. Gr.



FIG. 872.-Nyassa arguta. Interior of right valve

- parva, Walcott, 1885, Monogr. U. S. Geo.
- Sur., vol. 8, p. 173, Devonian. recta, Hall, 1870, Prelim. Notice Lam. Shells, p. 29, and Pal. N. Y., vol. 5, pl. 53. figs. 1-8, Ham. Gr.
- subalata, Hall, 1870, Prelim. Notice Lam. Shells, p. 29, and Pal. N. Y., vol. 5, pl. 53, figs. 21-26, Ham. Gr.

Opisthoptera, Meek. Not defined.

- ORTHODESMA, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 93. [Etv. orthos, straight; desma, a ligament.] Elongated, ventricose; cardinal line straight posterior to the beaks, and contracted anterior; ligament external; posterior scar elongate, anterior smaller; pallial line simple; surface concentrically lined. Type O. rectum.
- byrnesi, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 76, Hud. Riv. Gr. contractum, Hall, 1847, (Orthonota con-
- tracta,) Pal. N. Y., vol. 1, p. 300, Hud. Riv. Gr.
- cuneiforme, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 314, Hud. Riv. Gr.
- curvatum, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 95, Hud. Riv. Gr. faberi, n. sp. Shell large, posterior part
- of the cardinal line very slightly elevated, and anterior part contracted in front of the beaks; anterior end rounded, posterior end more abrupt;

basal line contracted in the central part by an undefined cincture arising below the umbones; beaks anterior, obtuse; umbones low and poorly defined; shell unusually high and thin for species in this genus; surface concentrically furrowed. This species bears some resemblance to a Modiolopsis, but it is doubtless an Orthodesma. Collected by Mr. Charles Faber in the upper part of the Hud. Riv. Gr., at Versailles, Indiana.



FIG. 873.—Orthodesma faberi.

- mickelboroughi, Whitfield, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 139, Hud. Riv. Gr.
- occidentale, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 3, p. 316, Hud. Riv. Gr.
- parallelum, Hall, 1847, (Modiolopsis parallela,) Pal. N. Y., vol. 1, p. 158, Hud. Riv. Gr.
- rectum, Hall & Whitfield, 1875, Ohio Pal., vol. 2, p. 94, Hud. Riv. Gr.



FIG. 874.-Orthodesma rectum.

- subovale, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 82, Hud. Riv. Gr. ORTHONOTA, Conrad, 1841, Ann. Rep. N. Y., p. 50. [Ety. orthos, straight; notos, the back.] Transversely elongate; margins subparallel; cardinal line straight; two cardinal teeth; no lateral teeth; ligament external; um bonal ridge oblique. Type O. undulata.
 - angulifera, (?) McCoy, 1850, Brit. Pal. Rocks, p. 276, Up. Sil. carinata, Conrad, 1841, Ann. Rep. N. Y.,
 - p. 51, and Pal. N. Y., vol. 5, pl. 78, figs. 34-35, Ham. Gr.
 - contracta, see Orthodesma contractam.
 - curta, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 76, and Pal. N. Y., vol. 2, p. 86, Clinton and Niagara Gr.
 - Lam. Shells, p. 89, and Pal. N. Y., vol. 5, pl. 78, fig. 36, Ham. Gr.
 - incerta, Billings, 1874, Pal. Foss., vol. 2, p. 130, Up. Sil.

parallela, see Orthodesma parallelum.

LAMELLIBRANCHIATA.

parvula, Hall, 1870, Prelim. Notice Lam. Shells, p. 88, and Pal. N. Y., vol. 5, pl. 78, figs. 29-32, Ham. Gr.

phaselia, Winchell, 1863, Proc. Acad. Nat. Sci., p. 12, Marshall Gr. pholadis, Conrad, 1838, (Pterinea phola-

dis,) Ann. Geo. Rep. N. Y., p. 118, Hud. Riv. Gr.

rectidorsalis, Winchell, 1862, Proc. Acad. Nat. Sci., p. 412, Marshall Gr. rigida, Hall, 1885, Pal. N. Y., vol. 5, p.

481, Chemung Gr.

siliquoidea, see Palæosolen siliquoideus. simulans, Billings, 1874, Pal. Foss., vol. 2, p. 131, Up. Sil.

(?) speciosa, Billings, 1874, Pal. Foss., vol. 2, p. 130, Up. Sil.

undulata, Conrad, 1841, Ann. Rep. N. Y., p. 51, and Pal. N. Y., vol. 5, pl. 78, figs. 37-42, Ham. Gr.



FIG. 875.—Orthonota undulata.

ventricosa, see Spathella ventricosa. venusta, Billings, 1874, Pal. Foss., vol. 2, p. 129, Up. Sil.

ORTHONOTELLA, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 117. [Ety orthos, straight; notos, back; ellus, diminutive.] Very small, inequilateral, inequivalve, more or less elliptical; beak anterior; surface smooth or concentrically lined; hingestraight behind the beaks; ligament external. Type O. faberi.

faberi, S. A. Miller, 1882, Jour. Cin. Soc. Nat. Hist., vol. 5, p. 117, Hud. Riv. Gr. Ostrea, Linnæus, 1758,

Syst. Nat. 10th ed.,

p. 696. [Ety. 08-

frea, an oyster.]

FIG. 876.-Orthonotella Greatly faberi. enlarged

Inequivalve, irregular in shape, with a single adductor muscle. Not a Palæozoic genus, though a species has been founded upon a single valve and called O. patercula.

patercula, Winchell, 1865, Proc. Acad. Nat. Sci., p. 124, and 4th Ann. Rep. U. S. Geo. Sur., p. 288, Burlington Gr.

PALÆANATINA, Hall, 1870. Prelim. Notice Lam. Shells, p. 84. [Ety. palaios, an-cient; Anatina, a genus.] Transversely elongate; gaping; left valve the larger; oblique constriction; hook-like process anterior to the beaks; no lateral

surface concentrically lined. teeth; Type P. typus.

angusta, Hall, 1885, Pal. N. Y., vol. 5, p. 490, Chemung Gr.

quadrata, see Prorhynchus quadratum. sinuata, Hall, 1885, Pal. N. Y., vol. 5, p. 491, Chemung Gr.

solenoides, Hall, 1885, Pal. N. Y., vol. 5, p. 489, Chemung Gr.

typus, Hall, 1870, Prelim. Notice Lam. Shells, p. 85, and Pal. N.Y., vol. 5, pl. 79, figs. 26–39,



ORT.-PAL.

Palæarca, syn. for type Cypricardites.

saffordi, see Cypricardites saffordi.

- salforal, see Cypricardites ventricosus.
 ventricosa, see Cypricardites ventricosus.
 PALÆOCARDIA, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 389. [Ety. palaios, ancient; kardia, a heart.] Cordiform, uncient; kardia, a heart.] Cordiform. obliquely subovate, ventricose; umbones gibbous; beaks prominent in-curved; hinge-line very short; surface marked with radiating strime. Type P. cordiformis.
 - cordiformis, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 389, Niagara Gr.
- PALÆOCONCHA, n. gen. cient; conche, shell.] [Ety. palaios, an-Shell small, equivalve, inequilateral, oblique, varying from subcircular or subovoid to mytiliform; height equal to or greater than length; closed all around; without external evidence of ligaments; anterior side more or less truncated and rounding into the base below; beaks elevated, projecting beyond cardinal line without incurving; cardinal line straight or slightly arching; some evidence points to an anterior and posterior muscular scar near the ends of the cardinal line; pallial line simple; no lateral teeth and probably edentu-lous; surface smooth. Type P. taberi, faberi, n. sp. Shell small, height greater than length, very slightly oblique, closed all around; beaks projecting high above the hinge-line without

incurving; sur-

face smooth,

variable in

size; a large

specimen has a

height of 0.20

inch, and

length 0.14

inch, a small

specimen is



FIG. 878.—Palæoconcha faberi. Magnified 5 diam.

about twothirds less. This species is distinguished from P. obliqua by its greater proportional height, more prolonged beak, less oblique form, and generally larger size. Collected in the upper part of the Hud. Riv. Gr., at Versailles, Indiana, and in Butler County, Ohio.

obliqua, Ha Am. Jour. Ohio Pal.,

PALÆONEILO, Lam. Shell cient; Nei posterior e the umbo trically sti arcuate, cr neath the ligament e terior add scars with

Type P. co



FIG. 879. Palæor fordensi

attenuata, Ha Shells, p. 1 50, figs. 34-barrisi, Whit barrisi,) Pr S, p. 298, s bedfordensis, 1875, Pal. (p. 298, Way bisulcata, I Prelim. N Shells, p. 1 N. Y., vo figs. 13-14, brevis, Hall, lim Notice N. Y., vol. mung Gr. carbonaria, se constricta, ((Nuculites



FIG. 881.-Palgeon Left valve enl crenulations of

Jour. Acad 8, p. 249, ai vol. 5, pl. constricta va N. Y., vol. dubia, Hall, 348, Up. H elongata, Ha 48, fig. 39, 1 emarginata, emarginata and Geo. V

498

 \wedge

[ORT.-PAL.

ncentrically lined.

Pal. N. Y., vol. 5,

chus quadratum. l. N. Y., vol. 5, p.

Pal. N. Y., vol. 5.



877.-Palæanatina typus.

tes saffordi. dites ventricosus. 7, 20th Rep. N. Y. 389. [Ety. palaios, neart.] Cordiform, ventricose; umaks prominent inrery short; surface ing striæ. Type P.

7, 20th Rep. N. Y. 89, Niagara Gr.

[Ety. palaios, an-Shell small, equioblique, varying subovoid to mytilito or greater than ound; without exigaments; anterior incated and roundbelow; beaks eleyond cardinal line cardinal line arching; some evianterior and posr near the ends of allial line simple; 1 probably edentuh. Type P. taberi. nall, height greater slightly oblique, beaks projecting ninge-line without incurving; surface smooth, variable in size; a large specimen has a height of 0.20 inch, and length 0.14 inch, a small specimen is about twospecies is distiniqua by its greater , more prolonged orm, and generally ted in the upper

7. Gr., at Versailles,

ler County, Ohio.

PAL.]

vol. 5, p. 344,

Chemung Gr.

arata, Hall, 1883, Pal. N. Y., vol.

5, pl. 50, fig. 23,

mung Gr.

maxima, Conrad,

obliqua, Hall, 1845, (Nucula obliqua,) Am. Jour. Sci., vol. 48, p. 292, and Ohio Pal., vol. 1, p. 139, Hud. Riv. Gr.
 PALEONEILO, Hall, 1870, Prelim. Notice Lam. Shells, p. 6. [Ety. palaios, an-cient; Neilo, a genus.] Nuculiform, cient; Neilo, a genus.] Nuculiform, posterior end extended, sulcus along the umbonal slope; surface concentrically striated or ribbed; hinge-line arcuate, crenulate, not interrupted beneath the beak by a ligamental pit; ligament external; anterior and posterior adductor scars distant; pedal scars within the umbonal cavity. Type P. constricta. angusta, Hall, 1885, Pal. N.Y.,



FIG. 879. Palæoneilo bedfordensis.

Ham. Gr. attenuata, Hall, 1870, Prelim. Notice Lam. Shells, p. 12, and Pal. N. Y., vol. 5, pl.

50, figs. 34-39, Waverly Gr. barrisi, White & Whitfield, 1862, (Leda barrisi,) Proc. Bost. Soc. Nat. Hist., vol. S, p. 298, syn. for P. nuculiformis.

bedfordensis, Meek, 1875, Pal. Ohio, vol. 2,

p. 298, Waverly Gr. bisulcata, Hall, 1870, Prelim. Notice Lam. 1870, Shells, p. 10, and Pal.

N. Y., vol. 5, pl. 50, FIG. 880. – Palæo-figs. 13-14, Ham. Gr. neilo bedfordenneilo bedforden-sis. Magnified. brevis, Hall, 1870, Pre-lim Notice Lam. Shells, p. 10, and Pal.

N. Y., vol. 5, pl. 50, figs. 24-33, Chemung Gr. carbonaria, see Yoldia carbonaria.

constricta, Conrad, 1842, (Nuculites constrictus,)



filosa, Conrad, 1842, (Nuculites filosus,)

Jour. Acad. Nat. Sci., vol. 8, p. 250, and

Pal. N. Y., vol. 5, pl. 49, figs. 33-38, Che-

Shells, p. 8, and Pal. N. Y., vol. 5, pl. 49, figs. 13-24, Ham. Gr.

fœcunda, Hall, 1870, Prelim. Notice Lam.

FIG. 882.—Palæoneilo max ima. Right valve. muta, Hall, 1870, Prelim. Notice Lam. Shells, p. 8, and Pal.

N. Y., vol. 5, pl. 49, figs. 25-32, Ham. Gr. nuculiformis, Stevens, 1858, (Leda nuculiformis,) Am. Jour. Sci. and Arts, 2d

ser., vol. 25, p. 262, Waverly Gr. parallela, Hall & Whitfield, 1870, 23d Rep. N. Y. Mus. Nat. Hist., p. 241, Wa-

- verly Gr. perplana, Hall, 1870, Prelim. Notice Lam. Shells, p. 12, and Pal. N. Y., vol. 5, pl.
- 50, figs. 15-22, Ham. Gr. plana, Hall, 1870, Prelim. Notice Lam. Shells, p. 7, and Pal. N. Y., vol. 5, pl. 48, figs. 21–28, Ham. Gr.
- similis, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 217, Erie shale, Por-
- tage (?) Gr. tenuistriata, Hall, 1870, Prelim. Notice Lam. Shells, p. 9, and Pal. N. Y., vol. 5, pl. 49, figs. 1-12, Ham. Gr.
- truncata, Hall, 1883, Pal. N. Y., vol. 5, pl. 50, figs. 40-41, Chemung Gr.
- virginica, Hall, 1885, Pal. N. Y., vol. 5, p. 340, Ham. Gr.

PALEOPINNA, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 4. (Plates and Explanations.)



FIG. 881.-Palæoneilo constricta. Left valve enlarged, showing crenulations of hinge-line.

Jour. Acad. Nat. Sci., vol.

8, p. 249, and Pal. N. Y., vol. 5, pl. 48, figs. 1-15, Chemung Gr. constricta var. flexuosa, Hall, 1883, Pal. N. Y., vol. 5, pl. 48, figs. 16-20, Ham. Gr. dubia, Hall, 1885, Pal. N. Y., vol. 5, p. 348, Up. Held. Gr.

elongata, Hall, 1883, Pal. N. Y., vol. 5, pl. 48, fig. 39, Chemung Gr.

emarginata, Conrad, 1841, (Nuculites emarginata,) Ann. Rep. N. Y., p. 50, and Geo. Wis., vol. 4, p. 337, Ham. Gr.

FIG. 883.-Palæopinna flabellum.

Ety. palaios, ancient; Pinna, a genus.] Shells large, gaping in front; hinge-line straight, ligamental area narrow, lon-gitudinal groove and slight oblique furrow extending backward from the beak; beak anterior, terminal, directed forward; test more convex, and with finer rays than on the ordinary Pinna, and also finely marked with concentric striæ of growth. Type P. flabellum.

- 1, p. 241, Up. Held. Gr.
 PALEOSOLEN, Hall, 1885, Pal. N. Y., vol. 5, p. 46. [Ety. palaios, ancient; Solen, a genus.] Shell in form like Solen; dor-sal and ventral margins subparallel; anterior end short, rounded; posterior end elongate, truncate; gaping; beaks small, appressed; cardinal line straight; umbonal slope prominent; surface concentrically marked. Type P., siliquoideus.
- Prelim. Not. Lam. Shells, p. 89, and Pal. N. Y., vol. 5, p. 483, Ham. Gr.
 PANENKA, Barrande, 1881, Syst. Sil. d. l. Boheme, vol. 6, p. 128. Equivalve, inequilateral, elliptical or subcircular, beaks prominent, incurved; cardinal line straight or arcuate; test thin; surface concentrically lined.
 - abrupta, Hall, 1885, Pal. N. Y., vol. 5, p. 423, Ham. Gr.
 - alternata, Hall, 1885, Pal. N. Y., vol. 5, p. 416, Up. Held. Gr. costata, Hall, 1885, Pal. N. Y., vol. 5, p.
 - 419, Marcellus Shale.

degener, Hall, 1885, Pal. N. Y., vol. 5, p. 424, Ham. Gr.

- dichotoma, Hall, 1885, Pal. N. Y., vol. 5, p. 416, Schoharie grit.
- elevata, Conrad. 1848, (Monotis elevata,) Proc. Acad. Nat. Sci., vol. 3, p. 23, Chemung Gr.

equilatera, Hall, 1885, Pal. N. Y., vol. 5, p. 419, Marcellus Shale.

- hero, Hall, 1885, Pal. N.Y., vol. 5, p. 418, Marcellus Shale.
- lincklæni, Hall, 1885, Pal. N. Y., vol. 5, p. 420, Marcellus Shale.
- mollis, Hall, 1885, Pal. N. Y., vol. 5, p. 420, Marcellus Shale.

multiradiata, Hall, 1885, Pal. N. Y., vol. 5, p. 417, Up. Held. Gr.

potens, Hall, 1885, Pal. N. Y., vol. 5, p. 422, Ham. Gr.

- poulsoni, Conrad, 1848, (Monotis poul-soni,) Proc. Acad. Nat. Sci., vol. 3, p. 23, Chemung Gr.
- radians, Conrad, 1842, (Pterinea radians,) Jour. Acad. Nat. Sci., p. 252, and Pal.
- N. Y., vol. 5, p. 422, Ham. Gr. retusa, Hall, 1885, Pal. N. Y., vol. 5, p. 421, Ham. Gr.

robusta, Hall, 1885, Pal. N. Y., vol. 5, p. 424, Portage Gr. speciosa, Hall, 1843, (Avicula speciosa,) Geo. Rep. 4th Dist. N. Y.,

- FIG. 884.—Panenka speciosa. p. 243, Portage Gr.
 - ventricosa, Hall, 1885, Pal. N. Y., vol. 5, p. 417, Marcellus Shale.

flabellum, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 240, Oriskany Gr. recurva, Hall, 1884, Pal. N. Y., vol. 5, pt. Panopæa, Menard de la Groye, 1807, Ann. du Mus. 9. [Ety. mythological name.] cooperi, see Chænomya cooperi.

PAN.-PAR.

- PARACARDIUM, Barrande, 1881, Syst. Sil. de la Boheme, vol. 6, p. 137. [Ety. para, allied to; Cardium, a genus.] Equivalve, inequilateral, subcircular or subelliptical; posterior side subtruncate; surface marked with fine radii and concentric striæ; the margin of a small cardinal area under the beaks is crenulated.
- doris, Hall, 1885, (Cardiola doris,) Pal. N. Y., vol. 5, p. 428, Portage Gr.
- PARARCA, Hall, 1885, Pal. N. Y., vol. 5, p. 36. Ety. para, allied to; Arca, a genus.] Equivalve, inequilateral, transversely subelliptical or rhomboidal; anterior end short, rounded; cardinal line about half the length of the valves, arching at the beaks; surface marked by radii and concentric striæ; hinge narrow, with a series of minute crenulations. Type P. venusta.
- erecta, Hall, 1885, (Cardiola erecta,) Pal. N. Y., vol. 5, p. 432, Waverly Gr. neglecta, Hall, 1885, Pal. N. Y., vol. 5, p. 432, Waverly Gr.
- præcedens, Hall, 1885, Pal. N. Y., vol. 5, p. 429, Up. Held. Gr.
- sao, Hall, 1885, (Cardiola sao,) Pal. N. Y., vol. 5, p. 430, Chemung Gr.
- transversa, Hall, 1885, (Cardiola transversa,) Pal. N. Y., vol. 5, p. 429, Chemung Gr.
- venusta, Hall, 1885, Pal. N. Y., vol. 5, p.
- 431, Chemung Gr. PARACYCLAS, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 171. [Ety. para, allied to; Cyclas, a genus.] Equivalve, subequilateral, suborbicular or subelliptical; anterior end regularly rounded; posterior end rounded or subtruncate, more produced than the anterior; beaks small and low; hinge-line short, post-cardinal slope sometimes subalate; surface marked concentrically; ligament supported internally on each side by a narrow plate, which leaves in the cast two diverging grooves directed forward from the beak; muscular impression on the post-umbonal slope; pallial line a little within the margin of the shell. Type P. elliptica.
 - billingsana, S. A. Miller, 1883, 2d Ed. Am. Pal. Foss., p. 311, Devonian. Proposed instead of Lucina occidentalis, Billings, 1859, Assiniboine and Sas. Ex. Exped., p. 187, figs. b and c, which name was preoccupied.
 - chemungensis, Hall, 1885, Pal. N. Y., vol.
- 5, p. 443, Chemung Gr. elevata, Hall, 1883, Pal. N. Y., vol. 5, pl. 72, figs. 37 to 41, Schoharie grit.
- elliptica, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 171, and Pal. N. Y., vol. 5, pl. 72, figs. 23-30, Cornif. Gr.
- elliptica var. occidentalis, Hall & Whit-field, 1872, 24th Rep. N. Y. Mus. Nat.

Hist., p. 18 72, figs. 31-

PEC.-PER.]



FIG. 885.-Paracyc

erecta, Hall, 445, Chemu fissa, Hall, 18 figs. 35, 36, hamiltonensis hamiltonen p. 95, Ham. ignota, Hall, 72, fig. 34, (lirata, Conrac Ann. Rep. N vol. 5, pl. 72



FIG. 886. -Paracyc ohioensis. U. S. Geo.] p. 248, Devo retusa, Hall, 1 Rep. 4th. 1 tage Gr. rotunda, Hall, p. 444, Chen sabini, White, p. 31, Chemitenuis, Hall, 1 72, figs. 20-2 varysburgensis varysburgia, Sur., Portage



FIG. 887.—Pe

wyomingensis, U. S. Geo. St Pecten, Mueller, known in the acutialatus, see armigerus, see 1

PAN.-PAR

PEC.-PER.]

Hist., p. 189, and Pal. N. Y., vol. 5, pl.

FIG. 885.-Paracyclas elliptica var. occidentalis.

erecta, Hall, 1885, Pal. N. Y., vol. 5, p. 445, Chemung Gr.

fissa, Hall, 1883, Pal. N. Y., vol. 5, pl. 72, figs. 35, 36, Schoharie grit.
hamiltonensis, Winchell, 1866, (Lucina hamiltonensis,) Rep. Low. Pen. Mich.,

p. 95, Ham. Gr. ignota, Hall, 1883, Pal. N. Y., vol. 5, pl. 72, fig. 34, Chemung Gr. lirata, Conrad, 1838, (Posidonia lirata,) Ann. Rep. N. Y., p. 116, and Pal. N. Y.,

vol. 5, pl. 72, figs. 1-19, Corniferous Gr.

U. S. Geo. Expl. 40th Parallel, vol. 4,

retusa, Hall, 1843, (Lucina ? retusa,) Geo. Rep. 4th. Dist. N. Y., p. 246, Por-

rotunda, Hall, 1885, Pal. N. Y., vol. 5,

sabini, White, 1876, Proc. Acad. Nat. Sci.,

ability, Williams, 1997, 1998
b. 31, Chemung Gr.
tenuis, Hall, 1883, Pal. N. Y., vol. 5, pl. 72, figs. 20–22, Ham. Gr.
varysburgensis, Williams, 1887, (Lucina varysburgia,) Bull. 41, U. S. Geo.

FIG. 887.—Pernopecten aviculatus.

U. S. Geo. Sur., Portage Gr.

armigerus, see A. armigerus.

known in the Palæozoic rocks.

wyomingensis, Williams, 1887, Bull. 41,

Pecten, Mueller, 1776. This genus is un-

acutialatus, see Aviculopecten acutialatus.

FIG. 886. -Paracyclas

p. 248, Devonian.

p. 444, Chemung Gr.

Sur., Portage Gr.

ohioensis.

tage Gr.

ohioensis, Meek, 1871, Proc. Acad. Nat. Sci.

Phil., p. 62, and Ohio Pal., vol. 1, p. 248, Cornif. Gr.

peroccidens, Hall & Whitfield, 1877,

72, figs. 31-33, Up. Held. Gr.

Groye, 1807, Ann. vthological name.] cooperi.

1881, Syst. Sil. 6, p. 137. [Ety. ardium, a genus.] eral, subcircular or rior side subtruned with fine radii e; the margin of a under the beaks is

rdiola doris,) Pal. Portage Gr.

N. Y., vol. 5, p. 36. o; Arca, a genus.] teral, transversely mboidal; anterior cardinal line about the valves, arching e marked by radii e; hinge narrow, nute crenulations.

rdiola erecta,) Pal. Waverly Gr. 'al. N. Y., vol 5, p.

. Pal. N. Y., vol. 5,

ola sao,) Pal. N. Y., ing Gr. 5, (Cardiola trans-

vol. 5, p. 429, Cheal. N. Y., vol. 5, p.

Geo. Rep. 4th Ety. para, allied to; uivalve, subequilat-

subelliptical; anteinded; posterior end ate, more produced beaks small and , post-cardinal slope ; surface marked nent supported inside by a narrow in the cast two diected forward from impression on the

pallial line a little of the shell. Type

er, 1883, 2d Ed. Am. evonian. Proposed ccidentalis, Billings, nd Sas. Ex. Exped., c, which name was

885, Pal. N. Y., vol. Gr.

al. N. Y., vol. 5, pl. hoharie grit. Geo. Rep. 4th Dist. al. N. Y., vol. 5, pl. if. Gr. talis, Hall & Whit-

p. N. Y. Mus. Nat.

aviculatus, see Pernopecten aviculatus. broadheadi, syn. for Aviculopecten carboniferus

cancellatus, see Aviculopecten cancellatus. carboniferus, see A. carboniferus. clevelandicus, see A. clevelandicus. coloradoensis, see A. coloradoensis.

convexus, see A. convexus.

crenulatus, see Crenipecten crenulatus. dolabriformis, see Aviculopecten dolabriformis.

duplicatus, see A. duplicatus.

hallianus, D'Orbigny, 1847, syn. for Aviculopecten cancellatus.

halli, see A. halli. hawni, Geinitz, 1866, Carb. und Dyas, p.

36, syn. for A. carboniferus. missouriensis, see A. missouriensis. neglectus, see Euchondria neglecta. occidentalis, see A. occidentalis. providencensis, see A. providencensis. radialis, see Pseudomonotis radialis. ringens, see Aviculopecten ringens. striatus, see A. striatus.

tenuilineatus, see Streblopteria tenuilineata. utahensis, see Aviculopecten utahensis.

Pernachactas, Castelnau, 1843, Syst. Sil., p. 44. Not recognized.



FIG. 888 .-- Pernopecten limiformis. Hinge-line.

PERNOPECTEN, Winchell, 1865, Proc. Acad. Nat. Sci. Phil., p. 125. [Ety. from the shells Perna and Pee-

ten.] Shell like Pecten hinge with a central cartilage pit and a crenulated hinge plate on each side below the hinge margin. Type P. limiformis.

aviculatus, Swallow 1858, (Pecten avicu-FIG. 889. -- Pernopecten limiforlus,) Trans. St. Louis

Acad. Sci., p. 213, and Geo. Sur. Ill., vol. 5, p. 588, Coal Meas Shucooperensis,

mard, 1885, (Avicula cooperensis,)

mis

33

Geo. Rep. Mo., p. 206, Waverly or Choteau Gr. fasciculatus, see Ly-

riopecten fasciatus. limiformis, White & Whitfield, 1862.

(Aviculopecten li-maformis,) Proc. FIG. 890.—Pernopecten shumardanus.

Bost. Soc. Nat. Hist., vol. 8, p. 295, Marshall Gr. limatus, Winchell, 1865, Proc. Acad. Nat. Sci., p. 126, Marshall Gr.

shumardanus, Winchell, 1865, Proc. Acad. Nat. Sci. Phil., p. 126, and Geo. Sur. Ill., vol. 2, p. 453, Kinderhook Gr.

- PHOLADELLA, Hall, 1870, Prelim. Notice Lam. Shells, p. 63. [Ety. diminutive of the recent genus *Pholas.*] Equivalve, elongated; valves inflated; beaks anterior, incurved; basal margin con-stricted; escutcheon and lunule; surface ribbed. Type P. newberryi. constricta, Hall, 1883, Pal. N. Y., vol. 5,
 - pl. 78, figs. 26-27, Ham. Gr.
 - cuneata, see Promacrus cuneatus.
 - decussata, Hall, 1883, Pal. N. Y., vol. 5, pl. 78, fig. 28, syn. for Promacrus cuneatus.
 - newberryi, Hall, 1870, Prefem. Notice Låm. Shells, p. 65, and Pal. N. Y., vol. 5, pl. 78, fig. 25, Waverly Gr.



FIG. 891 .-- Pholadella newberryi.

ornata, Hall, 1870, Prelim. Notice Lam. Shells, p. 64, syn. for P. radiata. parallela, Hall, 1883, Pal. N. Y., vol. 5, pl.

- 78, figs. 22-24, Ham. Gr.
- radiata, Conrad, 1842, (Nuculites radiatus,) Jour. Acad. Nat. Sci., vol. 8, p. 248, and Pal. N. Y., vol. 5, pl. 78, figs. 15-21, Ham. Gr.
- truncata, Hall, 1870, Prelim. Notice Lam. Shells, p. 64, syn. for P. radiata.

Pholadomya elongata, see Allorisma elongatum.

- PHTHONIA, Hall, 1870, Prelim. Notice Lam. Shells, p. 70. Equivalve, elongate-ovate, wider posteriorly; beaks obscure; surface radiated and concentrically marked; no teeth; ligament external. Type P. sectifrons.
 - cylindrica, Hall, 1883, Pal. N. Y., vol. 5, pl. 78, figs. 1-4. Ham. Gr.
 - lirata, Hall, 1883, Pal. N. Y., vol. 5, pl. 78, fig. 14, Ham. Gr.
 - nitida, Hall, 1885, Pal. N. Y., vol. 5, p. 477, Chemung Gr.
 - nodocostata, Hall, 1870, Prelim. Notice Lam. Shells, p. 71, and Pal. N. Y., vol. 5, pl. 78, figs. 5-9, Ham. Gr.



FIG. 892.-Phthonia sectifrons. Left valve.

sectifrons, Conrad, 1842, (Cypricardites sectifrons,) Jour. Acad. Nat. Sci., vol. 8, p. 245, and Pal. N. Y., vol. 5, pl. 78, figs. 10-13, Ham. Gr.

truncata, Hall, 1885, Pal. N. Y., vol. 5, p. 476, Chemung Gr.

- PINNA, Linnæus, 1758, Syst. Nat. 10th Ed.
 - [Ety. pinna, a wing.] Shell long, tri-angular equivalve; beaks terminal, pointed; posterior end broad, truncate, gaping; a subtrigonal, posterior muscular impression, and a small reniform one at the beaks; cartilage long, narrow, internal, supported by a slender ridge close within the cardinal edges; no teeth; shell of one internal laminated layer, and an external ver-tically fibrous layer. Type P. squamosa. A living genus that sometimes attains a length of two feet, and ranges from low water to sixty fathoms. It moves vertically, partly buried in sand, with knife-like edges erect. The byssus has been mixed with silk, spun and knit into gloves.
- adamsi, syn. for Pinna peracuta. consimilis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 236, Subcarbonirerous.
- hinrichsana, White & St. John, 1868, Trans. Chi. Acad. Sci., p. 122, St. Louis Gr.
- inexpectans, Walcott, 1885, Monogr. U.S. Geo. Sur., vol. 8, p. 235, Subcarboniferous.
- ludlovi, Whitfield, 1876, in Ludlow's Carroll to Yellowstone Park, p. 143, Coal Meas.
- marshallensis, Winchell, 1865, Proc. Acad. Nat. Sci., p. 126, Marshall Gr.



Fig. 893.-Pinna squamosa

- maxvillensis, Whitfield, 1882, Ann. N.Y. Acad. Sci., vol. 2, p. 221, Kaskaskia Gr.
- missouriensis, Swallow, 1863, Trans. St. Louis Acad. Sci., vol. 2, p. 97, Kaskaskia Gr.
- Acad. Sci., vol. 1, p. 214, and Pal. E. Neb., p. 198, Coal Meas.
- stludovici, Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 326, St. Louis Gr. subspatulata, Worthen, 1875, Geo. Sur.
- Ill., vol. 6, p. 524, Warsaw Gr. Pinnopsis, syn. for Lunulicardium.
- acutirostra, syn. Lunulicardium ornatum. ornatus, see Lunulicardium ornatum,
- Placunopsis, Morris & Lycett, 1853, Monogr. Foss. Great Oolite. [Ety. Placuna, a genus; opsis, resemblance.] Suborb-icular, upper valve convex, radiately striated or taking the form of the surface to which it adheres; lower valve flat; ligamental groove submarginal: muscular impression subcentral. Type P. jurensis. Not a Palæozoic genus.





FIG. 894.-Placui recticardinalis. ternal cast of valve

> planations. Mytilus, a 1 ligamental dinal teeth test, with c Mytilacra i absence of



FIG. 895.-Ple

arenaceus, Ha cea,) Prelim 20, and Pal. Schoharie gr knappi, Hall, 1 1, p. 256, Ha mytilimeris, (mytilimeris,) vol. 8, p. 246,

PLE.]

PHO.-PLA.

PHO.-PLA.

al. N. Y., vol. 5, p.

vst. Nat. 10th Ed.] Shell long, tribeaks terminal. end broad, truntrigonal, posterior 1, and a small reniks: cartilage long, pported by a slenthin the cardinal ell of one internal 1 an external verr. Type P. squaus that sometimes wo feet, and ranges sixty fathoms. It partly buried in edges erect. The ed with silk, spun

peracuta. 885, Monogr. U. S.). 236, Subcarbon-

& St. John, 1868, Sci., p. 122, St.

1885, Monogr. U.S. p. 235, Subcarbon-

6, in Ludlow's Car-Park, p. 143, Coal

ell, 1865, Proc. Acad. arshall Gr.



squamosa

ld, 1882, Ann. N. Y. . 221, Kaskaskia Gr. w, 1863, Trans. St. d. 2, p. 97, Kaskas-

358, Trans. St. Louis p. 214, and Pal. E. Meas.

Geo. Sur. 1883, St. Louis Gr. en, 1875, Geo. Sur. Warsaw Gr.

ulicardium. licardium ornatum.

rdium ornatum, ycett, 1853, Monogr. ['Ety. Placuna, a

mblance.] Suborb-e convex, radiately he form of the surlheres; lower valve roove submarginal: on subcentral. Type a Palæozoic genus.

Species are left here for want of material to determine their generic relations



PLE.]

carbonaria, Meek & Worthen, 1866, Proc. Chi. Acad. Sci., vol. 1, p. 13, Up. Coal Meas. recticardinalis, Meek, 1875, Ohio Pal., vol. 2, p. 331, Coal

FIG. 894.—Placunopsis PLETHOMYTILUS, Hall, recticardinalis. In- 1883, Pal. N. Y., recticardinalis. In-ternal cast of left valve.

vol. 5, pt. 1, p. 4. (Plates and Explanations.) (Ety. pletho, to be full; Mytilus, a genus.] Mytiloid, gibbous; ligamental area finely striated; no car-

Meas.

dinal teeth ; lateral teeth small, oblique ; test, with concentric striæ; differs from Mytilacra in its true hinge-line and the absence of teeth. Type P. ponderosus.



FIG. 895.-Plethomytilus ponderosus.

- arenaceus, Hall, 1870, (Mytilarca arena-cea,) Prelim. Notice Lam. Shells, p. 20, and Pal. N. Y., vol. 5, pt. 1, p. 253, Schoharie grit. knappi, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 256, Ham. Gr.
- mytilimeris, Conrad, 1842, (Inoceramus mytilimeris,) Jour. Acad. Nat. Sci., vol. 8, p. 246, Low. Held. Gr.

oviformis, Conrad, 1842, (Inoceramus oviformis,) Jour. Acad. Nat. Sci., vol. p. 246, and Pal. N. Y., vol. 5, pt. 1, p. 255, Ham. Gr.

- ponderosus, Hall, 1870, (Mytilarca pon-derosa,) Prehm. Notice Lam. Shells, p. 21, and Pal. N. Y., vol. 5, pt. 1, p. 254, Up. Held. Gr.
- PLEUROPHORUS, King, 1844, Ann. Mag. Nat. Hist., vol. 14, p. 313. [Ety. pleuron, a rib; phoros, bearing.] Inequilateral, longitudinally oblong or subovate; two cardinal teeth in each valve, alternately interlocking and divergent; one posterior lateral tooth in each valve, the receiving tooth in the left valve; anterior adductor scar deep, and bounded posteriorly by a ridge; pallial line simple. Type P. costatus.
- angulatus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 247, and Geo.
- Sur. III., vol. 6, p. 529, Coal Meas. calhouni, Meek & Hayden, 1858, (Ed-monia calhouni,) Trans. Alb. Inst., vol. 4, p. 80, and Pal. Up. Mo., p. 62, Permian Gr.
- chesterensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 16, and Geo.
- 111. St. Mus. Nat. Hist., p. 10, and Geo. Sur. Ill., vol. 8, p. 123, Kaskaskia Gr. costatiformis, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 247, and Geo. Sur. Ill., vol. 3, p. 535, Keokuk Gr. meeki, Walcott, 1885, Monogr. U. S. Geo.
- Sur., vol. 8, p. 246, Carboniferous. minimus, Worthen, 1884, Bull. No. 2, Ill.
- St. Mus. Nat. Hist., p. 17, and Geo. Sur. Ill., vol. 8, p. 124, St. Louis Gr. monroensis, Worthen, 1884, Bull. No. 2,
- III. St. Mus. Nat. Hist., p. 17, and Geo. Sur. Ill., vol. 8, p. 125, St. Louis Gr. oblongus, Meek, 1872, Pal. E. Neb., p. 212,
- Coal Meas.
- occidentalis, Meek & Hayden, 1862, Trans. Alb. Inst., vol. 4, p. 80, and Pal. Up. Mo., p. 35, Coal Meas. pallasi, as identified by Geinitz, is P.

oblongus.

permianus, Swallow.

1858, Trans. St. Louis Acad. Sci., vol. 1, p. 192, Permian Gr.



quadricostatus, Daw-son, 1868, Acad. FIG. 896.-Pleurophorus costatiformis Geo., p. 304, Car-

boniferous.

- simplus, as identified by Geinitz, is P. subcuneatus.
- subcostatus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 246, and Geo. Sur. Ill., vol. 2, p. 347, Up. Coal Meas. subcuneatus, Meek & Hayden, 1858,
- Trans. Alb. Inst., vol. 4, p. 81, and Pal.
- Up. Mo., p. 61, Permian Gr.
 (?) subellipticus, Meek, 1867, Am. Jour.
 Sci., vol. 44, p. 181, and Pal. E. Neb., p. 211, Coal Meas.
- tropidophorus, Meek, 1875, Ohio Pal., vol. 2, p. 338, Coal Meas.

Pleurorhynchus, Phillips, syn. for Conocardium.

antiquum, see Conocardium antiquum. attenuatum, see Conocardium attenuatum. crassifrons, see Conocardium crassifrons. cuneus, see Conocardium cuneus.

trigonale, Hall, see Conocardium subtrigonale.

vomer, see Conocardium vomer. Posidonia, Bronn, see Posidonomya. alata, see Posidonomya alata.

alveata, see Grammysia alveata. arcuata, see Grammysia arcuata. clathrata, see Posidonomya clathrata. distans, see Posidonomya distans. lirata, see Paracyclas lirata.

moorei, see Posidonomya moorii. perstriata, see Posidonomya perstriata.

- Posidonomya, Bronn, 1837, Leth. Geogn. [Ety. Poseidon, a mythological name; Mya, a genus.] Shell thin, obliquely oval, subtruncate at one end, equivalve, compressed, concentrically furrowed, hinge-line short and straight, edentulous. Type P. becheri.
 - alata, Hall, 1843, (Posidonia (?) alata,) Geo. 4th Dist. N. Y., p. 72, and Pal. N. Y., vol. 2, p. 87, Clinton Gr.

ambigua, Winchell, 1863, Proc. Acad. Nat. Sci., p. 10, Marshall Gr.

clathrata, Lea, 1853, (Posidonia clathrata,) Jour. Acad. Nat. Sci., 2d ser., vol. 2, p. 205, Coal Meas. evonica, Walcott, 1885,

eri.

FIG. 897.-Posidonomya bech-

- devonica, Walcott, 1885, Monogr. U. S. Geo. Sur. vol. 8, p. 179, Devonian. distans, Lea, 1853, (Posidonia distans,) Jour. Acad. Nat. Sci., 2d ser., vol. 2, p.
- 205, Coal Meas. fracta, Meek, 1875, Ohio Pal., vol. 2, p: 333, Coal Meas.
- fragosa, see Lunulicardium

fragosum. lævis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p.

178, Devonian. Winchell, mesambonata,

1862, Proc. Acad. Nat. Sci., p. 420, Marshall Gr. moorii, Gabb, 1859, (Posi-fracta.

fracta. donia moorei,) Proc. Acad.

Nat. Sci., p. 297, Coal Meas. perstriata, Lea, 1853, (Posidonia perstri-ata,) Jour. Acad. Nat. Sci., 2d ser., vol. 2, p. 205, Coal Meas.

rhomboidea, Hall, 1852, Pal. N. Y., vol. 2, p. 284, Niagara Gr.

romingeri, Winchell, 1862, Proc. Acad. Nat. Sci., p. 420, Marshall Gr.

striata, Stevens, 1858, Am. Jour. Sci., vol.

25, p. 265, Coal Meas. whiteana, Winchell, "1862, Proc. Acad. Nat. Sci., p. 420, Marshall Gr.

PRÆCARDIUM, Barrande, 1881, Syst. Sil. de la Boheme, vol. 6, p. 141. [Ety. præ, before; Cardium, a genus.] Equivalve, inequilateral, elliptical or trigonal;

beaks prominent, incurved; surface radiated, and concentrically lined; posterior to the beaks a small area carries a series of vertical nearly parallel teeth.

vetustum, Hall, 1843, (Cardium vetustum,) Geo. Rep. 4th Dist. N. Y., p. 245, and FIG. 899. Pal. N. Y., vol. 5, p. 427, Præcardium vetustum. vetustum. Portage Gr.

- PRISCONAIA, Conrad, 1867, Am. Jour. Conch., vol. 3. [Ety. proper name.] 1867, Am. Jour. Equivalve, inequilateral, and distinguished from Anthracosia, which it much resembles, by having lateral teeth. Type P. ventricosa.
- ventricosa, Conrad, 1867, Am. Jour. Conch., vol. 3, Coal Meas.
- PROMACRUS, Meek, 1871, Am. Jour. Conch., vol. 7, p. 4. [Ety. pro, forward; mak-ros, long.] Similar to Sanguinolites; anterior end much produced, narrowly rounded; posterior end produced, ob-liquely truncate; beaks appressed; cardinal margin nearly straight behind the beaks, and declining in front; umbonal slope angular, extending to the basal extremity; surface concentrically lined, and sometimes plicated anteriorly; ligament external. Type P. andrewsi.

andrewsi, Meek, 1871, Am. Jour. Conch., vol. 7, p. 4, Waverly Gr. cuneatus, Hall, 1870, (Pholadella cune-ata,) Prelim. Not. Lam. Shells, p. 66, and Pal. N. Y., vol. 5, p. 510, Waverly Gr. missouriensis, see Sanguinolites missouriensis.

nasutus, see Sanguinolites nasutus.

PRORHYNCHUS, Hall, 1885, Pal. N. Y., vol. 5, p. 48. [Ety. pro, forward; rhynchos, beak.] Left valve the larger and more gibbous; anterior end truncate, angular or nasute at the antero-dorsal ex-tremity; posterior end broad, margin truncate or broadly rounded; beaks low; cardinal line straight, extending the entire length of the dorsal margin, /and alate at both ends; umbonal slope subangular; surface concentrically

lined; strong lateral tooth, ligament external. Type P. quadratum. angulatum, Hall, 1885, Pal. N. Y., vol. 5, p. 493, Chemung Gr.

- nasutum, Hall, 1885, Pal. N. Y., vol. 5,
- p. 493, Chemung Gr. quadratum, Hall, 1883, (Palæanatina quadrata,) Pal. N. Y., vol. 5, p. 492, Chemung Gr.

Million Barris

FIG. 900.—Prothyris

meeki.

PROTHYRIS, Meek, 1869, Proc. Acad. Nat. Sci. Phil., p. 172. [Ety. pro, forward ; thyris, an orifice.] Equivalve, inequilat-

extremely elongate; cardinal eral. and basal margins subparallel; anterior PRO.—PTE.]

end rou

a deep tral man lanceolat straight slope so slope rou surface c elegans. alata, Hall 461, Cher elegans, Me vol. 7, p. exuta, Hal 462, Chen lanceolata, pl. 76, fig meeki, Win p. 305, W planulata, H pl. 76, fig. PROTOMYA, H 52. [Ety, Equivalve ovate-ellip rounded : rounded : prominen straight; u not define ally lined cular impr strong and oblonga. oblonga, Ha longa,) Pal

PSEUDOMONOTIS Deutsch., [Ety. pseud Suborbicul convex, rig cave; not a slightly ob gibbous, ir short, nar cavity und of right separated f rudimentar ject beyond cular scar



FIG. 901.—Pseudor hawni.

hawni var. ov (Eumicrotis Mo., p. 55, 1







[PLE.-PRO.
[PLE.-PRO.

ncurved; surface entrically lined; aks a series

arallel (Car-Rep.

Fig. 899. Præcardium 5, and . 427, vetustum.

.867, Am. Jour. y. proper name.] eral, and distinosia, which it much lateral teeth. Type

1867, Am. Jour. deas.

Am. Jour. Conch., ro, forward; makto Sanguinolites; roduced, narrowly end produced, obbeaks appressed; ly straight behind clining in front; lar, extending to surface concenometimes plicated external. Type

Am. Jour. Conch., Gr.

(Pholadella cuneam. Shells, p. 66, p. 510, Waverly Gr. inolites missouri-

tes nasutus.

Pal. N. Y., vol. forward ; rhynchos, e larger and more l truncate, angular antero-dorsal exad broad, margin rounded; beaks traight, extending the dorsal margin, is; umbonal slope concentrically e: I tooth, ligament uadratum. Pal. N. Y., vol. 5,

Pal. N. Y., vol. 5,

83, (Palæanatina 7., vol. 5, p. 492,

OTHYRIS, Meek, 1869, Proc. Acad. Nat. Sci. Phil., p. 172. [Ety. pro, forward; thyris, an orifice.] Equivalve, inequilat-ongate; cardinal bparallel; anterior PRO.-PTE.]

LAMELLIBRANCHIATA.

- end rounded or subtruncate, with a deep notch in the antero-ventral margin; posterior end rounded, lanceolate, or truncate; cardinal line straight or slightly arcuate; cardinal slope sometimes subalate; umbonal slope rounded, undefined or subangular; surface concentrically lined. Type P. elegans.
- alata, Hall, 1885, Pal. N. Y., vol. 5, p. 461, Chemung Gr.
- elegans, Meek, 1871, Am. Jour. Conch., vol. 7, p. 5, Coal Meas. exuta, Hall, 1885, Pal. N. Y., vol. 5, p.
- 462, Chemung Gr.
- lanceolata, Hall, 1883, Pal. N. Y., vol. 5, pl. 76, figs. 2 to 8, Ham. Gr. meeki, Winchell, 1875, Ohio Pal., vol. 2,
- p. 305, Waverly Gr. planulata, Hall, 1883, Pal. N. Y., vol. 5, pl. 76, fig. 1, Ham. Gr.
- PROTOMYA, Hall, 1885, Pal. N. Y., vol. 5, p. 52. [Ety, protos, first; Mya, a genus.] Equivalve, inequilateral, elongate, ovate-elliptical; anterior end broadly rounded; posterior end narrower, incurved; umbo rounded; beaks prominent; cardinal line long, nearly straight; umbonal slope gibbous above, not defined below; surface concentrically lined; ligament external; muscular impressions circular; anterior one strong and near the margin. Type P. oblonga.
- oblonga, Hall, 1885, (Cardiomorpha ob-longa,) Pal. N. Y., vol. 5, p. 509, Ham. Gr.

PSEUDOMONOTIS, Beyrich, 1862, Zeit. der Deutsch., Geol. Gesselsch., vol. 14. [Ety. pseudes, false; Monotis, a genus.] Suborbicular, plano-convex, left valve convex, right valve flat or slightly concave ; not auriculate ; beaks subcentral, slightly oblique, unequal, left elevated, gibbous, incurved, right small; hinge short, narrow, edentulous; cartilage cavity under the beaks; byssal notch of right valve narrow, deep, and separated from the hinge by a small rudimentary ear, which does not project beyond the margin; adductor muscular scar large, subcentral; impres-

sions of retractor

muscles, several, small, placed near the beaks;

surface radiated,

most distinct on

Hayden, 1858, (Monotis haw-

ni,) Trans. Alb.

Inst., vol. 4, p. 76, and Pal. Up.

the left valve. hawni, Meek &



FIG. 901.—Pseudomonotis hawni.

Mo., p. 54, Up. Coal Meas. hawni var. ovata, Meek & Hayden, 1865, (Eumicrotis hawni yar. ovata,) Pal. Up. Mo., p. 55, Permian Gr.

hawni var. sinuata, Meek & Worthen, 1866, (Eumicrotis hawni var. sinuata,) Geo. Sur. Ill., vol. 2, p. 338, Up. Coal Meas.

radialis, (?) Phillips, 1834, (Pecten radi-

alis,) Encyc. Meth., vol. 4, Coal Meas. PTERINEA, Goldfuss, 1826, Germ. Petref. [Ety. pteron, a wing.] Transversely trigonal, oblique, inequivalve, very inequilateral, left valve most convex, beaks near the small anterior end; hinge-line long, straight, forming a small anterior and large falciform posterior wing, with a linear, flattened, marginal cartilage facet, longitudinally striated; shell thick, calcareous; "two long, slightly diverging, posterior, lat-eral teeth, beneath the hinge in one valve and one in the other; a few short, cardinal teeth radiating beneath and in front of the beaks; anterior impression very strong just in front of the beak, posterior impression larger, but faintly marked, superficial; pallial scar simple; shallow byssal concavity. Type P. lævis.



FIG. 902 .- Pterinea demissa.

- appressa, Conrad, 1838, Ann. Rep. N. Y. Not defined.
- arenacea, Hall, 1877. Proposed, but not defined.
- aviformis, Conrad, 1842, (Avicula avi-formis,) Jour. Acad. Nat. Sci., vol. 8, p. 243, Trenton Gr.
- avis, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 105, Chemung Gr.
- bellilineata, Billings, 1866, Catal. Sil. Foss. Antic., p. 15, Hud. Riv. Gr.
- bisulcata, see Grammysia bisulcata.
- brisa, Hall, 1867, 20th Rep. N. Y. Mus. Nat. Hist., p. 384, syn. for P. striæcosta. cancellata, Barris, 1879, (Avicula cancel-
- lata,) Proc. Dav. Acad. Sci., vol. 2, p. 286, Corniferous limestone.

cardiiformis, see Megambonia cardiiformis. cardinata, Winchell, 1862, Proc. Acad. Nat. Sci., p. 412, Marshall Gr.

506

- carinata, Goldfuss, see Ambonychia carinata.
- chemungensis, Conrad, 1842, (Avicula chemungensis,) Jour. Acad. Nat. Sci., vol. 8, p. 243, and Pal. N. Y., vol. 5, pt. 1, p. 98, Chemung Gr.
- concentrica, Conrad, N. Y. Not defined. 1838, Ann. Rep.
- consimilis, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 100, Chemung Gr.
- corrugata, James, 1874, (Avicula corrugata,) Cin. Quar. Jour. Sci., vol. 1, p. 239, Hud. Riv. Gr.
- crenistriata, Winchell, 1862, (Cardiopsis crenistriata,) Proc. Acad. Nat. Sci., p. 417, Marshall Gr.
- crenulata, see Crenipecten crenulatus.
- cuneata, see Sphenotus cuneatus. curiosa, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 51, Anticosti Gr. cyrtodontoides, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., p. 95, Niagara Gr.
- demissa, Conrad, 1842, (Avicula demissa,) Jour. Acad. Nat. Sci., vol. 8, p. 242, and Pal. N. Y., vol. 1, p. 292, Hud. Riv. Gr.
- dispanda, Hall, 1884, Pal. N. Y., vol. 5,
- elliptica, Hall, 1847, (Avicula elliptica,) Pal. N. Y., vol. 1, p. 162, Trenton Gr.



FIG. 903.-Pterinea flabellum.

- flabellum, Conrad, 1842, (Avicula flabella,) Jour. Acad. Nat. Sci., vol. 8, p. 238, and Pal. N. Y., vol. 5, pt. 1, p. 93, Up. Held. and Ham. Grs.
- grandis, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 91, Up. Held. Gr.

- honeymani, Hall, 1860, (Avicula honey-mani,) Can. Nat. and Geol., vol. 5, p. 153, and Acad. Geol., p. 604, Up. Sil. insueta, Emmons, 1842, (Avicula insueta,) Geo. Rep. 2d Dist. N. Y., p. 399, and Pal. N. Y., vol. 1, p. 291, Utica Slate and Hud. Riv. Grs. interstrialis, Hall 1884 Pal. N. V. sol

- interstrialis, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 96, Chemung Gr.
- modiolaris, see Modiolopsis modiolaris.
- morganensis, see Avicula morganensis. mucronata, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 24, Hud. Riv. Gr.
- neglecta, McChesney, 1861, New Palaco-zoic Fossils, p. 88, Niagara Gr. newarkensis, Walcott, 1885, Monogr. U.S.
- Geo. Sur., vol. 8, p. 165, Devonian.
- orbicularis, see Ambonychia orbicularis.
- pholadis, see Orthonota pholadis. pinguis, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 92, Up. Held. Gr.
- pintoensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 234, Subcarboniferous.
- planulata, see Cypricardinia planulata.
- prolifica, Billings, 1866, Catal. Sil. Foss. Antic., p. 16, Hud. Riv. Gr. prora, Hall, 1884, Pal. N. Y., vol. 5, pt. 1,
- p. 102, Chemung Gr.
- punctulata, Conrad. Not defined. See Cimitaria recurva.
- pygmæa, see Modiella pygmæa.
- radians, see Panenka radians.
- reproba, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 104, Chemung Gr.
- reversa var. avis, see P. avis.
- revoluta, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., p. 95, Niagara Gr.
- rigida, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 101, Chemung Gr.
- rugosa, Conrad, 1841, (Avicula rugosa,) Ann. Geo. Rep. N. Y., and Geo. Rep. 4th Dist. N. Y., pl. 26, fig: 2, Waterlime Gr.
- similis, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 214, Marcellus Shale. spinalata, Winchell, 1865, Proc. Acad.
- Nat. Sci., p. 124, Burlington (?) Gr.
- striæcosta, McChesney, 1861, (Ambo-nychia striæcosta,) New Pal. Foss., p.
- 88, Niagara Gr. strigosa, White & Whitfield, 1862, Proc. Bost. Soc. Nat. Hist., p. 31, Marshall Gr.
- suborbicularis, see Pterinopecten suborbićularis.
- subpapyracea, Meek & Worthen, 1866, Proc. Chi. Acad. Sci., p. 21, Ham. Gr. thebesensis, Meek & Worthen, 1868, Geo.
- Sur. Ill., vol. 3, p. 354, Niagara Gr. thisbe, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 52, Anticosti Gr. trentonensis, Conrad, 1842, (Avicula trentonensis,) Jour. Acad. Nat. Sci., vol. 8,
- p. 240, and Pal. N. Y., vol. 1, p. 161, Trenton Gr.
- triquetra, see Gosselettia triquetra. undata, see Ambonychia undata.

PTE.]

[PTE.

undulata, Sur. Ill., varistriata, Antic., p volans, Bost. Soc PTERINOPECT 5, pt. 1, tions.) ten, a g convex; tric line straight; simple e



margins

undosus.

FIG. 90

conspectus,

pt. 1, p.

crenicostati 5, pt. 1, dignatus, 1 pt. 1, p. (dispandus, pt. 1, p. erectus, Ha 1, p. 77, exfoliatus, pt. 1, p. filitextus, H 5, pt. 1, p hermes, Ha pt. 1, p. 6 hoosacensis U. S. G€ Subcarbo imbecilis, H 5, pt. 1, p insons, Hall pt. 1, p. (intermedius vol. 5, pt. invalidus, E validus. lætus, Hall, pt. 1, p. 6 multiradiatu vol. 5, pt neptunus, I pt. 1, p. nodosus, Ha 1, p. 60, 1 reflexus, Ha 1, p. 58, I regularis, H pt. 1, p. 7

LAMELLIBRANCHIATA.

undulata, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 456, Kinderhook Gr. varistriata, Billings, 1866, Catal. Sil. Foss.

Varistriata, Billings, 1806, Catal. Sil. Foss. Antic., p. 50, Anticosti Gr.
volans, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., p. 95, Niagara Gr.
PTERINOPECTEN, Hall, 1883, Pal. N. Y., vol. 5, pt. 1, p. 3. (Plates and Explana-tions.) [Ety. Pterinea, a genus; Pec-ten, a genus.] Valves more or less convert radiated and hearing concerner. convex; radiated and bearing concentric lines of growth; hinge-line long, straight; wings not well defined, being simple expansions of the upper lateral margins to the hinge-line. Type P. undosus.



FIG. 904.-Pterinopecten undosus.

- conspectus, Hall, 1884, Pal. N. Y., vol. 5,
- pt. 1, p. 62, Marcellus Shale.
- dispandus, Hall, 1884, Pal. N. Y., vol. 5,
- erectus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 76, Chemung Gr. erectus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 77, Chemung Gr. exfoliatus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 61, Marcellus Shale.
- filitextus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 67, Ham. Gr. hermes, Hall, 1884, Pal. N. Y., vol. 5,
- pt. 1, p. 64, Ham. Gr.
- hoosacensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 232, Subcarboniferous.
- imbedilis, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 75, Chemung Gr. insons, Hall, 1884, Pal. N. Y., vol. 5,
- pt. 1, p. 59, Up. Held. Gr. intermedius, Hall, 1884, Pal. N. Y.,
- vol. 5, pt. 1, p. 68, Ham. Gr. invalidus, see Aviculopecten in-
- validus. lætus, Hall, 1884, Pal. N. Y., vol. 5,
- pt. 1, p. 63, Marcellus Shale.
- multiradiatus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, * p. 57, Up. Held. Gr. neptunus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 79, Chemung Gr.
- nodosus, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 60, Up. Held. Gr. reflexus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 58, Up. Held. Gr. regularis, Hall, 1884, Pal. N. Y., vol. 5,
- pt. 1, p. 70, Ham. Gr.

spio, Walcott, 1885, Monogr. U. S. Geo. Sur., vol, 8, p. 233, Subcarboniferous. spondylus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 65, Ham. Gr.



FIG. 905.-Pterinopecten undosus.

strictus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 74, Chemung Gr.

- suborbicularis, Hall, 1843, (Pterinea sub-orbicularis,) Geo. Rep. 4th Dist. N. Y., p. 264, and Pal. N. Y., vol. 5, p. 80, Chemung Gr.
- terminalis, see Aviculopecten terminalis. undosus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 72, Ham. Gr.
- vertumnus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 71, Ham. Gr. PTERONITELLA, Billings, 1874, Pal. Foss., vol.
 - 2, p. 141. [Ety. diminutive of Pteronites.] Resembles Pterinea, but pos-sesses in front of the beaks-several small, anterior, cardinal teeth, and close beneath the hinge-line several more or less elongated posterior teeth. Type P. venusta.
 - curta, Billings, 1874, Pal. Foss., vol. 2, p. 143, Low. Held. Gr#



FIG. 906.--Pteronitella venusta. b, Hinge-line.

- oblonga, Billings, 1874, Pal. Foss., vol. 2, p. 143, Low. Held. Gr. venusta, Billings, 1874, Pal. Foss., vol. 2,
- p. 142, Low. Held. Gr.
- p. 142, Low. Held. Gr. PTERONITES, McCoy, 1844, Syn. Carb. Foss. Ireland, p. 81. [Ety. pteron, a wing.] Subtriangular, depressed, hinge-line as long as the shell; beaks terminal, or nearly so, forming a very narrow, ob-

PTE.

PTE.]

(Avicula honey-1 Geol., vol. 5, p. p. 604, Up. Sil. (Avicula insueta,) N. Y., p. 399, and . 291, Utica Slate

Pal. N. Y., vol. 5, Gr. osis modiolaris.

1 morganensis. 9, Jour. Cin. Soc. 4, Hud. Riv. Gr.

1861, New Palaeoagara Gr.

885, Monogr. U.S. 165, Devonian.

chia orbicularis. pholadis.

. N. Y., vol. 5, pt.

85, Monogr. U. S. 234, Subcarbonif-

linia planulata. 3, Catal. Sil. Foss. iv. Gr. N. Y., vol. 5, pt. 1,

Not defined. See

ygmæa. idians.

- 1. N. Y., vol. 5, pt. Gr. I. N. Y., vol. 5, pt.
- Gr. avis.
- Marcy, 1865, Mem. p. 95, Niagara Gr. N. Y., vol. 5, pt. 1,

(Avicula rugosa,) Y., and Geo. Rep. 26, fig: 2, Water-

, Ann. N. Y. Acad. [arcellus Shale. 1865, Proc. Acad. rlington (?) Gr. y, 1861, (Amboy, 1861, (Ambo-New Pal. Foes., p.

itfield, 1862, Proc. p. 31, Marshall Gr. erinopecten subor-

& Worthen, 1866, , p. 21, Ham. Gr. Vorthen, 1868, Geo. 354, Niagara Gr. Catal. Sil. Foss. osti Gr. 1842, (Avicula trend. Nat. Sci., vol. 8, Y., vol. 1, p. 161,

tia triquetra. hia undata.

LAMELLIBRANCHIATA.

tusely pointed anterior end, from which the ventral margin extends to the broad posterior end; left valve most convex; internally a very small tooth under the beak of the right valve, and a very slender, posterior, lateral tooth close to the hinge-line the whole length. Type P. angustatus.

gayensis, Dawson, 1868, Acad. Geo., p. 301, Subcarboniferous.

gayensis var. ornatus, Dawson, 1883, Rep. on Redpath Mus., No. 2, p. 14, Subcarboniferous.

inoptatus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 239, Chemung Gr.

newarkensis, Meek, 1871, Proc. Acad. Nat. Sci., p. 162, Waverly Gr.



FIG. 907.-Pteronites profundus

profundus, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 237, Up. Chemung Gr. rostratus, Hall, 1884, Pal. N. Y., vol. 5, pt.

1, p. 238, Chemung Gr. spergenensis, Whitfield, 1882, Bull. Am. Mus. Nat. Hist., No. 3, p. 56, Warsaw Gr.

PT YCHODESMA, Hall Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 192. [Ety. ptychos, a folding;

Fig. 908.—Ptychodesma knap-panum. Right side.

or band.] Form modioloid; hinge having a wide ligamental area, grooved by the successive growth of the ligament, as in pectunculus. Type P. knappanum.



FIG. 909.—Ptychodesma knappanum. Enlarge-ment of one side of ligamental area.

- knappanum, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 192, Up. Held. Gr.
- minor, Hall, 1885, Pal. N. Y., vol. 5, p. 353, Chemung Gr.

nanum, Hall, 1885, Pal. N. Y., vol. 5, p. 353, Chemung Gr.



FIG. 910.-Ptychopteria beecheri.

PTYCHOPTERIA, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 3. [Ety. ptyche, fold ; Pteria, agenus.] Differs from Actinopteria in the nasute anterior extremity, and large, straight wing marked by a strong longitudinal fold. Hinge-line narrow, linear; furnished with one or two linear, oblique, cardinal and lateral teeth; surface with fine rays. It bears about the same relation to Actinopteria that Leptodesma does to Liopteria. Type P. eugenia. alata, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 139, Chemung Gr.

beecheri, Hall, 1884, Pal. N.Y., vol. 5, pt. 1, p. 143, Chemung Gr. elongata, Hall, 1884,

Pal. N. Y.,

&

desma, a

ligament,



FIG. 911.-Ptychopteria beecheri.

- vol. 5, pt. 1, p. 141, Chemung Gr.
- eucrate, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, 133, Chemung Gr. eudora, Hall, 1884, Pal. N. Y., vol. 5, pt
- 1, p. 138, Chemung Gr.
 eugenia, Hall, 1883, Pal. N. Y., vol. 5, pl.
 23, figs. 17-20, Chemung Gr.
- expansa, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 152, Chemung Gr. falcata, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 136, Up. Chemung Gr. galene, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 142, Chemung Gr.
- gibbosa, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 149, Up. Chemung Gr. lata, Hall, 1884, Pal. N. Y., vol. 5, pt. 1,
- p. 145, Up. Chemung Gr.
- lobata, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 150, Up. Chemung Gr.
- perlata, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 147, Up. Chemung Gr.
- proto, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 129, Chemung Gr.
- protoformis, Walcott, 1885, Monogr. U.S. Geo. Sur., vol. 8, p. 235, Subcarboniferous.
- salamanca, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 131, Chemung Gr.

PYA.-SAN.]

sao, Hall, 1 132, Che sinuosa, Ha 1, p. 130, spatulata, pt. 1, p. spio, Hall, p. 137, C thalia, Hal 1, p. 148 thetis, Hall p. 135, Cl trigonalis, pt. 1, p. vanuxemi. pt. 1, p. PYANOMYA, S Soc. Nat. pyanos, a valve, ele edentulor P. gibbosi faberi, n. sı equilatera height; c parallel; into the end broa cose in th bonal rids tinctly di FIG. 912.-Pyanc faberi. Right v

> tric lines from P. g bonal ridg straight ca and other

and dorsal vie

Cincinnati Faber. gibbosa, S. Soc. Nat.

Riv. Gr.



PYRENOMOEUS,

similar; fr form to the Equivalve. inent, beak sion near t eral form (that charac cle of a Clic cuneatus, Ha 87, Clinton

p 87. [E

[PTE.



[PTE.

PYA.-SAN.]

- sao, Hall, 1884, Pal. N. Y., vol. o, pt. 1, p. | SANGUINOLARIA, Lamarck, 1801, Syst. An. 132, Chemung Gr. sinuosa, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 130, Up. Chemung Gr. spatulata, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 144, Up. Chemung Gr. spio, Hall, 1884, Pal. N. Y., vol. 5, pt. 1,
- p. 137, Chemung Gr. thalia, Hall, 1884, Pal. N. Y., vol. 5, pt.
- 1, p. 148, Up. Chemung Gr. thetis, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 135, Chemung Gr.
- trigonalis, Hall, 1884, Pal. N. Y., vol. 5,
- pt. 1, p. 140, Chemung Gr. vanuxemi, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. 151, Up. Chemung Gr.
- PYANOMYA, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 318. [Ety. pyanos, a bean; Mya, a genus.] Equivalve, elongate, inequilateral, fragile, edentulous; ligament external. Type P. gibbosa.
 - Shell small, equivalve, infaberi, n. sp. equilateral; length twice as great as height; cardinal and basal lines subparallel; anterior end sharply rounded into the subelliptical base; posterior end broadly rounded; valves ventricose in the middle; beaks obtuse; umbonal ridge prominent, subangular, distinctly defined, and directed to 'the



FIG. 912.-Pyanomya faberi. Right valve and dorsal view.

- tric lines of growth. Distinguished from P. gibbosa by the angular umbonal ridge, less acute anterior end and straight cardinal line behind the beaks, and other particulars. Hud. Riv. Gr., Cincinnati, Ohio. Collected by Charles Faber.
- gibbosa, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 318, Hud. Riv. Gr.



FIG. 913.—Pyanomya gibbosa. Left valve and dorsal view.

PYRENOMŒUS, Hall, 1852, Pal. N. Y., vol. 2, p. 87. [Ety. pyrenos, Nucula; omoios, similar; from its resemblance in general form to the shells of the genus Nucula.] Equivalve, inequilateral; 'umbones prominent, beak elevated; muscular impression near the anterior extremity; general form of Nucula without the teeth that characterize that genus, or the clavicle of a Clidophorus. Type P. cuneatus. cuneatus, Hall, 1852, Pal. N. Y., vol. 2, p. 87, Clinton Gr.

sans Vert. [Ety. from the type Solen sanguinolentus.] Oval, compressed, rounded in front, attenuated and slightly gaping behind; hinge teeth ²/₃ small; siphonal inflection deep, connected with the -pallial line; ligament external, on very prominent fulcra. Type S. sanguinolentus. Typical species S. diphos. Not American Palæozoic. Species left under this name for want of material to determine generic relations.



FIG. 914 .--- Sanguinolaria diphos.

- leptogaster, Winchell, 1863, Proc. Acad. Nat. Sci., p. 18, Marshall Gr.
- rostrata, Winchell, 1865, Proc.' Acad. Nat. Sci., p. 129, Marshall Gr.
- sectoralis, Winchell, 1862, Proc. Acad.
- Nat. Sci., p. 422, Marshall Gr. septentrionalis, Winchell, 1862, Proc. Acad. Nat. Sci., p. 421, Marshall Gr. similis, Winchell, 1862, Proc. Acad. Nat.
- Sci., p. 421, Marshall Gr.
- SANGUINOLITES, McCoy, 1844, Synop. Carb. Foss., Ireland, p. 47. [Ety. Sanguino-laria, a genus; lithos, stone.] Subequivalve, oblong, elongated, margins sub-parallel or a little arched upward; sides compressed or diagonally gibbous from the beak backward; beaks small, anterior; hinge nearly as long as the shell, margin inflected to form a long posterior lunette; surface wrinkled; large, oval adductor impression in front of the beak surmounted by a small retractor; posterior adductor large, superficial; cartilage external; pallial impression entire; shell thin.



FIG. 915.-Sanguinolites obliquus.

acutus, see Goniophora acuta.

- * *xolus*, see Sphenotus *x*olus.
- amygdalinus, see Glossites amygdalinus. arciformis, see Sphenotus arciformis.
- borealis, Winchell, 1862, Proc. Acad. Nat. Sci., p. 415, Marshall Gr.
- brookfieldensis, Dawson, 1883, Rep. on Redpath Museum, p. 11, Subcarboniferous.
- burlingtonensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 14, and Geo. Sur. Ill., vol. 8, p. 129, Burlington Gr.

N. Y., vol. 5, p.



e same relation to Leptodesma does e P. eugenia. 1. N. Y., vol. 5, pt. g Gr.

11 -- Ptychopteria beecheri

Gr. 1. N. Y., vol. 5, pt. I. N. Y., vol. 5, pt,

Gr. al. N. Y., vol. 5, pl.

nung Gr. al. N. Y., vol. 5, pt.

Gr.

1. N. Y., vol. 5, pt. ung Gr.

1. N. Y., vol. 5, pt.

Gr. I. N. Y., vol. 5, pt.

ing Gr. N. Y., vol. 5, pt. 1,

ıg Gr.

. N. Y., vol. 5, pt. 1, ıg Gr.

1. N. Y., vol. 5, pt. ung Gr.

N. Y., vol. 5, pt. 1,

1885, Monogr. U.S. p. 235, Subcarbon-

, Pal. N. Y., vol. 5, ing Gr.



postero-basal margin; ligament external; hinge-line straight behind the beaks and inclined in front; no escutcheon or lunule.

Surface marked very faintly by concen-

clavulus, see Sphenotus clavulus. 'combensis, Walcott, 1885, Monogr. U. S.

Geo Sur., vol. 8, p. 175, Devonian. concentricus, Winchell, 1862, (Cardinia

concentrica,) Proc. Acad. Nat. Sci., p. 413, Marshall Gr.

cylindricus, Winchell, 1863, Proc. Acad. Nat. Sci., p. 13, Marshall Gr.

flavius, see Sphenotus flavius.

glaucus, see Goniophora glaucus. gracilis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 175, Devonian. hamiltonensis, see Goniophora hamiltonensis

ida, Hall, 1870, Prelim. Notice Lam. Shells, p. 43, and Pal. N. Y., vol. 5, pl. 65, fig. 20, Ham. Gr.

iowensis, Winchell, 1863, Proc. Acad.

Nat. Sci., p. 14, Marshall Gr. jejunus, Winchell, 1863, Proc. Acad. Nat. Sci., p. 15, Marshall Gr.

marshallensis, Winchell, 1862, Proc. Acad. Nat. Sci., p. 415, Marshall Gr.

missouriensis, Swallow, 1860, (Solen (?) missouriensis,) Trans. St. Louis Acad. Sci., vol. 1, p. 655, Waverly or Choteau Gr.

multistriatus, Worthen, 1884, Bull. No. 2, multistriatus, worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 14, and Geo. Sur. Ill., vol. 8, p. 129, Keokuk Gr.
nænia, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 249, Subcarboniferous.
naiadiformis, Winchell, 1870, Proc. Am. Phil. Soc., vol. 12, p. 255, Marshall Gr.
nasutus, Meek, 1871, Am. Jour. Conch., vol. 7, Kinderbook Gr.

vol. 7, Kinderhook Gr.

obliquus, Meek, 1871, Proc. Acad. Nat. Sci., p. 213, and Ohio Pal. vol. 2, p. 306, Waverly Gr.

perangulatus, see Goniophora perangulata. ponderosus, see Modiomorpha ponderosa. randolphensis, Worthen, 1883, (Cypri-cardia randolphensis,) Geo. Sur. Ill.,

vol. 7, p. 326, Kaskaskia Gr. retusus, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 247, Subcarboniferous. salteri, Walcott, 1885, Monogr. U. S. Geo.

Sarteri, Walcott, 1835, Monogl. J. Geo. Sur., vol. 8, p. 248, Subcarboniferous. sanduskiensis, Meek, 1871, Proc. Acad. Nat. Sci., p. 68, and Ohio Pal., vol. 1, p. 209, Up. Held. Gr. securis, Winchell, 1870, Proc. Am. Phil.

Soc., vol. 12, p. 255, Marshall Gr. simplex, Walcott, 1885, Monogr. U. S. Geo.

Sur., vol. 8, p. 248, Subcarboniferous.

solenoides, see Sphenotus solenoides.

striatus, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 249, Subcarboniferous. strigatus, Winchell, 1865, Proc. Acad. Nat.

Sci., p. 127, Marshall Gr.

subtortuosus, see Sphenotus subtortuosus. subtruncatus, Hall, 1885, Pal. N. Y., vol. 5, p. 508, Chemung Gr.

sulciferus, see Cypricardinia sulcifera. tethys, Billings, 1874, Pal. Foss., vol. 2, p.

50, Gaspe limestone No. 8, Devonian. undatus, Hall, 1870, Prelim. Notice Lam. Shells, p. 41, and Pal. N. Y., vol. 5, pl. 80, figs. 5, 6, Chemung Gr.

unioniformis, Winchell, 1862, Proc. Acad. Nat. Sci., p. 414, Marshall Gr. valvulus, see Sphenotus valvulus.

- SCHIZODUS, King, 1844, Ann. Mag. Nat. Hist., vol. 14, p. 313. [Ety. schizo, I split; odous, a tooth.] Shell oval of subtrigonal; anterior side rounded, shorter than the other; posterior side tapering, truncate at the extremity, umbonal ridge extending to the postero-basal region; beaks prominent; surface smooth or with concentric strize; hinge with twox smooth cardinal teeth in the right valve and three in the left; middle tooth of the left valve bifid, and fitdie tooth of the felt valve bind, and fit-ting between two of the right valve; free margins smooth. Type S. truncatus æqualis, Hall, 1885, Pal. N. Y., vol. 5, p. 459, Waverly Gr. amplus, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 41, and Geo. Sur. Ill., vol. 5, p. 579, Coal Meas. cayuga, Hall, 1870, Prelim. Notice Lam. Shells, p. 65 cayn for Cutberredon or

 - Shells, p. 95, syn. for Cytherodon ap-

pressus.

chesterensis, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 457, and Geo. Sur. Ill., vol. 2, p. 301, Kaskaskia Gr.



- circulus, Worthen, 1884, Bull. No. 2, Worthen, FIG. 916.-Schizodus medinensis. Ill. St. Mus. Nat.
 - Hist., p. 11, and Geo. Sur. Ill., vol. 8, p. 109, St. Louis Gr.
- contractus, Hall, 1885, Pal. N. Y., vol. 5, p. 451, Ham. Gr.
- cuneatus, Meek, 1875, Ohio Pal., vol. 2, p. 336, Coal Meas.
- curtiformis, Walcott, 1885, Monogr. U.S. Geo. Sur., vol. 8, p. 253, Subcarboniferous.
- curtus, Meek & Worthen, 1866, Proc. Chi. Acad. Sci., p. 18, Coal Meas.
- degener, Hall, 1885, Pal. N. Y. vol. 5, p. 456, Chemung Gr.
- deparcus, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 252, Subcarboniferous.
- depressus, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 11, and Geo. Sur. Ill., vol. 8, p. 109, St. Louis Gr.
- ellipticus, see Cytherodon ellipticus.

eminens, Hall, 1885, Pal. N. Y., vol. 5, p.

457, Chemung Gr. gregarius, see Cytherodon



gregarius. magnus, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 9, and Geo. Sur. Ill., vol. 8, p. 107, Kaskaskia Gr.

FIG. 917 Hinge of Schizodus truncatus. Proc. Acad. Nat. Sci. Phil., vol. 23, p. 165, and Ohio Pal., vol. 2, p. 299, Waverly Gr.

nauvooens Ill. St. M Sur. Ill., orbicularis. Geo. Sur ovatus, Me ovatus,) 262, and mian Gr patulus, Ha 457, Che

FIG. 918,-Schi

SED.]

mooresi, n

rhomboi

equal; a

beaks an rior side basal li rounded right an the beak the basa rising ab and situa dle of th rounded strongly near the scar to th rior mu moderate impressi the cent from the cular sci right va with a s tooth un showing Found b

Ohio, at in the C

collection

SCH.

510

新加州

LAMELLIBRANCHIATA.

ell, 1862, Proc. Acad. arshall Gr. is valvulus.

SCH.

SED.]

Ann. Mag. Nat. Hist., Ety. schizo, I split; nell oval or subtrige rounded, shorter sterior side tapering, extremity, umbonal the postero-basal re-ent; surface smooth c striæ; hinge with linal teeth in the ree in the left; midt valve bifid, and fitof the right valve; h. Type S. truncatus. Pal. N. Y., vol. 5, p.

Northen, 1870, Proc. hil., p. 41, and Geo. 579, Coal Meas. Prelim. Notice Lam. for Cytherodon ap-



FIG. 916.-Schizodus medinensis

Geo. Sur. Ill., vol. 8,

85, Pal. N. Y., vol. 5,

5, Ohio Pal., vol. 2, p.

, 1885, Monogr. U. S. p. 253, Subcarbonif-

then, 1866, Proc. Chi. Coal Meas.

Pal. N. Y. vol. 5, p.

1885, Monogr. U. S. p. 252, Subcarbonif-

, 1884, Bull. No. 2, Ill." t., p. 11, and Geo. Sur. St. Louis Gr.

rodon ellipticus. , Pal. N. Y., vol. 5, p.

arius, see Cytherodon

regarius.

gnus, Worthen, 1884, Sull. No. 2, Ill. St. Aus. Nat. Hist., p. 9, nd Geo. Sur. Ill., vol. , p. 107, Kaskaskia Gr. dinensis, Meek, 1871, Sci. Phil., vol. 23, p. al., vol. 2, p. 299, Wamooresi, n. sp. Shell very large, sub-rhomboidal, height and length subequal; anterior side straight from the beaks and at right angles to the posterior side, and then rounded into the basal line; basal margin regularly rounded; posterior side sloping at right angles to the anterior side from the beaks and abruptly rounding into the basal margin; beaks prominent, rising above the cardinal line, obtuse, and situate a little anterior to the middle of the shell; umbonal slope broadly rounded and undefined; pallial line strongly marked, pitted, and placed near the margin from one muscular scar to the other; anterior and posterior muscular scars subtrigonal and moderately impressed; a wide vascular impression, somewhat cordate, occupies the central area of the shell, extending from the anterior to the posterior muscular scars; one strong tooth in the right valve directed a little forward, with a socket on each side, the other tooth undefined; surface nearly smooth, showing fine concentric lines of growth. Found by Henry Moores, of Columbus, Ohio, at Carbon Hill, Hocking Valley, in the Coal Measures, and now in the collection of Charles Faber.



FIG. 918.—Schizodus mooresi. Right valve, poste-rior part broken off.

- nauvooensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 10, and Geo. Sur. Ill., vol. 8, p. 108, Keokuk Gr.
- orbicularis, Walcott, 1885, Monogr. U.S. Geo. Sur., vol. 8, p. 181, Devonian. ovatus, Meek & Hayden, 1858, (Axinus ovatus,) Proc. Acad. Nat. Sci. Phil., p. 262, and Pal. Up. Mo., p. 59, Per-mion G. mian Gr.
- patulus, Hall, 1885, Pal. N. Y., vol. 5, p. 457, Chemung Gr.

perelegans, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 42, and Geo. Sur. Ill., vol. 5, p. 581, Coal Meas.



FIG. 919.—Schizodus mooresi. Interior of right valve, showing pallial line and place of sub-cordate muscular impression and hinge-teeth.

- pintoensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 253, Subcarboniferous.
- quadrangularis, see Cytherodon quadrangularis.
- randolphensis, Worthen, (in press,) Geo. Sur, Ill., vol. 8, p. 110, Kaskaskia Gr. rossicus, Verneuil, 1845, Geo. Russ., vol. 2, p. 309, Permian Gr.
- z, p. 305, Fermini Gr.
 subtrigonalis, Meek, 1871, Proc. Acad.
 Nat. Sci., p. 166, Waverly Gr.
 triangularis, Swallow, 1858, Trans. St.
 Louis Acad. Sci., p. 193, Permian Gr.
 tumidus, see Cytherodon tumidus.
- ulrichi, Worthen, (in press,) Geo. Sur. Ill., vol. 8, p. 110, Up. Coal Meas. varsoviensis, Worthen, 1884, Ball. No. 2,
- Ill. St. Mus. Nat. Hist., p. 10, and Geo. Sur. Ill., vol. 8, p. 107, Keokuk Gr. wheeleri, Swallow, 1862, (Littorina wheel-
- eri,) Trans. St. Louis Acad. Sci., vol. 1, p. 658, and Pal. E. Neb., p. 209, Coal Meas.
- SEDGWICKIA, McCoy, 1844, Snyop. Carb. Foss. Ireland, p. 61. [Ety. proper name.] Nearly equivalve, inequilateral, depressed, oblong, or suboval, very thin; anterior side not quite closed, often gibbous; posterior side longer, more compressed, and gaping; beaks prominent, tumid, incurved; posterior umbonal slopes rounded, or forming an oblique ridge, separated from the postero-dorsal region by a shallow sulcus; lunule distinct; hinge edentulous; cardinal margin inflected so as to form a narrow false area behind the beaks; surface concentrically marked. Type S. attenuata.

LAMELLIBRANCHIATA.

- altirostrata, Meek & Hayden, 1858, (Allorisma (?) altirostratum,) Proc. Acad. Nat. Sci. Phil., p. 263, and Pal. Up. Mo., p. 41, Coal Meas.
- (?) compressa, Meek, 1872, Proc. Acad. Nat. Sci. Phil., p. 324, and Ohio Pal., vol. 1, p. 144, Hud. Riv. Gr.
- concava, Meek & Hayden, 1858, (Lyonsia concava,) Trans. Alb. Inst., vol. 4, p. 82, and Pal. Up. Mo., p. 41, Coal Meas.
- (?) divaricata, Hall & Whitfield, 1875, Ohio Par, vol. 2, p. 89, Hud. Riv. Gr.
 (?) fragilis, Meek, 1872, Proc. Acad. Nat.

) fragilis, Meek, 1872, Proc. Acad. Nat. Sci. Phil., p. 323, and Ohio Pal., vol. 1, p. 143, Hud. Riv. Gr.

(?) lunulata, Whitfield, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 140, Hud. Riv. Gr. neglecta, see Cuneamya neglecta.

subarcuata, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 251, and Geo. Sur. Ill., vol. 3, p. 537, Keokuk Gr.



FIG. 920.--Sedgwickia topekensis.

- topekaensis, Shumard, 1858, (Leptodomus topekaensis,) Trans. St. Louis Acad. Sci., vol. 1, p. 208, and Pal. Up. Mo., p. 40, Coal Meas.
- Solemya, Lamarck, 1818, Hist. Nat. An. sans Vert., vol. 5. See Solenomya—the correct orthography, first used by Menke, 1828, Syn. Meth. Edit.
- SOLEN, Linnæus, 1758, Syst. Nat., 10th ed. [Ety. Solen, a tube or pipe.] Shell very long; subcylindrical; ends gaping; hinge teeth two in each valve; ligament external; anterior scar elongated; posterior oblong; pallial line extending beyond the adductors. Type S. siliqua. Not a Palæozoic genus.



FIG. 921.-Solen siliqua. One-third diam.

missouriensis, see Sanguinolites missouriensis.

permianus, see Solenopsis permianus. priscus, Winchell, 1862, Proc. Acad. Nat Sci., p. 423, Portage Gr.

Sci., p. 423, Portage Gr. quadrangularis, Winchell, 1862, Proc. Acad. Nat. Sci., p. 422, Marshall Gr.

scalpriformis, see Solenopsis scalpriformis. Solenomya, Lamarck, 1818, (Solemya,) Hist. Nat. Anim. sans Vert., vol. 5, p. 488. [Ety. from the resemblance to the wo genera Solen and Mya.] Elongate, oblong, equivalve, very inequilateral, posterior end the shorter; dorsal and ventral margins subparallel; ends rounded and gaping; surface covered with; a thick, horny periostraca, extending in jagged portions beyond the ventral margin; beaks minute; cartilage forming a thick, triangular mass behind the beaks, supported internally by an oblique ensiform plate; long anterior margin simple, erect, without teeth; posterior adductor small, ovate, within the cartilage pit, anterior impression large, comma-shaped. Type S. australis.

- anodontoides, Meek, 1875, Ohio Pal., vol. 2, p. 339, Coal Meas.
- biarmica, Verneuil, 1845, Geo. Russ. and Ural Mountains, Permian Gr. This species does not occur in this country.
- curta, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 242, Subcarboniferous. iowensis, Worthen, 1884, Bull. No. 2, Ill.
- St. Mus. Nat. Hist., p. 13, and Geo. Sur. Ill., vol. 8, p. 132, St. Louis Gr. monroensis, Worthen, 1884, Bull. No. 2,
- monroensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 13, and Geo. Sur. Ill., vol. 8, p. 131, St. Louis Gr. radiata, Meek & Worthen, 1860, (Solemya
- radiata, Meek & Worthen, 1860, (Solemya radiata,) Proc. Acad. Nat. Sci. Phil., p. 457, and Geo. Sur. Ill., vol. 2, p. 349, Coal Meas.
- recurvata, Swallow, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 208, Up. Coal Meas.
- soleniformis, Cox, 1857, Geo. Sur. Ky., vol. 3, p. 573, Coal Meas. varsoviensis, Worthen, 1884, Bull. No. 2,
- varsoviensis, Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist., p. 12, and Geo. Sur. Ill., vol. 8, p. 131, Keokuk Gr.

kuk Gr. vetusta, Meek, 1871, Proc. A ca d. Nat. Sci. Phil., p. 66, and Ohio Pal., vol. 1, d. 206, Up. Held. Gr.

N. LAN

FIG. 923.-Solenopsis

FIG. 922.—Solenomya vetusta.

Solenopsis, McCoy, 1844, Carb. Foss. Ireand, p. 47. [Ety.

Solenopsis, resembling a shell of the genus Solen.] Elongated; beaks

gated; beaks compressed, anterior; depression in

- front of beaks; surface concentrically marked. Type S. minor. permianus, Swallow, 1858, (Solen per-
- permianus, Swallow, 1858; (Solen permianus,) Trans. St. Louis Acad. Sci., vol. 1, p. 190, Permian Gr. scalpriformis, Winchell, 1862, (Solen
- scalpriformis, Winchell, 1862, (Solen scalpriformis,) Proc. Acad. Nat. Sci., p. 422, Marshall Gr.
- solenoides, Geinitz, 1866, (Clidophorus solenoides,) Carb. und Dyas in Neb., p. 25, and Pal. E. Neb., p. 223, Coal Meas.

SPA.—SPH.]

SPATHELLA, H 33. [Ety minutive. eral, wide cylindrica rowly rousmall; um angular; Type S. ty typica, Hall 407, Chem ver.tricosa, (Orthonota Nat. Hist., vol. 5, p. 4 SPHENOLIUM, n leion, smoo inequilater tricose; ui curved at line at an from the wing-like lunule pre ment exte hinge-line forme. cuneiforme,

desma cui Nat. Hist., faberi, n. sp. size for sp



Fig. 924.—Spheno Left val riorly into

terior end basal marg tical; umb tapering to surface con by Charles at Cincinna



F1G. 925.—8

richmondense form, ventri anterior end defined; caj

51.14 01

SOL.

SOL.

SPA.-SPH.]

very inequilateral, horter; dorsal and subparallel; ends g; surface covered y periostraca, exortions beyond the aks minute; cartick, triangular mass upported internally orm plate; long anile, erect, without luctor small, ovate, e pit, anterior imna-shaped. Type S.

875, Ohio Pal., vol.

345, Geo. Russ. and Permian Gr. This ur in this country. Monogr. U. S. Geo. Subcarboniferous. 384, Bull. No. 2, Ill. p. 13, and Geo. Sur.

t. Louis Gr. 1884, Bull. No. 2, ist., p. 13, and Geo. 31, St. Louis Gr. hen, 1860, (Solemya l. Nat. Sci. Phil., p. [11., vol. 2, p. 349,

358, Trans. St. Louis p. 208, Up. Coal

357, Geo. Sur. Ky., Meas.

n, 1884, Bull. No. 2, Hist., p. 12, and . 8, p. 131, Keo-

kuk Gr. vetusta, Meek, Proc. 1871, Acad. Nat. Sci. Phil., p. 66, and Ohio Pal., vol. 1, d. 206, Up. Held. Gr.

14, Carb. Foss. Ire-



FIG. 923.-Solenopsis solenoides.

ior; depression in rface concentrically ninor. 1858; (Solen per-

t. Louis Acad. Sci., nian Gr.

hell, 1862, (Solen . Acad. Nat. Sci., p.

(Clidophorus 1866, und Dyas in Neb., . Neb., p. 223, Coal SPATHELLA, Hall, 1885, Pal. N. Y., vol. 5, p. 33. [Ety. spathe, a spathe; ellus, di-minutive.] Equivalve, very inequilateral, wider behind, transversely subcylindrical; anterior end short, narrowly rounded; beaks subanterior, small; umbonal slope rounded or subangular; surface concentrically lined. Type S. typica.

typica, Hall, 1885, Pal. N. Y., vol. 5, p. 407, Chemung Gr.

ventricosa, White & Whitfield, 1862, (Orthonota ventricosa,) Proc. Bost. Soc. Nat. Hist., vol. 8, p. 297, and Pal. N. Y., vol. 5, p. 408, Waverly Gr.

SPHENOLIUM, n. gen. [Ety, sphen, wedge; leion, smooth.] Shell large, equivalve, inequilateral, elongate, cuneiform, ventricose; umbones prominent; beaks incurved at the anterior end; cardinal line at an angle of fifty or sixty degrees from the basal line, and appearing wing-like toward the posterior end; lunule present; no escutcheon; ligament external; muscular scars and hinge-line unknown. Type S. cuneiforme.

cuneiforme, S. A. Miller, 1881, (Orthodesma cuneiforme,) Jour. Cin. Soc. Nat. Hist., vol. 3, p. 314, Hud. Riv. Gr. faberi, n. sp. Shell below the medium size for species in this genus; beaks



unite over hinge- \mathbf{the} line near the anterior end; anterior end. pointed, rounded; hing e-lin e

FIG. 924.-Sphenolium faberi. Left valve.

rising posteriorly into a wing-like expansion; posterior end prolonged at the posterobasal margin; basal margin subelliptical; umbones high and gradually tapering to the postero-basal margin; surface concentrically lined. Collected by Charles Faber in the Hud. Riv. Gr., at Cincinnati, Ohio.



FIG. 925.—Sphenolium richmondense.

richmondense, n. sp. Shell large, cuneiform, ventricose, beaks incurved at the anterior end, pointed; umbones high, defined; cardinal line at a high angle, having a wing-like posterior end; anterior end rounded below the lunule. Distinguished

from S. cuneiforme, which it much resembles, by its shorter form and more angular umbones. Possibly more specimens may



and if so, this specific name will fall into synonymy. Collected by Charles Faber in the upper part of the Hud. Riv. Gr., at Richmond, Indiana.

SPHENOTUS, Hall, 1885, Pal. N. Y., vol. 5, p. [Ety. sphen, wedge; ous, ear.] 33. Equival ve,



FIG. 927.--Sphenotus æolus.

truncate; cardinal line, long, straight; umbonal ridge extending to the postinferior extremity; surface concentrically lined; two short teeth beneath the beak of the right valve, and one or two slender lateral teeth; ligament external, contained in a groove; anterior muscular scar strongly marked; posterior scar shallow; pallial line simple. Type S. arciformis.

æolus, Hall, 1870, (Sanguinolites æolus,) Prelim. Not. Lam. Shells, p. 46, and Pal. N. Y., vol. 5, p. 404, Waverly Gr. arciformis, Hall, 1870, (Sanguinolites

arcæformis,) Prelim. Not. Lam. Shells, p. 40, and Pal. N. Y., vol. 5, p. 395, Ham. Gr.

arcuatus, Hall, 1885, Pal. N. Y., vol. 5, p. 400, Chemung Gr.

clavulus, Hall, 1870, (Sanguinolites clavulus,) Prelim. Not. Lam. Shells, and Pal. N. Y., vol. 5, p. 401, Chemung Gr. contractus, Hall, 1843, (Cypricardia contracta,) Geo. Sur. 4th Dist. N. Y., p. 292, and Pal. N. Y., vol. 5, p. 399, Che-

mung Gr. cuneatus, Conrad, 1838, (Pterinea cune-ata,) Ann. Rep. Geo. N. Y., p. 116, and Pal. N. Y., vol. 5, p. 396, Ham. Gr. flavius, Hall, 1870, (Sanguinolites flavius,) Prolim. Not. Lam. Chells. p. 47

Prelim. Not. Lam. Shells, p. 47, and Pal. N. Y., vol. 5, p. 403, Waverly Gr. rigidus, White & Whitfield, 1862, (Cypri-cardia rigida,) Proc. Bost. Soc. Nat. Hist, vol. 8, p. 300, and Pal. N. Y., vol. 5, p. 402, Waverly Gr. signatus, Hall, 1885, Pal. N. Y., vol. 5, p. 405, Waverly Gr.

solenoides, Hall, 1870, (Sanguinolites solenoides,) Prelim. Not. Lam. Shells, p. 38, and Pal. N. Y., vol. 5, p. 398, Ham. Gr.



very

equilateral.

elongate

anterior end

short; pos-

terior end

obliquely

in-

LAMELLIBRANCHIATA.

- subtortuosus, Hall, 1870, (Sanguinolites subtortuosus,) Prelim. Not. Lam. Shells, p. 41, and Pal. N. Y., vol. 5, p. 397, Ham. Gr.
- telamon, Hall, 1885, Pal. N. Y., vol. 5, p. 406. Waverly, Gr.
- truncatus, Conrad, 1842, (Cypricardites truncatus,) Jour. Acad. Nat. Sci., vol. 8, p. 244, Ham. Gr.
- undatus, Hall, 1885, Pal. N. Y., vol. 5, p. 506, Chemung Gr.
- valvulus, Hall, 1870, (Sanguinolites val-vulus,) Prelim. Not. Lam. Shells, p. 46, and Pal. N. Y., vol. 5, p. 403, Waverly Gr.



FIG. 928--Spirodomus insignis.

SPIRODOMUS, Beecher, 1886, 39th Rep. N. Y. Mus. Nat. Hist. [Ety. speira, spire; demos, house.] Equivalve, elongatespiral; beaks terminal; muscular impressions at the two extremities; no hinge-line. Type S. insignis.

Ininge-inte. Type 5. Insignis.
insignis, Beecher, 1886, 39th Rep. N. Y. Mus. Nat. Hist., Waverly Gr.
STREBLOPTERIA, McCoy, 1851, Ann. Mag. Nat. Hist., 2d series, vol. 7, p. 170, and Brit. Pal. Rocks, p. 482. [Ety. streblos, topod the waverevent stress a wing.]

turned the wrong way; pteron, a wing.] Pectinoid, ovate, or rounded, obliquely extended toward the anterior side; posterior wing rectangular, anterior ear small, deeply defined; surface smooth or radiately ridged; large, faintly marked muscular impression behind the middle; short, narrow tooth posterior to the beaks; ligament confined to a narrow, simple facet on the hinge margin. Type S. lævigata.

similis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 230, Carboniferous.

tenuilineata, Meek & Worthen, 1860, (Pec-ten tenuilineatus,) Proc. Acad. Nat. Sci., Phil., p. 452, and Geo. Sur. Ill., vol. 2, p. 334, Coal Meas.

TECHNOPHOBUS, n. gen. [Ety. techne, art; phoros, bearing.] Shell small, equivalve, inequilateral; anterior end short, broadly rounded; two or more fur-rows arising near the beak extend to the postero-basal margin; beak small, upright; surface concentrically lined; umbonal rib in front of the beak represented in the cast by a transverse sulcus; no external ligament, escutcheon, or lunule. Type T. faberi.

FIG. 929.-Streblop-

teria similis. Right valve.

faberi, n. sp. Shell small, equivalve, inequilateral, a little longer than high ; anterior end short, broadly rounded; base more narrowly rounded in the anterior and central part; the postero-basal part slightly produced; cardinal line straight or nearly so; beak extremely small and standing upright, like a little point projecting beyond the cardinal line; valves convex in the umbonal region; two furrows or cinctures arising near the beak in the umbonal region. which gradually widen, are directed to the postero-basal margin, and above these the postero-dorsal part of the shell

is somewhat wing-like: surface marked by very fine concentric lines; the casts show a deep sulcus directly in front of the beak for the reception of an umbonal rib, or support on the interior of the shell. Hud. Riv. Gr., near

SPI.-TEL

Sharonville, Hamilton County, Ohio. Collected by Mr. Charles Faber.



- FIG. 930.-Technophorus faberi. The right hand figure shows the left valve with a small piece broken from the posterior end; the left hand figure represents a well-preserved cast; the central figure presents a cardinal view.
- Tellina, Linnæus, 1758, Syst. Nat., 10th ed. [Ety. telline, a sort of mussel.] This genus unknown in the Palæozoic rocks. (?) ovata, Hall, 1843, Geo. Rep. 4th Dist. N. Y. Syn. for Palæoneilo maxima.
- TELLINOMYA, Hall, 1847, Pal. N. Y., vol.1, p. 151. [Ety. from the resemblance to the genera Tellina and Mya.] Nearly equilateral, generally transverse, anterior side largest; beaks approximate, not prominent; hinge-line with a double series of bent teeth connected by smaller ones beneath the beak; ligament posterior, external, on a fulcrum; no striated area or cartilage pit; muscular impressions strong not bounded by elevated lines; pallial line simple. Type T. nasuta.
 - abrupta, Billings, 1862, (Ctenodonta abrupta,) Pal. Foss., vol. 1, p. 46, Black Riv. Gr.
 - æquilatera, Hall, 1852, Pal. N. Y., vol. 2,
 - p. 330, Coralline limestone. alta, Hall, 1861, Geo. Rep. Wis., p. 27, and Geo. Sur. Ill., vol. 3, p. 309, Trenton Gr.
 - anatiniformis, see Pterotheca anatiniformis.
 - angela, Billings, 1865, (Ctenodonta an-gela,) Pal. Foss., vol. 1, p. 221, Quebec Gr.

TEL.-VAN.]

angustata, H vol. 5, p. 1 astartiformis astartæfori 1, p. 39, B attenuata, H vol. 5, p. 1 cingulata, U Nat. Hist ... contracta, S: tracta,) Ca Black Riv. curta, Hall. Clinton Gi donaciformis ciformis,) 1 ton Gr. dubia, Hall. 153, Black

elliptica, Hal 102, Clinto gibberula, Saberula, C 38, Black 1 gibbosa, Hal 153. Black hamburgensi U. S. Geo ton Gr. hartsvillensi hartsvillen Nashville (



FIG. 931.—Tellino mya hilli.

p. 262, Mar inflata, Hall. Trenton Gr iphigenia, F iphigenia,) Hud. Riv. lata, Hall, 18 Clinton Gr. levata, Hall, N. Y.,, vol. ton, and Hi logani, Salter, Rep. Brit. machæriformi æriformis,)(and Pal. N. mactriformis. træformis,) 76, Clinton C nasuta, Hal 1847, Pa N. Y., vol. p. 152, Bla Riv. and Tre ton Grs. nucleif or mi Hall, 185 Pal. N. Y vol. 3, p. 26 nuculiformis,

SPI.-TEL.

nall, equivalve, innger than high ; anadly rounded; base ded in the anterior the postero-basal ced; cardinal line o; beak extremely upright, like a little eyond the cardinal in the umbonal reor cinctures arising e umbonal region, den, are directed to margin, and above rsal part of the shell omewhat wing-like; ace marked by very concentric lines;

casts show a deep us directly in front he beak for the reion of an umbonal or support on the rior of the shell. 1. Riv. Gr., near ton County, Ohio. harles Faber.



aberi. The right hand lve with a small piece or end; the left hand ll-preserved cast; the cardinal view.

Syst. Nat., 10th ed. of mussel.] This gehe Palæozoic rocks. Geo. Rep. 4th Dist. læoneilo maxima.

, Pal. N. Y., vol..1, p. e resemblance to the Mya.] Nearly equitransverse, anterior ks approximate, not -line with a double connected by smaller beak; ligament poson a fulcrum; no rtilage pit; muscular g not bounded by pallial line simple.

862, (Ctenodonta abvol. 1, p. 46, Black

52, Pal. N. Y., vol. 2, mestone. o. Rep. Wis., p. 27, vol. 3, p. 309, Tren-

Pterotheca anatini-

65, (Ctenodonta anvol. 1, p. 221, QueTEL.-VAN.]

angustata, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 152, Up. Sil. astartiformis, Salter, 1859, (Ctenodonta

LAMELLIBRANCHIATA.

- astartæformis,) Can. Org. Rem., Decade
- 1, p. 39, Black Riv. Gr. attenuata, Hall, 1860, Can. Nat. and Geo.,
- vol. 5, p. 151, Up. Silurian. cingulata, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 23, Hud. Riv. Gr.
- contracta, Salter, 1859, (Ctenodonta contracta,) Can. Org. Rem. Decade 1, p. 37, Black Riv. and Trenton Gr.
- curta, Hall, 1852, Pal. N. Y., vol. 2, p. 86, Clinton Gr.
- donaciformis, Hall, 1847, (Nucula ? donaciformis,) Pal. N. Y., vol. 1, p. 316, Trenton Gr.
- dubia, Hall, 1847, Pal. N. Y., vol. 1, p. 153, Black Riv. and Trenton Grs.
- elliptica, Hall, 1852, Pal. N. Y., vol. 2, p. 102, Clinton Gr.
- berula, Salter, 1859, (Ctenodonta gib-berula,) Can. Org. Rem. Decade 1, p. 38, Black Riv. and Trenton Grs.
- gibbosa, Hall, 1847, Pal. N. Y., vol. 1, p. 153, Black Riv. and Trenton Grs.
- hamburgensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 76, Trenton Gr.
- hartsvillensis, Safford, 1859, (Ctenodonta hartsvillensis,) Geo. of Tenn., p. 287, Nashville Gr. hilli, S. A. Miller, 1874,

Cin. Quar. Jour. Sci.,

(Nucula houghtoni,)

p. 230, Hud. Riv. Gr. houghtoni, Stevens, 1858,



FIG. 931.-Tellinomya hilli.

Am. Jour. Sci, and Arts, 2d ser., vol. 25, p. 262, Marshall or Waverly Gr.

- inflata, Hall, 1861, Geo. Rep. Wis., p. 26, Trenton Gr.
- iphigenia, Billings, 1862, (Cteno nta iphigenia,) Pal. Foss., vol. 1, p. 152, Hud. Riv. Gr.
- lata, Hall, 1852, Pal. N. Y., vol. 2, p. 85, Clinton Gr.
- levata, Hall, 1847, (Nucula levata,) Pal. N. Y.,, vol. 1, p. 150, Black Riv., Tren-ton, and Hud. Riv. Grs.
- logani, Salter, 1851, (Ctenodonta logani,) Rep. Brit. Assoc., p. 36, Hud. Riv. Gr. machæriformis, Hall, 1843, (Nucula mach-
- æriformis,)Geo. Rep. 4th Dist. N.Y., p. 76, and Pal. N. Y., vol. 2, p. 85, Clinton Gr. mactriformis, Hall, 1843, (Nucula mac-
- træformis,) Geo. Rep. 4th Dist., N. Y., p. 76, Clinton Gr. Cantantantan
- nasuta, Hall, 1847, Pal. N. Y., vol. 1, p. 152, Black Riv. and Tren-
- ton Grs. nucleiformis, Hall, 1859, Pal. N. Y., FIG. 932.-Tellinomyra nasuta
- vol. 3, p. 263, Low. Held. Gr.

nuculiformis, Hall, 1847, (Modiolopsis

nuculiformis,) Pal. N. Y., vol. 1, p. 298, Hud. Riv. Gr. ovata, Hall, 1861, Geo. Rep. Wis., p. 28,

- Trenton Gr.
- pectunculoides, Hall, 1871, 24th Rep. N. Y. Mus. Nat. Hist., p. 228, Hud. Riv. Gr.
- protensa, Hall, 1852, Stans. Ex. to Gt. Salt Lake, p. 412, Coal Meas.
- sanguinolarioidea, Hall, 1847, Pal. N. Y., vol. 1, p. 152, Trenton Gr. stella, Winchell, 1862, (Nucula stella,)
- Proc. Acad. Nat. Sci., p. 417, Marshall Gr.

subnasuta, see Clinopistha subnasuta.

- ventricosa, Hall, 1861, Geo. Rep. Wis., p. 27, and Geo. Sur. Ill., vol. 3, p. 307,
- Trenton Gr. TELLINOPSIS, Hall, 1870, Prelim. Notice Lam, Shells, p. 80. [Ety. resembling a shell of the genus *Tellina*.] General form like Tellina; beaks small, subcentral, directed backward; ligament external; surface smooth or obscurely marked; ligament external; muscular impression shallow. Type T. subemarginata.

subemargin a ta,

Conrad, 1842, (Nuculites subemarginatus.) Jour. Acad. Nat. Sci.,



vol. 8, p. 249, and Pal. N. Y., Fig. 983.-Tellinopsis subvol. 5, p. 464, Ham. Gr.

Ungulina, Daudin, 1802, Bosc. Hist. Nat. Coq. 3. [Ety. ungulina, like a hoof.] suborbicularis, see Cardiomorpha suborbic-

ularis. Unio orthonotus, see Modiolopsis orthonota. primigenius, see Modiolopsis primigenia.

VANUXEMIA, Billings, 1858, Rep. of Progr, Geo. Sur. Can., p. 186. [Ety. proper name.] Ovate; beaks terminal or subterminal; posterior extremity rounded, anterior more or less acuminated; two muscular impressions; anterior teeth variable in number sometimes curved and striated; posterior lateral teeth from two to four. Type V. inconstans.



FIG. 934.—Vanuxemia bayfieldi. Interior of left valve, showing the striated teeth.

bayfieldi, Billings, 1858, Rep. of Progr. Geo. Sur. Can., p. 187, Hud. Riv. Gr. dixonensis, Meek & Worthen, 1866, Proc. Chi. Acad. Sci., p. 16, Trenton Gr.

- inconstans, Billings, 1858, Rep. of Progr. Geo. Sur. Can., p. 186, Black Riv. and Trenton Grs.
- montrealensis, Billings, 1859, Can. Nat. and Geol., vol. 4, p. 444, Chazy Gr. tomkinsi, Billings, 1860, Can. Jour., vol.
- 6, p. 357, Up. Held. Gr.
- Venus mohegan, Castelnau, 1843, Syst. Sil., p. 44. Not recognized.
- VERTUMNIA, Hall, 1884, Pal. N. Y., vol. 5, pt. 1, p. xii. Proposed as a subgenus of Pterinea, distinguished by having the right valve convex, and the left flat or concave; hinge area narrow. The spe-cies referred to it are Pterinea avis, P. reproba, and P. reversa.
- YOLDIA, Muller, 1842, Kroyer's Nat. Tid., vol. 4, p. 91. [Ety. proper name.] Shell ovate or subelliptical, subequilateral, compressed; posterior side narrower than the other; surface smooth, striate, or obliquely sculptured, and covered with a polished epidermis; margins smooth within; inner laminæ pearly; hinge plates small, numerous on each side of the beaks; cartilage pit under the beaks; pallial line sinuous. Type Y. myalis.
- carbonaria, Meek, 1871, Rep. Reg. University W. Va., p. 6, and Ohio Pal., vol. 2, p. 336, Coal Meas.

gibbosa, McChesney, 1859. The name was preoccupied. See T. rushensis. knoxensis, McChes-

VEN.-YOL.

FIG. 935.-Yoldia

myalis.

- ney, 1865, (Leda knoxensis,) Expl.
- Pal. Foss., pl. 2, Coal Meas. levistriata, Meek &
- Worthen. 1860. (Leda levistriata,) Proc. Acad. Nat.
 - Sci. Phil., p. 457, and Geo. Sur. Ill., vol. 2, p. 282, St. Louis Gr.
- oweni, McChesney, 1860, (Leda oweni,) Desc. New. Pal. Foss., p. 52, Coal Meas.
- polita, McChesney, 1859. The name was preoccupied, see Y. knoxensis.
- rushensis, McChesney, 1865, (Leda rush-ensis,) Expl. Pal. Foss., pl. 2, Coal Meas.
- stevensoni, Meek, 1871, Rep. Reg. University W. Va., p. 6, and Ohio Pal., vol. 2, p. 335, Coal Meas.
- subscitula, Meek & Hayden, 1858, (Leda subscitula, Trans. Alb. Inst., vol. 4, p. 79, and Pal. E. Neb., p. 205, Permian Gr.
- valvulus, Hall & Whitfield, 1872, 24th Rep. N. Y. Mus. Nat. Hist., p. 190, Up. Held. Gr.

SUBKINGDOM ARTICULATA.

THE Articulata are the most numerous of all living animals, and abound alike on land and sea. They are divided into Classes, Subclasses, Orders, and Suborders. Many of them possess intelligence, arising from ganglionic centers, and in the summer season provide their food for winter. Several living orders are unknown in Palæozoic rocks; this may have resulted, however, from want of preservation. The fossils belong to the Classes Annelida, Crustacea, Arachnida, Myriapoda, Insecta.

CLASS ANNELIDA.

The Annelida have the bodies divided into segments, which are generally furnished with jointed appendages. The living forms are distributed in four Orders, but no such division is practicable with the Palaeozoic fossils, where generally only the internal jaws, called Conodonts or worm-burrows, are found preserved. The Conodonts may be the internal jaws of Crustacea, as seems to the author most probable; but there is no ground for referring them to fish, as has been done by some authors. The class may be divided as follows:

CONODONTS.—Arabellites, Distacodus, Drepanodus, Eunicites, Glycerites, Lumbriconereites, Nereidavus, Oenonites, Polygnathus, Prioniodus, Staurocephalites.

WORM-B map ORDER]

Spir ORDER A

ARABELLITES,]

Soc. Lond. bella, an e Jaws with terior hool on a wide also subqu upper edg hamatus. ascialis, Hind Lond., vol. cervicornis, Geo. Soc. Riv. Gr. cornutus, Hi Soc. Lond .. crenulatus, Geo. Soc. Riv. Gr. cristatus, see] cuspidatus, Geo. Soc. 1 Riv. Gr. elegans, Hin Soc. Lond., gibbosus, H Geo. Soc. I Riv. Gr. hamatus, Hin Soc. Lond RiveGr. lunatus, Hind Lond., vol. obliquus, Hin Soc. Lond., ovalis, Hinde. Lond., vol. pectinatus, Geo. Soc. 1 Riv. Gr. politus, Hind Soc. Lond., quadratus, Geo. Soc. L Riv. Gr. rectus, Hinde. Lond., vol. scutellatus, H Geo. Soc. L Riv. Gr. similis, Hind Soc. Lond.,

similis var. ar Jour. Geo. 1

Ham. Gr.

ARENICOLITES, Sa Soc., vol. 13, colo, I inhat

holes which face of sand

ARA.-COR.]

[VEN.-YOL.

859. The name was C. rushensis.



FIG. 935.--Yoldia myalis.

d Geo. Sur. Ill., vol. Gr. 1860, (Leda oweni,) Foss., p. 52, Coal

359. The name was

. knoxensis. y, 1865, (Leda rush-Foss., pl. 2, Coal

871, Rep. Reg. Uni-3, and Ohio Pal., vol.

Hayden, 1858, (Leda Alb. Inst., vol. 4, p. Neb., p. 205, Per-

7hitfield, 1872, 24th at. Hist., p. 190, Up.

ATA.

s, and abound alike lers, and Suborders. ers, and in the sumers are unknown in at of preservation. chnida, Myriapoda,

h are generally furated in four Orders, where generally only nd preserved. The to the author most s has been done by

tes, Glycerites, Lum-Prioniodus, Stauro-

ARA.-COR.]

ANNELIDA.

WORM-BURROWS.-Arenicolites, Gyrichnites, Myrianites, Monocraterion, Nemapodia, Nereites, Palæochorda, Scolithus, Walcottia.

ORDER TUBICOLA.-Conchicolites, Cornulites, Salterella, Serpula, Serpulites, Spirørbis.

ORDER UNCERTAIN.—Protoscolex.

- ARABELLITES, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 377. [Ety. Arabella, an existing genus; lithos, stone.] Jaws with an extremely prominent anterior hook, and a row of smaller teeth on a wide base, sickle-shaped jaws, and also subquadrate forms, with a straight upper edge of small teeth. Type A. hamatus.
 - ascialis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 378, Hud. Riv. Gr.
- cervicornis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 379, Hud. Riv. Gr.
- cornutus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 377, Hud. Riv. Gr. renulatus, Hinde, 1879, Quar. Jour. crenulatus, Geo. Soc. Lond., vol. 35, p. 379, Hud. Riv. Gr.

cristatus, see Eunicites cristatus.

- cuspidatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 378, Hud. Riv. Gr.
- elegans, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 382, Clinton Gr. gibbosus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 378, Hud. Riv. Gr.
- hamatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 377, Hud. Rive Gr.
- lunatus, Hinde, 1879, Quar. Jour. Geo. Soc.
- India, 1873, 2011. Sour. Geo. Soc. Lond., vol. 35, p. 378, Hud. Riv. Gr.
 obliquus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 379, Hud. Riv. Gr.
 ovalis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 378, Hud. Riv. Gr.
- pectinatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 379, Hud. Riv. Gr.
- politus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 385, Ham. Gr. quadratus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 379, Hud. Riv. Gr.
- rectus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 378, Hud. Riv. Gr.
- scutellatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 379, Hud. Riv. Gr.
- similis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 382, Niagara Gr. similis var. arcuatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 385, Ham. Gr.
- ARENICOLITES, Salter, 1856, Quar. Jour. Geo. Soc., vol. 13, p. 199. [Ety. arena, sand; colo, I inhabit; lithos, stone.] Circular holes which appear in twos on the sur
 - face of sandstones, and have the ap-34

pearance of worm-burrows, like those of the Arenicola. Type A. sparsus or A. didyma.

- sparsus, Salter, 1856, Quar. Jour. Geo. Soc., vol. 13, p. 203, Clinton Gr. spiralis, Torell, 1868, as identified by Bill-
- ings, Pal. Foss., vol. 2, p. 77, Up. Taconic. woodi, Whitfield, 1882, Geo. Wis., vol. 4,
- p. 177, Potsdam Gr. Aulacodus obliquus, see Lumbriconereites obliquus.
- CONCHICOLITES, Nicholson, 1872, Am. Jour. Sci. and Arts, 3d ser., vol. 3, p. 202. [Ety. concha, shell; colo, I dwell; lithos, a stone.] Tubes conical, slightly curved, walls thin, composed of imbricating rings. Type C. gregarius. Prof. Hall and others regard this genus as a synonym for Cornulites. corrugatus, Nicholson, 1873, Lond. Geo.

 - Mag., vol. 10, p. 55, Hud. Riv. Gr. flexuosus, Hall, 1847, (Tentaculites flexu-osus,) Pal. N. Y., vol. 1, p. 92, Trenton and Hud. Riv. Grs.



FIG. 936 .- Conchicolites flexuosus, on Strophomena alternata

- intermedius, Nicholson, 1874, (Ortonia intermedia,) Geo. Mag., n. s., vol. 1, p. 199, Ham. Gr.
- minor, Nicholson, 1873, (Ortonia minor,) Lond. Geo. Mag., vol. 10, p. 56, Hud. Riv. Gr.
- CORNULITES, Schlotheim, 1820, Petrefaktenkunde, p. 378. [Ety. cornu, horn; lithos, stone.] Tube gradually tapering, conical, slightly flexuous, small end usually curved, and attached to some foreign body; walls thick, cellular, composed of numerous imbricating rings, their widest edge next the slender base; external surface annulated, finely striated longitudinally; inner surface and casts scalariform, with two or three longitudinally impressed furrows. Type C. serpularius.

arcuatus, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 276, Niagara Gr.

bellistriatus, Hall, 1888, Pal. N. Y., vol. 7, p. 20, Low. Held. Gr.

carbonarius, Gurley, 1883, New. Carb. Foss., p. 8, Kinderhook Gr. The publication is not such as required by the rules of nomenclature. chrysalis, Hall, 1888, Pal.

N. Y., vol. 7, p. 20, Low. Held. Gr.

FIG. 937 -- Cornucingulatus, Hall, 1888, Pal. N. Y., vol. 7, p. lites arcuatus.

20, Low. Held. Gr. clintoni, Hall, 1879, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 184, Clinton Gr. This name was proposed instead of C. flexuosus, which is preoccupied, when Conchicolites is regarded as synonymous with Cornulites.

contractus, Ringueberg, 1884, Proc. Acad. Nat. Sci., p. 148, Niagara Gr. Syn. for C. proprius.

distans, Hall, 1852, (Tentaculites distans,) Pal. N. Y., vol.

2, p. 184, Clinton Gr. flexuosus, Hall, 1852, Pal. N. Y.,

vol. 2, p. 98, Clinton Gr.

flexuosus var. gracilis, Hall, 1860, Can. Nat. and Geo., vol. FIG. 938.

Cornulites 5, p. 155, Niagara Gr. distans. 1884. Ringueberg, nodosus

Proc. Acad. Nat. Sci., p. 149, Niagara Gr. proprius, Hall, 1876, 28th Rep. N. Y. St.

Mus. Nat. Hist., p. 182, Niagara Gr. tribulis, Hall, 1888, Pal. N. Y., vol. 7, p. 20, Ham. Gr.

DISTACODUS, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 357. [Ety. distazo, to doubt; odous tooth.] Small, curved tooth, with a sharp edge on both the outer and inner curve; base expanded. Type D. incurvus.

incurvus, Pander, 1856, (Machairodus incurvus,) Monogr. d. foss. Fische. d. Silur. syst., p. 23, Hud. Riv. Gr.

- DREPANODUS, Pander, 1856, Monogr. d. foss. Fische. d., Silur. Syst., p. 20. [Ety. dre-pane, sickle; odous tooth.] Small, curved, spine-like tooth, nearly circular in sec-tion; base expanded. Type D. arcuatus.
- arcuatus, Pander, 1856, Monogr. d. Foss. Fische. d. Silur. Syst., p. 20, Hud. Riv. Gr.
- Eotrophonia, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 91. Not satisfactorily defined.
- setigera, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 91. Not satisfactorily defined, and specimen too poor for definition.
- EUNICITES, Ehlers, 1868, Palæontographica, vol. 17, p. 145. [Ety. Eunice, a Nereid; *lithos*, stone.] Minute, variously formed, denticulated jaws of annelids or crustaceans. Type E. avitus.

alveolatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 384, Ham. Gr. chiromorphus, Hinde, 1879, Quar. Jour.

DIS.-LUM.

- Geo. Soc. Lond., vol. 35, p. 381, Chinton Gr.
- clintonensis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 381, Clinton Gr.
- compactus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 384, Ham. Gr. contortus, Hinde, 1879, Quar. Jour. Geo.
- Soc. Lond., vol. 35, p. 375, Hud. Riv. Gr.
- coronatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 381, Clinton Gr.
- cristatus, Hinde, 1879, (Arabellites cristatus), Quar. Jour. Geo. Soc., vol 35, p. 378, Hud. Riv. Gr.
- digitatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 376, Hud. Riv. Gr.
- gracilis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 376, Hud. Riv. Gr.
- major, see Oenonites major.
- nanus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 384, Ham. Gr. palmatus, Hinde, 1879, Quar. Jour. Geo.
- Soc. Lond., vol. 35, p. 384, Ham. Gr. perdentatus, see Lumbriconereites perden-

tatus.

- simplex, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 376, Hud. Riv. Gr.
- tumidus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35. p. 384, Ham. Gr.
- GLYCERITES, Hinde, 1879, Quar. Jour. Geo. Soc. Lon., vol. 35, p. 380. [Ety. genus Glycera ; lithos, stone.] Jaws consisting of a simple curved hook with a wide base, without smaller teeth. Type G. sulcatus.
 - calceolus, Hinde, 1879, Quar. Jour. Geo.
 - Soc. Lond., vol. 35, p. 384, Clinton Gr. sulcatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 380, Hud. Riv. Gr.
 - sulcatus, var. excavatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 380, Hud. Riv. Gr.
- Gordia marina, see Palæochorda marina.
- GYRICHNITES, Whiteaves, 1883, Trans. Roy. Soc. Can., p. 109. [Ety. gyros, a circle; ichnos a track.] Trails supposed to have been made by an annelid. Type G. gaspensis.
 - gaspensis, Whiteaves, 1883, Trans. Roy. Soc. Can., p. 109, Mid. Devonian.

Helminthvidichnites, Fitch, see Palæochorda. marina, see Palæochorda marina. tenuis, see Palæochorda tenuis.

LUMBRICONEREITES, Ehlers, 1868, Palæontographica, vol. 17, p. 159. [Ety: Lumbri-concreis, a genus; lithos, stone.] Distin-guished from Eunicites by having a well defined basal extension. Type L. deperditus.

MAC.-PAL.]

ton Gr. basalis, Hin ton Gr. dactylodus, Geo. Soc. Riv. Gr. obliquus, Eic quus), Bul Moscou, p ton Gr. perdentatus, dentatus). 35, p. 375, triangularis, Geo. Soc. ton Gr. Machairodus, P preoccupie incurvus, see MONOCRATERION

sitatis lune one; krater the rock r in having a

at the uppe lesleyi, Prime 79, Calcifer

MYRIANITES, M 700. [Etv. A Trails lying more or less and resemb the surface cleaii.

murchisoni, H p. 44, Up. 'I sillimani, En p. 44, Up. 7

NEMAPODIA, Em 68. [Ety. n Trail consis sions marke

lel fine lines the short, fi of the trail.

tenuissima, E p. 68, Up. 1 NEREIDAVUS, GI

- and Arts, 3 Nereis, genu
- nute dentici N. varians.



Sci. and Art

Hud. Riv. G

of the Nereis. each side eq

tions oval u

NEREITES, Murch [Ety. from a

diam.

Soc. Lone

armatus, Hi Noc. Lon



[DIS.-LUM.

79, Quar. Jour. Geo. p. 384, Ham. Gr. 1879, Quar. Jour. ol. 35, p. 381, Chin-

1879, Quar. Jour. ol. 35, p. 381, Clin-

79, Quar. Jour. Geo. p. 384, Ham. Gr. 9, Quar. Jour. Geo. 35, p. 375, Hud.

79, Quar. Jour. Geo. 35, p. 381, Clin-

9, (Arabellites cris-Geo. Soc., vol 35, r.

9, Quar. Jour. Geo. 35, p. 376, Hud.

Quar. Jour. Geo. 35, p. 376, Hud.

major.

Quar. Jour. Gro. p. 384, Ham. Gr. 9, Quar. Jour. Geo. p. 384, Ham. Gr. riconereites perden-

), Quar. Jour. Geo. 35, p. 376, Hud.

9, Quar. Jour. Geo. p. 384, Ham. Gr. '9, Quar. Jour. Geo. 5. 380. [Ety. genus e.] Jaws consisting hook with a wide ler teeth. Type G.

9, Quar. Jour. Geo. p. 384, Clinton Gr. Quar. Jour. Geo. 35, p. 380, Hud.

atus, Hinde, 1879, oc. Lond., vol. 35, p.

eochorda marina. s, 1883, Trans. Roy. [Ety. gyros, a circle; ils supposed to have annelid. Type G.

s, 1883, Trans. Roy. lid. Devonian. :h, see Palæochorda. orda marina. la tenuis.

ers, 1868, Palæonto-. 159. [Ety. Lumbrithos, stone.] Distinnicites by having a extension. Type L. MAC.-PAL.]

ANNELIDA.

- armatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 383, Clinton Gr.
- basalis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 383, Clinton Gr.
- dactylodus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 380, Hud. Riv. Gr.
- obliquus, Eichwald, 1854, (Sphagodus obli-quus), Bull. d. l. Soc. Imp. d. Nat. d. Moscou, p, 110, Hud. Riv. and Clinton Gr.
- perdentatus, Hinde, 1879, (Eunicites perdentatus), Quar. Jour. Geo. Soc., vol. 35, p. 375, Clinton Gr.
- triangularis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 383, Clinton Gr.
- Machairodus, Pander, 1856. This name was preoccupied. See Distacodus. incurvus, see Distacodus incurvus.
- MONOCRATERION, Torell, 1860, Acta universitatis lundensis, p. 13. [Ety. monos, one; kraterion, small basin.] Borings in the rock resembling Scolithus, except in having a tunnel-shaped enlargement at the upper end.
- lesleyi, Prime, 1878, Geo. Sur. Pa. DD. p. 79, Calciferous (?) Gr.
- MYRIANITES, Murchison, 1839, Sil. Syst., p. 700. [Ety. Myrias, a myriad; lithos, stone.] Trails lying together in great numbers, more or less corrugated upon the edges, and resembling delicate wave lines upon the surface of the rock. Type M. macleaii.
- murchisoni, Emmons, 1844, Taconic syst., p. 44, Up. Taconic.
- sillimani, Emmons, 1844, Taconic Syst., p. 44, Up. Taconic.
- NEMAPODIA, Emmons, 1844, Taconic Syst, p. 68. [Ety. nema, a thread; pous, a foot.] Trail consisting of a series of depressions marked by numerous short parallel fine lines; the trail is flexnous, and the short, fine lines have the direction of the trail. Type N. tenuissima.
- tennissima, Emmons, 1844, Taconic syst, p. 68, Up. Taconic.
- NEREIDAVUS, Grinnell, 1877, Am. Jour. Sci. and Arts, 3d ser., vol. 14, p. 229. [Ety. Nereis, genus; avus, grandiather.] Minute denticulated teeth or jaws. Type N. varians.

solitarius, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 385, Fig. 939 - Nereidavus Ham. Gr.

variaus. Maguified 8 varians, Grinnell, 1877, Am. Jour.

diam

Sci. and Arts, 3d ser., vol. 14, p. 229, Hud. Riv. Gr.

NEREITES, Murchison, 1839, Sil. Syst., p. 700. [Ey, from a resemblance to the track of the Nereis.] Long, convoluted trails; each side equally crenulated; crenulations oval or pointed on the margin,



FIG. 940.-Nereites deweyi. lan ceolatus, Emmons, 1844, Taconic Syst., p. 69, Up.

Taconic. This may belong to Nereograpsus, as suggested by Emmons.

- loomisi, Emmons, 1844, Taconic Syst., p. 69, Up. Taconic.
- pugnus, Emmons, 1844, Taconic Syst., p. 69, Up. Taconic.

robustus, Emmons, 1856, (Nereograpsus robustus,) Am. Geol., p. 111, Up. Taconic. OENONITES, Hinde, 1879, Quar. Jour. Geo.

- Soc. Lond., vol. 35, p. 376. [Ety. Oenone, a genus; lithos, stone.] Jaws with a more or less curved anterior hook ; followed by a series of smaller teeth, similar in character to those of the existing genus Oenone. Type O. curvidens.
- amplus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 382, Clinton Gr. carinatus, Hinde, 1879, Quar. Jour. Geo.
- Soc. Lond., vol. 35, p. 377, Hud. Riv. Gr.
- cuneatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 377, Hud. Riv. Gr. curvidens, Hinde, 1879, Quar. Jour. Geo.
- Soc. Lond., vol. 35, p. 376, Hud. Riv. Gr. fragilis, Hinde, 1879, Quar. Jour. Geo. Soc.
- Lond., vol. 35, p. 382, Clinton Gr. inæqualis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 376, Hud. Riv. Gr.
- infrequens, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 382, Niagara Gr. major, Hinde, 1879, (Eunicites major.) Quar. Jour. Geo. Soc., vol. 35, p. 374, Hud. Riv, and Clinton Gr.
- rostratus, Hinde, 1879, Quar. Jour. Geo.
- Soc. Lond., vol. 35, p. 376, Hud. Riv. Gr. serratus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 376, Hud. Riv. Gr.
- Ortonia, Nicholson, 1872, Lond. Geo. Mag., vol. 9. Synonym for Conchicolites, if indeed both are not synonyms for Cornulites.

conica, syn. for Conchicolites flexuosus. intermedia, see Conchicolites intermedius. minor, see Conchicolites minor.

- PALEOCHORDA, McCoy, 1848, Quar. Jour. Geol. Soc., vol. 4, p. 224. [Ety. palaios, ancient; chorde, intestine.] Trail very
 - long, cylindrical, chord-like, frequently

519

and often traceable to the center of the trail. Type N. cambrensis. deweyi, Emcrossing itself, without order, surface smooth. Type P. minor.

marina, Emmons, 1844, (Gordia marina,) p. 68, and Am. Geol., p. 103, Up. Taconic.

prima, Whitfield, 1877, Prelim, Rept. Pal. Black Hills, p. 7, and Geol. Black Hills of Dakota, p. 331, Potsdam Gr. tenuis, Fitch, 1849, (Helminthoidichnites tanyis) Trans.

- tenuis,) Trans. Agr. Soc., and Am. Geol., p. 103, Up. Taconic
- PLANOLITES, Nicholson, 1873, Proc. Roy. Soc., No. 144. [Ety. planos, wanderer; lithos, stone.] Irregularly cylindrical, tortuous casts of supposed worm-tubes. Type P. vulgaris.
 - vulgaris, Nicholson, 1873, Proc. Roy. Soc., No. 144, and Pal. Prov. of Ontario, p. 42, Clinton Gr.
 - POLYGNATHUS, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. §5, p. 361. [Ety. polys, many; gnathos, jaw.] Minute variously formed teeth and minute tuberculated plates. Type P. dubius.

coronatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 365, Ham. Gr. crassus, Hinde, 1879, Quar. Jour. Geo. Soc.

Lond., vol. 35, p. 365, Ham. Gr.

cristatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 366, Ham. Gr. curvatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 366, Ham. Gr. dubius, Hinde, 1879, Quar. Jour. Geo. Soc.

Lond., vol. 35, p. 362, Ham. Gr. duplicatus, Hinde, 1879, Quar. Jour. Geo.

Soc. Lond., vol. 35, p. 364, Ham. Gr. eriensis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 366, Ham. Gr.

immersus, Hinde, 1879, Quar. Jour. Geo.

Sor. Lond., vol. 35, p. 364, Ham. Gr. linguiformis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 367, Ham. Gr. nasutus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 364, Ham. Gr.

palmatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 367, Ham. Gr. pennatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 366, Ham. Gr. princeps, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 365, Ham. Gr. punctatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 367, Ham. Gr. radiatus, Hinde, 1879, Quar. Jour. Geo.

Soc. Lond., vol. 35, p. 364, Ham. Gr. serratus, Hinde, 1879, Quar. Jour. Geo.

Soc. Lond., vol. 35, p. 365, Ham. Gr.

simplex, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 367, Ham. Gr. solidus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 365, Ham. Gr.

truncatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 366, Ham. Gr.

tuberculatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 366,

Ham. Gr.

PRIONIODUS, Pander, 1856, Monogr. d. Foss. Fische d. Silur. Syst., p. 28. [Ety. prionion, small saw; odous, tooth.] Basal portion narrow supporting numerous, delicate denticles and an elongated

tapering tooth which extends below the basal portion. Type P. elegans. abbreviatus, Hinde, 1879, Quar. Jour. Geo.

Soc. Lond., vol. 35, p. 359, Ham. Gr. acicularis, Hinde, 1879, Quar. Jour. Geo.

Soc., Lond., vol. 35, p. 360, Ham. Gr. alatus, Hinde, 1879, Quar. Jour. Geo.

Soc. Lond., vol. 35, p. 361, Ham. Gr. angulatus, Hinde, 1879, Quar. Jour. Geo.

Soc. Lond., vol. 35, p. 360, Waverly Gr. armatus, Hinde, 1879, Quar. Jour. Geo.

Soc. Lond., vol. 35, p. 360, Ham. Gr. clavatus, Hinde, 1879, Quar. Jour. Geo. Soc., vol. 35, p. 360, Ham. Gr. elegans. Pander, 1856, Monogr. d. Foss.

Fische d. Silur. Syst., p. 29, Hud. Riv.Gr.

erraticus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 359, Ham. Gr.

furcatus, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 358, Hud. Riv. Gr. pander, Hinde, 1879, Quar. Jour. Geo.

Soc. Lond., vol. 35, p. 361, Ham. Gr.
politus, Hinde, 1879, Quar. Jour. Geo.
Soc. Lond., vol. 35, p. 358, Hud. Riv. Gr.
radicans, Hinde, 1879, Quar. Jour. Geo.
Soc. Lond., vol. 35, p. 356, Hud. Riv. Gr.
spicatus, Hinde, 1879, Quar. Jour. Geo.
Soc. Lond., vol. 35, p. 261, Hum. Geo.

Soc. Lond., vol. 35, p. 361, Ham. Gr. PROTOSCOLEX, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 89. [Ety. protos, first; skolex, worm.] Long, slender, nu-merous segments, both ends obtusely pointed. Type P. covingtonensis.

covingtonensis, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 89, Utica Slate Gr. ornatus, Ulrich, 1878, Jour.

Cin. Soc. Nat. Hist., vol.

1, p. 90, Utica Slate Gr. simplex, Ulrich, 1878, Jour. Cin. Soc., Nat. Hist., vol. 1, p 91, Utica Slate Gr.

tenuis, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 90, Utica Slate Gr. SALTERELLA, Billings, 1861,

Pal. Foss., vol. 1, p. 17.

[Ety. proper name.] Small, slender, elongate, FIG. 941.-Protoconical tubes, consisting scoler orna

of several hollow cones placed one within another, the last one forming the chamber of habitation;

surface concentrically or longitudinally striated. Type S. ru-2088.

> billingsi, Safford, 1869. Geo. of Tenn., p. 289, Trenton Gr.

> obtusa, Billings, 1861, Pal. Foss., vol. 1, p. 18, Up. Taconic.

pulchella, Billings, 1861, Pal. Foss., vol. 1, p. 18, Up. Taconic. rugosa, Billings, 1861, Pal.

Foss., vol. 1, p. 17, Up. Taconic.

SCOLITHUS, Haldeman, 1840, Supp. to. Mongraph of Limniades. [Ety. skolex, worm;



FIG. 942.-Salter-

ella rugosa.

[PLA.—SCO.

lithos, sto

without o canadensis, 1, p. 96, Pe



FIG. 943.

linearis, Hall 2, Potsdam verticalis, Ha 6, Medina tuberosus, M Pal. No. 2, woodi, Whit Sur. Wis., Serpula, Linnae p. 786. [Et careous, proor spirally groups, at capable of aperture at ple and rou insita, White. p. 37, and (Coal Meas. omphalodes, se valvata, see S SERPULITES, MI Syst., p. 608 annelids.] 7 calcareous, longitudina the circum



rest of the s

posterior en

inelegans, Day 312, Carbon murchisoni, E p. 48, Potsda

murrayi, Daw Mus., No. 2,

pulites anuulatus.



[PLA.—SCO.

ich extends below Type P. elegans. 879, Quar. Jour. Geo. p. 359, Ham. Gr. 19, Quar. Jour. Geo. , p. 360, Ham. Gr. Quar. Jour. Geo. p. 361, Ham. Gr. 79, Quar. Jour. Geo. p. 360, Waverly Gr. Quar. Jour. Geo. p. 360, Ham. Gr. Quar. Jour. Geo. э. Ham. Gr. 6, Monogr. d. Foss.

., p. 29, Hud. Riv.Gr. 9, Quar. Jour. Geo. p. 359, Ham. Gr. Quar. Jour. Geo. p. 358, Hud. Riv. Gr.), Quar. Jour. Geo. p. 361, Ham. Gr. Quar. Jour. Geo. 358, Hud. Riv. Gr. Quar. Jour. Geo. 356, Hud. Riv. Gr. Quar. Jour. Geo. p. 361, Ham. Gr. 878, Jour. Cin. Soc. p. 89. [Ety. protos, Long, slender, nuboth ends obtusely

covingtonensis. 1, 1878, Jour. Cin. Soc.). 89, Utica Slate Gr.

Jour. ., vol. Gr. Jour. ., vol. e Gr. Jour.

t., vol. te Gr. 1861, p. 17.

me.] ngate, FIG. 941.-Proto-

sisting scolex orna-tus. cones another, the last one nber of habitation; lly or longitudinally iated. Type S. ru-

igsi, Safford, 1869. o. of Tenn., p. 289, enton Gr.

sa, Billings, 1861, Pal. ss., vol. 1, p. 18, Up. conic.

hella, Billings, 1861, 1. Foss., vol. 1, p. 18,

). Taconic. sa, Billings, 1861, Pal. ss., vol. 1, p. 17, Up.

conic. 1840, Supp. to. Mon-

s. [Ety. skolex, worm;

SER.-STA.]

lithos, stone.] Merely worm furrows, without organic characters. canadensis, Billings, 1862, Pal. Foss. vol. 1, p. 96, Potsdam Gr.



FIG. 943.-Scolithus canadensis.

linearis, Hall, 1847, Pal. N. Y., vol. 1, p. 2, Potsdam Gr.

verticalis, Hall, 1852, Pal. N. Y., vol. 2, p. 6, Medina sandstone.

tuberosus, Miller & Dyer, 1878, Cont. to Pal. No. 2, p. 5, Hud. Riv. Gr.

woodi, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis., p. 45, Potsdam Gr. Serpula, Linnæus, 1758, Syst. Nat., 10th ed.

p. 786. [Ety. serpo, to creep.] Tube calcareous, procumbent, variously curved or spirally coiled, growing singly or in groups, attached to marine bodies, capable of receiving the entire animal; aperture at the larger extremity simple and rounded. Type S. vermicularis. insita, White, 1878, Proc. Acad. Nat. Sci., p. 37, and Cont. to Pal., No. 8, p. 171,

Coal Meas. omphalodes, see Spirorbis omphalodes.

valvata, see Spirorbis valvatus. SERPULITES, Murchison, 1839, Murch. Sil.

Syst., p. 608. [Ety. Serpula, a genus of annelids.] Tube smooth, arched, slightly calcareous, glossy; having two small longitudinal tubes at opposite points of the circumference, stronger than the rest of the shell, and prolonged at the posterior end. Type S. longissimus.

annulatus, Dawson, 1868, Acad. Geol., p. 312, Car-

boniferous. dissolutus, Billings, 1862, Pal. Foss., vol. 1, p. 56, Trenton Gr.

Fig. 944 -- Serhortonensis, Dawson, 1868, pulites an-uulatus. Acad. Geol., p. 312, Carboniferous.

inelegans, Dawson, 1868, Acad. Geol., p. 312, Carboniferous.

murchisoni, Hall, 1861, Geo. Rep. Wis., p. 48, Potsdam Gr.

murrayi, Dawson, 1883, Rep. on Redpath Mus., No. 2, p. 13, Carboniferous.

splendens, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 470, Chazy Gr.

Sphagodus obliquus, see Lumbriconereites obliquus.

- SPIRORBIS, Lamarck, 1801, Syst. An. sans Vert., p. 326. [Sig. spiral-whorl.] Tube calcareous, solitary, coiled; flat, dextral or sinistral, attached by one side to some foreign object. Type Serpula spirorbis of Linnaeus.
 - ammon, Winchell, 1866, Rep. Low. Pen-
 - insula Mich., p. 97, Ham. Gr. angulatus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 84, Ham. Gr. angulatus, Dawson, 1868. The name was

preoccupied.

- annulatus, Hall, 1858, Trans. Alb. Inst., vol. 4, p. 34, and Bull. Am. Mus. Nat. Hist., p. 92, Warsaw Gr.
- annulatus var. nodulosus, see S. nodulosus.
- anthracosia, Whitfield, 1881, Am. Jour. Sci. and Arts, 3d ser. vol. 21, p. 128, Coal Meas.

arietinus, Dawson, 1869, Rep. of Progr. Geo. Sur. Can., p. 14, Coal Meas. arkonensis, Nicholson, 1874, Geo. Mag.,

vol. 1, p. 199, Ham. Gr.

carbonarius, Dawson, 1845,

Quar. Jour. Geo. Soc., vol. 1, p. 326, Coal Meas. cincinnatiensis, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1,



p. 38, Hud. Riv. Gr. flexuosus, Hall, 1863, Fig. 945.—Spiror-Trans. Alb. Inst., vol. 4, bis carbonarius. p. 224, Niagara Gr.

inornatus, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 224, Niagara Gr.

kinderhookensis, Gurley, 1883, New Carb. Foss., p. 9. Publication not sufficient. laxus, Hall, 1859, Pal. N. Y., vol. 3, p.

349, Low. Held. Gr. bow Held, Gr.
nodulosus, Hall, 1858, Traus. Alb. Inst., vol. 4, p. 34, and Bull. Am. Mus. Nat. Hist., p. 93, Warsaw Gr.
obesus, Winchell, 1866, Rep. Low. Peninsula Mich., p. 97, Ham. Gr.
omphalodes, Goldfuss, 1826, Germ. Petrof. Un. Hold. and Ham. Gr.

tref., Up. Held. and Ham. Grs.

- orbiculostoma, Swallow, 1858, Trans. St. Louis Acad. Sci., p. 181, Permian Gr.
- spinuliferus, Nicholson, 1875, Pal. Prov. Ont., p. 83, Ham. Gr.

valvatus, Goldfuss, 1826, (Serpula valvata). Not American.

- STAUBOCEPHALITES, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 383. [Ety. Staurocephalus, an existing genus; lithos, stone.] Jaws of more or less elongated compressed denticulate plates resembling those of the genus Staurocephalus. Type S. niagarensis.
 - ni garensis, Hinde, 1879, Quar. Jour. Geo. Soc. Lond., vol. 35, p. 383, Niagara Gr.





FIG. 946.-Walcottia rugosa.

WALCOTTIA, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 39. [Ety. proper name.] A rugose, flexuous, worm-like furrow. Type W. rugosa. cookana, Miller & Dyer, 1878, Cont. to Pal., No. 2, p. 11, Hud. Riv. Gr. rugosa, Miller & Dyer, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 39, Hude Riv. Gr.

CLASS CRUSTACEA.

THERE is such an immense diversity among Crustaceous animals, it has been found necessary to make subclasses, orders, and suborders, to give intelligible definitions to the classification. They are generally covered with a peculiar calcareous secretion or integument, constituting a cutaneous skeleton, inclosing the soft parts of the body. Segments are united by a membrane, giving flexibility to the armor. There being no way to increase the integument by growth, it is cast off at stated periods, and a new one is secreted to cover the enlarged body. The subclasses are Cirripedia, Entomostraca, Xyphosura, Edriopthalmata, and Podopthalmata.

The Subclass Cirripedia includes only a single order which bears the same name. The animals, when mature, are attached to submarine objects, and are inclosed in a shell composed of several calcareous plates, from an opening in which articulated cirri are exserted and retracted when the animal is alive in search of prey. The common barnacle, which frequently covers the bottoms of ships so as to impede their progress across the ocean, is a representative of this order.

The Subclass Entomostraca is divided into several orders, only three of which are Palæozoio, viz.: Ostracoda, Phyllopoda, and Trilobita. The Ostracoda are minute animals inclosed in a little bivalve shell; the feet and antennæ are protruded between the lower edges of the valves. The Cypris, Daphnia, and Polyphemus are living examples of this order. The Phyllopoda are so named on account of the broad and leaf-like feet. Some of them are covered with a bivalve shell, and others are without such protection. The Palæozoic are bivalve shells. The Estheria, which abound in pools and springs, belong to this order. The Trilobita possessed a cephalic shield, a trilobed thorax composed of segments, which were flexible and allowed the animal to double itself up, and a tail-piece called the pygidium. The order became extinct in the Palæozoic era.

The Subclass Xyphosura has an anterior subcrescentiform carapace, inclosing the cephalothoracic organs, and a posterior abdominal piece, from which a tail spine projects. The upper surface is convex, and the lower concave. There are three orders—Amphipeltida, Euripterida, and Xyphosura. Only a fragment of the shell of the Amphipeltida is known. The Euripterida is also an extinct order. A common form of the Xyphosura is the Limulus, or Horseshoe Crab, which is common on the shores of the tropical seas.

The Subclass Edriophalmata has the head distinct from the thoracic segments, and therefore has no cephalothorax. The head has a pair of simple compound eyes, not pedunculated. The Palæozoic orders are Amphipoda and Anisopoda. The Ord or become pa leaping or s hopper on the long body, co which the con

WAL.

The Submovable stalk piece of shell, jaws, feet, etc minates in a c There are sev Phyllocarida,

The Phyl pace has no resea at moderat segments are u branchial orga are almost alw their relations

> Family 1 Family I

FAMILY E FAMILY C FAMILY C FAMILY F FAMILY L

Family E Family U

FAMILY A FAMILY A FAMILY A FAMILY A Physui FAMILY BA FAMILY BE FAMILY C

CRUSTACEA.

yer, 1878, Jour. Cin. ol. 1, p. 39. [Ety. rugose, flexuous, Type W. rugosa.)yer, 1878, Cont. to Iud. Riv. Gr. er, 1878, Jour. Cin. ol. 1, p. 39, Huda

[WAL

nimals, it has been ve intelligible defpeculiar calcareous inclosing the soft g flexibility to the t is cast off at stated The subclasses are opthalmata.

th bears the same bjects, and are inopening in which alive in search of ns of ships so as to order.

Ily three of which The Ostracoda are antennæ are pro-Daphnia, and Poe so named on acrith a bivalve shell, ralve shells. The er. The Trilobita s, which were flexlled the pygidium.

carapace, inclosing from which a tail ncave. There are a fragment of the extinct order. A ab, which is com-

thoracic segments, simple compound nd Anisopoda. The Order Amphipoda consists of animals that live in water, burrow in sand, or become parasitic on fishes. The abdomen is well developed, and bears limbs for leaping or swimming. They always swim on their sides. The common sandhopper on the shore of the sea belongs to this order. The Order Anisopoda has a long body, convex above and flattened below, and has affinities with the Isopoda, of which the common wood-louse is an example.

The Subclass Podopthalmata has compound eyes at the extremity of a pair of movable stalks; the head and thorax are generally united, covered by a single piece of shell, and called the cephalothorax; this includes the antennæ, eyes, mouth, jaws, feet, etc. The remaining segments form an abdomen, which frequently terminates in a caudal fin. Common examples are the squill and the small edible crab. There are several orders in this subclass, only three of which are Palæozoic, viz.: Phyllocarida, Decapoda, Tetradecapoda.

The Phyllocarida has cephalic, thoracic, and abdominal segments. The carapace has no regular hinge. The living representative is Nebalia, which inhabits the sea at moderate depths. The Decapoda are stalk-eyed, and the head and thoracic segments are united in a cephalothorax, incased in a common shell, and have the branchial organs inclosed on the sides of the cephalothorax. The true thoracic legs are almost always ten, whence the name of the order. The Tetradecapoda have their relations with the Decapoda.

SUBCLASS AND ORDER CIRRIPEDIA.

FAMILY BALANIDÆ.—Palæocrusia, Protobalanus. FAMILY LEPADIDÆ.—Lepidocoleus, Strobilepis, Turrilepas.

SUBCLASS ENTOMOSTRACA.

ORDER OSTRACODA.

FAMILY BEYRICHILDÆ.—Beyrichia, Beyrichona, Hipponicharion, Primitia. FAMILY CYPRIDÆ.—Candona. FAMILY CYTHERIDÆ.—Cytherella, Cytheropsis. FAMILY FABERILDÆ.—Faberia. FAMILY LEPERDITILDÆ.—Aparchites, Isochilina, Leperditia.

ORDER PHYLLOPODA.

FAMILY ESTHERIDE.—Estheria, Leaia, Schizodiscus. FAMILY UNCERTAIN.—Lepidilla, Lepiditta.

ORDER TRILOBITA.

FAMILY ACIDASPIDÆ.—Acidaspis.

FAMILY AGLASPIDE. - Aglaspis.

FAMILY AGNOSTIDÆ.—Agnostus, Microdiscus, Shumardia.

FAMILY ASAPHIDÆ.—Asaphus, Barrandia, Megalaspis, Nileus, Ogygia, Symphysurus.

FAMILY BATHYURIDÆ.—Asaphiscus, Bathyurellus, Bathyuriscus, Bathyurus.

FAMILY BRONTEIDÆ.—Bronteus.

FAMILY CALYMENIDE.—Calymene, Homalonotus.

FAMILY CERAURIDÆ.—Ceraurus, Sphærocoryphe, Sphærexochus.

FAMILY CONOCORYPHIDE.—Bailiella, Chariocephalus, Conocoryphe, Harttia, Menocephalus, Prototypus.

FAMILY CYPHASPIDÆ. — Cyphaspis.

FAMILY DICELLOCEPHALIDÆ.—Dicellocephalus, Pterocephalia, Ptychaspis.

FAMILY ENCRINURIDÆ.—Amphion, Eucrinurus.

FAMILY ELLIPSOCEPHALIDÆ. — Ellipsocephalus.

FAMILY HARPIDE.-Harpes.

524

FAMILY, ILL ÆNIDÆ. —Illænurus, Illænus.

FAMILY LICHIDÆ.—Lichas, Terataspis.

FAMILY OLENIDE.—Dolichometopus, Oryctocephalus, Telephus, Triarthrella, Triarthrus.

FAMILY PARADOXIDÆ.—Anopolenus, Atops, Bathynotus, Elliptocephala, Mesonacis, Olenoides, Paradoxides.

FAMILY PHACOPIDÆ.—Dalmanites, Phacops.

FAMILY PROETIDE.—Harpides, Phæthonides, Phillipsia, Proetus.

FAMILY PTYCHOPARIDÆ. —Agraulus, Crepicephalus, Liostracus, Longocephalus, Loganellús, Ptychoparia, Solenopleura.

FAMILY REMOPLEURIDÆ. --- Remopleurides.

FAMILY TRINUCLEIDÆ.-Ampyx, Dionide, Endymionia, Trinucleus.

FAMILY AFFINITY UNCERTAIN.-Pemphigaspis.

TRACKS SUPPOSED TO BE CRUSTACEAN.—Asaphoidichnus, Climachtichnites, Diplichnites, Protichnites, Rusichnites.

SUBCLASS XIPHOSURA.

ORDER AMPHIPELTIDA.

FAMILY AMPHIPELTIDÆ. — Amphipeltis.

ORDER EURYPTERIDA.

FAMILY ECHINOGNATHIDÆ. —Echinognathus.
 FAMILY EURYPTERIDÆ. —Anthraconectes, Dolichopterus, Eurypterella, Eurypterus, Pterygotus, Stylonurus.
 FAMILY HEMIASPIDÆ. —Bunodella.

/ ORDER XIPHOSURA

FAMILY BELINURIDÆ.—Belinurus, Euproops, Protolimulus FAMILY CYCLIDÆ.—Cyclus, Dipeltis.

SUBCLASS EDRIOPTHALMATA.

ORDER AMPHIPODA.

FAMILY DIPLOSTYLIDÆ. — Diplostylus.

ORDER ANISOPODA.

FAMILY ACANTHOTELSONIDÆ. - Acanthotelson.

Famil R Famil Famil Famil Famil Famil

ACA.]

Famil Famil Famil

FAMIL



FIG. 947.—Aca: telson; B, si C, enlarged s

> Enlarge antenne spines c

Acantholoma, s

spinosa, syn.

ochus.

ACA.]

locoryphe, Harttia,

alia, Ptychaspis.

ephus, Triarthrella, is, Elliptocephala,

'roetus. cus, Longocephalus,

rinucleus.

8, Climachtichnites,

urypterella, Euryp-

SUBCLASS PODOPTHALMATA.

ORDER PHYLLOCARIDA.

FAMILY CERATIOCARIDÆ.—Ceratiocaris, Colpocaris, Echinocaris, Elymocaris, Ribeiria (?), Solenocaris, Tropidocaris.

FAMILY DISCINOCARIDÆ.—Dipterocaris, Spathiocaris. FAMILY PINACARIDÆ.—Dithyrocaris, Mesothyra. FAMILY PROTOCARIDÆ.—Protocaris. FAMILY RAGHURIDÆ.—Rachura. FAMILY RHINOCARIDÆ.—Rhinocaris.

ORDER DECAPODA.

FAMILY ANTHRACARIDÆ.—Anthrapalæmon. FAMILY CARIDIDÆ.—Palæopalæmon. FAMILY PALÆOCARIDÆ.—Gampsonyx, Palæocaris.

ORDER TETRADECAPODA.

FAMILY ARCHÆOCARIDÆ.—Archæocaris.



FIG. 947.—Acanthotelson eveni. A, dorsal view; st, stylet; t, telson; B, side view; a and x, antennæ; f, anterior leg; C, enlarged stylet.

f, anterior leg; length of the two anterior thoracic segments; thoracic and abdominal segments about the Fig. 949.

same length; anterior thoracic legs the tells on longer than the others; telson simple, long, spine-like, laterally compressed; stylets with second segments longer than first, and similar to the telson. Type A. stimpsoni. eveni, Meek & Worthen, 1868, Am. Jour. Sci., vol.



FIG. 948.—Acanthotelson eveni. Enlarged; *H*, anterior legs and antennæ; *S*, punctures left by spines on the lower side.

Acantholoma, syn. for Acidaspis. spinosa, syn. for Acidaspis tuberculata.

FIG. 950.—Acanthotelson stinupsoni. Enlarged 3 diam.; i, a protuberance that may be an eye.

46, p. 28, and Geo. Sur. Ill., vol. 3, p. 551, Coal Meas.

A CANTHOTELSON, Meek & Worthen, 1860, Proc. A cad. Nat. Sci., p. 47. [Ety. akantha, spine; telson, end.] Superior antennæ as long as the inferior, flagella longer than the p e d un cles; head about the length of the two anterior



inæqualis, Meek & Worthen, syn. for Palæocaris typus.

stimpsoni, Meek & Worthen, 1865, Proc. Acad. Nat. Sci., p. 47, and Geo. Sur. Ill., vol. 2, p. 401, Low. Coal Meas.

Acidaseis, Murchison, 1839, Sil. Syst. p. 658. [Ety. akis, a point; aspis, shield.] Cephalic shield, semicircular, margin thickened and spinous, lateral angles produced in spines; glabella convex, narrow in front, not reaching the margin, two lobes on each side, and having a large spine projecting backward, eyes prominent; thorax with eight seg-ments; pleuræ wide, and terminating in spines; pygidium small, axis short, of two joints, sides depressed, one segmental furrow, long spine extending backward from the margin at each side, and smaller spines from the other parts of the margin. Type A. brighti.

anchoralis, S. A. Mil-ler, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 349, Hud. Riv. Gr. callicera, Hall, 1888, Pal. N. Y., vol. 7, p. 69, Up. Held. Gr. ceralepta, Anthony, 1838, (Ceratocephala ceralepta,) Am.

anchoralis. Cephalic shteld.

Jour. Sci., vol. 34, p. 379. Not defined so as to be recognized.

so as to be recognized. cincinnatiensis, Meek, 1873, Ohio Pal., vol. 1, p. 167, Hud. Riv. Gr. crosotus, Locke, 1843, Am. Jour. Sci., vol. 44, p. 347, and Ohio Pal., vol. 1, p. 165, Had. Bir.

vol. 1, p. 165, Hud. Riv. Gr. The word is mis-

spelled; it should be FIG. 952.-Acidaspis anchoralis. Pygidium. crossota. danai, Hall, 1862, Geo. Pygi Sur. Wis., p. 423, Niagara Gr.

criopis, see Terataspis eriopis.

fimbriata, Hall, 1879, Desc. New Spec. Foss. p. 20, and 11th Rep. Geo. and Nat. Hist. Ind., p. 334, Niagara Gr.

grandis, see Terataspis grandis. halli, Shumard, 1855, Geo. Sur. Mo., p.

200, Trenton Gr.

200, Irenton Gr.
hamata, Conrad, 1841, (Dicranurus hamatus,) Ann. Rep. N. Y., p. 48, and Pal. N. Y., vol. 3, p. 371, Low. Held. Gr.
horani, Billings, 1859, Rep. of Progr. Geo.
Sur. Can., p. 341, Trenton Gr.
ida sur, for Addensis duration.

ida. svn. for Acidaspis danai.

onealli, S. A. Miller, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 86, Hud. Riv. Gr. parvula, Walcott, 1877, 31st Rep. N. Y. St. Mus. Nat. Hist., p. 69, Trenton Gr. romingeri, Hall, 1888, Pal. N. V vol. 7, p. 71, Ham. Gr.

Y., vol. 7, p. 71, Ham. Gr. spiniger, see spiniger. Bathyurus

onealii. trentonensis, Hall, 1847, Pal. N. Y., vol. 1, p. 240, Trenton Gr.

FIG. 953

Acidaspis

- tuberculata, Conrad, 1840, Ann. Rep. N. Y., p. 205, and Pal. N. Y., vol. 3, p. 368, Low. Held. Gr.
- AGLASPIS, Hall, 1862, Can. Nat. and Geo., vol. 7, p. 443, and 16th Rep. N. Y. St. Mus. Nat. Hist., p. 181. [Ety. aglaos, bright; aspis, shield.] Cephalic shield somewhat semielliptical, wider than long, sinus in front; glabella narrow. conical; eyes prominent, and situate anterior to the middle; thorax having eight segments; pygidium small, and terminating in a single spine. Type A. barrandii.
 - barrandii, Hall, 1862, Can. Nat. and Geo., vol. 7, p. 443, and 16th Rep. N. Y. St. Mus. Nat. Hist., p. 181, Potsdam Gr. eatoni, Whitfield, 1880, Ann. Rep. Geo.
- Sur. Wis., p. 52, and Geo. of Wis., vol. 4, p. 192, Potsdam Gr.
- 1822, Hist. Nat. AGNOSTUS, Brongniart, Crust. Foss., p. 38. [Ety. agnostos, ob-scure.] Body elongate, elliptical; ce-phalic shield and pygidium subequal, subrotund, or longer than wide, convex rim on the border; glabella convex; no eyes; no facial sutures; two thoracic segments. Type A. pisiformis.
- acadicus, Hartt, 1868, Acad. Geol., p. 655, St. John Gr.
- acadicus var. declivis, Matthew, 1885, Trans. Roy. Soc. Can., p. 70, St. John Gr. acutilobus, Matthew, 1885, Trans. Roy. Soc. Can., p. 73, St. John Gr. americanus, Billings, 1860, Can. Nat. and
- Geol., vol. 5, p. 301, and Pal. Foss, p. 395, Up. Taconic.
- bidens, Meek, 1873, 6th Rep. Hayden's Geo. Sur. Terr., p. 463, and Monog. U. S. Geo. Sur., vol. 8, p. 26, Prospect Mount-ain Gr., Up. Taconic.
- Canadensis, Billings, 1860, Can. Nat. and Geol., vol. 5. p. 301, and Pal. Foss., vol. 1, p. 397, Up. Taconic.
- coloradoensis, Shumard, 1861, Am. Jour, Sci. and Arts, 2d ser., vol. 32, p. 218, Up. Taconic.
- communis. Hall & Whitfield, 1877, U. S. Geo. Expl. 40th parallel. vol. 4, 288, Prospect Mountain Gr., Up. Taconic.
- ? di-parilis, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 179, Potsdam Gr. fabus, Billings, 1865, Pal. Poss., vol. 1, p.
- 298, Up. Taconic.
- galba, Billings, 1865, Pal. Foss., vol. 1, p. 297, Up. Taconic.
- interstrictus, White, 1874, Rep. Invert.
 Foss., p. 7, and Geo. Sur. W. 100th
 Mer., vol. 4, p. 38, Up. Taconic.
 ?jos-pha, Hall, 1863, 16th Rep. N. Y., St.
 Must Matt and T.S. Pottelam Gr.
- Mus. Nat. Hist., p. 178, Potsdam Gr.
- latus, see Beyrichia lata.
- lobatus, see Microdiscus lobatus.
- maladensis, Meek, 1873, H-yden's Sur. Terr., p. 464. Not properly defined. neon, Hall & Whitfield, 1877, U. S. Geo.
- Expl., 4th parallel, vol. 4, p. 229, Prospect Mountain Gr., Up. Taconic.

Soc. Ca orion, Bi

Can., p.

pect Me

nobilis, ser., vo obtusilob

> vol. 5, 397, Up ? parilis, Mus. N

partitus,

prolongus Geo. E

regulus, 1

Can., p



FIG. 954. Agnostus rex.

25, Pros

St. John

Can., p.

Geo. Ex

Up. Tac

umbo, Ma Can., p. vir, Matthe

p. 69, St.

Roy. Soc

Trilobite

ovate; c cular to

that mer

front, co

front, ne

distant f

facial sut eral post ward, cui terior ma

cheeks sr segments,

small, rot

stoma ora

A. ceticer affinis, Billi 72, Up. Ta

articephalus

bipunctatus,

Soc. Can.,

bipunctat

Sci., vol. 2

defined;

genus.

convex,

furrows

ing in

vir var. con

AGRAULUS, H einer N

similis, Ha

tessella, M

tumidosus

AGR. - AMP.

ACI.-AGN.



ACI.-AGN.

1840, Ann. Rep. Pal. N. Y., vol. 3, p.

Can. Nat. and Geo., 16th Rep. N. Y. St. . 181. [Ety. aglaos, d.] Cephalic shield ptical, wider than it; glabella narrow, ninent, and situate idle; thorax having ygidium small, and igle spine. Type A.

Can. Nat. and Geo., 16th Rep. N. Y. St. 181, Potsdam Gr. 30, Ann. Rep. Geo. d Geo. of Wis., vol. ir.

1822, Hist. Nat. [Ety. agnostos, obgate, elliptical; cepygidium subequal, r than wide, convex ; glabella convex; utures; two thoracic pisiformis.

Acad. Geol., p. 655,

is, Matthew, 1885, 1., p. 70, St. John Gr. 1885, Trans. Roy. John Gr.

1860, Can. Nat. and I, and Pal. Foss, p.

6th Rep. Hayden's 3, and Monog. U.S. 26, Prospect Mount-

1860, Can. Nat. and and Pal. Foss., vol. ic.

rd, 1861, Am. Jour, er., vol. 32, p. 218,

hitfield, 1877, U. 8. arallel. vol. 4, p. itain Gr., Up. Ta-

3, 16th Rep. N. Y. p. 179, Potsdam Gr. Pal. Poss., vol. 1, p.

Pal. Foss., vol. 1, p.

1874, Rep. Invert. eo. Sur. W. 100th Ip. Taconic. 16th R. p. N. Y., St.

78, Potsdam Gr. a.

s lobatus.

3, H-yden's Sur. roperly d. fined. d, 1877, U. S. Geo. vol. 4, p. 229, Pros-Up. Taconic.

AGR. - AMP.]

rex.

nobilis, Ford, 1872, Am. Jour. Sci., 3d ser., vol. 3, p. 421, Up. Taconic. obtusilobus, Matthew, 1885, Trans. Roy. Soc. Can., p. 72, St. John Gr.

CRUSTACEA.

FIG. 955.

orion, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 301, and Pal. Foss., vol. 1, p. 397, Up. Taconic.

? parilis, Hall, 1863, 16th Rep. N. Y. St.

Mus. Nat. Hist., p. 179, Potsdam Gr. partitus, Matthew, 1885, Trans. Roy. Soc. Can., p. 68, St. John Gr.

prolongus, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th parallel, p. 230, Prospect Mountain Gr., Up. Taconic. regulus, Matthew, 1885, Trans. Roy. Soc.

Can., p. 67, St. John Gr. *rex*, Barrande. Probably not

an American species, but illustrative of the genus. richmondensis, Walcott, 1884,

Monogr. U. S. Geo. Sur. vol. 8, p. 24, Prospect Mountain Gr., Up. Taconic.

FIG. 954. Agnostus seclusus, Walcott, 1884, Monrex. ogr. U. S. Geo. Sur., vol. 8, p. 25, Prospect Mountain Gr., Up. Taconic.

similis, Hartt, 1868, Acad. Geol., p. 656, St. John Gr.

- tessella, Matthew, 1885, Trans. Roy. Soc. Can., p. 71, St. John Gr.
- tumidosus, Hall & Whitfield, 1877, U.S. Geo. Expl. 40th parallel, vol. 4, p. 231, Up. Taconic.
- umbo, Matthew, 1885, Trans. Roy. Soc. Can., p. 71, St. John Gr.
- vir, Matthew, 1885, Trans. Roy. Soc. Can., p. 69, St. John Gr.
- vir var. concinnus, Matthew, 1885, Trans. Roy. Soc. Can., p. 70, St. John Gr. Agraulus, Hawle & Corda, 1847, Prodrom.
- einer Monographie der bomischen Trilobiten, p. 142. [Ety. agraulos, dwell-ing in the fields.] Body elongateovate; cephalic shield large, semicircular to lunate, with a wide margin, that merges in the cheeks; glabella convex, narrowed and rounded in front, conoidal, three or four lateral furrows on each side, margined in front, neck furrow distinct; eyes small, distant from glabella or submarginal; facial sutures, beginning near the lateral posterior angles, are directed forward, curving over the eyes to the anterior margin, nearly in parallel lines; cheeks small, narrow; sixteen thoracic segments, axal lobe convex; pygidium small, rounded, three segments; hypostoma oval, truncated anteriorly. Type A. ceticephalus.
- affinis, Billings, 1874, Pal. Foss., vol. 2, p. 72, Up. Taconic.
- articephalus, Matthew, 1885, Trans. Roy. Soc. Can., p. 75, St. John Gr.
- bipunctatus, Shumard, 1863, (Arionellus bipunctatus,) Trans. St. Louis Acad. Sci., vol. 2, p. 101, Potsdam Gr. Poorly defined; probably belongs to another genus.

convexus, Whitfield, 1877, (Arionellus convexus,) Geo. Sur. Wis., vol. 4, p. 190, Potsdam Gr. Founded upon a fragment, and may belong to another genus.

cylindricus, Billings, 1860, Arionellus cylindricus, Can. Nat. and Geo., vol. 5, p. 301, and Pal. Foss., vol. 1, p. 406, Up. Ta-conic or St. John Gr.

Agraulus cylindricus 1885. globosus, Walcott, Monogr. U. S. Geo. Sur., vol. 8, p. 61, Up. Taconic.

hallanus, Matthew, 1887, Trans. Roy. Soc. Can., p. 132, St. John Gr.

planus, Shumard, 1861, (Arionellus pla-nus,) Am. Jour. Sci. and Arts, 2d. series, vol. 32, p. 219, Potsdam Gr.

pustulatus, Walcott, 1879, (Arionellus pustulatus,) 31st Rep. N. Y. St. Mus. Nat. Hist., p. 68, Chazy Gr.

quadrangularis, Whitfield, 1884, (Arionel-

lus quadrangularis,) Bull. Am. Mus. Nat. Hist., vol. 1, p. 139, Up. Taconic. socialis, Billings, 1874, Pal. Foss., vol. 2, p. 71, Up. Taconic or St. John Gr.

- strenuus, Billings, 1874, Pal. Foss., vol. 2, p. 71, Up. Taconic or St. John Gr.
- subclavatus, Billings, 1860, (Arionellus subclavatus,) Can. Nat. and Geo., vol. 5, p. 301, and Pal. Foss., vol. 1, p. 406, Up. Taconic or Quebec Gr.
- texanus, Shumard, 1861, (Arionellus texanus,) Am. Jour. Sci. and Arts, 2d ser., vol. 32, p. 218, Potsdam Gr. or Up. Taconic.
- tripunctatus, Whitfield, 1876, Rep. Recon. Up. Mo. to Yel. Nat. Park, p. 141, Potsdam Gr. or Up. Taconic.
- whitfieldauus, Matthew, 1887, Trans. Roy. Soc. Can., p. 130, St. John Gr.
- whitfieldanus var. compressus, Matthew 1887, Trans. Roy. Soc. Can., p. 130, St. John Gr.

woosteri, Whitfield, 1878, Geo. Sur. Wis., vol. 4, p. 189, Potsdam Gr.

AMPHION, Pander, 1830, Beitrage zur Geognosie des Russischen Reiches, p. 139. Cephalic [Ety. mythological name.] shield short, transverse; glabella con-vex or subrectangular, three pairs of furrows, front inclosing a small fore-head lobe; eyes small; facial suture, behind the eyes, ending on the exterior margin in advance of the rounded ap-

gles; thorax 15 to 18 articulations; pleuræ without grooves; pygid-ium with short axis and pleuræ with free terminations; lab-

rum pointed, FIG. 956 -- Amphion cana-densis. Pygidium. convex, mar- densis. gined. Type A. frontiloba.

barrandii, Billings, 1865, Pal. Foss., vol.

1, p. 288, Quebec Gr.



convexus, Billings, 1865, Pal. Foss., vol. 1, p. 322, Quebec Gr. insularis, Billings, 1865, Pal. Foss., vol. 1,

p. 290, Quebec Gr.

julius, Billings, 1865, Pal. Foss., vol. 1, p. 290, Quebec Gr.

matutinus, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 222, Potsdam Gr. multisegmentatus, see Encrinurus multiseg-

mentatus.

nevadensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 94, Chazy Gr. salteri, Billings, 1861, Can. Nat. and Geo.

vol. 6, Calciferous Gr.

westoni, Billings, 1865, Pal. Foss., vol. 1, p. 321, Quebec Gr.

AMPHIPELTIS, Salter, 1863, Quar. Jour. Geo.

Soc., vol. 19, p. 75. [Ety. amphi, on both sides; *peltis*, provided with a shield or buckler.] Carapace oblong, oval, rounded in front, more truncate behind; thorax with 9 segments, 5 project beyond the carapace and 4 concealed beneath tail-piece semiit: circular, as wide as the abdomen, and as long as the last three segments taken together. Type A. paradoxus.

FIG. 957.—Amphi-peltis paradoxus. paradoxus, Salter, 1863,

Quar. Jour. Geo. Soc., vol. 19, p. 76, and Acad. Geo., p. 523, Up. Devonian. Ampyx, Dalman, 1827, Uber die palæaden oder die sogenannten Trilobiten, p. 53. [Ety. ampyx, head-band.] Cephalic shield somewhat trigonal; glabella large, prominent, narrow behind, and pro-

jecting upward and forward anteriorly cheeks flattened, posterior angles produced; no eyes or facial sutures; thoracic segments 5 or 6, flattened, sides straight, divided by a diagonal

pleural groove; pygidium subtrigonal, nearly as large as the cephalic shield; one anterior segmental furrow; axis faintly marked with transverse furrows. Type

. nasutus. vol. 1, p. 24, Chazy Gr. læviusenlus, Billings, 1865,

Pal. Foss., vol. 1, p. 295, FIG. 958.

normalis, Billings, 1865, Pal. Head with Foss., vol. 1, p. 295, Que-bec Gr.

rutilius, Billings, 1865, Pal. and the Foss., vol. 1, p. 296, Quebec Gr. semicostatus, Billings, 1865, Pal. Foss., vol. 1, p. 297, Quebec Gr. and

canadensis, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 381, Chazy Gr. cocki.

- Anomocare, Angelin, 1852, Pal. Scand., p. 24. This genus is not yet known in America
 - (?) parvum, Walcott, 1885, Mon. U. S. Geo. Sur., vol. 8, p. 59, Up. Taconic. This species is founded on a fragment of the cephalic shield and the generic reference is only provisional.

ANOPOLENUS, Salter, 1864, Quar. Jour. Geo. Soc., vol. 20, p. 236, and vol. 21, p. 477. [Ety. a, without; ops, an eye; Olenus, agenus.] Elongated, depressed; cephalic shield semicircular with prolonged spines, and clavate glabella having 4 pairs of furrows; fixed cheeks, large, punctate, strongly margined, each a quarter of a circle in shape, and reaching nearly to the front of the glabella, against which the long eyes abut; thence the facial suture curves outward, and is marginal



FIG. 959.-Anopolenus venustus.

below; free cheeks are a narrow band margined and reaching only threefourths down the fixed cheek ; pygidium wide, expanded, but narrower than the thorax, widely marginate, and serrated by 6 or 8 marginal spines. Type A. henrici.

venustus, Billings, 1874, Pal. Foss., vol. 2, p. 73, Up. Taconic.

ANTHRACONECTES, Meek & Worthen, 1868, Am. Jour. Sci., vol. 46, p. 21, and Geo. Sur. Ill., vol. 3, p. 544. Ety. anthrax, coal ; nectos, swimming.] Distinguished from Eurypterus by the absence of lateral spines at the articulations of the legs, which ter-

minate in single FIG. 960.—Anthraconec-tes mazonensis. Hy-points, and in the postoma enlarged to great length and simple extremity of the mesial ap-

pendage of its operculum, as well as in the possession of two little spatulate supplementary pieces. Type A. mazonensis.

mazonensis, Meek & Worthen, 1868, Am. Jour. Sci and Arts, vol. 46, p. 21, and Geo. Sur. Ill., vol. 3, p. 544, Coal Meas.



in front; the long eve-

lobe, which forms the

margin of the fixed

cheeks, reaches quite

to the glabella in

front, and nearly to

the posterior angle

tes mazonensis. Hy-postoma enlarged to show the scale-like sculpturing.

FIG. 962. — Ant gracilis. Dor gracilis. Dor what enlarged

front mar have wide and third the rest a

same ; pendag eral ali tion of

ANTHRACOPAI





AMP.-ANT.

AMP.-ANT.

ANT.-ARC.]

Prototypus hitch-

52, Pal. Scand., p. not yet known in

885, Mon. U. S. Geo. Up. Taconic. This on a fragment of the d the generic referonal.

4, Quar. Jour. Geo. and vol. 21, p. 477. ps, an eye; Olenus, depressed; cephalic with prolonged r glabella having 4 fixed cheeks, large, margined, each a n shape, and reachont of the glabella, e long eyes abut; suture curves oufard, and is marginal front; the long evebe, which forms the argin of the fixed eeks, reaches quite the glabella in ont, and nearly to e posterior angle low; free cheeks e a narrow band aching only threefixed cheek ; pygidded, but narrower widely marginate, r 8 marginal spines.

74, Pal. Foss., vol. 2,



ig. 960.—Anthraconec-tes mazonensis. Hypostoma enlarged to show the scale-like sculpturing.

erculum, as well as of two little spatupieces. Type A.

Worthen, 1868, Am. vol. 46, p. 21, and . 3, p. 544, Coal I.

CRUSTACEA.



FIG. 961.—Anthraconectes mazonensus. a, b, c, Legs, crushed and broken; h, ends of dorsal half of body segments; m, hyposioma; P, swimming paddle broken; t, natural articulation; g, basal joints of same; x, enlarged surface markings; M, mesial ap-pendage of operculum; l, 2, 3, articulations; x, t, lat-eral alge of operculum; s, s, accessory pieces; O, posi-tion of mouth.

ANTHRACOPALEMON, Salter, 1861, Quar. Jour.



16. 962. — Anthracopalæmon gracilis. Dorsal view some-what enlarged. FIG. 962.

> front margin serrate; outer antennæ have wide, square basal joints; second and third joints not much oblique; the rest about as broad as long; ab-

Geo. Soc. Lond., vol. 17, p. 529. Ety. anthrax, coal; palæmon. prawn.] Carapace scarcely as broad 88 long, simple, convex. sides arched outward; central ridge in front separated by a furrow

from a central ridge;

ments, subtrigonal, pointed in front, truncated

and sinuous FIG. 964.—Archæocaris ver-posteriorly; ab- miformis. domen with six

imbricating segments; telson as long as 31 abdominal segments with a stylet on each side. Type A. vermiformis.

529

domen of six joints, as broad as long, pleuræ except the second pointed; telson broad,



FIG. 963.—Anthracopalæmon FIG. 983.—Anthracopalæmon gracilis. Caudal parts and one abdominal segment in advance of the telson—ali enlarged. a, Small, ter-minal paletic; d, d, two accessory lamellæ; c, c, lateral lamellæ or fins.

timate joint double on each side, subtrigonal, broad, lateral fins divided. Type A. grossarti.

gracilis, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 50, and Geo. Sur. Ill., vol. 2, p. 407, Coal Meas. hillanus, Dawson, 1877, Geo. Mag., vol. 4, p. 56, Coal Meas.

- APARCHITES, Jones, 1889, Ann. and Mag. Nat. Hist., 6th ser., vol. 3, p. 384. [Ety. aparche, first.] In form like Leperditia. but smaller and without ocular or muscular spot, and having no overlap on the ventral margin, Type A. whiteavesi. whiteavesi, Jones, 1889, Ann. and Mag. Nat.
- Hist., 6th ser., vol. 3, p. 384, Trenton Gr. ARCHEOCARIS, Meek, 1872, Proc. Acad. Nat.
- Sci. Phil., p. 335. [Ety. archaios, an-cient; karis, shrimp.] Cephalothorax about equaling

in length 31 seg-

vermiformis, Meek, 1872, Proc. Acad. Nat. Sci. Phil., p. 335, and Ohio Pal., vol. 2, p. 321, Subcarboniferous.

Arctinurus, Castelnau, 1843, Syst. Syl., p. 21, syn. for Lichas.

- Arethusina, Barrande, 1852, Syst. Sil. Boh. Not yet known as an American genus. (?) americana, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 62, Potsdam Gr. Founded upon a fragment of a cephalic shield which does not belong to this genus
- Arges, Goldfuss, 1839, Nova Acta Phys. Acad. Caes. Leop: Nat. Cur. Not American. Arionellus, Barrande, 1852, Syst. Sil. Boh.,

syn. for Agraulus.

bipunctatus, see Agraulus bipunctatus. convexus, see Agraulus convexus. cylindricus, see Agraulus cylindricus. oweni, see Crepicephalus oweni. planus, see Agraulus planus. pustulatus, see Agraulus pustulatus. quadrangularis, see Agraulus quadrangu-

laris. subclavatus, see Agraulus subclavatus. texanus, see Agraulus texanus.

tripunctatus, see Agraulus tripunctatus. ARISTOZOE, Barrande, 1872, Syst. Sil. Boh.,

vol. 1, p. 477. [Ety. aristos, best; zoon, animal.] Carapace bivalve; test thin; hinge-line straight; ventral margin grooved and reflected; tubercle near anterior margin. Type A. bisulcata. rotundata, Walcott, 1887, Am. Jour. Sci.

and Arts, 3d ser., vol. 4, p. 193, Up. Taconic.

troyensis, Ford, 1873, (Leperditia troyensis,) Am. Jour. Sci. and Arts, 3d ser., vol. 6. p. 138, Up. Taconic.

ASAPHISCUS, Meek, 1873, 6th Rep. Hayden's Geo. Sur. Terr., p. 485. [Ety. from the genus Asaphus.] Distinguished from Asaphus by having nine thoracic segments, a copical and well-defined gla-bella, without lateral lobes, the furrow at the anterior margin of the head, and less arcuate eyes more remote from the glabella; distinguished from

Bathyurellus by having its conical glabelladepressed, and the margin of the head, in front, first convex, and sloping forward into a transverse mesial furrow, and then rising in a convex margin; the mesial lobe of the pygidium is longer, and the free margins narrower, less flattened and alate.

Type A. wheeleri. bradleyi, Meek, 1873, 6th Rep. Hayden's Geo. Sur. Terr., p. 484, Up. Taconic.

65. — Asaphiscus wheeleri.

FIG. 965. wheeleri, Meek, 1873, 6th Rep. Hayden's Geo. Sur. Terr., p. 485, and Geo. Sur. W. 100th Mer., vol. 4, p. 43, Up. Taconic.

ASAPHOIDICHNUS, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 217. [Ety. Asaphus, a genus; eidos, form; ichnos, track.] A track supposed to have been made by a crustacean. Type A. trifidus.

dyeri, S. A. Miller, 1880, dyerl, S. A. Miller, 1000, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 219, Utica Slate Gr. trifidus, S. A. Miller, 1880, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 219 Utica Slate Gr.

218, Utica Slate Gr.

ASAPHUS, Brongniart, 1822, Hist., Nat. Crust. Foss., p. 171 [Ety. asaphus, uncertain, obscure.] Body somewhat elliptical, sides straightened cephalic shield and pygidium nearly equal and somewhat semielliptical; glabella con-tracted between the eyes; eyes large, smooth; facial sutures extending forward and outward in advance of the eyes, and then curving to the middle of the front margin, posteriorly extending ob-liquely outward, and cutting the posterior margin of the cephalic shield within the lateral angles; thoracic segments 8, with wide, nearly straight pleural grooves; axis of pygidium, when traceable, elongate conic, seg-ments usually indis-tinct. Type A. cornig- Fig. 966.—Asaph-

- oidichnus trifierus. dus.
- acantholeurus, ' see Dalmanites acantholeurus.
- alacer, Billings, 1866, Catal. Sil. Foss. Antic., p. 26, Hud. Riv. Gr.
- aspectans, see Dalmanites aspectans.
- astragalotes, Green, 1834, Am. Jour. Sci., vol. 25, p. 325. Probably founded upon
- vol. 29, pJ 325. Fromably founded upon the pygidium of a Phacops.
 barrandi, Hall, 1851, Lake Sup. Land Dist., p. 210, Birdseye Gr.
 canadensis, Chapman, 1856, Can. Jour-vol. 2, p. 47, Trenton Gr.
 canalis, Conrad, 1847, Pal. N. Y., vol. 1,

- p. 25, Chazy Gr. caribouensis, Walcott, 1885, Monogr. U. S.
- Geo. Sur., vol. 8, p. 98, Quebec Gr.

FIG. 967.-Asa gigas.

Worthen p. 54, Hu halli, Conra halli, Chap Nat. Hist ton Gr. hausmani. D'Archia

ican. hincksi, Sal Hist., 3d homalonoto

N. Y. St. ton Gr.

(?) huttoni, 1, p. 271, (?) illænoid

vol. 5, p. iowensis, O and Minn

laticostatus, s (?) latimargi vol. 1, p. 2

limulurus, se marginalis,] p. 24, Chaz

megalapthalm Tenn. Nias but probat

a. Sittman nat. fc. 11



ASA.

caudatus,

cordieri, (limulur

corycoeus, 1

crypturus,

(?) curios

denticulatu

🗙 ditmarsiæ

Pa., vo

form ne

vol. 1, r

Scotia I

39, p. 4 fragmen

limulur

diurus, Gr

edwardsi,

extans, see

limului

ARC.-ASA

ASA.]

6th Rep. Hayden's 485, and Geo. Sur. l. 4, p. 43, Up. Ta-



1885, Monogr. U. S. 98, Quebec Gr.

- caudatus, Green, syn. for Dalmanites limulurus. (?)
- cordieri, Castelnau, syn. for Dalmanites limulurus.
- crypturus, Green, 1834, Trans. Geo. Soc. Pa., vol. 1, p. 37. Not an Asaphus; form not determined.
- (?) curiosus, Billings, 1865, Pal. Foss., vol. 1, p. 318, Quebec Gr.
- denticulatus, see Dalmanites denticulatus. 🗶 ditmarsiæ, Honeyman, 1879, Proc. Nova
- Scotia Inst., vol. 5, p. 18, Low. Sil. diurus, Green, 1839, Am. Jour. Sci., vol. 39, p. 40, Niagara Gr. Probably the
- fragment of a Dalmanites. edwardsi, Castelnau, syn. for Dalmanites
- limulurus.

Grs.

N. Y., vol. 1, p. 174, and Pal. N. Y., vol. 1, p. 231, Trenton and Hud. Riv.

(?) goniocercus, Meek,

1873, Hayden's Geo. Sur. Terr., p. 480, Quebec Gr. or Up. Taconic. Probabiy

5, p. 301, Up. Ta-

conic. Not defined

so as to be recog-

a Megalaspis.

extans, see Bathyurus extans. gigas, Dekay, 1825, (Isotelus gigas,) Ann. Lyc. Nat. Hist.



(?) goniurus, Billings, 1860, Can. Nat., vol.

FIG. 967.-Asaphus gigas.

graftonensis, Meek & Worthen, 1870, Proc. Acad. Nat. Sci., p. 54, Hud. Riv. Gr.

nized.

- halli, Conrad, syn. for Dalmanites boothi. halli, Chapman, 1858, Ann. and Mag. Nat. Hist., 3d ser., vol. 2, p. 14, Treuton Gr.
- hausmani, Brongniart, as identified by D'Archiac and Verneuil. Not American.
- hincksi, Salter, 1859, Ann. and Mag. Nat. Hist., 3d ser., vol. 4, p. 2, Trenton Gr. homalonotoides, Walcott, 1877, 31st Rep.
- N. Y. St. Mus. Nat. Hist., p. 71, Trenton Gr.
- (?) huttoni, Billings, 1865, Pal. Foss., vol.
- 1, p. 271, Quebec Gr. or Up. Taconic. (?) illænoides, Billings, 1860, Can. Nat.
- vol. 5, p. 301, Up. Taconic. iowensis, Owen, 1852, Geo. Wis., Iowa, and Minn., p. 577, Trenton Gr.
- laticostatus, syn. for Dalmanites anchiops. (?) latimarginatus, Hall, 1847, Pal. N. Y.,
- vol. 1, p. 253, Utica Slate Gr. limulurus, see Dalmanites limulurus.
- marginalis, Hall, 1847, Pal. N. Y., vol. 1, p. 24, Chazy Gr.
- megalapthalmus, Troost, 1840, 5th, Geo. Tenn. Niagara Gr. Not clearly defined, but probably a Dalmanites. a. Sittmarsia, Honeyman, acc. to Vogdes + (Proc. Autout Ina nat. Sc., 1888 Vol 7 of. 1) = a. eruhting and

megistus, Locke, 1841, (Isotelus megistos,) Trans. Am. Geo. and Nat., p. 221, Trenton and

Hud. Riv. Grs. micrurus, see. Dalmanites micrurus.

- (?) morrisi, Billings, 1865, Pal. Foss., vol. 1, p. 272, Quebec Gr. or Up. Taconic. murchisoni, Castelnau, syn. for A.
- gigas. myrmecophorus,see Dalmanites myrmecopho-
- rus. nasutus, see Dal-

tus.

vol. 1, p. 248. Fig. 968.—Asaphus megis-tus. Not defined so

as to establish a species.

- notans, Billings, 1866, Catal. Sil. Foss. Antic., p. 24, Hud. Riv. Gr. obtusus, Hall, 1847, Pal. N. Y., vol. 1, p.
- 24, Chazy Gr.
- pelops, Billings, 1865, Pal. Foss., vol. 1, p. 317, Quebec Gr. or Up. Taconic. Not an Asaphus.
- platycephalus, Stokes, 1822, Trans. Geo. Soc. Lond., 2d ser., vol 1, p. 258, Trenton Gr.
- platypleurus, Green, 1837, Am. Jour. Sci., vol. 32, p. 169, Low. Sil. Not very clearly defined.
- pleuropteryx, see Dalmanites pleuropteryx.
- polypleurus, Green, 1838, Am. Jour. Sci., vol. 34, Keokuk Gr. Probably a Phillipsia.
- quadraticaudatus, Billings, 1865, Pal. Foss., vol. 1, p. 272, Quebec Gr. or Up. Taconic. Not an Asaphus.
- romingeri, Walcott, 1876, 28th Rep. N. Y. Mus. Nat. Hist.; p. 96, Black Riv. and Trenton Gr.

selenurus, see Dalmanites selenurus.

- stokesi, s e Proetus stokesi.
- susæ, Calvin, 1882, Geo. Wis., vol. 4, p. 236, Trenton Gr.
- tetragonocephalus, Green, 1834, Am. Jour. Sci., vol. 25, p. 336. Not an Asaphus, and the relations not clear.

- trentmensis, s-e Lichas trentonensis. triangulatus, Whitfield, syn. for. A. homalonotoides.
- trimblii, Green, 1837, Jour. Acad. Nat. Sci. Phil., vol. 7, Niagara Gr.
- vetustus, Hall, 1847, (Ogygia vetustus,) Pal. N. Y., vol. 1, p. 227, Birdseye Gr.
- vigilans, Meek & Worthen, 1870, (Isotelus vigilans,) Proc. Acad. Nat. Sci. Phil., p. 53, and Geo. Sur. Ill., vol. 6, p. 497, IIud. Riv. Gr.



manites nasu-

wetherilli, Green, syn. for Dalmanites limulurus.

532

wisconsinensis, Walcott, 1876, 28th Rep. N. Y. Mus. Nat. Hist., p. 97, Trenton Gr.

Arops, Emmons, 1844, Taconic System, p. 64, and Am. Geol. p. 115, [Ety. a, ab-sence of; ops, an eye.] Cephalic shield semicircular, anterior and lateral edges turned upward, posterior angles rounded, convex; glabella subquadrate, convex, appearing as a continuation of the central lobe, two lateral furrows on each side, neck segment well defined; facial suture beginning at the antero-lateral part of the cephalic shield, runs nearly parallel with the anterior margin to the front of the glabella, when it turns at right angles and runs parallel with the glabella to the posterior margin; no eyes; thoracic segments 17, axial nearly as wide as the lateral lobes, narrowing gradually to the pygillium, armed with a row of short spines, lateral lobes with a row of tubercles on the median line; pygidium small, somewhat semielliptical, flat, axial lobe with a single ring. Type A. trilineatus.

fischeri, Billings, 1865, (Triarthrus fischeri,) Pal. Foss., vol. 1, p. 291, Quebec Gr. or Up. Taconic.

miser, Billings, 1861, (Conocephalites miser,) Pal. Fors., vol. 1, p. 12, Up. Taconic.

trilineatus, Emmons, 1844, Taconic System, p. 64, and Am. Geol., p. 115, Up. Taconic.

suture cutting the posterior margin about the middle, and in front of the

eyes arching forward, first outward and

then inward; pleuræ falcate, with a

fulcrum close to the axis, grooved, not

faceted; pygidium with short axis and smooth sides. Type B. cordai.

(?) maccoyi, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 96, Trenton Gr.

BAILIELLA, Matthew, 1884, Trans. Roy. Soc.



FIG. 969-Atops trilineatus.

Can., vol. 2, pl. 1. [Ety. proper name.] Proposed as a subgenus and foundedon Conocoryphe baileyi.

Coy,1849, Ann. Nat. Hist. 2d ser. vol. 4, p. 409. [Ety. proper name.] Ovate, depressed; glabella with incompleteaxial furrows and no distinct lobes; eves large, subcentral; facial

BARRANDIA, MC-

Barrandia, Hall, 1860. The name was preoccupied by McCoy in 1849; beside, it is a syp. for Elliptocephala. thompsoni, see Elliptocephala thompsoni.

vermontana, see Elliptocephala vermontana.

BATHYNOTUS, Hall, 1860, 3d Rep. N. Y. St. Mus. Nat. Hist., p. 117. [Ety. bathys, ample; notos, back.] Cephalic shield somewhat semielliptical, with posterior



FIG. 970-Bathynotus holopyga. Long eye-lobes crushed down.

angles produced in very long spines; glabella transversely lobed; eye-lobe narrow, elongate, extending from opposite the antero lateral angle of the glabella obliquely backward nearly to the posterior margin; facial suture passes nearly around the extended eyelobe, and cuts the margin before reaching the posterior extension of the eyelobe; anteriorly it passes in front of the glabella without, as it appears, cutting, the front margin; free cheeks united in front; thirteen thoracic segments; middle lobe prominent, twice as wide as the lateral lobes; articulations strong, each bearing a central node; pleuræ short, each terminating in a spine, the last pair being prolonged far beyond the pygidium; pygidium short, middle lobe with three annulations, lateral lobes flat and plain; hypostoma having an obtuse angle; at the front margin of the doublure, the latter being cut away to permit the extension to cross it, behind the doublure it is transversely quadrangular. Type B. holopyga.

 bolopyga, Hall, 1859, (Peltura holopyga,)
 12th Rep. N. Y. St. Mus. Nat. Hist.,
 p. 61 and Pal. N. Y., vol. 3, p. 528, Up. Taconic.

side lobe smooth b cave. Ty abruptus, I p. 263, Q bradleyi, M expansus, p. 318, Q formosus, I p. 266, Q fraternus, I p. 267, Qu litoreus, Bi p. 320, Qr marginatus, 1, p. 264, nitidus, Bil Foss., vol bec Gr. o rarus, Billi Foss., vol. bec Gr. o truncatus, M den's Geo 465. Not defined. validus, Bill Foss., vol. Taconic. wheeleri, Mee



FIG. 972.—Bathys productus

terior mar the greater and extend terior base latter, they cutting th leave a na thorax fro strong; ple semicircula by several lateral lobe

BAT.]

BATHYURELL

1, p. 262 rus.] F

shield co

or point

nate; fac

curving

or inwar

behind t

parallel t

the mar

angle; tl pygidiun [ATO.- BAT.

The name was prein 1849; beside, it is phala. cephala thompsoni. stocephala vermont-

), 3d Rep. N. Y. St.). 117. [Ety. bathus. .] Cephalic shield tical, with posterior



Long eye-lobes own.

very long spines; y lobed; eye-lobe stending from opteral angle of the backward nearly to gin; facial suture 1 the extended eyenargin before reachtension of the eyeasses in front of the it appears, cutting, ee cheeks united in acic segments; mid-, twice as wide as rticulations strong, itral node; pleuræ ing in a spine, the longed far beyond dium short, middle nnulations, lateral 1; hypostoma hav-; at the front mar-, the latter being t the extension to oublure it is transr. Type B. holo-

(Peltura holopyga,) t. Mus. Nat. Hist., vol. 3, p. 528, Up.

BAT.]

CRUSTACEA.

BATHYURELLUS, Billings, 1865, Pal. Foss, vol. 1, p. 262. [Ety. diminutive of Bathyu-rus.] Form oblong, ovate; cephalic shield convex, lunate; glabella conical or pointed, without furrows; eyes lunate: facial suture in front of the eve. curving outward, then straight forward or inward on approaching the margin behind the eye, running outward subparallel to the neck furrow, and cutting the margin before reaching the outer angle; thorax, nine segments; axis of pygidium short, not strongly grooved, side lobes with short ribs, and a broad, smooth borderall around, sometimes concave. Type B. abruptus and B. nitidus. abruptus, Billings, 1865, Pal. Foss., vol. 1,

p. 263, Quebec Gr. or Up. Taconic. bradleyi, Meek, see Asaphiscus bradleyi. expansus, Billings, 1865, Pal. Foss., vol. 1, p. 318, Quebec Gr. or Up. Taconic. formosus, Billings, 1865, Pal. Foss., vol. 1, p. 266, Quebec Gr. or Up. Taconic. fraternus, Billings, 1865, Pal. Foss., vol. 1, p. 267, Quebec Gr. or Up. Taconic. litoreus, Billings, 1865, Pal. Foss., vol. 1, p. 320, Quebec Gr. or Up. Taconic.

marginatus, Billings, 1865, Pal. Foss., vol. 1, p. 264, Quebec Gr. or Up. Taconic.

nitidus, Billings, 1865, Pal. Foss., vol. 1, p. 265, Que-bec Gr. or Up. Taconic. rarus, Billings, 1865, Pal. Foss., vol. 1, p. 320, Que-bec Gr. or Up. Taconic. truncatus, Meek, 1873, Hay-

6th

Geo. Sur. Terr., p.

484. [Ety. from Bathyurus.] Ovate;

head semicircular;

glabella straight or

slightly expanded

in front, three or

four pairs of fur-

rows; eyes elon-gate; facial su-

Rep.

U. S.

den's Geo. Sur. Terr., p. 465. Not satisfactorily FIG. 971 - Ba defined. thyurellus nivalidus, Billings, 1865, Pal. tidus.

Foss., vol. 1, p. 268, Quebec Gr. or Up. Taconic.

wheeleri, Meek, see Asaphiscus wheeleri. BATHYURISCUS, Meek,

1873,

Hayden's



FIG. 972.—Bathyuriscus productus.

tures cut the anterior margin of the head each side of the greatest expansion of the glabella, and extend obliquely inward to the anterior bases of the eyes; encircling the latter, they extend obliquely outward, cutting the posterior margin so as to leave a narrow, elongate lateral limb; thorax from 7 to 9 segments; axis strong; pleural groove broad; pygidium semicircular, axis strong, and crossed by several furrows which cross the lateral lobes. Type B. haydeni. 35

- haydeni, Meek, 1873, (Bathyurus haydeni,) 6th Rep. Hayden's U. S. Geo. Sur. Terr., p. 482, Up. Taconic.
- howelli. Walcott, 1886. Bull. U. S. Geo. Sur. No. 30, p. 216, Up. Taconic. productus, Hall & Whitfield, 1877, (Ogygia
- producta,) Geol. Expl. 40th Par., vol. 4, p. 244, Up. Taconic.
- BATHYURUS, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 365. [Ety. bathys, deep; oura, tail.] Elliptical, sides straight; cephalic shield lunate, posterior angles produced in spines; glabella subquad-rate, rounded anteriorly, convex, furrows obscure, neck segment distinct; eyes large, smooth, semilunar; facial sutures curving forward anteriorly, and posteriorly directed straight backward from the eye, and then, abruptly curving outward, cut the cephalic shield half-way to the genal angle; nine thoracic segments, axial lobe narrower than lateral lobes, and gradually tapering; pleuræ furrowed; pygidium smaller than the head, segments closely united, border flattened and smooth; hypo-stoma not forked. Type B. extans.

amplimarginatus, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 365, Calciferous Gr. angelini, Billings, 1859, Can. Nat. and Geol., vol. 4, p. 468, Chazy Gr.

- arcuatus, Billings, 1865, Pal. Foss., vol. 1, p. 205, Quebec Gr. or Up. Taconic.
- armatus, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 321, Quebec Gr. or Up. Taconic.
- bituberculatus, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 321, Quebec Gr. or Up. Taconic.
- breviceps, Billings, 1865, Pal. Foss., vol. 1, p. 262, Quebec Gr. or Up. Taconic.
- capax, Billings, 1860, Can. Nat. and Geol., vol. 5, p. 321, Quebec Gr. or Up. Taconic.
- caudatus, Billings, 1865, Pal. Foss., vol. 1, p. 261, Quebec Gr. or Up. Taconic.
- conicus, Billings, 1859, Can. Nat. and
- Geol., vol. 4, p. 366, Calciferous Gr.
 (?) congeneris, Walcott, 1885, Monogr.
 U. S. Geo. Sur., vol. 8, p. 92, Quebec Gr. or Up. Taconic.
- cordai, Billings, 1860, Can. Nat. and Geol., vol. 5, p. 321, Calciferous Gr.
- crotaliformis, Dwight, 1884, Am. Jour. Sci. and Arts, 3d ser., vol. 27, p. 253, Calciferous Gr.
- cybele, Billings, 1859, Can. Nat. and Geol., yol. 4, p. 366, Calciferous Gr.
- dubius, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 321, Quebec Gr. or Up. Taconic.
- extans, Hall, 1847, (Asaphus (?) extans,) Pal. N. Y., vol. 1, p. 228, Lower Trenton Gr.
- gregarius, Billings, 1865, Pal. Foss., vol. 1, p. 363, Up. Taconic.
- haydeni, see Bathyuriscus haydeni.
- longispinus, Walcott, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 94, Black River and Trenton Grs.

CRUSTACEA.

minganensis, Billings, 1865, Pal. Foss., vol. 1, p. 353, Calciferous Gr. nero, Billings, 1865, Pal. Foss., vol. 1, p. 260, Quebec Gr. or Up. Taconic.

oblongus, Billings, 1860, Can. Nat. and Geo.,

vol. 5, p. 321, Quebec Gr. or Up. Taconic. parvulus, Billings, 1861, Pal. Foss., vol. 1, p. 16, Up. Taconic.

perplexus, Billings, 1865, Pal. Foss., vol. 1, p. 364, Potsdam Gr. or Up. Taconic.

perspicator, Billings, 1865, Pal. Foss., vol. 1, p. 205, Quebec Gr. or Up. Taconic. pogonipensis, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th Parallel, vol. 4,

p. 243, Quebec Gr. or Up. Taconic. quadratus, Billings, 1860, Can. Nat. and

Geo., vol. 5, p. 320, Quebec Gr. or Up. Taconic.

saffordi, Billings, 1860, Can. Nat. and Geol., vol. 5, p. 321, Quebec Gr. or Up. Taconic.

Taconic.
seelyi, Whitfield, 1886, Bull. Am. Mus.
Nat. Hist., vol. 1, p. 339, Birdseye Gr.
senectus, Billings, 1861, Pal. Foss., vol.
1, p. 15, Up. Taconic.
serratus, Meek, 1873, 6th Rep. Hayden's Geo. Sur. Terr., p. 480, Potsdam Gr. or

Up. Taconic. ? simillimus, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 93, Quebec Gr. or Up. Taconic.

smithi, Billings, 1862, Pal. 14 Foss., vol. 1, p. 56, Black Riv. Gr.

FIG. 973. Bathyurus smithi. solitarius, Billings, 1865, Pal. Foss., vol. 1, p. 362, Up. Taconic.

spiniger, Hall, 1847, (Acid-aspis spininger,) Pal. N. Y., vol. 1, p. 241, Black River and Trenton Gr.

stonemani, Vogdes, 1884, 12th Rep. Geo. and Nat. Hist. Minn., p. 8, Trenton Gr. strenuus, Billings, 1865, Pal. Foss., vol. 1, p. 204, Quebec Gr. or Up. Taconic. taurifrons, Dwight, 1884, Am. Jour. Sci. and Arts, 3d ser., vol. 27, p. 252, Calciferous Gr.

timon, Billings, 1865, Pal. Foss., vol. 1,

p. 261, Quebec Gr. or Up. Taconic.
 tuberculatus, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 91, Quebec

Gr. or Up. Taconic.

vetulus, Billings, 1865, Pal. Foss., vol. 1, p. 365, Potsdam Gr. or Up. Taconic. BELINURUS, Konig, 1825, Icones Fossilium Sectiles, p. 230. [Ety. belos, dart; oura, tail.] Cephalo-thoracic shield subcrescentiform, more than twice as wide as long, lateral angles pointed; ocular ridge surrounds a transversely subelliptical area, within which there is a crown shaped area, surrounded by a ridge; eyes small, and at the lateral extremities of the subelliptical area; mesial lobe narrow, and contracted toward each end; lateral lobes wide, flattened on the margin and serrate on the edge; telson tapering to a point. Type B. bellulus.

danæ, see Euproops danæ. laccei, Packard, 1885, Am. Naturalist, vol.





FIG 974.—Belinurus bellulus. e, Position of eye, at the lateral extremity of a transversely elliptical area.

- BEYRICHIA, McCoy, 1844, Syn. Sil. Foss. Ireland, p. 57. [Ety. proper name.] Carapace equivalve, oblong, extremi-ties rounded, ventral border semicircular, dorsal straight; valves wider at the caudal than the cephalic extremity, more or less convex, impressed with transverse furrows. Type B. kloedeni, quilatera, Hall, 1860, Can. Nat. and
 - sequilatera, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 158, and Acad. Geol., p. 609, Up. Silurian.
 - americana, Shumard, 1858, (Cythere americana,) Trans. St. Louis Acad, Sci., vol. 1, p. 227, Up. Coal Meas.
- arcuata, Bean, 1886, Lond. Geo. Mag., p. 438, Low. Held. Gr.

atlantica, Billings, 1865, Pal. Foss., vol. 1, p. 300, Quebec Gr. or Up. Taconic. bella, Walcott, 1883, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 213, Trenton Gr. chambersi, S. A. Miller,

1874, Cin. Quar. Jour. Sci., vol. 1, p. 234, Hud. River Gr.

ciliata, Emmons, 1855, American Geo., p. 219, Hud. Riv. Gr.

cincinnatiensis, see Primitia cincinnatiensis.

clathrata, Jones, 1858, Ann. and Mag. Nat. Hist., 3d series, vol. 1, p. 242, Niag-

ara Gr. decora, Billings, 1866, Catal. Sil. Foss. Antic., p. 67, Anticosti Gr. dagon, Clarke, 1855,

Bull. U. S. Geo.

FIG. 975.-Bey

Mag. 12 diam.

richia chambersi.

Sur., No. 16, p. FIG. 976.-Beyrichia dur-29, Genesee yl. Magnified 25 diam. Shale.

duryi, S. A. Miller, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 232, Hud. Riv. Gr.



logani. see logani var. ditoides. logani var. formis.

maccoyana Nat. Hist daga Gr. notata, Ha

379, Low notata var. N. Y., vo novascotia,

Geo. Mag boniferou occidentalis Sur., vol.

oculifera, H Mus. Nat

oculina, Ha 378, Low pennsylvan Mag. Nat

Onondaga persulcata, Nat. Hist petrifactor, Trans. C

Louis Gr. petrifactor y 1868, Tran

Louis Gr. plagosa, Jon Hist., 3d s

punctulifera St. Mus. 1 pustulosa,

Geo., vol. Acad. Geo

Silurian. quadrilirata. field, syn. regularis.

regularis, E Am. Geo., richardsoni, Jour. Sci.,



BEY .- BOR.

19

fætoidea,

FIG. 977.—Be duryi. Inte valve, m

Hist., 6 Held. G

Geo. Re vol. 2, p.

lim. Not

lata, Vanı

lithofactor

diam.

Chi. Ac

BEL .-- BEY.

BEL .-- BEY.

danæ. , Am. Naturalist, vol. 688.



lus. e, Position of eye, ity of a transversely

844, Syn. Sil. Foss. Ety. proper name.] oblong, extremire, itral border semicirght; valves wider at e cephalic extremity, vex, impressed with s. Type B. klædeni. 860, Can. Nat. and 3, and Acad. Geol., p.

1858, (Cythere amer-Louis Acad, Sci., vol. Meas.

Lond. Geo. Mag., p.

65, Pal. Foss., vol. 1, or Up. Taconic. 35th Rep. N. Y. St.

213, Trenton Gr. ambersi, S. A. Miller,

874, Cin. Quar. Jour. sci., vol. 1, p. 234, Hud. River Gr.

ata, Emmons, 1855, American Geo., p. 219,

Hud. Riv. Gr. cinnatiensis, see Prinitia cincinnatiensis.

, Ann. and Mag. Nat. vol. 1, p. 242, Niag-



976.—Beyrichia dur-Magnified 25 diam.

874, Cin. Quar. Jour. Hud. Riv. Gr.

BEY .- BOR.]

fætoidea, White & St. John, 1868, Trans.

granulata.

1859, Pal. N. Y., vol. 3, p. 377, Low. Held. Gr.

ionesi, Dawson, 1868, Acad.

Carboniferous.

klædeni var. aca-

Geol., p.

Chi. Acad. Sci., p. 126, Up. Coal Meas. granulosa, Hall, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 186, Niagara Gr.

FIG. 977.—Beyrichia duryi. Interior of left valve, magnified 25 diam.

dica, 1889, Ann. and. Mag. Nat. Hist., 6th ser., vol. 3, p. 379, Low. Held. Gr.

- lata, Vanuxem, 1842, (Agnostus latus,)
 Geo. Rep. N. Y., p. 80, and Pal. N. Y.,
 vol. 2, p. 301, Clinton Gr.
- lithofactor. White & St. John, 1868, Prelim. Notice of New Foss., Coal Meas.
- logani, see Primitia logani. logani var. leperditoides, see Primitia leperditoides.
- logani var. reniformis, see Primitia reniformis.
- maccoyana, Jones, 1855, Ann. and Mag. Nat. Hist., 2d ser., vol. 16, p. 88, Onondaga Gr.
- notata, Hall, 1859, Pal. N. Y., vol. 3, p. 379, Low. Held. Gr.
- notata var. ventricosa, Hall, 1859, Pal. N. Y., vol. 3, p. 380, Low. Held. Gr.
- novascotia, Jones & Kirby, 1884, Lond. Geo. Mag., 3d ser., vol. 1, p. 356, Carboniferous.
- occidentalis, Walcott, 1885, Monogr. U.S. Sur., vol. 8, p. 204, Devonian. oculifera, Hall, 1871, 24th Rep. N.Y.St.
- Mus. Nat. Hist., p. 232, Hud Riv. Gr. oculina, Hall, 1859, Pal. N. Y., vol. 3, p. 378, Low. Held. Gr.
- pennsylvanica, Jones, 1858, Ann. and Mag. Nat. Hist., 3d ser., vol. 1, p. 253,
- Onondaga Gr.
- persulcata, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 12, Hud. Riy. Gr. petrifactor, White & St. John, 1868, petrifactor, White & St. John, 1868, Trans. Chi. Acad. Sci., p. 125, St.
- Louis Gr. petrifactor var. velata, White & St. John.
- 1868, Trans. Chi. Acad. Sci., p. 126, St. Louis Gr.
- Louis Gr. plagosa, Jones, 1858, Ann. and Mag. Nat. Hist., 3d ser., vol. 1, p. 243, Niagara Gr. punctulifera, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 83, Ham. Gr. pustulosa, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 157, and Acad. Geol., p. 609, Up.

- Silurian. quadrilirata, Hall & Whit- FIG. 978.
- field, syn. for Beyrichia regularis. Tall & Whit-Fig. 978. Bey-richia richard-soni. Mag. 6% diam.
- regularis, Emmons, 1855, diam. Am. Geo., p. 219, Hud. Riv. Gr. richardsoni, S. A. Miller, 1874, Cin. Quar.
- Jour. Sci., vol. 1, p. 347, Hud. Riv. Gr.

rugulifera, see Primitia rugulifera. sigillata, see Primitia sigillata.

ler, 1874, Cin. Quar. Jour. Sci., vol. 1, p. 233, Hud. Riv. Gr. This

CRUSTACEA.

Hall.

312.



ably belongs FIG. 979.-Beyrichia striato-to an under marginata. Mag. 20 diam. fined genus.

- symmetrica, Hall, 1852, Pal. N. Y., vol. 2,
- p. 317, Niagara Gr. trisulcata, Hall, 1859, Pal. N. Y., vol. 3, p. 381, Low. Held. Gr.
- tumifrons, Hall, syn. for Beyrichia ciliata. venusta, Billings, 1868, Catal. Sil. Foss. Antic., p. 68. Anticosti Gr.
- BEYRICHONA, Matthew, 1885, Trans. Roy. Soc. Can., p. 65. [Ety. from the genus Beyrichia.] Breadth and length nearly equal, broad end anterior, subtrigonal toward the base, rounded on the surface and having two furrows, short and faintly impressed. Type B. papilio.
 - papilio, Matthew, 1885, Trans. Roy. Soc. Can., p. 65, St. John Gr. tinea, Matthew, 1885, Trans. Roy. Soc.
 - Can., p. 66, St. John Gr.
- Brongniartia, Eaton, 1832, Geo. Text Book, syn. for Asaphus.
- BRONTEUS, Goldfuss, 1839, Nova. Act. Phys. Med. Cæsareæ Leop. Carol. Nat. Cu-rios, xix, p. 360. [Ety. mythological name.] Glabella depressed, ovate, widest in front, three pair of segmental furrows, anterior ones farthest apart: eye-line proceeding upward from the middle of each side of the posterior margin, with a short, sigmoidal curve to the eye-lobe, and thence curving inward and forward to the front; thorax of ten segments, axial lobe equaling the lateral lobes in width, lateral lobes flat, without facets, bent backward at the tip, no pleural groove; pygidium semi-orbicular with a flattened entire mar-

gin, axial lobe short, sulci prolonged toward the margin, lateral folds broad, not reaching the margin. Type B. altaceus.

acamas, Hall, syn. for B. occasus.

barrandi, Hall, 1859, Pal. N. Y., vol. 3, p. 350, Low. Held. Gr. canadensis, Logan,



FIG. 980.—Bronteus lunatus.

1846, Rep. Geo. Sur. Canada, App. G. G. G. of Legislative Documents, Low. Held. Gr.

flabellifer, Goldfuss, Nova. Acta. Acad. Caes. Leop. Nat. Cur., vol. 16, p. 360, Up. Silurian.

insularis, Billings, 1866, Catal. Sil. Foss.

Antic, p. 66, Anticosti Gr. laphami, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 88, and Geo. Wis., vol. 4, p. 310, Niagara Gr.

p. 310, Niagara Gr. lunatus, Billings, 1857, Rep. of Progr. Geo. Sur. Can., p. 338, Trenton Gr. niagarensis, Hall, 1852, Pal. N. Y., vol. 2, p. 314, Niagara Gr. occasus, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., vol. 1, p. 104, Niagara Gr. Niagara Gr.

pompilius, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 123, Low. Held. Gr. tullius, Hall, 1888, Pal. N. Y., vol. 7, p. 12, Ham. Gr.

Bumastus, Murchison, 1839, Sil. Syst. Not American, though I have illustrated the genus because so many have referred Illænus to it.



FIG. 981.-Bumastus barriensis.

barriensis, see Illænus ioxus. trentonensis, see Illænus trentonensis. BUNODELLA, Matthew, 1888, Trans. Roy. Soc.

- Can., p. 56. Body ovate-elongate, tri-lobed longitudinally; cephalic shield subtriangular, with rounded angles; composed of a glabella, fixed cheeks and movable (?) cheeks; glabella broadly cylindrical and rounded in front; fixed cheeks expanded in front, and having ear-shaped lateral lobes defined by an impressed line which may have been movable; thorax, so far as known, had seven segments, and con-sisted of an elongate cylindro-conical body, having triangular lappets or pleuræ attached at the sides. Type B. horrida.
- horrida, Matthew, 1888, Trans. Roy. Soc. Can., p. 56, Up. Silurian or Low. Devonian.
- CALYMENE, Brongniart, 1822, Hist. Nat. Crust. Foss., p. 7. [Ety. kekalymenos, concealed.] Cephalic shield sublunate, margin thickened, distinctly defined; glabella convex, narrower in front than behind, three lateral furrows on each side, the posterior one deep, neck segment well defined, eyes, small, prominent, hiant, near the glabella fur-rows, and slightly anterior to, the rows, and slightly anterior to the middle; facial sutures cut the margin, in front of the eyes and curving slightly over each eye, defining a semicircular

eye-lobe, they extend to the lateral angles, each of which is exactly bisected : anteriorly they are connected by a rostral suture, thorax of thirteen segments, axis most convex, lateral lobes wider than axis, bent down with large facets; pygidium semi-oval, axis prominent, seven to eleven segments, margin entire. Type C. blumenbachi. anchiops, see Dalmanites anchiops. becki, see Triarthrus becki.

BUM.-CAL.

- blumenbachi, Brongniart, 1822, Hist. Nat. Crust. Foss., p. 11. American form called C. niagarensis.
- bucklandi, syn. for Ceraurus pleurexan-

themus. bufo, see Phacops bufo.

- callicephala, Green, 1832, Monograph Trilobites, p. 30, and Pal. N. Y., vol. 1,
- p. 238, Trenton and Hud. Riv. Grs.
- camerata, Conrad, 1842, Jour. Acad. Nat. Sci., vol. 8, p. 278, and Pal. N. Y., vol. 2, p. 337, Coralline limestone.
- christyi, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 119, Hud. Riv. Gr.
 christi, Geo. Rep. 3d Dist. N. Y., p. 49, Oliver Cont.
- Clinton Gr.
- conradi, Emmons, 1856, Am. Geol., p. 236, Hud. Riv. Gr.

crassimarginata, see Proetus crassimarginatus

mammillata, Hall, 1861, Geo. Rep. Wis., p. 50, Trenton Gr.

marginalis, see Proetus marginalis. multicosta, Hall, 1847, Pal. N. Y., vol. 1, p. 228, Birdseye and Trenton Gr.

nasuta, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 131, Niagara Gr.



FIG. 982.—Calymene callicephala. Rolled speci-men and the under side of cephalic shield with hypostoma in place.

- niagarensis, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 102, and Pal. N. Y., vol.
- 2, p. 307, Niagara Gr. This is the American variety of C. blumenbachi. nupera, see Phacops nupera.

odontocephala, syn. for Dalmanites selenurus.

- phlyctainodes, see Encrinurus phlyctainodes.
- platys, Green, 1832, Monograph of Trilo-bites, p. 32, and Illust. Devon. Foss.,

pl. 1, Schoharie grit. rostrata, Vogdes, 1880, Proc. Acad. Nat. Sci., p. 176, Clinton Gr.

- rowii, see Proetus rowii. rugosa, Shumard, 1855, Geo. Rep. Mo., p. 200, Low. Held. Gr.

CAN.-CER.]

senaria, (cephala spinifera, trisulcata, N. Y., I CANDONA, E Club, v and pr Cypris, sess no pair of i appenda longer a (?) elonga Geo. Ma bonifero CERATIOCARI Nat. His keration, pace bi

> with a each side elongated

convex, v

posterior

each side

down, is marked w

Type C. so

aculeata, Ha p. 422, Wa

acuminata, I

armata, syn.

bradleyi, see beecheri, Cla Sur., No. 1 deweyi, Hall N. Y., vol.

elytroides, see grandis, Poh Nat. Hist.,

longicauda, se

maccoyana, 3, p. 421, V punctata, see

pusillus, Matt

Can., vol. 6

p. 422, Wa

BUM.-CAL.

nd to the lateral anis exactly bisected; re connected by a rax of thirteen segconvex, lateral lobes ent down with large semi-oval, axis to eleven segments, ype C. blumenbachi. ites anchiops. pecki. art, 1822, Hist. Nat.

1. American form is. leraurus pleurexan-

0. 1832, Monograph id Pal. N. Y., vol. 1, | Hud. Riv. Grs. 42, Jour. Acad. Nat. and Pal. N. Y., vol. limestone. 13th Rep. N. Y. St. 119, Hud. Riv. Gr. Hemicrypturus clin-Dist. N. Y., p. 479,

56, Am. Geol., p. 236,

roetus crassimargin-

61, Geo. Rep. Wis.,

s marginalis. , Pal. N. Y., vol. 1, I Trenton Gr. Jour. Cin. Soc. Nat. Niagara Gr.



ephala. Rolled speci-e of cephalic shield

43, Geo. Rep. 4th and Pal. N. Y., vol. Gr. This is the f C. blumenbachi. upera.

r Dalmanites selen-

crinurus phlyctai-

Ionograph of Trilollust. Devon. Foss.,

D, Proc. Acad. Nat. Ġr. ii.

5, Geo. Rep. Mo., p.

CAN.-CER.]

- senaria, Conrad, 1841, syn. for C. callicephala.
- spinifera, not defined.
- trisulcata, Hall, 1843, Geo. Rep. 4th Dist. N. Y., p. 74, Clinton Gr. CANDONA, Baird, 1845, Trans. Berw. Nat. Club, vol. 2, p. 152. A living genus, and probably not Palæozoic. Like Cypris, except the lower antennæ possess no tuft of setae, and the second pair of jaws are destitute of a branchial appendage. The shell is also usually longer and narrower. Type C. lucens. (?) elongata, Jones & Kirby, 1884, Lond.
 - Geo. Mag., 3d ser., vol. 1, p. 356, Carboniferous.
- CERATIOCARIS, McCoy, 1849, Ann. and Mag. Nat. Hist., 2d ser., vol. 4, p. 412. [Ety. keration, pod; karis, shrimp,] Cara-pace bivalve, dorsal line angulated

- simplex, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 43, Ham. Gr. sinuata, Meek & Worthen, 1868, Am. Jour.
- Sci., vol. 46, p. 22, and Geo. Sur. Ill., vol. 3, p. 540, Coal Meas.

strigata, see Solenocaris strigata.

- Ceratocephala, Warder, not defined so as to be recognized.
 - ceralepta, Anthony, a fragment of the tail of a Ceraurus pleurexanthemus, or of an Acidaspis.
 - goniata, Warder, a fragment of a Dal-manites, or an Acidaspis.
- CERAURUS, Green, 1832, Monograph Trilo-bites, p. 84. [Ety. keras, horn; oura, bites, p. 84. [Ety. keras, horn; oura, tail.] Cephalic shield crescentiform, trilobed, posterior angles extended into spines; glabella subquadrate, rounded and prominent in front, three lateral furrows on each side; eyes faceted minutely; facial

FIG. 983.-Ceratiocaris sinuala. Outline.

with a slight furrow beneath it on each side; sides semielliptical, much elongated from before backward, evenly convex, ventral margin gently convex, posterior end truncated obliquely; on each side near the anterior end, low each side heat the anterior end, low down, is an ocular spot; surface marked with fine, imbricating striæ. Type C. solenoides. aculeata, Hall, 1859, Pal. N. Y., vol. 3, p. 422, Waterlime Gr. acuminata, Hall, 1859, Pal. N. Y., vol. 3, p. 422, Waterlime Gr.

armata, syn. for Echinocaris punctata.

bradleyi, see Colpocaris bradleyi. beecheri, Clarke, 1885, Bull. U. S. Geo. Sur., No. 16, p. 44, Ham. Gr. deweyi, Hall, 1859, (Onchus deweyi,) Pal-

N. Y., vol. 2, p. 320, Niagara Gr. elytroides, see Colpocaris elytroides. grandis, Pohlman, 1881, Bull. Buf. Soc. Nat. Hist., vol. 4, p. 19, Waterlime Gr. longicauda, see Echinocaris longicauda. maccoyana, Hall, 1859, Pal. N. Y., vol. 3, p. 421, Waterlime Gr.

punctata, see Echinocaris punctata. pusillus, Matthew, 1889, Trans. Roy. Soc. Can., vol. 6, p. 49, Low. Held. Gr.

which points they extend outward, and then deflect a little backward, and cut the lateral margins forward of the neck furrow, if it were extended; cheeks generally scrobiculate; thorax of ten or twelve segments, axial lobe narrower than the lateral lobes; pleuræ flattened for a

the

sutures, commenc-ing at the anterior

margin, passing close to the anterior

corners of the glabella curve around

eyes,

from

distance, and then curve downward and backward; pygidium small, seg-ments terminating in digitations or spines; labrum oblong truncate, with a pair of furrows and small lateral auricles. Type C. pleurexanthemus. (?) apollo, Billings, 1860, (Cheirurus apollo,) Can. Nat. and Geol., vol. 5,

p. 67, Quebec Gr. or Up. Taconic.

bimucronatus, see Ceraurus niagarensis. crosotus, see Acidaspis crosotus.

- (?) eryx. Billings, 1860, (Cheirurus ervx,) Can. Nat. and Geol., vol. 5, p. 67, Que-
- bec Gr. or Up. Taconic. (?) glaucus, Billings, 1865, (Cheirurus glaucus,) Pal. Foss., vol. 1, p. 323, Quebec Gr. or Up. Taconic.
- icarus, Billings, 1860, (Cheirurus icarus,) Can. Nat. and Geol., vol. 5, p. 67, Hud. Riv. Gr.

insignis, see Ceraurus niagarensis.

meekanus, n. sp., Hud. Riv. Gr. Pro-posed instead of C. icarus, Meek, in Ohio Pal., vol. 1, p. 162, and plate 14, figs. a, b, and c. Meek referred this form to C. icarus of Billings, but it is distinguished by the form of the gla-

bella, by the furrows, structure of the thorax and form of central lobe, and by the pygidium, beside occurring in higher rocks and growing to a much larger size.

(?) mercurius, Billings, 1865, (Cheirurus mercurius,) Pal. Foss., vol. 1, p. 285, Quebec Gr. or Up. Taconic.

- st. Mus. Nat. Hist., p. 427, Niagara Gr. numitor, Billings, 1866, (Cheirurus numi-tor,) Catal. Sil. Foss. Antic., p. 27, Hud.
- Riv. Gr.
- nuperus, Billings, 1866, (Cheirurus nu-perus,) Catal. Sil. Foss. Antic., p. 60, Anticosti Gr.
- (?) perforator, Billings, 1865, (Cheirurus perforator,) Pal. Foss., vol. 1, p. 287, Quebec Gr. or Up. Taconic.

pleurexanthemus, Green, 1832, Monog. Trilobites, 84, and Pal. N. Y., vol. 1, p. 242, Trenton and Hud. Riv. Gr.

(?) polydorus, Billings, 1865, (Cheirurus polydorus,) Pal. Foss., vol. 1, p. 286, Quebec Gr. or Up. Taconic. pompilius, Bill-

ings, 1865, (Cheirurus

FIG. 984. - Ceraurus pleurexanthemus.

> oompilius,) Pal. Foss., vol. 1. p. 181, Chazy or Black Riv. Gr.

(?) prolificus, Billings, 1865, (Cheirurus prolificus,) Pal. Foss., vol. 1, p. 285 and 325, Quebec Gr. or Up. Taconic.

pustulosus, syn. for Ceraurus pleurexanthemus.

rarus, Walcott, 1877, 31st Rep. N. Y. St.

- Mus. Nat. Hist., p. 68, Trenton Gr. satyrus, Billings, 1865, (Cheirurus saty-rus,) Pal. Foss., vol. 1, p. 324, Chazy Gr. (?) sol, Billings, 1865; (Cheirurus sol,) Pal. Foss., vol. 1, p. 288, Quebec Gr. or Un Tacophic
 - Up. Taconic.
- (?) solitarius, Billings, 1865, (Cheirurus solitarius,) Pal. Foss., vol. 1, p. 206, Quebec Gr. or Up. Taconic.
- tarquinius, Billings, 1863, (Cheirurus tar-quinius,) Proc. Port. Soc. Nat. Hist., vol. 1, p. 121, Upper Silurian.

vigilans, see Encrinurus vigilans.

- (?) vulcanus, Bellings, 1865, (Cheirurus vulcanus,) Pal. Foss., vol. 1, p. 284, and 324, Quebec Gr. or Up. Taconic.
 CHARIOCEPHALUS, Hall, 1863, 16th Rep. N. Y.
- St. Mus. Nat. Hist., p. 175. [Ety. charis, charming or graceful; kephale, head.] Cephalic shield broad; cheeks moderately convex toward the eyes glabella regularly convex and marked

by transverse furrows; eyes large, facial sutures cutting the contour of the front at or near the center as in Agraulus, but distinguished by the character of the palpebral lobe, large eye, and form of the cheek. Type C. whitfieldi,

[CHA.—CLI.

- tumifrons, Hall & Whitfield, 1877, U. S. Geo. Expl., 40th parallel, vol. 4, p. 224, Potsdam Gr.
- whitfieldi, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 175, Potsdam Gr. Cheirurus, Beyrich, 1845, syn. for Ceraurus.
- apollo, see Ceraurus apollo.

eryx, see Ceraurus ervx. glaucus, see Ceraurus glaucus. icarus, see Ceraurus icarus. mercurius, see Ceraurus mercurius. numitor, see Ceraurus numitor. nuperus, see Ceraurus nuperus. perforator, see Ceraurus perforator. polydorus, see Ceraurus polydorus. pompilius, see Ceraurus pompilius. prolificus, see Ceraurus prolificus. satyrus, see Ceraurus satyrus. sol, see Ceraurus sol. solitarius, see Ceraurus solitarius.

tarquinius, see Ceraurus tarquinius. vulcanus, see Ceraurus vulcanus.



FIG. 985,-Climachtichnites wilsoni.

CLIMACHTICHNITES, Logan, 1860, Can. Nat. and Geol., vol. 5, p. 279. [Ety. klimax, ladder; ichnos, footstep.] A continuous COL.-CON.

narrow making the tra wilsoni fosteri, C vol. 1, wilsoni, 1 vol. 5, 4 dam Gr youngi, C vol. 1, 1 COLPOCARIS, Sci. Phi karis, s truncate a profot extremi duced, 1 ventral the dor ment; n

C. bradle

86. — Col bradley FIG. 986.

Nat. Hist

8, p. 153, elytroides Sci. Phil vol. 2, p. Conocephalus, d. Urwe genus of Conocephalites, Boh. Th onym for also refer to the sa the origin am not co for Atops, There W defined a when the Emmons demand it adamsi, see (anatinus, see antiquatus, se arenosus, see aurora, see] baileyi, see C billingsi, see l binodosus, see calciferus, see calymenoides,

noides. cordilleræ, see depressus, see diadematus, se elegans, see C eos, see Crepi eryon, see Pty

CHA.-CLL

ting the contour of ear the center as in stinguished by the palpebral lobe, large the cheek. Type C.

'hitfield, 1877, U.S. arallel, vol. 4, p. 224,

, 16th Rep. N. Y. St. 175, Potsdam Gr. 5, syn. for Ceraurus. apollo. vx.

glaucus. icarus. rus mercurius. s numitor. s nuperus. us perforator. us polydorus. us pompilius. as prolificus. satyrus.

is solitarius. rus tarquinius. s vulcanus.



an, 1860, Can. Nat. tep.] A continuous COL.-CON.]

CRUSTACEA.

narrow trail, with cross furrows, making it ladder-like. It may not be the track of a Crustacean. Type C. wilsoni.

fosteri, Chamberlin, 1883, Geo. of Wis., vol. 1, p. 132, Potsdam Gr. wilsoni, Logan, 1860, Can. Nat. and Geol.,

vol. 5, and Geo. of Can., p. 107, Potsdam Gr.

youngi, Chamberlin, 1883, Geo. of Wis., vol. 1, p. 132, Potsdam Gr.
COLPOCARIS, Meek, 1872, Proc. Acad. Nat. Sci. Phil., p. 323. [Ety. kolpos, sinus; karis, shrimp.] Carapace valves are truncated backward and moment with truncated backward and upward, with a profoundly sinuous outline; posterior extremity of the dorsal margin produced, pointed and curved downward; ventral margin inflected; attached on the dorsal margin by a flexible ligament; no eye tubercle or spot. Type C. bradleyi.

bradleyi, Meek, 1872, Proc. Acad. Nat. Proc. Acad. Nat. Sci. Phil., vol. 24, p. 322, and Ohio Pal., vol. 2, p. 318,

FIG. 986. — Colpocaris bradleyi.

Pese, - Colpocaris bradleyi.
 Nat. Hist., p. 3, and Geo. Sur. Ill., vol. 2, p. 318, Waverly Gr. chesterensis, W or then, 1884, Bull. No. 2, Ill. St. Mus.
 8, p. 153, Kaskaskia Gr.
 9, 153, Kaskaskia Gr.

o, p. 105, RASKASKIA GF. elytroides, Meek, 1872, Proc. Acad. Nat. Sci. Phil., vol. 24, p. 334, and Ohio Pal., vol. 2, p. 319, Waverly Gr. Conocephalus, Zenker, 1833, Beitr. z. Naturg. d. Urwelt, p. 49. Preoccupied for a genus of Orthoptera.

ocephalites, Barrande, 1852, Syst. Sil. Con Boh. This genus is regarded as a synonym for Ptychoparia, by Walcott, who also refers Atops, which has priority, to the same genus. After examining the original figure of Ptychoparia, I am not convinced that it is a synonym for Atops, hence I retain both names. There were but few genera better defined and established than Atops, when the name was put forth by Emmons; hence the rules of priority

demand its retention. adamsi, see Conocoryphe adamsi. anatinus, see Ptychoparia anatina. antiquatus, see Ptychoparia antiquata. arenosus, see Ptychoparia arenosa. aurora, see Liostracus aurora. baileyi, see Conocoryphe baileyi. billingsi, see Ptychoparia billingsi. binodosus, see Ptychoparia binodosa. calciferus, see Ptychoparia calcifera. calymenoides, see Ptychoparia calymenoides.

cordilleræ, see Ptychoparia cordilleræ. depressus, see Ptychoparia depressa. diadematus, see Ptychoparia diademata. elegans, see Conocoryphe elegans. eos, see Crepicephalus eos. eryon, see Ptychoparia eryon.

explanatus, see Ptychoparia explanata. formosus, see Solenopleura formosa. gemini-spinosus, see Conocoryphe geminispinosa.

halli, see Solenopleura halli.

hartti, see Ptychoparia hartti.

laticeps, see Pterocephalia laticeps.

matthewi, see Harttia matthewi.

minor, see Ptychoparia minor. minutus, see Ptychoparia minuta.

miser, see Atops miser. nactus, Hall. Not defined so as to be recognized.

nasutus, see Ptychoparia nasuta.

neglectus, see Liostracus neglectus.

optatus, see Ptychoparia optata.

orestés, see Solenopleura orestes.

ouangondianus, see Liostracus ouangondianus.

oweni, see Ptychoparia oweni.

pattersoni, see Ptychoparia pattersoni.

perseus, see Ptychoparia perseus.

quadratus, Hartt, see Liostracus quadratus.

quadratus, Whitfield, see Ptychoparia quadrata.

robbi, see Solenopleura robbi.

shumardi, see Ptychoparia shumardi. subcoronatus, see Ptychoparia subcoronata. tener, see Liostracus tener.

teucer, see Ptychoparia teucer. thyrsites, see Solenopleura thyrsites. verrucosus, see Ptychoparia verrucosa. vulcanus, see Crepicephalus vulcanus.

winona, see Ptychoparia winona. zenkeri, see Ptychoparia zenkeri.

- CONOCORVPHE, Corda, 1847, Prodrom einer Monographie der bohmischen Trilobiten, p. 139. [Ety. konos, cone; koryphe, top of the head.] Cephalic shield somewhat semicircular, convex; gla-bella convex, somewhat cone-shaped, widest behind, rounded in front, from one-half to three-fourths the length of the head, lateral furrows from one to three on each side, more or less distinct; facial sutures cut obliquely across the margin from about the beginning of the lateral third, and curve around the eyes, and then curve out-ward toward the posterior angles; (in C. sulzeri and as described by Corda, the facial sutures begin near the apex directly in front of the eyes, and are directed in lines nearly parallel to the eye-lobes.) Thorax eight to sixteen segments, axial lobe narrower than
 - segments, axial lobe narrower than lateral lobes, pleuræ faceted; pygidium small. Type C. sulzeri. adamsi, Billings, 1861, (Conocephalites adamsi,) Geo. Vt., vol. 2, p. 950, Up. Taconic or Georgia Gr. baileyi, Hartt, 1868, (Conocephalites baileyi,) Acad. Geol., p. 645, St. John Gr. elegans Hartt, 1868, (Conocephalites

 - elegans, Hartt, 1868, (Conocephalites elegans,) Acad. Geol., p. 650, St. John Gr. gallatinensis, Meek, 1873, 6th Rep. Hay-den's U. S. Geo. Sur. Terr., p. 485, Up.
 - Taconic.

CRUSTACEA.

geminispinosa, Hartt, 1868, (Condcephalites geminispinosus,) Acad. Geol., p. 653, St. John Gr.

kingi, Meek, 1870, Proc. Acad. Nat. Sci. Phil., vol. 22, p. 63, and Rep. on 40th Parallel, p. 20, Up. Taconic. quadrans, Hall & Whitfield, 1877, (Crepicephalus quadrans,)Geo. 40th Parallel, vol. 4, p. 238, Up. Taconic. walcotti, Mat-thew, 1884, thew, 1884, Trans. Roy. Soc.

-Conocoryphe kingi. FIG. 987.-

Can., p. 119, St. John Gr. Coronura, Hall, 1888, Pal. N. Y., vol. 7, p. 32. Founded upon the variation in the spines of the pygidium of Dalmanites. Corycephalus, Hall, 1888, syn. for Dalmanites.

CREPICEPHALUS, Owen, 1852, Geo. Sur. Wis. Iowa, and Minn., p. 876. [Ety. krepis, horseshoe; kephale, head.] Glabella rather flat, slipper-shaped, tapering and slightly acuminated anteriorly, with a faint ridge in the median line; two small depressions, and a posterior furrow partially divide the glabella; facial sutures run nearly parallel to the margin of the glabella, and join a thickened, cord-like, anterior, narrow border, inclosing a convex area, narrower in front than at the sides; pygidium large; axial lobe has four segments, side-lobes bounded by a slightly concave border, which widens posteriorly, and terminates in long spines, and of which the confines are almost rectangular, with rounded corners.

- Type C. iowensis. angulatus, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th Parallel, vol. 4, p. 220, Potsdam Gr.
- anytus, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th parallel, vol. 4, p. 219, Potsdam Gr.
- dam Gr. angusta, Walcott, 1886, Bull. U. S. Geo. Sur., No. 30, p. 208, Up. Taconic. centralis, Whitfield, 1877, Rep. on the Pal. of Black Hills, p. 10, and Geo. Black Hills, p. 341, Potsdam Gr. diadematus, Hall, 1863, (Conocephalites diadematus, Hall, Der N. V. St. Mun
- diadematus, Jahr, Joss, (Conocephantes diadematus,) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 167, Potsdam Gr. ps, Hall, 1863, (Conocephalites eos.) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 151, Potsdam Gr. eos,
- gibbesi, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis., p. 50, Potsdam Gr. granulosus, Hall & Whitfield, 1877, U. S.
- Geo. Expl. 40th Parallel, vol. 4, p. 214, Potsdam Gr.

haguei, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th Parallel, vol. 4, p. 210, Potsdam Gr.

[COR -CYB,

iowensis, Owen, 1852, Geo. Sur. Wis., Iowa, and Minn., p. 576, Potsdam Gr.



FIG. 988.—Crepicephalus lilianus. Cephalic shield without the FIG. 989.-Crepicepha-lus lilianus. Pygidium. movable cheeks.

- lilianus, Walcott, 1886, Bull. U. S. Geo. Sur., vol. No. 30, p. 207, Up. Taconic. maculosus, Hall & Whitfield, 1877, U. S.
- Geo. Expl. 40th Parallel, vol. 4, p. 215, Potsdam Gr.
- miniscensis, Owen, 1852, Geo. Sur. Wis., Iowa, and Minn., pl. 1, fig. 14, Pots-dam Gr.
- montanensis, Whitfield, 1876, Rep. Recon. Up. Mo. to Yel. Nat. Park, p. 141, Potsdam Gr.
- nitidus, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th Parallel, vol. 4, p. 212, Potsdam Gr.
- onustus, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., Potsdam Gr. oweni, Meek & Hayden, 1861, (Ariønellus
- (Crepicephalus) oweni,) Proc. Acad. Nat.
- Sci., vol. 13, p. 436, Potsdam Gr. planus, Whitfield, 1877, Rep. on Pal. of Black Hills, p. 11, and Geol. Black Hills, p. 343, Potsdam Gr.
- quadrans, see Conocoryphe quadrans.
- simulator, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th Parallel, vol. 4, p. 218, Potsdam Gr.
- unisulcatus, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th Parallel, vol. 4, p. 216, Potsdam Gr.
- vulcanus, Billings, 1861, (Conocephalites vulcanus,) Pal. Foss., vol. 1, p. 14, Potsdam Gr.
- wisconsinensis, see Lonchocephalus wisconsinensis.
- Cryphæus, Green, 1837, Jour. Acad. Nat. Sci., vol. 7, syn. for Dalmanites. Not well defined, and the name was preoccupied for a genus of Coleoptera in 1833.
 - boothi, see Dalmanites boothi.
 - calliteles, see Dalmanites calliteles.
- greeni, syn. for Dalmanites calliteles.
- Cryptolithus, syn. for Trinucleus.
- *tesselatus*, see Trinucleus concentricus. *Cybele*, Loven, 1845, p. 110, Ofversigt Vetensk, Acad. Handl., p. 110.
 - punctata, Hall, 1852. This species belongs to the genus Encrinurus, and the specific name being preoccupied, the name is changed to E. ornatus.

CYC.-CYT.

Cyclus ame vol. 19 fined s CYPHASPIS, Trilobi vex; semici in spi very o with bound semilu tures 1 from th are the gles; t at the pygidi depres



brevimar

FIG. 990.-Cy pis christ girardeau

Mo., p. hybrida,

N. Y., Up. He lævis, Ha lipsia Devon. Chemu minuscula (Phillip cula,) Foss., p Gr. ornata (Phillip Illust. pl. 21, I ornata van vol. 7, 1 stephanop vol. 7, p Cythere, Mul secta, e vida a li knowu i americana, earbonaria, cincinnatie ensis. crassimarg ginata. irregularis, nebraskensi okeni, see]

540

5/
[COR -CYB.

ld, 1877, U. S. Geo. vol. 4, p. 210, Pots-

Geo. Sur. Wis., 576, Potsdam Gr.



1G. 989.—Crepicepha-lus lilianus. Pygidium

, Bull. U. S. Geo. 207, Up. Taconic. hitfield, 1877, U.S. allel, vol. 4, p. 215,

52, Geo. Sur. Wis., pl. 1, fig. 14, Pots-

ld, 1876, Rep. Re-. Nat. Park, p. 141,

tfield, 1877, U. S. allel, vol. 4, p. 212,

78, Ann. Rep. Geo.

Gr. n, 1861, (Arionellus ni,) Proc. Acad. Nat.

Potsdam Gr. 7, Rep. on Pal. of , and Geol. Black

m Gr. yphe quadrans. hitfield, 1877, U. S.

allel, vol. 4, p. 218, 7hitfield, 1877, U.S.

allel, vol. 4, p. 216,

61, (Conocephalites ., vol. 1, p. 14, Pots-

onchocephalus wis-

Jour. Acad. Nat. r Dalmanites. Not ie name was preocof Coleoptera in

boothi. es calliteles. nites calliteles. inucleus. as concentricus. 110, Ofversigt ndl., p. 110. This species belongs nurus, and the spesoccupied, the name latus.

CYC.-CYT.]

CRUSTACEA.

Cyclus americanus, Packard, 1885, Am. Nat., vol. 19, p. 293, Coal Meas. Not defined so as to be recognized.

CYPHASPIS, Burmeister, 1843, Die Organ der Trilobiten, p. 103. [Ety. cyphos, con-vex; aspis, shield.] Cephalic shield semicircular, posterior angles produced in spines, margin thickened; glabella very convex, ovoid, no furrows, but with two small pyriform basal lobes bounded by deep furrows; eyes small, semilunate; cheeks broad; facial sutures proceed in a nearly straight line from the anterior margin to the eyes, and are then directed to the posterior angles; thorax 10 to 17 segments, rounded at their extremities; axis tapering; pygidium small, axis short, lateral lobes

depressed. Type C. ceratopthalmus. brevimarginatus, Walcott, 1885, Monogr.

U. S. Geo. Sur., vol. 8, p. 93, Trenton Gr. christyi, Hall, Trans. Alb. Inst., vol. 4, p. 188, Ni-agara Gr. cœlebs, Hall, 1888, Pal. N. Y., vol. 7, p. 151, Low. Held. Gr. craspedota, Hall, 1888, Pal. N. Y., vol. 7, p. 148, Ham. Gr. diadema, Hall, 1888, Pal. N. Y., vol. 7, p. 144, Up. Held. Gr.

FIG. 990.—Cyphas-pis christyi. girardeauensis, Shumard, 1855, Geo. Rep. Mo., p. 197, Trenton Gr. hybrida, Hall, 1888, Pal.

N. Y., vol. 7, p. 144, Up. Held. Gr. lævis, Hall, 1876, (Phil-lipsia lævis,) Illust. Devon. Foss., pl. 21, Chemung Gr. minuscula, Hall, 1876, (Phillipsia minuscula,) Illust. Devon. Foss., pl. 20, Up. Held. Gr.

- ornata, Hall, 1876, (Phillipsia ornata,) FIG. 991.—Cyphas-Illust. Devon. Foss., ^{pis} girardeauenpl. 21, Ham. Gr.
- ornata var. baccata, Hail, 1888, Pal. N. Y.,
- vol. 7, p. 146, Ham. Gr. stephanophora, Hall, 1888, Pal. N. Y., vol. 7, p. 142, Up. Held. Gr. Cythere, Muller, 1785, Entomostraca sue In-secta, etc., p. 63. The type is C. fla-vida a living species. The genus is un-known in Paleoccia nocks. knowu in Palæozoic rocks.
- americana, see Beyrichia americana. earbonaria, see Leperditia carbonaria. cincinnatiensis, see Cytheropsis cincinnatiensis.
- crassimarginata, see Cytheropsis crassimarginata.

irregularis, see Cytheropsis irregularis. nebraskensis, see Cytheropsis nebraskensis. okeni, see Leperditia okeni.

simplex, see Cytheropsis simplex. sublævis, see Leperditia sublævis. subrecta, see Leperditia subrecta. CYTHERELLA, inflata.

I find in the Acadian Geology, p. 206, a small Entomos-



traca, from the FIG. 992.—Cytherella in-Coal Meas. of flata. Nova Scotia, fig-

ured under this name, but without any description or reference to any other author. The figures are reproduced.

Cytherella glandella, see Cytheropsis glandella.

Cytherina, Lamarck, 1818, Anim. sans Vert. t. v, p. 125. [Ety. diminutive of Cythere.] A synonym for Cythere,

which is not a Palæozoic genus. alta, see Leperditia alta.

crenulata, see Cytheropsis crenulata.

cylindrica, see Isochilina cylindrica.

fabulites, see Leperditia fabulites.

spinosa, see Beyrichia spinosa. Not Reuss in 1844.

subcylindrica, see Cytheropsis subcylindrica.

subelliptica, see Cytheropsis subelliptica.

CYTHEROPSIS, McCoy, 1849, Ann. and Mag. Nat. Hist., 2d. ser., vol. 4, p. 249, [Ety. *Cytheropsis*, resembling Cythere.] Dis-tinguished from Cythere, which now swarm in the sea, by the great thick-ness of the values and in having one ness of the valves, and in having eye or muscle spots. Type C. aldensis. cincinnatiensis, Meek, 1872, (Cythere cin-

cinnatiensis,) Proc. Acad. Nat. Sci., p. 331, and Ohio Pal., vol.

1, p. 158, Hud. Riv. Gr. concinna, see Primitia concinna.



crassimarginata, Win- FIG. 993.-Cytherchell, 1862, (Cythere opsis cincinnaticrassimarginata,) Proc.

Acad. Nat. Sci., p. 429, Marshall Gr.

crenulata, Emmons, 1856, (Cytherina crenulata,) Am. Geol., p. 220, Trenton Gr.



FIG. 994.—Cytheropsis glandella

- glandella, Whitfield, 1882, (Cytherellina glandella,) Bull. Am. Mus. Nat. Hist., vol. 1, p. 94, Warsaw Gr.
- irregularis, S. A. Miller, 1878, (Cythere irregularis,) Jour. Cin. Soc. Nat. Hist., vol. 1, p. 106, Hud. Riv. Gr.
- nebraskensis, Geinitz, 1866, (Cythere nebraskensis,) Carb. und Dyas in Neb., p. 2, Coal Meas.
- rugosa, Jones, 1858, Ann. Nat. Hist., 3d
- ser., vol. 1, p. 249, Black Riv. Gr. siliqua, Jones, 1858, Ann. Nat. Hist., 3d
- ser., vol. 1, p. 249, Black Riv. Gr.

- simplex, White & St. John, 1868, (Cythere simplex,) Trans. Chi. Acad. Sci., p. 127, St. Louis Gr.
- subcylindrica, Emmons, 1856, (Cytherina subcylindrica,) Am. Geo., p. 220, Trenton Gr.
- subelliptica, Emmons, 1856, (Cytherina subelliptica,) Am. Geo., p. 220, Black Riv. Gr.
- Dalmania, Emmrich, 1845. This name having been preoccupied for a genus of insects, Dalmanites has been substituted, though many authors prefer to use Odontochile, a name proposed by Corda.
- DALMANITES, (Emmrich, 1845, Dalmania,) Barrande, 1852, Syst. Syl. Bon., vol. 1. [Ety. proper name.] Cephalic shield sublunate, with lateral angles produced into spines; glabella widest anteriorly, rounded in front, with a highly convex anterior subelliptical lobe, three lateral furrows on each side; eyes prominent, subreniform, lenses numerous, situated posteriorly; facial sutures, curving slightly from the anterior margin, and each, following the curvature of the eye to the posterior part by a sigmoidal flexure, reach the lateral mar-gin very slightly posterior to the eye itself; thorax with eleven segments, axis most convex, lateral lobes wider and more or less flattened; pygidium subtriangular, usually extended posteriorly into a spine, segments numer-ous. Type D. caudatus.

acantholeurus, Conrad, 1841, (Asaphus acantholeurus,) Ann. Rep. N. Y., p. 48, and Illust. Devon.

Foss., pl. 19, Onon-daga limestone.

achates, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 63, Trenton Gr.

Regeria, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 57, and Illust. Devon. Foss. pl. 12, Up. Held. Gr. anchiops, Green, 1832 (Calymene anchiops,) Monograph of Trilo-

FIG. 995.-Dalmanites achates.

bites, p. 35, and Illust. Devon. Foss., pl. 9, Schoharie grit. anchiops var. armatus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 56, Schoharie grit.

anchiops var. sobrinus, syn. for D. anchiops. aspectans, Conrad, 1841, (Asaphus aspectans,) Ann. Rep. N. Y., p. 49, and Illust. Devon. Foss., pl. 13, Up. Held. Gr.

barrisi, Hall, 1888, Pal. N. Y., vol. 7, p. 48, Ham. Gr.

bebryx, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 61, Trenton Gr. bicornis, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 196, Niagara Gr.

bifidus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 63, Up. Held. Gr. boothi, Green, 1837, (Cryphæus boothi,)

Am. Jour. Sci., vol. 32, p. 343, and Pal. N. Y., vol. 7, p. 42, Ham. Gr., breviceps, Hall, 1866, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 223, Hud. Riv. Gr. callicephalus, Hall, 1847, (Phaceps callicephalus)

(Phacops callicephalus,) Pal. N. Y., vol. 1, p. 247, Trenton Gr.

1837, calliteles, Green, (Cryphaeus calliteles,) Am. Jour. Sci. and Arts, vol. 32, p. 346, and Illust. Devon. Foss., pl. 16, Ham. Gr. calypso, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat.



Hist., p. 61, and Illust. Fig. 996.-Dal-Devon. Foss., pl. 13, Up. manites cal-licephalus licephalus. Held. Gr.

carleyi, Meek, 1872, Am. Jour. Sci., 3d ser., vol. 3, p. 424, and Ohio Pal. vol. 1, p. 170, Hud. Riv. Gr.

comis, Hall, 1888, Pal. N. Y., vol. 7, p. 41, Up. Held. Gr. concinnus, Hall, 1876, Illust. Devon. Foss., pl.

10, Schoharie grit. concinnus var. serrula, Hall, 1888, Pal. N. Y., vol. 7, p. 30, Up. Held. Gr.

FIG. 997. Dalmanites calliteles.

coronatus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 58, and Illust. Devon. Foss., pl. 12, Ham. Gr.

- and Illust. Jevon. Foss., pl. 12, Ham. Gr. cuyahogæ, Claypole, 1884, Geol. Mag., 3d ser., vol. 1, p. 303, Waverly Gr. danæ, Meek & "Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 264, and Geo. Sur. Ill., vol. 3, p. 363, Niagara Gr. dentatus, Barrett, 1876, Am. Jour. Sci. and Arts, vol. 11, p. 200, Low. Held. Gr. denticulatus. Conrad. 1841. (Aaaphua
- denticulatus, Conrad, 1841, (Asaphus denticulatus,) Ann. Rep. N. Y., p. 48, and Illust. Devon. Foss., pl. 10, Up.
- Held. Gr.
- Hell. Gr.
 emarginatus, Hall, 1876, Illust. Devon. Foss., pl. 10, Up. Held. Gr.
 epicrates, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 119, Low. Held. Gr.
 erina, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 62, Up. Held. Gr.
 helena, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist. p. 61, Up. Held. Gr.
- Mus. Nat. Hist., p. 61, Up. Held. Gr. intermedius, Walcott, 1877, 31st Rep. N. Y. St. Mus. Nat. Hist., p. 69, Trenton Gr.
- laticaudatus, Hall, 1847. This name is erased from the list.
- limulurus, Green, 1832, (Asaphus limulurus,) Monograph Trilobites, p. 48, and Pal. N. Y., vol. 2, p. 303, Niagara Gr. logani, Hall, 1860, Can. Nat. and Geo.,
- vol. 5, p. 156, and Acad. Geol., p. 608, Up. Silurian.

myrmeco myrme of Tribe Foss., p nasutus, tus,) An N. Y., v ohi**oensis**, Acad. N Pal., vo phacopty p. 31, U pleione, I Mus. Na Foss., p pleuropter pleurop p. 55, 4 Low. H pygmæus, p. 56, U regalis, H pl. 11, S selenurus, urus,) G Devon. tridens, H 361, Lov tridentifer Mo., p. troosti, Saff

verrucosus

vol. 4, p

macrops, Mus. N meeki, W Sur., v micrurus rus,) N Pal. N.



FIG.

542

[DAL.

[DAL.

DIC.]

15th Rep. N. Y. St. 63, Up. Held. Gr. (Cryphæus boothil) 32, p. 343, and Pal. Ham. Gr.

24th Rep. N. Y. St. 223, Hud. Riv. Gr.

1847 alus.) p. 247, 1837. teles,) Arts, Illust. 16, ١.

15th Nat.

Illust. Fig. 996.-Dalmanites cal-licephalus. 3, Up.

Am. Jour. Sci., 3d nd Ohio Pal. vol. 1, r.

Hall, 1888, Pal. Y., vol. 7, p. 41, Up. d. Gr.

nnus, Hall, 1876, st. Devon. Foss., pl. Schoharie grit.

nnus var. serrula, II, 1888, Pal. N. Y., 7, p. 30, Up. Held.

atus, Hall, 1862, h Rep. N. Y. St. s. Nat. Hist., p. 58, oss., pl. 12, Ham. Gr. 1884, Geol. Mag., 3d Vaverly Gr.

rthen, 1865, Proc. l., p. 264, and Geo. 63, Niagara Gr.

76, Am. Jour. Sci. 200, Low. Held. Gr. , 1841, (Asaphus Rep. N. Y., p. 48, Foss., pl. 10, Up.

876, Illust. Devon. eld. Gr.

63, Proc. Port. Soc. 119, Low. Held. Gr. th Rep. N. Y. St. 62, Up. Held. Gr. 5th Rep. N. Y. St. 61, Up. Held. Gr. 1877, 31st Rep.

. Hist., p. 69, Tren-

47. This name is

(Asaphus limul-32. Frilobites, p. 48, and). 303, Niagara Gr. in. Nat. and Geo., Acad. Geol., p. 608,

macrops, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 59, Up. Held. Gr. meeki, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 207, Lower Devonian. micrurus, Green, 1832, (Asaphus micru-

rus,) Monograph Trilobites, p. 56, and Pal. N. Y., vol. 3, p. 359, Low. Held. Gr.



FIG. 998.-Dalmanites limulurus.

- myrmecophorus, Green, 1835, (Asaphus myrmecophorus,) Supp. to Monograph of Tribolites, p. 16, and Illust. Devon. Foss., pl. 13, Up. Held. Gr.
- nasutus, Conrad, 1841, (Asaphus nasu-tus,) Ann. Rep. N. Y., p. 48, and Pal. N. Y., vol. 3, p. 362, Low. Held. Gr. obioensis, Meek & Worthen, 1871, Proc.
- Acad. Nat. Sci. Phil., p. 91, and Ohio Pal., vol. 1, p. 234, Up. Held. Gr. phacoptyx, Hall, 1888, Pal. N. Y., vol. 7,

p. 31, Up. Held. Gr

pleione, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 62, and Illust. Devon. Foss., pl. 16, Up. Held. Gr.

- pleuropteryx, Green, 1832, (Asaphus pleuropteryx.) Monograph Tribolites, p. 55, and Pal. N. Y., vol. 3, p. 356, Low. Held. Gr.
- pygmæus, Hall, 1888, Pal. N. Y., vol. 7, p. 56, Up. Held. Gr.
- regalis, Hall, 1876, Illust. Devon. Foss.,
- regains, Hair, 1876, Hust. Devon. Poss., pl. 11, Schoharie grit. selenurus, Eaton, 1832, (Asaphus selen-urus,) Geo. Text Book, p. 31, and Illust. Devon. Foss., pl. 12, Corniferous Gr. tridens, Hall, 1859, Pal. N. Y., vol. 3, p.
- 361, Low. Held. Gr.
- tridentiferus, Shumard, 1855, Geo. Rep. Mo., p. 199, Low. Heid. Gr. troosti, Safford. Not defined.
- verrucosus, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 218, Niagara Gr.

- vigilans, Hall, 1861, Rep. Prog. Geo. Sur. Wis., p. 51, Niagara Gr.
- werthneri, Foerste, 1885, Bull. Sci. Lab. Denison Univ., p. 116. Not well defined.
- DICELLOCEPHALUS, Owen, 1852, Geo. Sur. Wis., Iowa., and Min., p. 573, (written by Owen Dikelocephalus.) [Ety. dikella, mattock ; kephale, head.] Cephalic shield sublunate or semicircular, rather flat; glabella oblong; sides parallel, rounded in front, transverse behind; three lateral furrows on each side, the posterior two crossing the glabella and dividing it into three lobes; facial sutures arise in the center of the anterior border, run parallel with the same to the front of the eyes, are then directed backward, make a sigmoid flexure over each eye, and when near the neck segment abruptly curve laterally, reaching the pos-terior border near the posterior spines of the cephalic shield; thorax with nine segments, axis narrower than lateral lobes; pygidium with a flattened border, produced posteriorly on each side, and rounded in the middle; axis extended only about half the length, with four to six segments, which become obsolete on the lateral lobes. Type D. minnesotensis.
 - affinis, Billings, 1865, Pal. Foss., vol. 1, p. 197, Quebec Gr. or Up. Taconic.
 - angustifrons, Walcott, 1885, Monogr. U. S.
- Geo. Sur., vol. 8, p. 42, Potsdam Gr. barabuensis, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 63, and Geo. Wis., vol. 4, p. 201, Low. Magnesian Gr. belli, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 301, Quebec Gr. or Up. Taconic. bilobatus, Hall & Whitford 1977, U.S.
- bilobatus, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th Parallel, vol. 4, p. 226, Potsdam. Gr.
- (?) corax, Billings, 1865, Pal. Foss., vol. 1, p. 334, Quebec Gr. or Up. Taconic.
- crassimarginatus, Whitfield, 1882, Geo. Wis., vol. 4, p. 344, Potsdam Gr.
- cristatus, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 301, Quebec Gr. or Up. Taeonic.
- devinei, Billings, 1865, Pal. Foss., vol. 1, p. 195, Quebec Gr. or Up. Taconic.
- eatoni, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 65, and Geo. Wis., vol. 4, p. 202, Low. Magnesian Gr.
- expansis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 45, Potsdam Gr. finalis, Walcott, 1885, Monogr. U. S. Geo.
- Sur., vol. 8, p. 89, Up. Taconic. flabellifer, Hall & Whitfield, 1877, U. S.
- Geo. Expl. 40th Parallel, vol. 4, p. 227, Potsdam Gr.
- (?) flagricaudus, White, 1874, Rep. Invert. Foss., p. 12, and Geo. Sur. W. 100th Mer.,
- vol. 4, p. 60, Quebec Gr. or Up. Taconic. gothicus, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th Parallel, vol. 4, p. 242, Up.

ranulosus, see Ptychaspis granulosa.

544

- hisingeri, Billings, 1865, Pal. Foss., vol. 1, p. 196, Quebec Gr. or Up. Taconic. inexpectans, Walcott, 1885, Monogr. U. S.
- Geo. Sur., vol. 8, p. 90, Quebec Gr. or Up. Taconic. iole, Walcott, 1885, Monogr. U. S. Geo. Sur.
- vol. 8, p. 43, Potsdam Gr. or Up. Taconic. latifrons, Shumard, 1863, Trans. St. Louis
- Acad. Sci., vol. 2, p. 101, Potsdam Gr. lodensis, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis., p. 51, and Geo. Wis., vol. 4,
- p. 189, Potsdam Gr. magnificus. Billings, 1860, Can. Nat. and
- Geo., vol. 5, p. 301, Quebec Gr. or Up. Taconic.
- marcoui. Whitfield, 1884, Bull. Am. Mus. Nat. Hist., vol. 1, p. 139, Up. Taconic. marica, Walcott, 1885, Monogr. U. S. Geo.
- Sur., vol. 8, p. 44, Potsdam Gr.
- megalops, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 301, Quebec Gr. or Up. Taconic.
- miniscensis, see Ptychaspis miniscensis. minnesotensis.



FIG. 999.-Dicellocephalus minnesotensis.

dam Gr. missisquoi, Billings, 1865, Pal. Foss., vol. 1, p. 199, Quebec Gr. or Up. Taconic.

multicinctus, Hall & Whitfield, 1877, U.S. Geo. Expl. 40th Parallel, vol. 4, p. 226, Potsdam. Gr.

nasutus, Walcott, 1885, Monogr. U. S. Geo.

Sur., vol. 8, p. 44, Potsdam Gr. osceola, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 146, Potsdam Gr. oweni, Billings, 1860, Can. Nat. and Geo.,

vol. 5, p. 301, Quebec Gr. or Up. Taconic.

- pauper, Billings, 1865, Pal. Foss., vol. 1, p. 200, Quebec Gr. or Up. Taconic.
- pepinensis, Owen, 1852, Geo. Wis., Iowa,
- and Minn., p. 574, P. Usdam Gr. planifrons, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 301, Quebec Gr. or Up. Taconic.

pogonipensis, Hall & Whitfield, 1877, U. S. Geo. Expl. 40th Parallel, vol. 4, p. 243, Potsdam Gr.

quadriceps, see Olenoides quadriceps.

richmondensis, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8. p. 41, Potsdam Gr. roemeri, Shumard, 1861, Am. Jour. Sci., vol. 32, p. 220, Potsdam Gr.

selectus, Billings, 1865, Pal. Foss., vol. 1, p. 199, Quebec Gr. or Up. Taconic.

sesostris, see Ptychaspis sesostris.

Mus. Nat. Hist., p. 143, Potsdam Gr. wahsatchensis, see Olenoides wahsatch

DIC.-DIP.

ensis.

Dicranurus, syn. for Acidaspis.

- hamatus, see Acidaspis hamata. DIONIDE, Barrande, 1847, in Lith. Proc. [Ety. from the mythological name Dione.] Body oval, tapering behind, trilobed, faintly convex; cephalic shield short, wide, semicircular, or crescentiform, produced at the postero-lateral angles into spines; glabella short, wide, strongly convex, smooth, no lateral furrows; two longitudinal furrows, making it trilobate; cheeks wide, with perforated margin; no eyes; no facial suture; hypostoma elliptical, with two bow-shaped wings in front, and posterior margin entire; six thoracic segments, with nodes on each side of the axial lobe; pygidium subtriangular, rounded behind axis, with numerous segments, and lateral lobes with radial furrows. Type D. formosa.
- (?) perplexa, Billings, 1866, Catal. Sil. Foss.
- Antic., p. 67, Anticosti Gr. DIPELTIS, Packard, 1885, Am. Nat., vol. 19, p. 291. [Ety. dis, double; pelte, small shield.] Cyclus-like in form ; suborbicular, flattened, disk-like, sloping from the median area to the edge; divided in two parts, a cephalic shield and abdomen; integument thin, showing no segmênts. Type D. diplodiscus.
- diplodiscus, Packard, 1885, Am. Nat., vol. 19, p. 291, Coal Meas. Poorly defined. Dipleura, Green, syn. for Homalonotus.

dekayi, see Homalonotus dekayi.

DIPLICHNITES, Dawson, 1863, Am. Jour. Sci. and Arts, 3d ser., vol. 5, p. 19. [Ety. diploos, double; ichnos, foot-print.] Consisting of two rows of impressions, each about an inch long and one-fourth of an inch wide, placed close together, while the rows are six inches apart, and the intermediate space smooth, as if a flat body had been drawn over it. Type D. ænigma.

ænigma, Dawson, 1863, Am. Jour. Sci. and Arts, 3d ser., vol. 5, p. 19, Coal Meas.

DIPLOSTYLUS, Salter, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 76. [Ety. Diplosty lus, double tail, in allusion to

a

the two Fig. 1000.—Diplostylus dawsoni. pairs of ap- a, Tail, nat. size; b, terminal pendages joint, enlarged. pendages

to the telson.] Carapace unknown; body segments arched, and with minute pleuræ; tail segment large, triangular, DIP.-ECH.

append dawsoni, Soc., v 207, Co DIPTEROCAL and Ar dipteros Carapa major width ally for of the arated t concen pennidæd and Ar mung (pescervæ, and Ar mung (procne, C Arts, 3d



FIG. 1001 ris cor Telson and

eral ang

face wit gins thi three lo middle e others 1 terminat angular scouleri. belli, see M carbonaria 1870, Pr Phil., p. Ill., vol. neptuni, se tuni. Dolichocephal Proc. An syn. for a lacoana, sy excelsior DOLICHOMETO logia Sc long; me two hollo mid marg glabella eral fur facial su rior marg

directed

which, t margin ;]

spinou

Owen, 1852, Rep. Wis., Iowa, and

Min., p. 574, Potsdam Gr. minnesotensis

var. limbatus, Hall, 1863, 16th

Rep. N. Y. St. Mus. Nat. Hist.,

p. 141, Potsdam

16th Rep. N. Y.

St. Mus. Nat.

Hist., p. 144, Pots-

Hall, 1863,

Gr.

misa.

DIC.-DIP.

s sesostris. 16th Rep. N. Y. St.

143, Potsdam Gr. lenoides wahsatch-

daspis.

3 hamata.

47. in Lith. Proc. nythological name tapering behind, vex : cephalic shield cular, or crescentithe postero-lateral glabella short, wide, ooth, no lateral furlinal furrows, makeks wide, with pero eyes; no facial elliptical, with two in front, and poste-; six thoracic segon each side of the ium subtriangular, cis, with numerous al lobes with radial

ormosa. 866, Catal. Sil. Foss. osti Gr.

5. Am. Nat., vol. double ; pelte, small e in form ; suborbict-like, sloping from the edge; divided alic shield and abt thin, showing no diplodiscus.

1885, Am. Nat., vol. Poorly defined. r Homalonotus.

tus dekavi.

1863, Am. Jour. Sci. vol. 5, p. 19. [Ety. ps, foot-print.] Conof impressions, each and one-fourth of ced close together, six inches apart,

te space smooth, as een drawn over it.

, Am. Jour. Sci. and p. 19, Coal Meas.



-Diplostylus dawsoni. nat. size; b, terminal

arapace unknown; ed, and with minute nt large, triangular, CRUSTACEA.

spinous, with two pairs of simple, ovate

appendages. Type D. dawsoni. dawsoni, Salter, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 77, and Acad. Geol., p. 207, Coal Meas.

- DIPTEROCARIS, Clarke, 1883, Am. Jour. Sci. and Arts, 3d ser., vol. 25, p. 121. [Ety. dipteros, two-winged; karis, shrimp.] Carapace elongate, divided along the major axis into two wings; greatest width anteriorly; wings united medi-ally for one-third to one-fifth the length of the carapace; anchylosed, but separated toward the ends. Surface marked concentrically. Type D. pennidædali. pennidædali, Clarke, 1883, Am. Jour: Sci. and Arts, 3d ser., vol. 25, p. 122, Chemung Gr.
 - pescervæ, Clarke, 1883, Am. Jour. Sci. and Arts, 3d ser., vol. 25, p. 123, Chemung Gr.

procne, Clarke, 1883, Am. Jour. Sci. and Arts, 3d ser., vol. 25, p. 122, Chemung Gr.



DITHYROCARIS, Scouler, 1844, Syn. Carb. Foss., Ireland & McCoy, 1855, Brit-ish Pal. Rocks, p. 181. [Ety. dithyros, having two valves; karis, shrimp.) Carapace semioval; anterior end rounded, sometimes notched: posterior end subtruncate, with lat-

1001. - Dithyro-F1G. caris corbonaria. Telson and stylets.

> eral angles produced into spines; surface with faint imbricating striæ, margins thickened and corrugated, with three longitudinal ridges, one in the middle extending the entire length, the others not reaching the margin; tail terminating in three tri-

angular spines. Type D. scouleri

belli, see Mesothyra belli. carbonaria, Meek & Worthen, 1870, Proc. Acad. Nat. Sci. Phil., p. 55, and Geo. Sur. Ill., vol. 5, p. 618, Coal Meas. neptuni, see Mesothyra nep-

tuni.

Dolichocephala, Claypole, 1883, Proc. Am. Phil. Soc., p. 238, syn. for Stylonurus.

lacoana, syn. for Stylonurus excelsior.

DOLICHOMETOPUS, Angelin, 1852, Paleontologia Scandinavica. [Ēty. dolichos. long; metope, panel or space between two hollows.] Cephalic shield with tu-mid margin; eyes large, narrow, lunate; glabella wider in front, smooth, no lateral furrows; neck furrow-marked; facial sutures, beginning at the posterior margin near the lateral angles, are directed toward the eyes, passing which, they diverge to the anterior margin; pygidium semicircular, strongly

- convex, margin entire, axis almost semicylindrical, with two or more furrows. Type D. suecicus. It is doubtful about this being an American genus, as the identifications have been
- genus, as the identifications have been made alone on the pygidium.
 ? convexus, Billings, 1865, Pal. Foss., vol. 1, p. 269, Quebec Gr. or Up. Taconic.
 ? gibberulus, Billings, 1865, Pal. Foss., vol. 1, p. 269, Quebec Gr. or Up. Taconic.
 ? rarus, Billings, 1865, Pal. Foss., vol. 1, p. 259, Colsiformer Gr. 352, Calciferous Gr.
- DOLICHOPTERUS, Hall, 1859, Pal. N. Y., vol. 3, p. 414. [Ety. dolichos, long; pteron, wing.] Cephalic, thoracic, and caudal portions similar to Eurypterus; post-oral plate lyrate or cordiform lyrate; central thoracic appendage from the first thoracic segment, strong, thick, and simple, in its anterior part; anterior feet composed of strong, thick joints, with curved terminal spines; natatory organs having the joints elongate, the seventh and eighth little dilated, and the terminal palette extremely developed. Type D. macrochirus.

chirus. macrochirus, Hall, 1859, Pal. N. Y., vol. 3, p. 414, Waterlime Gr. mansfieldi, Hall, 1877, Trans. Am. Phil. Soc., p. 621, Lower Coal Meas. ECHINOCARIS, Whitfield, 1880, Am. Jour. Sci. and Arts, 3d ser., vol. 19, p. 34. [Ety. echinos, sea urchin; karis, shrimp.] Carapace biralye values suboyate Carapace bivalve; valves subovate, united dorsally by a straight hinge, anterior, posterior, and basal margins rounded; surface marked by longitudinal ridges or representative nodes or ridges; abdomen naked, composed of several segments and a caudal plate, which is produced into an elongated



FIG. 1002.-Echinocaris punctata.

spine, with a lateral movable spine on each side; posterior margin of the abdominal segments bearing spines. Type E. sublævis.

- condylepis, Hall, 1888, Pal. N. Y., vol. 7, p. 173, Chemung Gr.
- longicauda, Hall, 1863, (Ceratiocaris lon-gicauda,) 16th Rep. N. Y. St. Mus. Nat.
- Hist., p. 73, Genesee Slate. multinodosa, Whitfield, 1880, Am. Jour. Sci. and Arts, 3d ser., vol. 19, p. 38, Erie shales.

CRUSTACEA.

- punctata, Hall, 1863, (Ceratiocaris punc-tata,) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 74, Ham. Gr. pustuloss, Whitfield, 1880, Am. Jour. Sci.
- and Arts, 3d ser., vol. 19, p. 38, Erie shales.
- socialis, Beecher, 1884, Rep. of Prog. Pa. Geo. Sur. PPP, p. 10, Chemung Gr. sublevis, Whitfield, 1880, Am. Jour. Sci.
- and Arts, 3d ser., vol. 19, p. 36, Erie shales
- whitfieldi, Clarke, 1885, Bull. U. S. Geo. Sur. No. 16, p. 45, Ham. Gr.
- wrightana, Dawson, 1881, (Equisetides wrightanus,) Quar. Jour. Geo. Soc., vol. 37, p. 301, Portage Gr.
- ECHINOGNATHUS, Walcott, 1882, Am. Jour. Sci. and Arts, 3d ser., vol. 23, p. 213. [Ety. echinos, sea urchin; gnathos, jaw.] Founded upon fragments; endogna-thary limbs (one or more pairs) formed of eight or nine joints, six of which carry long, backward curving spines, articulated to their posterior side; terminal joint slender, elongate, acumi-nate; surface of body with scale-like
 - markings. Type E. clevelandi. clevelandi, Walcott, 1882, Am. Jour. Sci. and Arts, 3d ser., vol. 23, p. 213, Utica Slate Gr.
 - ELLIPSOCEPHALUS, Zenker, 1833, Beitrage zur Naturgeschichte der Urwelt, p. 51. [Ety. ellipsis, ellipse; kephale, head.] Broadly ovate; cephalic shield semi-circular, depressed, without spines; glabella subquadrangular, rounded in front, without transverse furrows; eyes oblong, lunate, narrow, projecting out-ward; facial sutures short, commencing at the anterior margin, in front of the eyes, and curving over them toward the posterior angles; thoracic segments twelve, axis nearly as broad as lateral
- lobes; pygidium small, semicircular, trilobed. Type E. hoffi.
 ? curtus, Whitfield, 1877, Ann. Rep. Geo. Sur. Wis., p. 58, and Geo. Wis., vol. 4, p. 191, Potsdam Gr. Founded upon a fragment of the cephalic shield, and the generic reference is very doubtful. ELLIPTOCEPHALA, Emmons, 1844, Taconic System, p. 21. [Ety. ellipsis, ellipse; kephale, head.] Ovate; cephalic shield lunate, more than twice as wide as long, posterior angles produced in spines; groove and border on the anterior and lateral margins; glabella nearly equal in width throughout, and marked with three pairs of furrows; eyes large, elongate, semilunate, extending from near the base of the shield more than half way to the anterior margin; hy-postoma broadly ovate; thirteen or fourteen articulations in the thorax, axis convex, lateral lobes flattened, last segments directed backward; pygidium narrow, elongated, axis acutely pointed. Type E. asaphoides. This generic name can stand in accordance with rule n of

the British Association of 1842, and the established laws of nomenclature adhered to by reputable scientists since that time, notwithstanding it is recommended to naturalists in selecting names to avoid such as too closely approximate words already adopted. It is true the masculine form of the word was preoccupied by Zenker, but the same can be said of Goniophora of Phillips, for Agassiz had preceded him in using the word Goniophorus; Schizodon was used for a mammal before King used Schizodus for a Lamellibranch; Gray used Acrophylla before Nicholson used Acrophyllum; and we might mention a hundred other instances where generic names, differing only in gender or termination, have been introduced and accepted by the best naturalists, and have come into such general use as to constitute part of the nomenclature of science. Olenellus can not be used to supplant Elliptocephala upon any ground of dis-

- covery, definition, or law,
 /. asaphoides, Emmons, 1844, Taconic System, p. 21, and Pal. N. Y., vol. 1, p. 256, Up. Taconic.

 - gilberti, Meek, 1874, (Olenellus gilberti,) Rep. Invert. Foss., p. 7, and Geo. Sur. 100th Mer., vol. 4, p. 44, Up. Taconic. howelli, Meek, 1875, (Olenellus howelli,) Rep. Invert. Foss., p. 8, and Geo. Sur. 100th Mer., vol. 4, p. 47, Up. Taconic.

iddingsi, Walcott, 1885, (Olenellus id-

dingsi,) Monogr. U. S. Geo. Sur., vol. 8, p. 28, U p. T aconic. tho mpsoni, Hall, 1859, (Olenellus t h o m p-soni,) 12th Rep. N. Y. St. Mus. St. Mus. Nat. Hist., p. 59, Up. Taconic.

FIG. 1008.-Elliptocephala thompsoni.

- Taconic. thompson.
 undulostriata, Hall, 1847, (Olenus undulostriatus,) Pal. N. Y., vol. 1, p. 258, Up. Taconic. Poorly defined.
 ELYMOCARIS, Beecher, 1884, Rep. Pa. Geo. Sur. PPP, p. 13. [Ety. elymos, pod; karis, shrimp.] * Carapace bivalve; elongate, longitudinally subquadrangular, dorsal line nearly as long as the valves; marring thickened: ontic node near the margins thickened; optic node near the anterior end, behind which are two elevations; two segments in the ab-domen; telson a short, broad spine, with two lateral spines, crenulated on 1. a Mesonacio, teste Peach, 2. 9.4. J. Vol L. (1894) 4. 674. V Walcott

EMB.-EUP.]

ECH.-ELY.

the inne E. siliqua capsella, Ha 181, Ham siliqua, Bee PPP, p. 1 Embolamus re Bathyuris spinosa, Ro spinosus. ENCRINURUS, Mineral. parted ; semiellipt gles produ form, thre the base; eyes in th vated on f the eye c of the an ments; lobes wit flected, se row, conv lines. Ty deltoideus,

p. 198, U



FIG. 1004.-Enc rus egani.

292, Quebe

multisegmen phion mu Londonde nereus, Hall Rep. N. Y Nat. Hist Niagara G ornatus, Hal field, 1875, vol. 2, p. ara Gr. phlyctainode phlyctaino Arts, vol. 3 2, p. 314, M punctatus, W Soc. Upsal trentonensis. St. Mus. ton Gr. varicostatus, St. Mus. N vigilans, Hal ECH.-ELY.

ion of 1842, and the nomenclature adble scientists since anding it is recomlists in selecting as too closely ap-ready adopted. It e form of the word y Zenker, but the of Goniophora of had preceded him Goniophorus; Schi-a mammal before us for a Lamelli-Acrophylla before ophyllum; and we hundred other inric names, differing termination, have id accepted by the d have come into s to constitute part e of science. Olesed to supplant Elany ground of disor law.

1844, Taconic Sys-N. Y., vol. 1, p. 256,

(Olenellus gilberti,) p. 7, and Geo. Sur. 44, Up. Taconic. (Olenellus howelli,) p. 8, and Geo. Sur. . 47, Up. Taconic.



8.-Elliptocephala hompsoni.

847, (Olenus undu-Y., vol. 1, p. 258, y defined.

884, Rep. Pa. Geo. [Ety. elymos, pod; apace bivalve; elonsubquadrangular, long as the valves; optic node near the id which are two gments in the abshort, broad spine, ines, crenulated on

EMB.-EUP.]

CRUSTACEA.

- the inner margins for fimbria. Type E. siliqua.
- capsella, Hall, 1888, Pal. N. Y., vol. 7, part Endymion, Billings, 1862. The name being 181, Ham. Gr.
- siliqua, Beecher, 1884, Rep. Pa. Geo. Sur. PPP, p. 13, Chemung Gr.
- Embolamus rotundatus, Rominger, syn. for Bathyuriscus howelli.
- spinosa, Rominger, syn. for Olenoides spinosus.
- ENCRINURUS, Emmrich, 1845, Neues Jahrb. f. Mineral, p. 42. [Ety. en, prefix; krino, parted; oura, tail.] Cephalic shield semielliptical, tuberculated, lateral an-gles produced into spines; glabella pyriform, three furrows at each side toward the base; cheeks flattened, triangular; eyes in the middle of the cheeks, elevated on foot-stalks; facial suture behind the eye cuts the outer margin in front of the angles; thorax with eleven seg-ments; pygidium triangular, lateral lobes with about eight segments, deflected, sometimes pointed; axis narrow, convex, with numerous segmental lines. Type E. punctatus. deltoideus, Shumard, 1855, Geo. Sur. Mo.,
- p. 198, Up. Sil. egani, S. A. Miller, 1880, Jour. Cin. Soc.

Nat. Hist., vol. 2, p. 254, Niagara Gr. elegantulus, Billings, 1866, Catal. Sil. Foss.

Antic., p. 62, Anti-costi Gr.

(Cryptonymus læ-vis,) Palæontologia Scandinavica, p. 4,

Up. Sil.

excedrensis, Safford, Not defined. lævis, Angelin, 1852,



1004.-Encrinu-FIG. rus egani.

mirus, Billings, 1865, Pal. Foss., vol. 1, p. 292, Quebec Gr. or Up. Taconic. multisegmentatus, Portlock, 1843, (Am-phion multisegmentatus,) Rep. Geo. of

Londonderry, etc., Anticosti Gr. nereus, Hall, 1867, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 425,

Niagara Gr. ornatus, Hall & Whit-

field, 1875, Ohio Pal., Fig. 1005.-Encrinu-vol. 2, p. 154, Niag-ara Gr.

- phlyctainodes, Green, 1837, (Calymene phlyctainodes,) Am. Jour. Sci. and
- Arts, vol. 32, p. 167, and Pal. N.Y., vol. 2, p. 314, Niagara Gr. punctatus, Wahlenberg, 1821, Nova Acta Soc. Upsal., Anticosti Gr. trentonensis, Walcott, 1877, Rep. N. Y. St. Mus. Nat. Hist., p. 68, Trenton Gr.

varicostatus, Walcott, 1877, 31st Rep. N. Y. St. Mus. Nat. Hist., p. 69, Trenton Gr. vigilans, Hall, 1847, (Ceraurus vigilans,)

Pal. N. Y., vol. 1, p. 245, Black Riv. and Trenton Grs.

preoccupied for a genus of plants, the author proposed Endymionia. meeki, see Endymionia meeki.

ENDYMIONIA, Billings, 1865,

Pal. Foss., vol. 1, pp. 93, 281. [Ety. proper name.] Cephalic shield semioval, convex; glabella ovate, convex, an elongate



oval tubercle on each FIG. 1006.-Endyside; thorax of six or mionia meeki

seven segments, axis convex, side lobes flat, groove crossing them diagonally; pygidium semioval, trilobed and divided by furrows into segments; distinguished from Trinucleus by the absence of a punctured border on the head shield, and from Ampyx by the form of the glabella, which has a tubercle on each side, and is destitute of a rostrum. Type E. meeki. meeki, Billings, 1862, (Endymion meeki,)

- Pal. Foss., vol. 1, pp. 93, 281, Quebec Gr. or Up. Taconic. Enoploura, Wetherby, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 163. Proposed instead of Anomalocystites, upon the ground that it is a Crustacean, instead of a Cystidean.
- ESTHERIA, Ruppell, and Straus-Durckheim, 1837, Mus. Senckenberg., vol. 2, p. 119. [Ety. proper name.] Carapace valves oval, globose, with a definite hinge-line, well marked umbones and concentric ridges, valves inequilateral, subtrigonal or subovate, umbo near an-terior end. Type E. dahalacensis. A living genus, and probably not Palæozoic.

pulex, Clarke, 1882, Am. Jour. Sci. and Arts, 3d ser., vol. 23, p. 466, Ham. Gr.

 EUPBOOPS, Meek, 1867, Am. Jour. Sci., vol.
 43, p. 394. [Ety. eu, very; pro, forward; ops, eye.] Cephalo-thoracic shield crescentric, more than twice as wide as long, convex, lateral angles terminating in spines; posterior mar-gin concave, from the lateral angles two-thirds of the distance to the middle, the central part being straight or slightly concave; the ocular ridge sur-rounds a crown-shaped or subquadrangular area, occupying the central third of the shield; the sides are slightly concave, in front there is a central emargination, and posteriorly the ridge is continued in a spine, on each side, directed back over the abdomen; eyes small, compound, located at the antero-lateral angles of the crown-shaped central area; mesial lobe small, narrowing forward and reaching the ocular ridge, in a linear carina; it bears a tubercle on the posterior part; abdomen trans-versely subelliptical, mesial lobe nar-

row; lateral lobes wide, flattened on the margins; segments defined by lin-ear ridges, which are produced beyond the flattened borders in curved mucronate spines; telson subtrigonal, gradu-

-548

ally tapering. Type E. danæ. colletti, White, 1884, 13th Rep. Ind, Geo. Sur. Nat. Hist., p. 172, Coal Meas. danæ, Meek & Worthen, 1865, (Bellinu-rus danæ,) Proc. Acad. Nat. Sci. Phil., p. 43, and Geo. Sur. III. vol. 2, p. 305 p. 43, and Geo. Sur. Ill., vol. 2, p. 395, Coal Meas.



F1G. 1007.-Euproops dance. e, Eyes; p, pits; s, node.

longispina, Packard, 1885, Am. Naturalist, vol. 19, p. 291, Coal Meas.

EURYPTEKELLA, Matthew, 1888, Trans. Roy. Soc. Can., p. 60. [Ety. diminutive of Eurypterus.] Minute; body ovate elongate, obscurely divided into three regions, and faintly trilobed; head sub-triangular, rounded at the outer corners, emarginate behind, seemingly composed of three anchylosed segments; thorax subquadrate, four segments, first one with a median ridge; abdomen elongately triangular, several seg-ments, produced in a long, flexible tail, surface tuberculated. Type E. ornata. ornata, Matthew, 1888, Trans. Roy. Soc. Can., p. 60, Lower Devonian.

EURYPTERUS, DeKay, 1825, Ann. Lyc. Nat. Hist. N. Y., vol. 1, p. 375. [Ety. euros, breadth; pteron, wing.] Body ovate-lanceolate, gradually attenuate behind, terminating in a spiniform tail; carapace on the upper side entire; eyes two distant, sessile, within the margin of the carapace, two simple oculiform tuber-cles or corneæ situated subcentrally; thoracic and caudal portions composed of thirteen joints, the first narrow and the last prolonged in a triangular spine, with serrated edges; the first two articulations are anchylosed on the lower side, and from the central part a locomotive appendage is directed backward to the 3d or 4th articulation, terminat-ing in two slender processes; mouth

central, beneath the carapace, surrounded by four pairs of jointed feet and a fifth larger pair; the three anterior pairs are similar; several joints bear a small articulating spine at the distal extremities, and the terminal joint consists of a spine; the fourth pair is longer, more slender, without spines, except on the terminal joint; the fifth pair are natatory, longer, more dilated, and placed beneath the posterior part of the carapace, basal joints composed of broad rhomboidal plates covering the posterior part of the carapace, over the inner edges of which there is a longituinner edges of which there is a longitu-dinally ovate plate, at the anterior sin-uate margin of which is the entrance to the mouth. Type E. remipes. beecheri, Hall, 1884, Geo. Sur. Pa. PPP, p. 30, Chemung Gr. boylei, Whiteaves, 1884, Pal. Foss., vol. 3, p. 42, Guelph Gr. dekayi, Hall, 1859, Pal. N. Y., vol. 3, p. 411, Waterlime, Gr. eriensia, Whitfold, 1882, App. N. V.

- eriensis, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 196, Low. Held. Gr.

Riganteus, Pohlman, 1882, Bull. Buff. Soc. Nat. Sci., vol. 4, p. 41, Waterlime Gr. grandis, Grote & Pitt, 1875, (Eusarcus grandis,) Bull. Buff. Soc. Nat. Hist.,

vol. 3, p. 17, Waterlime Gr.

- lacustris, Harlan, 1834, Trans. Geo. Soc. Penn., vol. 1, p. 98, and Pal. N. Y., vol. 3, p. 407, Waterlime Gr.
- acustris var. robustus, Hall, 1859, Pal
 N. Y., vol. 3, p. 410, Waterlime Gr.
 mazonensis, Meek & Worthen, 1868, Am.
 Jour. Sci., vol. 46, p. 21, and Geo. Sur
 Ill., vol. 3, p. 544, Coal Meas.
- micropthalmus, Hall, 1859, Pal. N. Y., vol. 3, p. 407, Low. Held. Gr. pachychirus, Hall, 1859, Pal. N. Y., vol. 3, p. 412, Waterlime Gr.
- pennsylvanicus, Hall, 1877, Proc. Am. Phil. Soc., p. 621, Carboniferous.
- potens, Hall, 1884, Geo. Sur. Pa. PPP. p. 37, Carboniferous.
- prominens, Hall, 1884, Proc. Am. Ass. Sci., vol. 33, p. 420, and Pal. N. Y., vol. 7, p. 157, Clin-

ton Gr. pulicaris, Salter, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 78, and Acad. Geol., p. 523, Up. Devonian. pustulosus, Hall, 1859, Pal. N. Y., vol. 3, p. 413, Waterlime Gr.

FIG. 1008.—Eurypterus rem-ipes. Diagram of small specimen. remipes, De-

Kay, 1825, Ann. Lyc. Nat. Hist. N. Y., p. 375, and Pal. N. Y., vol. 3, p. 404, Waterlime Gr.

EUS.-HIP.]

scorpion vol. 3, p. stylus, Ha 34, Low. tetragonop Soc. In lime Gr. Eusarcus, Gr Nat. His rvpterus grandis, se scorpionis, 1 FABERIA, D. Minute (with ope trusion o are refer the test Beyrichi by being are evide able in fo anomala, r outline, thicknes



ter; one



than the

from the

ing on th

this reac

of the sh that doe

test. Fo Hud. Riv

and now

Carolinæ

p. 358. [Cephalic

very con trally, i

panded o

ternal ma posterior produced

spines; g

very p short, fr

quadrate.

part con

curved la

row on

separatin

liptical lo

eyes sma

the glabe posterior

Faber.

HARPES, Gold medica A

EUR.

scorpionis,

EUR.

the carapace, surpairs of jointed feet air; the three anterior several joints bear a spine at the distal the terminal joint e; the fourth pair is ider, without spines, minal joint; the fifth longer, more dilated. th the posterior part asal joints composed lal plates covering the he carapace, over the ich there is a longitue. at the anterior sinwhich is the entrance

ype E. remipes. Geo. Sur. Pa. PPP, hr.

1884, Pal. Foss., vol. 3,

Pal. N. Y., vol. 3, p. r.

1882, Ann. N. Y. p. 196, Low. Held. Gr. , 1882, Bull. Buff. Soc. p. 41, Waterlime Gr. Pitt, 1875, (Eusarcus 3uff. Soc. Nat. Hist., erlime Gr.

834, Trans. Geo. Soc. 8, and Pal. N. Y., vol. ne Gr.

stus, Hall, 1859, Pal 10, Waterlime Gr.

k Worthen, 1868, Am. , p. 21, and Geo. Sur Coal Meas.

all, 1859, Pal. N. Y., v. Held. Gr.

1859, Pal. N. Y., vol. me Gr.

all, 1877, Proc. Am. Carboniferous. Geo. Sur. Pa. PPP, p.

1884, Proc. Am. Ass.

0, and Pal. N. Y., vol.



. 1008.—Eurypterus rem-bes. Diagram of small pecimen.

list. N. Y., p. 375, and , p. 404, Waterlime Gr.

EUS.-HIP.]

- scorpionis, Grote & Pitt, 1875, (Eusarcus scorpionis,) Bull. Buff. Soc. Nat. Hist., vol. 3, p. 1, Waterlime Gr.
- stylus, Hall, 1884, Geo. Sur. Pa., PPP, p. 34, Low. Coal Meas.
- tetragonopthalmus, Fischer, 1839, Bull. Soc. Imper. Nat. Moscou., Waterlime Gr.
- Eusarcus, Grote & Pitt, 1875, Bull. Buff. Soc. Nat. Hist., vol. 3, p. 1, syn. for Eurvpterus.
- grandis, see Eurypterus grandis.
- scorpionis, see Eurypterus scorpionis.
- FABERIA, n. gen. [Ety. proper name.] Minute crustaceans inclosed in a shell with openings on the edge for the protrusion of the feet and antennæ. They are referred to the Ostracoda, because the test is like that of Leperditia and Beyrichia, but they are distinguished by being closed in a single shell; they are evidently globose, depressed or vari-able in form. Type F. anomala. anomala, n. sp. Minute, subcircular in outline, and flattened on each side;

thickness about one-fourth the diameter; one edge somewhat sharpened; a



slit or opening, about eight times as long as wide, exists on the thicker edge of the shell; and at less

FIG. 1009.-Faberia anomala. Three views, mag. 5 diam.

than the thickness of the shell distant from the slit, there is a circular opening on the edge of the shell, and below this reaching nearly to the thinner edge of the shell, there is a very narrow slit that does not seem to penetrate the test. Found in the upper part of the Hud. Riv. Gr., in Butler County, Ohio, and now in the collection of Charles Faber.

HARPES, Goldfuss, 1839, Nova Acta Physico medica Academiæ Cæsareæ Leopoldino Carolinæ Naturæ Curiosorum, vol. 19, p. 358. [Ety. harpe, a hook or sickle.] Cephalic shield horseshoe-shaped,

very convex centrally, flatly expanded on the external margin, and posterior angles produced in long spines; glabella very prominent, short, front subquadrate, posterior part contracted, a curved lateral fur-

FIG. 1010.-Harpes row on each side ungula.

separating two el-liptical lobes from the posterior half; eyes small, near the anterior part of the glabella; facial sutures from the posterior angles, curving through the eyes and then to the antero-lateral margins, thoracic segments numerous. Type H. ungula.

antiquatus, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 468, Chazy Gr.

consuetus, Billings, 1866, Catal. Sil. Foss. Antic., p. 64, Anticosti Gr. dentoni, Billings, 1863, Can. Nat. and

Geo., vol. 8, p. 36, Hud. Riv. Gr.

escanabæ, Hall, 1851, Geo. Lake Sup. Land Dist., vol. 2,

CRUSTACEA.

p. 211, Trenton Gr. granti, Billings, 1865, Pal. Foss. vol. 1, p. 326, Quebec Gr.

ottawensis, Billings, 1865, Pal.

Foss., vol. 1, FIG. 1011.-Harpes ottawensis. p. 182, Trenton Gr.

HARPIDES, Beyrich, 1846, Untersuchungen Trilobiten als Fort. [Ety. from resem-blance to the genus Harpes.] Cephalic shield semicircular, margin wideand flat, spines at posterior lateral angles; glabella short, narrow, granular; lobe on each side at base; cheeks have radiating striæ; eyes small, joining the front end of the glabella by a small ridge; thorax with 22 segments, pleuræ three times as wide as the axis. Type H. mgosus. Only fragments have been referred to this genus in America.

atlanticus, Billings, 1865, Pal. Foss., vol. 1, p. 281, Quebec Gr. or Up. Taconic. concentricus, Billings, 1865, Pal. Foss., vol. 1, p. 382, Quebec Gr. or Up. Taconic.

? desertus, Billings, 1865, Pal. Foss., vol.

1, p. 333, Quebec Gr. or Up. Taconic, HARTTIA, Walcott, 1884, Bull. U. S. Geo. Sur. vol. 2, p. 283. [Ety. proper name.] Distingnished from Conocoryphe by having a lobe or elevation in the front of the glabella, small pygidium, and sloping front to the cheeks and frontal lobes. Type H. matthewi. matthewi, Hartt, 1868,

(Conocephalites matthewi,) Acad. Geol., p. 646, St. John Gr.



Mhalus.

Hausmannia, Hall, 1888, FIG. 1012. - Harttia synonym for Dal- matthewi. Cephalic shield. manites.

Hemicrypturus, Green, syn. for Asaphus. clintoni, Vanuxem, 1843, Geo. Rep. 3d Dist. N. Y., p. 79, Clinton Gr. Gen-

eric relation not determined. rasoumowski, syn. for Asaphus expansus. HIPPONICHARION, Matthew, 1885, Trans. Roy.

Soc. Can., p. 64. Breadth nearly equals the length; broadly semi-elliptical to-



ward the base, flattened, crossed by three symmetrical ridges; the middle

one is inconspicuous. Type H. eos. eos, Matthew, 1885, Trans. Roy. Soc. Can., p. 64, St. John Gr.



HOLOMETOPUS, Angelin, Palæontologia 1852, Scandinavica. [Ety. holos, entire; metopon, between the space Cephalic shield eyes.]

semicircular; glabella long, narrow, convex, widened in front, separated from cheeks by deep furrows; cheeks tumid; eyes small, situated well to the posterior; neck furrow distinct; facial sutures curved a little outward, in front of the eye. Type H. limbatus.

of the eye. Type H. Imbaus. angelini, Billings, 1862, Pal. Foss., p. 95, Quebec Gr. or Up. Taconic. HOMALONOTUS, Konig, 1825, Icones. Foss. Sectiles, p. 4. [Ety. homalos, ou the same level; notos, back.] Cephalic shield hyperbolic, anterior angle subacute, margins rounded, surface convex; glabella subquadrate, short, wider posteriorly, no furrows; eyes opposite the



FIG. 1014.-Homalonotus delphinocephalus.

central part of the glabella, small; facial suture, from the anterior angle to the margin, following the border of the margin, and curving like the letter S, it reaches the eye, and by a like curve passes to the posterior lateral angle;

thoracic segments 13, axis wider than the lateral lobes, which have subtrun-cate ends, with large distinct facets; pygidium hyperbolic and terminating in a spine. Type H. knighti. atlas, Castelnau, 1843, Syst. Sil., p. 20 Not

recognized.

- dawsoni, Hall, 1860, Can. Nat. and Geo., vol. 5, p. 155, and Acad. Geol., p. 607, Up. Silurian.
- dekayi, Green, 1832, (Dipleura dekayi,) Monograph Trilobites, p. 79, and Illust. Devon. Foss., pl. 25, Ham. Gr.
- delphinocephalus, Green, 1832, (Trimerus delphinocephalus,) Monograph of Trilobites, p. 82, and Pal. N. Y., vol. 2, p. 309, Niagara Gr.
- giganteus, Castelnau, 1843, Syst. Sil., p. 20. Not recognized.
- herculaneus, Castelnau, 1843, Syst. Sil., p. 20. Not recognized.
- jacksoni, Green, 1837, (Trimerus jacksoni,) Am. Jour. Sci., vol. 32, p. 347, Up. Sil. knighti, Konig, 1825, Icones. Foss. Sec-
- tiles, pl. 7, fig. 85, Low. Held. Gr. major, Whitfield, 1885, Bull. Am. Mus. Nat. Hist., vol. 1, p. 193, Oriskany Gr. vanuxemi, Hall, 1859, Pal. N. Y., vol. 3, p. 352, Low. Held. Gr.
- ILLÆNUBUS, Hall, 1863, 16th Rep. N. Y. Mus. Nat. Hist., p. 176. [Ety. from the genus Illænus; oura, tail.] Body broadly ellip-tical; cephalic shield short, convex, semielliptical; glabella subquadrate, convex, smooth, without distinct dorsal furrow; palpebral lobe marginal; cheeks wide; facial suture nearly vertical, slightly diverging, anterior to the eye; movable cheeks wide and short; thoracic segments convex, central lobe wide, lateral bes narrow, pygidium short, narrow, subelliptical, convex in front, more curved behind. Type I. quadratus. convexus, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 66, and Geo. Wis., vol. 4, p. 203, Low. Mag. Gr.

 - eurekensis, Walcott, 1885, Monogr. U. 8. Geo. Sur., vol. 8, p. 97, Potsdam Gr. quadratus, Hall, 1863, 16th Rep. N. Y. St.
- Mus. Nat. Hist., p. 176, Potsdam Gr. ILLÆNUS, Dalman, 1828, ueber die Palæaden
 - oder die sogenannten Trilobiten, p. 51. [Ety. illaino, to look awry, to squint.] Cephalic shield very convex and like one-fourth of a sphere, with the an-terior margin slightly produced; gla-bella defined only as a slight convexity, between subparallel lines, on the posterior part of the shield; eyes semilunate, near the lateral margins smooth; facial suture makes a gentle curve from the antero-lateral margin to the eye, and then to the margin midway of the lateral lobes of the thorax; thoracic segments 9 or ten, broad; pygidium much like the cephalic shield. Type I. crassicauda.
 - ambiguus, Foerste, 1885, Bull. Sci. Lab. Denison Univ., p. 106, Niagara Gr.

americanu Geol., v angusticol Geo., vo arcturus, 23, Chaz arcuatus, p. 279, 0 armatus, 1 Mus. Na barriensis, species Illænus bayfieldi, Ğeo., v(clavifrons. Geo., vo Riv. Grs conifrons, Geo., vo conradi, 1 Geo., vo consimilis 1, p. 277 consobrin 1, p. 280 cornigerus St. Mus. crassicaud mostrac

Upsal., vol. 1, p



FIG. 1015.-

cuniculus, Mus. Na davtonens Pal., vol fraternus,



FIG. 1016.-111 globosns. view.

Can. Na Riv. Gr. herricki, F Nat. His imperator. Wis., p. Mus. Na incertus, I p. 332, G indetermi N. Y. St. Riv. Gr.

ISO.]

[HOM.-ILL.

ts 13, axis wider than , which have subtrun-large distinct facets; bolic and terminating e H. knighti.

43, Syst. Sil., p. 20. Not

), Can. Nat. and Geo., 1 Acad. Geol., p. 607,

32, (Dipleura dekayi,) bites, p. 79, and Illust. . 25, Ham. Gr.

Green, 1832, (Trimerus s,) Monograph of Trilo-Pal. N. Y., vol. 2, p.

1, 1843, Syst. Sil., p. 20.

au, 1843, Syst. Sil., p. ed.

37, (Trimerus jacksoni,) vol. 32, p. 347, Up. Sil. 25, Icones. Foss. Sec-, Low. Held. Gr.

1885, Bull. Am. Mus. p. 193, Oriskany Gr. 859, Pal. N. Y., vol. 3, l. Gr.

3, 16th Rep. N. Y. Mus. [Ety. from the genus .] Body broadly ellipeld short, convex, semia subquadrate, convex, distinct dorsal furrow; arginal; cheeks wide; ly vertical, slightly dito the eye; movable short; thoracic segntral lobe wide, lateral gidium short, narrow. nvex in front, more Type I. quadratus.

l, 1878, Ann. Rep. Geo. and Geo. Wis., vol. 4, Gr.

t, 1885, Monogr. U. S. p. 97, Potsdam Gr. 33, 16th Rep. N. Y. St. o. 176, Potsdam Gr. 28, ueber die Palæaden nten Trilobiten, p. 51. ook awry, to squint.] very convex and like sphere, with the an-ghtly produced; gla-y as a slight convexity, llel lines, on the pos-shield; eyes semilueral margins smooth; es a gentle curve from l margin to the eye, nargin midway of the the thorax; thoracic ten, broad; pygidium phalic shield. Type I.

1885, Bull. Sci. Lab. . 106, Niagara Gr.

- americanus, Billings, 1859, Can. Nat. and Geol., vol. 4, p. 371, Trenton Gr. angusticollis, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 376, Black Riv. Gr. arcturus, Hall, 1847, Pal. N. Y., vol. 1, p.
- 23, Chazy and Black Riv. Grs.
- arcuatus, Billings, 1865, Pal. Foss., vol. 1, p. 279, Quebec Gr.
- armatus, Hall, 1867, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 418, Niagara Gr. barriensis, Murch. 1839, Sil. Syst. The
- species formerly identified with this is Illænus ioxus.
- bayfieldi, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 369, Chazy Gr. clavifrons, Billings, 1859, Can. Nat. and
- Geo., vol. 4, p. 379, Chazy and Black Riv. Grs.
- conifrons, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 378, Black Riv. Gr.
- conradi, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 372, Black Riv. Gr.
- consimilis, Billings, 1865, Pal. Foss., vol. 1, p. 277, Quebec Gr.
- consobrinus, Billings, 1865, Pal. Foss., vol.
- 1, p. 280, Quebec Gr. cornigerus, Hall, 1872, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 186, Niagara Gr. crassicauda, Wahlenberg, 1821, (Ento-mostracites crassicauda,) Nov. Act. Soc.
- Upsal., vol. 8, p. 27, and Pal. N. Y., vol. 1, p. 229, Trenton and Galena Grs.



FIG. 1015.-Illænus globosus. Two views.

- cuniculus, Hall, 1867, 20th Rep. N. Y. St. Mus. Nat. Hist, p. 421, Niagara Gr. daytonensis, Hall & Whitfield, 1875, Ohio
- Pal., vol. 2, p. 119, Niagara Gr. fraternus, Billings, 1865, Pal. Foss., vol. 1, p. 276, Quebec Gr.

globosns.

view.

globosus, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 367, Chazy Gr.

graftonensis, Meek & Worthen, 1869, Proc. Acad. Nat. Sci. Phil. Fig. 1016,-Illænus and Geo. Sur. Ill., vol.

ew. Can. Nat. and Geo., vol. 4, p. 380, Hud. Riv. Gr. and Mid. Sil.

- herricki, Foerste, 1887, 15th Rep. Geo. and
- Nat. Hist. of Minn., p. 479, Trenton Gr. imperator, Hall, 1861, Rep. of Progr. Wis., p. 49, and 20th Rep. N. Y. St. Mus. Nat. Hist., p. 332, Niagara Gr. incertus, Billings, 1865, Pal. Foss., vol. 1,
- p. 332, Quebec Gr.
- indeterminatus, Walcott, 1877, 31st Rep. N. Y. St. Mus. Nat. Hist., p. 70, Black Riv. Gr.

- insignis, Hall, 1864, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 331, Niagara Gr. ioxus, Hall, 1867, 20th Rep. N. Y. St.
- Mus. Nat. Hist., p. 420, Niagara Gr. latidorsatus, Hall, 1847, Pal. N. Y., vol. 1,
- p. 230, Trenton Gr.
- madisonanus, Whitfield, 1882, Geo. Wis., vol. 4, p. 307, Niagara Gr. milleri, Billings, 1859, Can. Nat. and Geo.,
- vol. 4, p. 375, Black Riv. and Trenton Grs.
- minnesotensis, Foerste, 1887, 15th Rep. Geo. and Nat. Hist. of Minn., p. 478, Trenton Gr.
- niagarensis, Whitfield, 1880, Ann. Rep. Geo. Sur. Wis., p. 68, Niagara Gr.
- orbicaudatus, Billings, 1859, Can. Nat. and Geo., vol. 4, p. 379, Hud. Riv. Gr. and Mid. Sil.
- ovatus, Conrad, 1843, (Thaleops ovatus,) Proc. Acad. Nat. Sci. Phil., vol. 1, p. 332, and Pal. N. Y., vol. 1, p. 259, Black Riv. Gr.
- pterocephalus, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 87, and Geo. Wis.,
- vol. 4, p. 309, Niagara Gr. simulator, Billings, 1865, Pal. Foss., vol. 1, p. 327, Quebec Gr.



Fig. 1017.—Illænus taurus.

- taurus, Hall, 1861, Rep. of Progr. Wis. Sur., p. 49, and Geo. Sur. Ill., vol. 3, p. 320, Trenton and Galena Grs.
- trentonensis, Emmons, 1842, (Bumastus trentonensis,) Geo. Rep. N. Y., p. 390, and Pal. N. Y., vol. 1, p. 230, Trenton Gr.
- tumidifrons, Billings, 1865, Pal. Foss., vol.
- 1, p. 278, Quebec Gr. vindex, Billings, 1865, Pal. Foss., vol. 1, p. 179, Chazy Gr.

worthenanus, syn. for Illænus insignis.

Isochilina, Jones, 1858, Can. Org. Rem., Decade 3, p. 197. [Ety. isos, equal; cheilos, lip.] Equivalve, the margins of the valves meeting uniformly, not overlapping, as in Leperditia greatest con-vexity central or toward the anterior end, eye tubercle present; muscular spot not distinct, externally. Type I. ottawa.

armata, Walcott, 1883, 35th Rep. N. Y. St. Mus. Nat. Hist., p. 213, Trenton Gr. cylindrica, Hall, 1852,



FIG. 1018.-Isochi-lina jonesi.

Pal. N. Y., vol. 2, p. 14, Medina Gr. gracilis, Jones, 1858, Can. Org. Rem. Decade 3, p. 98, Black Riv. and Trenton Grs.

(Cytherina cylindrica,)

jonesi, Wetherby, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 80, Trenton Gr. labrosa, Jones, 1889, Ann. and Mag. Nat.

- Hist., 6th ser., vol. 3, p. 383, Low. Held. Gr.
- ottawa, Jones, 1858, Can. Org. Rem., Dec-
- ade 3, p. 97, Black Riv. Gr. Isotelus, DeKay, 1825, Annals Lyceum Nat. Hist. N. Y., vol. 1, p. 174. [Ety. isos, equal; telos, end.] A subgenus of Asaphus.

canalis, see Asaphus canalis. gigas, see Asaphus gigas.

maximus, see Asaphus megistus.

megistus, see Asaphus megistus.

vigilans, see Asaphus vigilans.

LEAIA, Jones, 1862, App. to Mon. Foss. Estheria., p. 116. [Ety. proper name] Carapace bivalve, subquadrate, thin, horny, truncated and slightly curved behind, rounded in front, straight on the dorsal edge; surface concentrically ridged and finely reticulated in the furrows; each valve crossed by one, two, or three ridges; the first and most conspicuous crosses from the anterior part of the umbo to the anteroventral angle; the second, when it exists, reaches the postero-ventral angle, and the third lies along the dorsal

margin. Type L. leidyi. leidyi, Lea, 1856, (Oppricardia leidyi,) Proc. Acad. Nat. Sci., vol. 7, p. 341, Coal Meas.



FIG. -1019 — Lesia tricarinata. **B** 1, right value : $B_{1,1}^{*}B_{2,2}^{*}$ enlarged ; **B** 3, dorsal view; c, left value.

tricarinata, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3. p. 541, Coal Meas. **KLEPERDITIA**, Rouault, 1851, Bull. Soc. Geo. France, 2d ser., t. 8, p. 377. [Ety. lopis, scale; dittes, double.] Carapace bivalve, inequivalve, right valve larger than the left, and overlapping the ventral border. and to some extent the anterior and posterior borders of the left valve; valves smooth, convex, horny, oblong, longer than broad, bean shaped, inequilateral, posterior half the broader; dorsal

[ISO.-LEP.

- border straight; ventral border; dorsal border straight; ventral border semi-circular. Type L. brittanica. alta, Conrad, 1843, (Cytherina alta,) (ieo, Rep. 3d Dist. N. Y., p. 112, and Pal. N. Y., vol. 3, p. 373, Low. Held. (ir. amygdalina, Jones, 1858, Can. Org. Rem., Decade 3, p. 97, Chear, Gr.
- - Decade 3, p. 97, Chazy Gr. angulifera, Whitfield, 1882, Ann. N. Y. Acad. Sci., vol. 2, p. 197, Low. Held. Gr.
- anna, Jones, 1858, Can. Org. Rem., Dec-ade 3, p. 96, Hud. Riv. Gr.
- anticostiana, Jones, 1858, (L. canadensis var. anticostiana,) Can. Org. Rem., Dec-ade 3, p. 95, Hud. Riv. Gr.
- arctica, Jones, 1856, Ann. and Mag. Nat.
- Hist., 2d ser., vol. 17, p. 87, Up. Sil. argenta, Walcott, 1886, Bull. U. S. Geo. Sur., No. 30, p. 146, Up. Taconic. billingsi, Jones, N881, Ann. and Mag. Nat. Hist. 5th sort word 18, Terryton Gr.
- Hist., 5th ser., vol. 18, Trenton Gr.
- bivertex, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 11, Utica Slate Gr. bivia, White, 1874, Rep.



Invert. Foss., p. 11, and Geo. Sur. W. 100th Mer., vol. 4, p. 58, Quebec Gr.

- FIG. 1020.-Leperlitia byrnesi. S. A. Miller, Mag. 1874, Cin. Quar. Jour. Mag.
 - Sci., vol. 1, p. 123, Utica Slate Gr. cæcigena, S. A. Miller, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 262, Hud.
 - Riv. Gr. canadensis, nadensis, Jones, 1858, Ann. Nat. Hist., 3d ser., 0
 - vol. 1, p. 244, Chazy to Trenton Gr.
 - capax, Safford. Not defined. carbonaria, Hall, 1858, (Cythere carbonaria,) Trans.
 - Alb. Inst., vol. 4, p. 33, and Bull. Am. Mus. Nat. FIG. 1021-Le-Hist., p. 94, Warsaw Gr. cayuga, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. perditia cæ-cigena. Nat
 - ural size and magnified. Hist., p. 83, Cornif. Gr.
 - concinnula, Billings, 1865, Pal. Foss., vol. 1, p. 299, Quebec Gr. or Up. Taconic.

 - crepiformis, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 10, Hud. Rigogr. cylindrica, Hall, 1871, 24th Rep. N. Y. St. Mus. Nat. Hist., p. 231, Utica Slate
 - and Hud. Riv. Grs.
 - dermatoides, Walcott, 1887, Am. Jour. Sci. and Arts, 3d ser., vol. 34, p. 192, Up. Taconic.
 - ebinina, Dwight, 1889, Am. Jour. Sci. and Arts, 3d ser., vol. 38, p. 144, Up. Taconic.
 - faba, Hall, 1876, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 186, Niagara Gr.

fabulites, (lites,) Pr Trenton

LEP. -LIC.]

fonticola, I Mus. Nat

gibbera, Jo Hist., 2d ara Gr. gibbera var. gracilis, see hudsonica, p. 375, I jonesi, Hal 372, Low josephana, var. jose ade 3, 1 ton Gr. labrosa, Jo labrosa,) 93, Chazy

louckana. louckana. 93, Black marginata,

schaftlich ara Gr. minutissim St. Mus. and Hud

morgani, Sat nana, Jone nana,) Ca Calcifero okeni, Mur Jahrbuch Carbonife

ottawa, see ovata, Jone Hist., 3d Riv. Gr. pauquettan

var. pauq ade 3, p. parasitica,

p. 276, L parvula, H p. 376, Lo pennsylvan

Mag. Nat Clinton G punctulifera

St. Mus. 1 radiata, Ulr

Hist., vol. rotundata, Geo. Sur.

scalaris Jon laris,) Ar ser., vol.

seneca, Hal Mus. Nat.

sinuata, Ha vol. 5, p.

spinulifera, St. Mus. 1 sublævis, S

lævis,) G Magnesia

" Ramed after M. Leperdit of Rennes. See Annals nat. His t. Por 6. od. 5, p. 340,



[ISO.-LEP.

t valve larger than the ing the ventral border. ent the anterior and of the left valve; valves horny, oblong, longer shaped, inequilateral. he broader; dorsal ventral border semibrittanica.

(Cytherina alta,) Geo. Y., p. 112, and Pal. 373, Low. Held. Gr. 1858, Can. Org. Rem., Chazy Gr.

ld, 1882, Ann. N.Y. 2, p. 197, Low.

Can. Org. Rem., Dec-Riv. Gr.

1858, (L. canadensis Can. Org. Rem., Dec-

Riv. Gr.

- Ann. and Mag. Nat. . 17, p. 87, Up. Sil. 1886, Bull. U. S. Geo.
- 6, Up. Taconic. 1, Ann. and Mag. Nat.

1. 18, Trenton Gr. 1879, Jour. Cin. Soc.

p. 11, Utica Slate Gr. ia, White, 1874, Rep. nvert. Foss., p. 11, and eo. Sur. W. 100th fer., vol. 4, p. 58, Queec Gr.

nesi, S. A. Miller, 874, Cin. Quar. Jour. Utica Slate Gr.

ller, 1881, Jour. Cin. vol. 4, p. 262, Hud.

0

1858, 3d ser., hazy to

defined. 58, (Cy-Trans.

, p. 33, us. Nat. FIG. 1021.-Leperdicia cæ-cigena. Nataw Gr. 2, 15th ural size and us. Nat. magnified.

- if. Gr. , 1865, Pal. Foss., vol. Gr. or Up. Taconic.
- 1879, Jour. Cin. Soc. p. 10, Hud. RigoGr. 71, 24th Rep. N. Y.
- t., p. 231, Utica Slate ott, 1887, Am. Jour.

ser., vol. 34, p. 192,

889, Am. Jour. Sci. ., vol. 38, p. 144, Up.

h Rep. N. Y. St. Mus. Niagara Gr.

- fabulites, Conrad, 1843, (Cytherina fabulites.) Proc. Acad. Nat. Sci. Phil., p. 332, Trenton Gr.
- fonticola, Hall, 1867, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 428, Niagara Gr. gibbera, Jones, 1856, Ann. and Mag. Nat.
- Hist., 2d ser., vol. 17, p. 90, Niagara Gr.
- gibbera var. scalaris, see L. scalaris.
- gracilis, see Isochilina gracilis.
- hudsonica, Hall, 1859, Pal. N. Y., vol. 3, p. 375, Low. Held. Gr.
- jonesi, Hall, 1859, Pal. N. Y., vol. 3, p. 372, Low. Held. Gr.
- josephana, Jones, 1858, (L. canadensis var. josephana,) Can. Org. Rem., Dec-ade 3, p. 94, Black Riv. to Trenton Gr.
- labrosa, Jones, 1858, (L. canadensis var. labrosa,) Can. Org. Rem., Decade 3, p. 93, Chazy Gr.
- louckana, Jones, 1858, (L. canadensis var. louckana,) Can. Org. Rem., Decade 3, p. 93, Black Riv. Gr.
- marginata, Keyserling, 1846, Wissenschaftliche Beobachtungen, etc., Niagara Gr.
- minutissima, Hall, 1871, 24th Rep. N. Y. St. Mus. Nat. Hist,, p. 231, Utica Slate and Hud, Riv. Gr.
- morgani, Safford. Not defined.
- nana, Jones, 1858, (L. canadensis var. nana,) Can. Org. Rem., Decade 3, p. 92, Calciferous Gr.
- okeni, Munster, 1830, (Cythere okeni,) Jahrbuch fur Min., Geo. und Petrif. Carboniferous.
- ottawa, see Isochilina, ottawa.
- ovata, Jones, 1858, Ann. and Mag. Nat. Hist., 3d ser., vol. 1, p. 252, Black Riv. Gr.
- pauquettana, Jones, 1858, (L. canadensis var. pauquettana,) Can. Org. Rem., Dec-ade 3, p. 94, Black Riv. Gr. parasitica, Hall, 1859, Pal. N. Y., vol. 3,
- p. 276, Low. Held. Gr. parvula, Hall, 1859, Pal. N. Y., vol. 3, p. 376, Low. Held. Gr.
- pennsylvanica, Jones, 1858, Ann. and Mag. Nat. Hist., 3d ser., vol. 1, p. 251, Clinton Gr.
- punctulifera, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 92, Ham. Gr. radiata, Ulrich, 1879, Jour. Cin. Soc. Nat.

- Hist., vol. 2, p. 9, Utica Slate Gr. rotundata, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 206, Devonian. scalaris Jones, 1858, (L. gibbera var. sca-laris,) Ann. and Mag. Nat. Hist., 3d
- ser., vol. 1, p. 250, Waterlime Gr. seneca, Hall, 1862, 15th Rep. N. Y. St.
- Mus. Nat. Hist., p. 84, Ham. Gr. sinuata, Hall, 1860, Can. Nat. and Geo.,
- vol. 5, p. 158, Up. Silurían. spinulifera, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 83, Up. Held Gr. sublævis, Shumard, 1855, (Cythere sublævis,) Geo. Rep. Mo., p. 195, Low. Magnesian Gr.

- troyensis, see Aristozoe troyensis. turgida, Billings, 1865, Pal. Foss., vol. 1,
- p. 299, Quebec Gr. ventralis, Billings, 1865, Pal. Foss., vol. 1, p. 300, Quebec Gr.
- unicornis, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 10, Utica Slate Gr.
- LEPIDILLA, Matthew, 1885, Trans. Roy. Soc. Can., p. 62. [Ety. lepis, a scale.] Bivalve; hinge-line straight, projecting from the general contour of the shell; umbo and hinge-line separated from the valve by a sinus, behind which there is a foramen. Type L. anomala. anomala, Matthew, 1885, Trans. Roy. Soc.
 - Can., p. 62, St. John Gr.
- LEPIDITTA, Matthew, 1885, Trans. Roy. Soc. Can. p. 61. [Ety. *lepis*, scale; *dittos*, double.] Minute, obliquely semicircular, wider on the anterior half, hinge straight; umbones in the middle, low. Type L. alata.
 - alata, Matthew, 1885, Trans. Roy. Soc. Can., p. 61, St. John Gr. curta, Matthew, 1885, Trans. Roy. Soc.
 - Can., p. 62, St. John Gr.

LEPIDOCOL EUS Faber, 1886, Jour. Cin. Soc. Nat. Hist., vol. 9, p. 15. [Ety. lepis, scale; koleos,

FIG. 1023.-Lepi-

docoleus jame-si. Faber's.

Cincinnati

specimen.



Body elon. FIG. 1022 .-- Lepidocoleusjamesi. Mag 2 diam. Lebanon specgate, comimen. posed of two

series of thin, imbricating, angular plates,

interlocking and overlapping along the basal edges; plates small, more or less triangular in outline; one side always longer than either of the others; one side usually sigmoidal; entire outer surface marked Type L. with striæ. jamesi.

jamesi, Hall & Whitfield. 1875, (Plumulites jamesi,) Ohio Pal., vol. 2, p. 106, Hud. Riv. Gr.

LICHAS, Dalman, 1826, Uber die Palæaden oder die Sogenannten Trilobiten, p. 71. [Ety. mythological name.] Body subovate, flat, granu-lated; cephalic shield somewhat lunate, often pointed in front; gla-

bella large, convex, a furrow curving inward and backward from the anterior third on each side, and cutting off or partly inclosing two oval spaces; cheeks small; eyes large, reniform; eye-line

cutting the outer margin in front of the angles; thorax of ten segments; pleuræ flat, falcate, each with a furrow not reaching the margin; pygidium, side lobes flat, two falcate ribs on each side with a mesial duplicating groove, mid-dle lobe, semielliptical, pointed. Type L. laciniatus.



FIG. 1024.-Lichas faberi. Mag. 2 diam.

armatus, Hall, 1862. Preoccupied; changed to L. eriopis.

bigsbyi, Hall, 1859, Pal. N. Y., vol. 3, p. 364, Low. Held. Gr.

- boltoni, Bigsby, 1825, (Paradoxides bol-toni,) Jour. Acad. Nat. Sci., vol. 4, p. 365, and Pal. N. Y., vol. 2, p. 311, Niagara Gr.
- boltoni var. occidentalis, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 223, and 11th Rep. Ind. Geo. Sur., p. 344, Niagara Gr.
- breviceps, Hall, 1863, Trans. Alb. Inst., vol. 4, p. 222, and 11th Rep. Ind. Geo. Sur., p. 343, Niagara Gr.

canadensis, Billings, 1866, Catal. Sil. Foss.

Antic., p. 65, Antic. Gr. champlainensis, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 342, Birdseye Gr.

cucullus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 266, and Geo. Sur. Ill., vol. 3, p. 299, Trenton Gr. decipiens, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., p. 104, Niag-

- ara Gr. dracon. Hall, 1888, Pal. N. Y., vol. 7, p.
- 85, Up. Held. Gr.
- emarginatus, Hall, 1879, 28th Rep. N. Y. St. Mus. Nat. Hist., p. 199, Niagara Gr.

eriopis, see Terataspis eriopis.

faberi, n. sp. Broadly elliptical, granu-lated; head somewhat crescentiform, slightly pointed in front, very convex, posterior angles terminating in short, obtuse spines; glabella very convex, divided into three lobes; central lobe contracted in the middle, widely expanded in front, and less expanded besmall lobe from the postero-lateral angles; lateral lobes reniform; and an other small lobe is separated from the posterior part of the cheeks by a stronger furrow; eyes prominent, reniform, and directed backward; occipital ring wide; axial lobe of thorax wider than the lateral lobes; pygidium laciniate, axis with two narrow articulations in front, and a longer posterior one that slopes backward and becomes confluent with the expanded border; lateral lobes composed of three expanded articulations, which terminate in acute points, and are marked in the central part by a groove for three-fourths of their length, which is represented by a rib on the under side; central lobe grooved in like manner, and bidd at the posterior extremity. The pygid-ium will readily distinguish it from L. trentonensis, beside the broader axial lobe of the thorax and somewhat different cephalic shield. Hud. Riv. Gr. at Cincinnati, Ohio. The specimen illustrated is from the collection of Charles Faber.



FIG. 1025.-Lichas faberi. Large and small pygidium.

- grandis, see Terataspis grandis. gryps, Hall, 1888, Pal. N. Y., vol. 7, p. 84, Up. Held. Gr. harrisi, S. A. Miller, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 106, Hud. Riv. Gr.
- hispidus, Hall, 1888, Pal. N. Y., vol. 7, p.
- 77, Up. Held. Gr. hylæus, Hall, 1888, Pal. N. Y., vol. 7, p. 81, Up. Held. Gr.
- jukesi, Billings, 1865, Pal. Foss., vol. 1, pp. 282 and 335, Quebec Gr. minganensis, Billings, 1885, Pal. Foss.,
- vol. 1, p. 181, Chazy or Black Riv. Gr. nereus, Hall, 1863, 16th Rep. N. Y. St.
- Mus. Nat. Hist., p. 226, Niagara Gr. obvius, Hall, 1868, 20th Rep. N. Y. St. Mus. Nat. Hist., p. 424, Niagara Gr. ptyonurus, Hall, 1888, Pal. N. Y., vol. 7, p. 86, Niagara Gr.
- pugnax, Winchell & Marcy, 1865, Mem. Bost. Soc. Nat. Hist., p. 103, Niagara Gr.

LIC.

pustulosus.



FIG. 1026.-Li trentonens

Body elo croscopic furrows front; fi at the limb con tal ring a at the rounded pleuræ o rounde minute, segments uleatus. aurora, Har ocephalit Acad. Ge John Gr. linnarsoni. Paradoxi 47, St. Jo linnarsoni Trans. I John Gr. neglectus. neglectus Gr. Pro ouangondia lites oua 648, St. J. ouangondia 1887, Trai John Gr. ouangondia thew, 188 St. John ouangondia 1887, Tra John Gr. quadratus, quadratus John Gr. tener, Hartt Acad. Ge Lisgocaris, Cla lutheri, see ! LONCHOCEPHA Iowa, and long; kep having a

LIO. -MEG.]

[LIC.

dly elliptical, granuwhat crescentiform, i front, very convex. erminating in short, abella very convex. e lobes; central lobe middle, widely exnd less expanded beit furrow cuts off a the postero-lateral es reniform; and ans separated from the the cheeks by a eyes prominent, renibackward; occipital lobe of thorax wider bes; pygidium lacininarrow articulations longer posterior one ard and becomes conxpanded border; lated of three expanded ch terminate in acute narked in the central e for three-fourths of ch is represented by a r side; central lobe manner, and bifid at tremity. The pygid-distinguish it from L. ide the broader axial and somewhat differld. Hud. Riv. Gr. at The specimen illuscollection of Charles



Large and small peri. dium.

pis grandis. Pal. N. Y., vol. 7, p. 84,

- ller, 1878, Jour. Cin. vol. 1, p. 106, Hud.
- 8, Pal. N. Y., vol. 7, p.
- Pal. N. Y., vol. 7, p.
- 35, Pal. Foss., vol. 1, pp.
- bec Gr. ngs, 1865, Pal. Foss.,
- azy or Black Riv. Gr. , 16th Rep. N. Y. St.
- p. 226, Niagara Gr.
- , 20th Rep. N. Y. St.
- p. 424, Niagara Gr. 888, Pal. N. Y., vol. 7,
- & Marcy, 1865, Mem.
- Hist., p. 103, Niag-

LIO.-MEG.]

pustulosus, Hall, 1859, Pal. N. Y., vol. 3,

CRUSTACEA.

p. 366, Low. Held. Gr. superbus, Billings

1875, Can. Nat. and Geol., vol. 7, p. 239, Up. Held. Gr. trentonensis, Conrad,

1842, (Asaphus trentonensis,) Jour. Acad. Nat. Sci., vol. 8, p. 277, and Pal. N. Y., vol. 1, p. 235, Black Riv. and Trenton Grs. OSTRACUS, Angelin,

1852, Palæontologica Scandinavica, p. 23. [Ety. leiostrakos

smooth-shelled.] Body elongate: test smooth or with microscopic punctures; glabella elevated, furrows faint; dorsal furrow faint in front; fixed cheek arched downward

at the sides; front limb concave; occipital ring aculeate ; head at the genal angle rounded; ends of the pleuræ of the thorax rounded; pygidium minute, having few segments. Type L. aculeatus.

FIG. 1026.-Lichas

trentonensis.

- aurora, Hartt, 1868, (Conocephalites aurora,)
- Acad. Geol., p. 653, St. FIG. 1027.-Llostra-John Gr. cus aculeatus. linnarsoni, Brogger, 1878,
- Paradoxides skifrene vid Krekling, p. 47, St. John Gr.
- linnarsoni var. alata, Matthew, 1887, Trans. Roy. Soc. Can., p. 147, St. John Gr.
- neglectus, Hartt, 1868, (Conocephalites neglectus,) Acad. Geol., p. 652, St. John Gr. Probably a syn. for L. tener.
- ouangondianus, Hartt, 1868, (Conocephalites ouangondianus,) Acad. Geol., p. 648, St. John Gr.
- ouangondianus var. gibbus, Matthew, 1887, Trans. Roy. Soc. Can., p. 140, St. John Gr.
- ouangondianus var. immarginata, Matthew, 1887, Trans. Roy. Soc. Can., p. 139, St. John Gr.
- ouangondianus var. planus, Matthew, 1887, Trans. Roy. Soc. Can., p. 140, St. John Gr.
- quadratus, Hartt, 1868, (Conocephalites quadratus,) Acad. Geol., p. 654, St. John Gr.
- tener, Hartt, 1868, (Conocephalites tener,) Acad. Geol., p. 652, St. John Gr.
- Lisgocaris, Clarke, syn. for Spathiocaris. lutheri, see Spathiocaris lutheri.
- LONCHOCEPHALUS, Owen, 1852, Geo. Wis., Iowa, and Minn., p. 575. [Ety. longus, long; kephale, head.] Cephalic shield, having a wide frontal limb; posterior

angle of each cheek terminating in a spine; glabella short, subquadrate, or truncato-conical, highly arched; two or three obscure furrows on each side; base projected backward, in a spine of greater or less length, in the median line, over the thoracic segments; facial sutures cut the anterior margin in front of the eyes, and gently curve outward and then inward to the anterior angles of the palpebral lobes; thence curving to the base of the eyes, they are directed backward and slightly outward to the posterior margin; pygidium supposed to be semilunar, with little or no border, and having four segments in the axial lobe. Type L. chippewensis.

chippewensis, Owen, 1852, Geo.Wis., Iowa,

Gr.



pleuræ about

twelve; groove

running along the

middle nearly to

the extremities;

pygidium with a well-defined axis,

side lobes de-

pressed, and with

four to six ribs;

distinguished from

Olenus by having the facial suture

curved outward in

1852, Geo. Wis. I o w a, a n d FIG. 1028.—Lonchoceph-Minn., p. 576, alus chippewensis. Minn., p. 576, Potsdam Gr.

- wisconsinensis, Owen, 1852, Geo. Wis., Iowa, and Minn., p. 576, and 16th Rep. N. Y. St. Mus. Nat. Hist., p. 146, Potsdam Gr.
- LOGANELLUS, Devine, 1863, Can. Nat. and Geo., vol. 8, p. 95. [Ety. proper name.] General form ovate; cephalic shield lunate; glabella convex, conical, two or three oblique furrows on each side; facial suture behind the eye curving outward, and cutting the posterior margin inside the angle and in front of the eye, curving ontward to the frontal margin; thorax broad, side lobes flat,



FIG. 1029.-Longanellus quebecensis.

> front of the eye. Type L. quebecensis. This is one of the forms often referred to Conocoryphe or to Ptychoparia, but the genus may be worth preserving.

- quebecensis, Devine, 1863, Can. Nat. and Geo., vol. 8, p. 95, Quebec Gr. or Up. Taconic.
- MEGALASPIS, Angelin, 1852, Palæontologia Scandinavica. [Ety. megale, great; aspis, shield.] Body subelliptical; cephalic shield obtusely pointed in front, genal angles spined; glabella convex,



commencing

at the ante-

rior apex of

the shield,

curving lat-

the eyes in

front and

making a sig-

and

con-

to

erally,

then

tracting

expanded anteriorly, no lateral fur-rows, eyes large and close, posterior; facial sutures



556

FIG. 1030.—Megalaspis belem-nura. Pygidium.

- moidal flexure, cut the posterior margin midway between the dorsal furrows and the genal spines; pygidium sub-triangular, outer margin bordered, and terminating in a spine. Type M. limbata.
 - belemnura, White, 1874, Rep. Invert. Foss., p. 11, and Geo. Sur. W. 100th Mer., vol. 4, p. 59, Quebec Gr. or Up. Taconic.



FIG. 1031.-Mesonacis vermontana.

MENOCEPHALUS, Owen, 1852, Geo. Sur. Wis., Iowa, and Minn., p. 577. [Ety. menos, strength; kephale, head.] Cephalic shield semicircular, with a narrow border all around; glabella highly convex, hemispherical or ovate, with a broadly rounded front, sometimes showing two inconspicuous lateral furrows

on each side; cheeks tumid; eyes distant from the middle of the glabella; facial suture cuts the front margin a little inside a line drawn lengthwise of the body and through the eye, and cuts the posterior margin a little outside this line; thoracic segments six or seven, axis convex, tapering a little narrower than the side lobes; pygidium semicircular, axis and side lobes divided by segmental furrows. Type M. minnesotensis

?globosus, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 301, and Pal. Foss., vol. 1, p. 408, Quebec Gr. or Up. Taconic.

minnesotensis, Owen, 1852, Geo. Sur. Wis., Iowa, and Minn., p. 577, Potsdam Gr.

(?) salteri, Devine, 1863.



MEN.-MES.

Can. Nat. and Geo., vol. 8, p. 210, and Pal. Foss., Menocephalus vol. 1, p. 203, Up. Tasalteri.

- conic. conte. ? sedgwicki, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 301, and Pal. Foss., vol.
- 1, p. 407, Quebec Gr. or Up. Taconic. MESONACIS, Walcott, 1885, Am. Jour. Sci. and Arts, 3d ser., vol. 29, p. 328. [Ety. mesos, middle; akis, point, spear.] Head and first fourteen segments like Elliptocephala, and the pygidium and ten posterior segments like Paradox-ides. Type M. vermontana.
- vermontana, Hall, 1859, (Olenus vermont-anus,) 12th Rep. N. Y. St. Mus. Nat. Hist., p. 60, Up. Taconic, Georgia Gr. MESOTHYRA, Hall, 1888, Pal. N. Y., vol. 7, p.
 - lvi. [Ety. mesos, middle; thuris, small door.] Carapace subquadrate; valves in contact at the apices of two broad, subtriangular extensions, situated on the dorsal line opposite the eye nodes, forming a broad and short anterior or rostral cleft, and a long posterior cleft; test broadly infolded on the lower surface, thickened and produced into a conspicuous and acute posterior spine; posterior margin incurved and produced into a short spine at the dorsal line; surface with a single strong carina on each valve; abdomen consisting of two somites, of which the posterior is the longer; post-abdomen with a broad caudal plate, which is produced into a relatively short telson; lateral spines long and setaceous. Type M. oceani.
 - elli, Woodward, 1870, (Dithyrocaris belli,) Geo. Mag., vol. 8, p. 106, Mid. belli, Devonian.
 - neptuni, Hall, 1863, (Dithyrocaris nep-tuni,) 16th Rep. N. Y. St. Mus. Nat.

 - Hist., p. 75, Ham. Gr. oceani, Hall, 1888, Pal. N. Y., vol. 7, p. 187, Portage Gr. spumæa, Hall, 1888, Pal. N. Y., vol. 7, p. 193, Ham. Gr.
 - veneris, Hall, 1888, Pal. N. Y., vol. 7, p 193, Ham. Gr.

MICRODISCUS, 116. [Et Subellipt cular; gla in front, without cheeks n trace of ticulation lobes w shorter t trigonal lobed, as ments, a quadrico connexus, and Arts

Taconic. dawsoni, H St. John lobatus, H Pal. N. Y

meeki, Fo Arts, 3d parkeri, W Sur. No.



FIG. 1033.-M discus qui costatus. M nified 5 diam

NILEUS, Dalr oder die Etv. m shield to lateral a bella sub no later all direc facial su with, an margin, to the a forming the post rected la within t angle of eyes ver many lei segment bate, axi pygidiu long, no ments, posterio madillo. affinis, B Foss., v Up. Tac

MIC.-OLE.]

MEN.-MES.

eks tumid; eyes disddle of the glabella; the front margin a drawn lengthwise of ugh the eye, and cuts rgin a little outside ic segments six or ex, tapering a little side lobes ; pygidium and side lobes divided ows. Type M. min-

1860, Can. Nat. and and Pal. Foss., vol. ir. or Up. Taconic.



)., vol. FIG. 1032. Menocephalus Foss., p. Tasalteri.

1860, Can. Nat. and , and Pal. Foss., vol. Fr. or Up. Taconic. 1885, Am. Jour. Sci. vol. 29, p. 328. [Ety. ikis, point, spear.] urteen segments like d the pygidium and ments like Paradoxrmontana.

59, (Olenus vermont-N. Y. St. Mus. Nat. aconic, Georgia Gr. , Pal. N. Y., vol. 7, p. niddle; thuris, small subquadrate; valves apices of two broad. ensions, situated on posite the eye nodes, nd short anterior or i long posterior cleft; ed on the lower surnd produced into a cute posterior spine; curved and produced at the dorsal line; gle strong carina on ien consisting of two the posterior is the men with a broad a is produced into a lson; lateral spines Type M. oceani.

1870, (Dithyrocaris vol. 8, p. 106, Mid.

, (Dithyrocaris nep-N. Y. St. Mus. Nat. Gr. al. N. Y., vol. 7, p.

Pal. N. Y., vol. 7, p.

Pal. N. Y., vol. 7, p

MIC.-OLE.]

CRUSTACEA.

- MICRODISCUS, Emmons, 1856, Am. Geol., p. 116. [Ety. mikros, small; diskos, quoit.] Subelliptical; cephalic shield semicircular; glabella narrow, convex, rounded in front, more or less pointed behind. without furrows or occipital groove; cheeks more or less convex, no eves or trace of sutures; thorax with four articulations, axis narrow, convex, lateral lobes wider, depressed; pygidium shorter than the cephalic shield, subtrigonal or rounded posteriorly, trilobed, axis divided into four or six seg ments, and having a border. Type M. quadricostatus.
- connexus, Walcott, 1887, Am. Jour. Sci. and Arts, 3d ser., vol. 34, p. 194, Up. Taconic.
- dawsoni, Hartt, 1868, Acad. Geo., p. 654. St. John Gr.
- lobatus, Hall, 1847, (Agnostus lobatus,) Pal. N. Y., vol. 1, p. 258, Up. Taconic.

meeki, Ford, 1876, Am. Jour. Sci. and

Arts, 3d ser., vol. 11, p. 371, Up. Taconic. parkeri, Walcott, 1886, Bull. U. S. Geo. Sur. No. 30, p. 157, Up. Taconic.

pulchellus, Hartt, 1885, Trans. Roy. Soc. Can., p. 74, St. John Gr.

Roy. Soc. Can., p. 75,



1856, Am. Geo., p. 116, Up. Taconic. F16. 1033.-Microspeciosus, Ford, 1873, discus quadri-costatus. Mag-nified 5 diam. Am. Jour. Sci. and

St. John Gr.

Arts, 3d ser., vol. 6, p. 137, Up. Taconic.

NILEYS, Dalman, 1826, Über die Palæaden oder die Sogenannten Trilobiten, p. 49. [Ety. mythological name.] Cephalic shield twice as wide as long, convex, lateral angles broadly rounded; glabella subquadrate, undefined anteriorly, no lateral furrows, convex, sloping in all directions from the central part; facial sutures in front, nearly parallel with, and almost reaching, the anterior margin, each forming a sigmoid flexure to the anterior part of the eye, then forming a semicircular eye-lobe from the posterior angle of the eye, and directed laterally to the posterior margin within the broadly rounded

angle of the cephalic shield; eyes very large, lunate, with many lenses; eight thoracic segments, indistinctly trilobate. axial lobe the broader; pygidium twice as wide as long, not trilobate, no segments, broadly rounded FIG. 1034. Nileus posteriorly. Type N. armadillo.

macrops. affinis, Billings, 1865, Pal. Foss., vol. 1, p. 275, Quebec Gr. or Up. Taconic.

macrops, Billings, 1865, Pal. Foss., vol. 1, p. 273, Quebec Gr. or Up. Taconic. scrutator, Billings, 1865, Pal. Foss., vol. 1, p. 274, Quebec Gr. or Up. Taconic.

Nothozoe, Barrande, Whitfield referred some ovate bodies found in the Potsdam sandstone, without characteristics, to this genus, under the name of Nothozoe vermontana. See Bull. Am. Mus. Nat. Hist., 1884, vol. 1, p. 144.

Nuttainia, syn. for Trinucleus.

- concentrica, see Trinucleus concentricus. sparsa, syn. for Homalonotus dekayi
- Odontocephalus, Conrad, 1840, Am. Geo. Rep. N. Y. Not properly defined.

selenurus, see Dalmanites selenurus. Odontochile, syn. for Dalmanites.

- OGYGIA, Brongniart, 1822, Hist. Nat. Crust. Foss., p. 28. [Ety. mythological name. Flat or slightly convex; cephalic shield semicircular; glabella wider in front, with three lateral furrows on each side; eyes large, lunate, affixed centrally near the glabella, facial suture marginal in front, curving like the letter S, and terminating posteriorly midway between the outer angle of the cephalic shield and thoracic axis; thorax with narrow axis, pointed pleuræ, grooved, obscure, and remote fulcrum; eight segments; pygidium many segments, sides with radiating furrows, the interstices of which are divided by half rays. Type O. guettardi.
- klotzi, Rominger, 1887, Proc. Acad. Nat. Sci. Phil., p. 12, Potsdam Gr. parabola, Hall & Whitfield, syn. for Ba-
- thyuriscus productus.
- problematica, Walcott, 1885, Monogr. U. S. Geo. Sur., vol. 8, p. 63, Potsdam Gr.
- serrata, Rominger, syn. for Olenoides nevadensis.
- producta, Hall & Whitfield, see Bathyuriscus productus.

spinosa, see Olenoides spinosus.

- vetusta see Asaphus vetustus.
- Olenellus, Hall, 1862, 15th Rep. N.Y. St. Mus. Nat. Hist., p. 86, syn. for Elliptocephala. asaphoides, see Elliptocephala asaphoides. gilberti, see Elliptocephala gilberti.
 - howelli, see Elliptocephala howelli.
 - iddingsi, see Elliptocephala iddingsi.
 - vermontanus, Hall, 1859, see Mesonacis vermontana.
- OLENOIDES, Meek, 1877, Geol. Expl. 40th Par., vol. 4, p. 25. [Ety. Olenus, and oides form.] Ovate, head large, semiexpanded in front; three pairs of fur-rows; eyes elongate; facial sutures extend obliquely outward from the anterior base of the eyes and cut the frontal margin; posteriorly they cut the margin at the pleural angle, and run subparallel to the margin to the posterior end of the eye; thorax with eight or more segments; axis strong, pleural groove broad, and lobes well defined; pygidium marked transversely on the

CRUSTACEA.

axis, and lateral segments directed backward. Type O. nevadensis.

558



FIG. 1035.—Olenoides typicalis."

fordi, Walcott, 1887, Am. Jour. Sci. and Arts, 3d ser., vol. 34, p. 195, Up. Taconic. lævis, Walcott, 1886, Bull. U. S.

- Geo. Sur., No. 30, p. 187, Up. Taconic.
- nevadensis, Meek, 1870, (Paradoxides nevadensis,) Proc. Acad. Nat. Sci. Phil., p. 62, 4-and Geol. Expl. 40th Par., vol. 4, p. 23, Up. Taconic. quadriceps, Hall & Whitfield,
- 1877, (Dicellocephalus quadriceps,) Geol. Expl. 40th Par.,
- vol. 4, p. 240, Up. Taconic. spinosus, Walcott, 1885, (Ogygia spinosa,) Mon. U. S. Geo. Sur., vol. 8, p. 63, Up.
- Taconic. stissingensis, Dwight, 1889, Am. Jour. Sci. and Arts, 3d ser., vol. 38, p. 147, Up. Taconic.
- typicalis, Walcott, 1886, Bull. U. S. Geo.
- Sur. No. 30, p. 183, Up. Taconic. wabsatchensis, Hall & Whitfield, 1877, Dicellocephalus wahsatchensis,) Geol. Expl. 40th Par., vol. 4, p. 241, Up. Taconic.
- Olenus, Dalman, 1826, Uber die Palæaden oder die sogenannten Trilobiten, p. 54. Not an American genus.

f logani, see Loganellus quebecensis.

thompsoni, see Elliptocephala thompsoni. undulostriatus, see Elliptocephala undulostriata.

vermontana, see Mesonacis vermontana.

OBYCTOCEPHALUS, Walcott, 1886, Bull. U. S. Geo. Sur. No. 30, p. 210. [Ety. oryktos, furrowed; kephale, head.] Glabella oblong, transversely lobed; eyes central, narrow, ocular ridges connecting them with the axial furrow about the glabella; facial suture marginal in front. and cutting the posterior margin within



the postero-lateral angles; free cheeks spinous; pygidium with segmented axis and pleural lobes; margin spinous. Type O. primus.

primus, Walcott, 1886, Bull. U. S. Geo. Sur. No. 30, p. 210, Up. Taconic. PALEOCARIS, Meek ĸ

Worthen,





shorter than the flagella; head about

as long as the

first two abdominal seg-

ments; tho-

racic legs long and 'slender,

anterior pair

not chelate;

telson long, tapering, and

horizontally

OLE.-PAL.

cient; karis, shrimp.] Pygidium. Inner and outer pairs of antennæ of nearly equal length'



FIG. 1088.-Palæocaris typus. 3 diam.

the former each bearing a well developed accessory appendage; peduncles of both pairs



FIG. 1039.—Palæocaris typus. Caudal part 4 diam.

flattened : stylets with first joint very small, second double, and also flattened horizontally. Type P. typus.

Nat. Sci. Phil., p. 49, and Geo. Sur. Ill., vol 2, p. 405, Coal Meas.

PAL. -PAR.]

PALEOCREUSI 7, p. 210. sia, a ge liform, s by a hor central a tubulifor shaped. devonica, (p. 210, U PALÆOPALÆM Sci. and [Ety. pale Shrimp-l rowed, 1 keeled o men, siz elongate son; seg not lob rounded dal flaps of five v apparent gular pla thoracic gated, si upper se compress short: a P. newb newberrvi.

and Arts. PARADOXIDES Crust. 1 marvelo shield | reflexed moderat three cu it into fe eves obl site the facial su

front of

to the e

FIG. 1040.-Pa bohemi

> Soc. Car acadicus, Soc. Car

OLE.-PAL.

lobed; eyes central, ges connecting them rrow about the glae marginal in front, sterior margin within



primus. Cephalic us ld.

angles; free cheeks m with segmented bes; margin spinous.



3 diam

earing a well developendage; peduncles of both pairs shorter than

the flagella; head about as long as the first two abdominal segments; thoracic legs long and slender, anterior pair not chelate; telson long, tapering, and horizontally

flattened : styt very small, second

attened horizontally. nen, 1865, Proc. Acad.

. 49, and Geo. Sur. Coal Meas.

PAL. -PAR.]

- PALEOCREUSIA, Clarke, 1888, Pal. N. Y., vol. 7, p. 210. [Ety. palaios, ancient; Creu-sia, a genus.] Capitulum ovate, patel-liform, surface conical; apex truncated by a horizontal plane, forming a large central aperture; surface striated; basis tubuliform, subcylindrical or cup-
- shaped. Type P. devonica. devonica, Clarke, 1888, Pal. N. Y., vol. 7, p. 210, Up. Held. Gr.
- PALEOPALEMON, Whitfield, 1880, Am. Jour. Sci. and Arts, 3d ser., vol. 19, p. 40. [Ety. palaios, ancient; palæmon, a genus.] Shrimp-like, thoracic carapace narrowed, but not rostrate in front and keeled on the back and sides; abdomen, six segments terminated by an elongated, triangular, and pointed tel-son; segments arched; pleuræ smooth, not lobed or expanded, extremities rounded; sixth segment bearing caudal flaps, one on each side, composed of five visible elements, the outer four "apparently anchylosed to form a triangular plate on each side of the telson; thoracic ambulatory appendages elongated, smooth and filiform, except the upper second joint, which is laterally compressed; abdominal appendages short; antennæ large and strong. Type

P. newberryi. newberryi, Whitfield, 1880, Am. Jour. Sci.

and Arts, 3d ser., vol. 19, p. 41, Erie shales. PARADOXIDES, Brongniart, 1822, Hist. Nat. Crust. Foss., p. 31. [Ety. paradoxos, marvelous, paradoxical.] Cephalic shield lunate, margin thickened, not reflexed; glabella clavate or oval, moderately convex, enlarged anteriorly, three curved furrows cross it, dividing it into four parts; fixed cheeks tumid; eyes oblong, lunate, distant and opposite the second division of the glabella; facial suture, cutting the margin in front of the eye and curving S-like to the eye, and curving in like manner

to the posterior margin directly behind the eye; movable cheek tumid and prolonged in a spine; thorax 16 to 20; segments, axis convex, narrower than the lateral lobes, lateral lobes flattened and turned backward ; pygidium circular or oval; axis segmented, short, lateral lobesflattened and projected back-ward. Type P. tessini.

abenacus, Mattan 1995 Trans. Roy. FIG. 1040.-Paradoxides bohemicus.

Soc. Can., p. 78, St. John Gr. acadicus, Matthew, 1883, Trans. Roy. Soc. Can., p. 103, St. John Gr.

- acadicus var. suricus, Matthew, 1885, Trans. Roy. Soc. Can., p. 77, St. John Gr.
- arcuatus, Harlan, 1835, Trans. Geo. Soc., syn. for Triarthrus becki.
- barberi, N. H. Winchell, 1885, 13th Ann. Rep. Geo. Sur. Minn., p. 67, Potsdam Gr. Not a Paradoxides.
- bennetti, Salter, 1859, Quar. Jour. Geo. Soc., vol. 15, p. 552, Up. Taconic.

boltoni, see Lichas boltoni.

CRUSTACEA.



FIG. 1041.-Paradoxides harlani.

decorus, Billings, 1874, Pal. Foss., vol. 2, p. 75, Up. Taconic.

eatoni, syn. for Triarthrus becki.

- etemnicus, Matthew, 1883, Trans. Roy. Soc. Can. pp. 92, 271, St. John Gr.
- etemnicus var. breviatus, Matthew, 1883, Trans. Roy. Soc. Can., p. 99, St. John Gr.
- etemnicus var. malicitus, Matthew, Trans. Roy. Soc. Can., p. 101, St. John Gr.
- etemnicus var. pontificalis, Matthew, 1883, Trans. Roy. Soc. Can., p. 102, St. John Gr.
- etemnicus var. quacoensis, Matthew, 1883, Trans. Roy. Soc. Can., p. 102, St. John Gr.
- etemnicus var. suricoides, Matthew, 1883, Trans. Roy. Soc. Can., p. 106, St. John Gr.
- harlani, Green, 1834, Am. Jour. Sci., vol. 25, p. 336, Up. Taconic. lamellatus, Hartt, 1868, Acad, Geol., p. 656, St. John Gr.
- lamellatus var. loricatus, Matthew, 1883, Trans. Roy. Soc. Can., p. 106, St. John Gr.
- micmae, Hartt, 1868, Acad. Geol., p. 657, and Trans. Roy. Soc. Can., vol. 2, p. 101, St. John Gr.

nevadensis, Meek, see Olenoides nevadensis.

560

quadrispinosus, Emmons, syn. for Bathynotus holopyga.

regina, Matthew, 1887, Am. Jour. Sci. and Arts, 3d ser., vol. 33, p. 389, and Trans. Roy. Soc. Canada, p. 115, St. John Gr.

tenellus, Billings, 1874, Pal. Foss., vol. 2, Up. Taconic.

thompsoni, see Elliptocephala thompsoni. triarthrus, Harlan, syn. for Triarthrus becki.

vermontana, see Mesonacis vermontana. Peltura, M. Edwards, 1840, Hist. Nat. Crust., t. 3, p. 344. Type P. scarabæoides.

holopyga, see Bathynotus, holopyga.

PEMPHIGASPIS, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 221. [Ety. pem-phix, pustule; aspis, shield.] Founded upon part of a shield somewhat re-thing the statement of the stateme sembling the pygidium of a trilobite; a narrow, straight, annulated axis extends to the margin posteriorly; side lobes wider, ovate and ventricose. Type P. bullata.

bullata, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 211, Potsdam Gr. PHACOPS, Emmrich, 1839, de Trilobites,

Dissertatio Inauguralis, p. 19. [Ety. phakos, lens; ops, eye.] Form compact, glabella inflated and expanded in front; the two front pairs of furrows are obscure; eyes large, numerous lenses; genal rounded; pleuræ rounded, pygidium moderate, of few (often coalesced) segments with an even border, never produced. Type P. latifrons. bufo, Green, 1832,

(Calymene

Ham. Gr.

Monograph of Trilo-

bites, p. 41, and Illust. Devon. Foss., pl. 8,

bombifrons, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p.

67, Up. Held. Gr.

cacapona, Hall, 1862, 15th Rep. N. Y. St.

bufo,)



FIG. 1042.—Phacops bufo.

Mus. Nat. Hist. p. 68, Up. Held. Gr.

callicephala, see Dalmanites callicephalus. cristata, Hall, 1862, 15th Rep. N. Y. St.

Mus. Nat. Hist., p. 67, Up. Held. Gr. ristata var. pipa, Hall, 1888, Pal. N. Y., vol. 7, p. 18, Up. Held. Gr. hudsonica, Hall, 1859, Pal. N. Y., vol. 3, p. 355, Low. Held. Gr.

laticaudus, see Dalmanites laticaudus. logani, Hall, 1859, Pal. N. Y., vol. 3, p. 353,

Low. Held. Gr.

nupera, Hall, 1843, (Calymene nupera,) Geo. Rep. 4th Dist. N. Y., p. 262, and Illust. Devon. Foss., pl. 8, Chemung Gr.

orestes, Billings, 1860, Can. Nat. and Geo., vol. 4, p. 65, Mid. Sil.

rana, Green, 1832, (Calymene bufo var. rana,) Monograph of Triløbites, p. 42. and Illust. Devon. Foss., pl. Ham. Gr.

PEL.-PHI.

- trajanus, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 124, Low. Held. Gr.
- trisulcata, Hall, 1843, (Calymene (?) trisulcata,) Geo. Rep. 4th Dist. N. Y., p. 74, and Pal. N. Y., vol. 2, p. 300, Clinton Gr.
- PHÆTHONIDES, Angelin, 1878, Paleonto-logia Scandinavica, p. 21. [Ety. phæ-thon, radiant.] Head shield resembling Cyphaspis, the frontal area more concave, and lateral glabellar furrows stronger and generally duplicate; thorax having seven or more narrow segments; axis wide; pygidium re-sembling Proetus, relatively large, 8 to 12 annulations on the axis, and 8 or 9 on the pleuræ; these extend to the margin, and are duplicate the entire length. Type P. stokesi. arenicolus, Hall, 1888, Pal. N. Y., vol. 7, p. 134, Up. Held. Gr. cyclurus, Hall, 1888, Pal. N. Y., vol. 7,

 - p. 137, Low. Held. Gr.
 - denticulatus, Meek, 1877, (Proetus den-ticulatus,) Geol. Expl. 40th Par., p. 49, Devonian.
 - gemmæus, Hall, 1888, Pal. N. Y., vol. 7, p. 136, Low. Held. Gr.
- varicella, Hall, 1888, Pal. N. Y., vol. 7, p. 135, Up. Held Gr. PHILLIPSIA, Portlock, 1843, Rep. Geol. Lon-

donderry, p. 305. [Ety. proper name.] Cephalic shield subsemicircular, angles terminating in spines glabella subcylindrical, not contracted at base, three furrows on each side; eyes large, reniform, reticulated; thorax of 9 segments having pleu-ral grooves and distinct facets; pygidium semioval, axis and lateral lobes furrowed,



Type P. gemmulifera. sia gemmulifera. auriculatus, Hall, 1862,

- (Proetus auriculatus,) 15th Rep. N.Y. St. Mus. Nat. Hist., p. 79, Waverly Gr. bufo, Meek & Worthen, 1870, Proc.
- Acad. Nat. Sci., p. 52, and Geo. Sur. Ill., vol. 5, p. 528, Keokuk Gr. cliftonensis, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 227, Coal Meas.
- coronata, Hall, syn. for Cyphaspis ornata.
- doris, Hall, 1860, (Proetus doris,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 112, Waverly Gr.
- howi, Billings, 1863, Can. Nat. and Geol., vol. 8, p. 209, Carboniferous.

insignis, Wi Sci., p. 24



Frg. 1044.-Phil lipsia lodien-

missouriens St. Louis Meas. ornata, Hall perannulata Louis Ac mian Gr. portlocki, M Acad. Na Ill., vol. 5 rockfordens Nat. Sci., sangamoner Proc. Ac Geo. Sur Meas. scitula, Me Acad. Na Ill., vol. 8 stevensoni, versity W swallovi, Sl lovi,) Ge verly Gr. tennesseens Tenn., p. tuberculata, Proc. Aca

ton Gr.

vindobonen p. 313, Ca Piliolites, Cozz

ohioensis, Co

manites.

boltoni, see I

trentonensis.

Plumulites, Ba devonicus, se

gracillimus, jamesi, see 1 newberryi, se

Prestwichia, V

Geo. Soc.

in Americ

Hist., 3d

primitia, 1 minute;

eriensis, see PRIMITIA, Jon

' Platynotus, sy

but prob

lævis, see C

PRI.-PRO.]

[PEL.-PHI.

Calymene bufo var. of Trilobites, p. 42, on. Foss., pl.

63, Proc. Port. Soc. 1, p. 124, Low.

(Calymene (?) trisul-h Dist. N. Y., p. 74, vol. 2, p. 300, Clin-

n, 1878, Palæonto, p. 21. [Ety. phæ-ad shield resembling ntal area more conglabellar furrows enerally duplicate; en or more narrow ide; pygidium rerelatively large, 8 to the axis, and 8 or 9 these extend to the luplicate the entire okesi. 8, Pal. N. Y., vol. 7,

łr. Pal. N. Y., vol. 7,

Gr. 1877, (Proetus den-

cpl. 40th Par., p. 49,

Pal. N. Y., vol. 7, Gr.

, Pal. N. Y., vol. 7,

343, Rep. Geol. Lon-[Ety. proper name.]



th. FIG. 1043.-Phillipsia gemmulifera. 62.

s,) 15th Rep. N. Y. p. 79, Waverly Gr. rthen, 1870, Proc. 52, and Geo. Sur. eokuk Gr.

I, 1858, Trans. St. rol. 1, p. 227, Coal

for Cyphaspis or-

'roetus doris,) 13th . Nat. Hist., p. 112,

Jan. Nat. and Geol., oniferous.

PRI.-PRO.]

insignis, Winchell, 1863, Proc. Acad. Nat. Sci., p. 24, Burlington Gr. lævis, see Cyphaspis lævis.

lodiensis, Meek, 1875, Ohio Pal., vol. 2, p. 323, Wa-verly Gr.

major, Shumard, 1858,

Trans. St. Louis Acad. Sci., vol. 1, p. 226, and Pal. E. Neb., p. 238, Coal Meas. meramecensis, Shumard,

1855, Geo. Rep. Mo., p. 199, Archimedes limestone or Keokuk Gr. minuscula, see Cyphaspis

lipsia lodien-818

FIG. 1044.-Phil-

minuscula. missouriensis, Shumard, 1858, Trans. St. St. Louis Acad. Sci., vol. 1, p. 225, Coal Meas.

ornata, Hall, see Cyphaspis ornata.

- perannulata, Shumard, 1858, Trans. St. Louis Acad. Sci., vol. 1, p. 296, Permian Gr.
- portlocki, Meek & Worthen, 1865, Proc. Acad. Nat. Sci., p. 268, and Geo. Sur. Ill., vol. 5, p. 525, Keokuk Gr. rockfordensis, Winchell, 1865, Proc. Acad.
- Nat. Sci., p. 133, Kinderhook Gr.
- sangamonensis, Meek & Worthen, 1865 Proc. Acad. Nat. Sci., p. 271, and Geo. Sur. Ill., vol. 5, p. 615, Coal Meas.
- sciula, Meek & Worthen, 1865, Proc. Acad. Nat. Sci., p. 270, and Geo. Sur. Ill., vol. 5, p. 612, Coal Meas. stevensoni, Meek, 1871, Reg. Rep. Uni-versity W. Va., Kaskaskia Gr.
- swallovi, Shumard, 1855, (Proetus swallovi,) Geo. Rep. Mo., p. 196, Waverly Gr.
- tennesseensis, Winchell, 1869, Geo. of Tenn., p. 445, Waverly Gr. tuberculata, Meek & Worthen, 1870,
- Proc. Acad. Nat. Sci., p. 52, Burlington Gr.
- vindobonensis, Hartt, 1868, Acad. Geol., p. 313, Carboniferous.
- Piliolites, Cozzens, 1848. Not identified. ohioensis, Cozzens, 1848. Not identified, but probably the fragment of a Dalmanites.
- Platynotus, syn for Lichas.
- boltoni, see Lichas boltoni.
- trentonensis, see Lichas trentonensis. Plumulites, Barrande, syn. for Turrilepas devonicus, see Turrilepas devonicus. gracillimus, see Turrilepas gracillimus.
- jamesi, see Lepidocoleus jamesi. newberryi, see Turrilepas newberryi.
- Prestwichia, Woodward, 1867, Quar. Jour, Geo. Soc. Lond., vol. 23. Not known in America.

eriensis, see Protolimulus eriensis.

PRIMITIA, Jones, 1865, Ann. and Mag. Nat. Hist., 3d ser., vol. 16, p. 415. [Ety. primitia, first of the kind.] Carapace minute; bivalve, equivalve, convex

- oblong; hinge straight; surface of each valve impressed, on the dorsal region either medially or toward the anterior extremity, with a vertical sulcus, variable in size. Type P. strangulata.
- acadica, Matthew, 1885, Trans. Roy. Soc. Can. p. 66, St. John Gr.
- æqualis, Jones & Hall, 1886, Ann. and Mag. Nat. Hist., 5th ser., vol. 17, p. 411, Low. Held. Gr.
- cincinnatiensis, S. A. Miller, 1875, (Beyrichia cincinnati-
- Ē ensis,) Cin. Quar. Jour. Sci., vol. 2, p. 350, Hud. FIG. 1045. Primitia
- Riv. Gr. cincinnaticoncinna, Jones, 1858, (Cytherensis. opsis concinna,) Ann. and
 - Mag. Nat. Hist., 3d ser., vol. 1, p. 249, Black Riv. Gr.
- cristata, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 59, Calciferous Gr.
- gregaria, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 58, Calciferous Gr.
- logani, Jones, 1858, (Beyrichia logani,) Ann. and Mag. Nat. Hist., 3d ser., vol. 1, p. 244, Chazy Gr.
- leperditioides, Jones, 1858, (Beyrichia logani var. leperditioides,) Can. Org. Rem., Decade 3, p. 91, Chazy Gr.
- mundula, Jones, 1855, Ann. and Mag. Nat. Hist., 2d ser., vol. 16, p. 90, Low. Devonian.
- muta, Jones, 1865, Ann. and Mag. Nat. Hist., 3d ser., vol. 16, p. 425, Up. Sil
- reniformis, Jones, 1858, (Beyrichia logani var. reniformis,) Can. Org. Rem., Decade 3, p. 91, Chazy Gr.
- rugulifera, Jones, 1858, (Beyrichia rugulifera,) Ann. and Mag. Nat. Hist., 3d ser., vol. 1, p. 242, Niagara Gr.
- scaphoides, Jones, 1889, Ann. and Mag. Nat. Hist., 6th ser., vol. 3, p. 377, Low. Devonian.
- seeleyi, Whitfield, 1889, Bull. Am. Mus. Nat. Hist., vol. 2, p. 60, Calciferous Gr.
- sigillata, Jones, 1858, (Beyrichia sigillata,) Ann. and Mag. Nat. Hist., 3d ser., vol. 1, p. 242, Niagara Gr.
- PROETUS, Steininger, 1830, Bemerkungen uber die Versteinerungen welche im Uebergangs-Gebirge der Eifel, p. 4. [Ety. mythological name.] Subelliptical; cephalic shield semicircular, margin thickened; glabella very convex, parabolic, rounded anteriorly, no lateral furrows; neck furrow well marked; eyes prominent, smooth, close to glabella; facial suture, on a line with the eyes in front, curves gently backward and reaches the posterior margin, within the genal angle; thoracic segments 10, convex, lateral lobes, with an oblique indentation; pygidium tri-

lobed, segmented, semicircular; axis very convex, short. Type P. cuvieri.

alaricus, Billings, 1860, Can. Nat. and Geo., vol. 5, p. 68, Hud. Riv. Gr.

angustifrons, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 70, Schoharie grit. auriculatus, see Phillipsia auriculatus. canaliculatus, Hall, 1862, 15th Rep. N. Y. St. Mus.

FIG. 1046.-Proetus alaricus.

Nat. Hist., p. 73, Up. Held. Gr. clarus, Hall, 1862, 15th Rep. N. Y. St.

Mus. Nat. Hist., p. 71, Up. Held. Gr. conradi, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 69, and Illust. Devon.

Foss., pl. 20, Schoharie grit. corycœus, Conrad, 1842, (Asaphus cory-cœus,) Jour. Acad. Nat. Sci., vol. 8, p. 277, and Pal. N. Y., vol. 2, p. 315, Niagara Gr.

crassimarginatus, Hall, 1843, (Calymene crassimarginata,) Geo. Rep. 4th Dist. N. Y., p. 172, and Illust. Devon. Foss., pl. 20, Up. Held. Gr.

curvimarginatus, Hall, 1888, Pal. N. Y., vol. 7, p. 94, Up. Held. Gr.

davenportensis, Barris, 1879, Proc. Dav. Acad. Sci., vol. 2, p. 287, syn. for P. prouti

delphinulus, Hall, 1888, Pal. N. Y., vol. 7, p. 111, Up. Held. Gr.

denticulatus, see Phæthonides denticulatus.

doris, see Phillipsia doris.

ellipticus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci, p. 267, and Geo. Sur. Ill., vol. 3, p. 460, Kinderhook Gr. folliceps, Hall, 1888, Pal. N. Y., vol. 7, p.

101, Up. Held. Gr.

granulatus, Wetherby, 1881, Jour. Cin. Soc. Nat. Hist., vol. 4, p. 81, Kaskaskia Gr.

haldemani, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 74, Ham. Gr. hesione, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 70, and Illust. Devon. Foss., pl. 20, Schoharie grit.

- jejunus, Hall, 1888, Pal. N. Y., vol. 7, p. 124, Ham. Gr.
- junius, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 122, Low. Held. Gr.
- latimarginatus, Hall, 1888, Pal. N. Y., vol. 7, p. 97, Up. Held. Gr. loganensis, Hall & Whitfield, 1877, U. S.
- Geo. Exp. 40th Par., vol. 4, p. 264, Waverly Gr.
- longicaudus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 108, and Illust.
- Devon Foss, pl. 20, Ham, Gr. macrobius, Billings, 1863, Proc. Port. Soc. Nat. Hist., vol. 1, p. 123, Low. Held. Gr.

- macrocephalus, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 77, Ham. Gr.
- marginalis, Conrad, 1839, (Calymene mar-ginalis,) Ann. Geo. Rep. N. Y., p. 66, and Illust. Devon. Foss., pl. 21, Tully limestone.
- microgemma, Hall, 1888, Pal. N. Y., vol. 7, p. 109, Up. Held. Gr.
- missouriensis, Shumard, 1855, Geo. Rep. Mo., p. 110, Waverly or Cho-Мо., teau Gr.
- nevadæ, Hall, 1888, Pal. N. Y., vol. 7, p. 129, Low. Devonian.
- occidens, Hall, 1862, 15th -Rep. N. Y. St.
- Mus. Nat. Hist., p. 80, Ham. Gr. ovifrons, Hall, 1888, Pal. N. Y., vol. 7, p. 110, Up. Held. Gr.
- parviusculus, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 120, and 24th Rep., p. 223, Hud. Riv. Gr.
- peroccidens, Hall & Whitfield, 1877, U.S. Geo. Expl. 40th Par., vol. 4, p. 262, Waverly Gr. phocion, Billings, 1874,
- Pal. Foss., vol. 2, p. 63, Gaspe limestone No. 8, Devonian.

planimarginatus, Meek, 1871, Proc. Acad. Nat.

Sci. Phil., p. 89, and Ohio Pal., vol. 1, p.

223, Up. Held. Gr.

protuberans, Hall, 1859, Pal. N. Y., vol. 3, p. 351, Low. Held.

- Gr. prouti, Shumard, 1863, Trans. St. Louis Acad. FIG. 1047.
- Proetus phocion. Sci., vol. 2, p. 110, Ham. Gr.
- Ham. Gr. rowii, Green, 1838, (Calymene rowii,) Am. Jour. Sci., vol. 33, p. 406, and Illust. Devon. Foss., pl. 21, Ham. Gr.
- spurlocki, Meek, 1872, Am. Jour. Sci., 3d ser., p. 426, and Ohio Pal., vol. 1, p. 161, Hud. Riv. Gr. The young of an Asaphus.
- stenopyge, Hall, 1888, Pal. N. Y., vol. 7, p. 110, Up. Held. Gr.
- stokesi, Murchison, 1839, (Asaphus stokesi,) Sil. Syst., p. 625, and Pal. N. Y., vol. 2, p. 316, Niagara Gr.

- swallovi, see Phillipsia swallovi.
- tumidus, Hall, 1888, Pal. N. Y., vol. 7, p. 113, Up. Held. Gr.
- verneuili, Hall, 1861, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 73, and Illust. Dev. Foss., pl. 20, Up. Held. Gr.
- PROTICHNITES, Owen, 1852, Jour. Geo. Soc., vol. 8, p. 214. [Ety. protos, first; ichnos, foot-print; *lithos*, stone.] It consists of two rows of tracks or depressions, several inches apart; each row consists of numerous irregular and subcircular depressions, sometimes elongated; between the rows there is frequently a groove, and at other times, the surface

has apparently Type P. septem



1048. - Protich-FIG nites septemnotatus.

nus, genus.] S

basis; compose the carina is lai rostrum small; side; radial are broad. Type P hamiltonensis, W vol. 7, p. 209, H PROTOCARIS, Walcot Sur., vol. 2, p. karis, shrimp.] dence of a dor the dorsal line, the sides; no jointed, 31 se

from beneath segment broad and terminatin p. marshi.

marshi, Walcott, Sur. vol. 2, p. 2 PROTOLIMULUS, Pacl

Acad. Sci., p. Limulus, a

large, subsemici duced; cephal terminal segme bers foliaceous six (?) segmen

caudal spine. eriensis, Willian

eriensis,) Am. ser., vol. 30, p. PROTOTYPUS, Walco Sur., No. 30, p.

typus, type.] B

562

PRO.]

PRO.]

PRO.]

PRO.]

FIG

tus.

15th Rep. Hist., p. 77,

alymene mar-N. Y., p. 66, pl. 21, Tully

l. N. Y., vol.

55, Geo. Rep. or Cho-

Y., vol. 7, p. ep. N. Y. St.

m. Gr. . Y., vol. 7, p. th Rep. N. Y.

20, and 24th ld, 1877, U.S. ol. 4, p. 262,



1047 - Proetus phocion.

mene rowii, p. 406, and 1, Ham. Gr. Jour. Sci., 3d vol. 1, p. 161, ng of an Asa-

N. Y., vol. 7,

9, (Asaphus and Pal. N.Y.,

ovi. . Y., vol. 7, p.

Rep. N. Y. St. d Illust. Dev. r. .

our. Geo. Soc.,] It consists r depressions, h row consists d subcircular elongated; befrequently a s, the surface

nites septemnota-

lineatus, Owen, 1852, Jour. Geo. Soc., vol. 8, pl. 13, Potsdam Gr. logananus, Marsh, 1869, Am. Jour. Sci. and Arts, 2d ser., vol. 48, Potsdam Gr.

has apparently been pressed smooth.

Gr.

Type P. septemnotatus.

multinotatus, Owen, 1852, Jour. Geo. Soc., vol. 8, pl. 12, Potsdam Gr. octonotatus, Owen,

alternans, Owen, 1852,

latus, Owen, 1852, Jour.

Jour. Geo. Soc., vol.

8, pl. 14, Potsdam

Geo. Soc., vol. 8, pl. 11, Potsdam Gr.

CRUSTACEA.

1852, Jour. Geo. Soc., vol. 8, pl. 10, Potsdam Gr. septemnotatus, Owen, 1852, Jour. Geo. Soc., vol. 8, pl. 9. Pots-

dam Gr. 1048. – Protich-s septemnota-PROTOBALANUS, Whit-field, 1888, Pal. N.Y. vol. 7, p. lxii. [Ety.

protos, first; Bala-nus, genus.] Shell ovate about the basis: composed of 12 plates of which the carina is largest and most elevated; rostrum small; lateralia five on each side; radial areas between the lateralia broad. Type P. hamiltonensis.

hamiltonensis, Whitfield, 1888, Pal. N. Y., vol. 7, p. 209, Ham. Gr.

PROTOCARIS, Walcott, 1884, Bul. U. S. Geo. Sur., vol. 2, p. 283. [Ety. protos, first; karis, shrimp.] Carapace without evidence of a dorsal suture, rounded on the dorsal line, and bent downward on the sides; no rostrum; body many jointed, 31 segments extending out from beneath the carapace, the last segment broader than the preceding, and terminating in two spines. Type p. marshi.

- p. marshi. marshi, Walcott, 1884, Bull. U. S. Geo. Sur. vol. 2, p. 283, Georgia Gr. PROTOLIMULUS, Packard, 1886, Mem. Nat. Acad. Sci., p. 150. [Ety. protos, first; *Limulus*, a genus.] Cephalothorax large, subsemicircular; genal angles pro-duced company. duced; cephalic appendages small; terminal segments of the posterior members foliaceous; abdomen composed of six (?) segments, including the large
- caudal spine. Type P. eriensis. eriensis, Williams, 1885, (Prestwichia eriensis,) Am. Jour. Sci. and Arts, 3d ser., vol. 30, p. 46, Chemung Gr.
- PROTOTYPUS, Walcott, 1886, Bull, U. S. Geo. Sur, No. 30, p. 211. [Ety. protos, first; typus, type.] Body ovate; head broad,

semicircular; glabella large, sides parallel, rounded in front, no furrows; frontal limb narrow, in front of the



FIG. 1049.-Protocaris marshi.

glabella and bordered; fixed cheeks crossed in front of the eyes by an ocular ridge; eyes large, reniform; occipital ring narrow; movable cheeks curved on the outer margin and terminating



FIG. 1050 .- Prototypus hitchcocki.

in spines; facial suture passing very little outward from the eye to the anterior margin, which it cuts at nearly right angles; behind the eye, it passes obliquely outward and backward, with

slight curvature, to just within the cheek spine; thorax, twelve segments, strongly trilobed; pleura straight, broadly channeled and pointed; pygidium small, semielliptical, and marked by three furrows on the small axis and

- lateral areas. Type P. hitchcocki. hitchcocki, Whitfield, 1884, (Angelina hitchcocki,) Bull. Am. Mus. Nat. Hist., vol. 1, p. 148, Up. Taconic.
- PTEROCEPHALIA, Roemer, 1849, Texas, mit naturwissench. Anhang. Bonn., and afterward in 1852, Kreid von Texas, p. 92. [Ety. pteron, wing; kephale, head.] Cephalic shield semicircular, nearly flat; glabella less than half the length of the head shield, with a flat, winglike projection in front; two or three furrows on each side; neck furrow distinct; facial sutures directed nearly straight back from the anterior margin to the eye, after passing which it is directed at an angle laterally of about forty-five degrees to the posterior margin; eyes situate nearly opposite the posterior lobe of the glabella; pygidium subcircular, margin flattened and produced; axial lobe narrow, about ten
- segments. Type P. sanctisabæ. laticeps, Hall & Whitfield, 1877, (Cono-

cephalites laticeps,) Geo. Expl. 40th Par, vol. 4, p. 221, Potsdam. Gr. occidens, Walcott, 1884, Mon. U. S. Geo. Sur., vol. 8, p. 58, Potsdam Gr. sanctisabæ, Roemer, 1849, Texas, mit

naturwissench. Anhang., and in 1852, Kreid von Texas, p. 92, Potsdam Gr. PTERYGOTUS, Agassiz, 1839, Murch. Sil. Syst.,

p. 605. [Ety. *pteron*, wing; *ous*, ear.] Distinguished from Eurypterus by having eyes marginal instead of within the



FIG. 1051.-Pterygotus problematicus.

carapace, twelve segments instead of thirteen in the body, a bilobate caudal extremity and chelate antennæ at the anterior part of the carapace. Type P. problematicus.

- acuticaudatus, Pohlman, 1882, Bull. Buf. Soc. Nat. Sci., vol. 4, p. 42, Waterlime Gr.
- buffaloensis, Pohlman, Bull. Bul. Soc. Nat. Hist., vol. 4, p. 17, Waterlime Gr. cobbi, Hall, 1859, Pal. N. Y., vol. 3, p. 417, Waterlime Gr.
- cummingsi, Grote & Pitt, 1875, Bull. Buf. Soc. Nat. Hist., vol. 4, p. 18, Waterlime Gr.
- globicaudatus, Pohlman, 1882, Bull. Buf. Soc. Nat. Hist., vol. 4, p. 42, Waterlime Gr.
- macrophthalmus, Hall, 1859, Pal. N. Y., vol. 3, p. 418, Waterlime Gr. osborni, Hall, 1859, Pal. N. Y., vol. 3, p.
- 419, Waterline Gr. quadraticaudatus, Pohlman, 1882, Bull. Buf. Soc. Nat. Hist., vol. 4, p. 43, Waterlime Gr.
- cheeks; glabella cylindrical, convex, transversely lobed, prominent in front; eyes anterior to the middle; facial suture cutting the anterior border almost in front of the eye, and from below the eye it proceeds obliquely to the base a little without the center of the cheek, leaving the movable cheek near the size of the fixed cheek; movable cheek subtrapezoidal, border thickened, and extended backward in a spine. Type P.
 - miniscensis. barabuensis, Winchell, 1864, Am. Jour. Sci. and Arts, 2d ser., vol. 37, p. 230, Potsdam Gr.
 - granulosa, Owen, 1852, (Dikelocephalus granulosus,) Geo. Wis., Iowa, and Minn., p. 575, Potsdam Gr.
- p. 5/5, Potsdam Gr. miniscensis, Owen, 1852, (Dikelocephalus miniscaensis,) Geo. Wis., Iowa, and Minn., p. 574, Potsdam Gr. minuta, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 55, and Geo. of Wis., vol. 4, p. 186, Potsdam Gr. pustulosa, Hall & Whitfield, 1877, U. S. Goo. Excl. 40th Par. vol. 4, p. 929
- Geo. Expl. 40th Par., vol. 4, p. 223, Potsdam Gr.

sesostris, Billings, 1865 (Dikelocephalus sesostris), Pal. Foss., vol. 1, p. 198, Quebec



Gr. or Up. Taconic. speciosa Walcott, 1879, 32d Rep. N. Y. St. Frg. 1052.-Ptychaspis Mus. Nat. Hist., p. sesostris. 131, Calciferous Gr.

striata, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 55, Potsdam Gr. Ртусноравиа, Corda, 1847, Prodrom. einer Monographie der bohmischen Trilobiten, p. 141. [Ety. ptyche, fold.] Ce-phalic shield semilunar; genal angle spined or pointed; glabella narrow an-teriorly, elevated; furrows four, distinct, directed forward; facial sutures widely separated, extending and converging

[PTE.—PTY.

forward from the the anterior m where a line w through each eye (Corda's figure n cut the margin la at right angles the glabella); th selves from the margin by makin cut the margin w eral angles; fixe ward at the sides thoracic segmen pleuræ pointed (medium size, six in the axis; surfa punctures or scal

P. striata. affinis, Walcott, 188

p. 54, Potsdam G anatina, Hall, 1863 tinus,) 16th Rep

Hist., p. 158, Pote (?) annectans, Wale Geo. Sur., vol. 8,

antiquatus, Salter, antiquatus,) Jour

554, Up. Taconic. arenosa, Billings, arenosus,) Pal. Fe

dam Gr. billingsi, Shumard,

billingsi,) Am. Jo 32, p. 220, Potsdar binodosa, Hall, 186

nodosa,) 16th Rej

Hist., p. 160, Pots breviceps, Walcott, Sur., vol. 8, p. 49, calciferus, Walcott,

calciferus,) 32d R

Hist., p. 129, Calc calymenoides, Whi Wis., vol. 4, p. 17

clavata, Walcott, 18 ser., vol. 34, p. 19 cordilleræ, Roming

lites cordilleræ.)

Phil., p. 12, Potsd depressa, Shumard, depressus,) Am. 219, Potsdam Gr.

dissimilis, Walcott, Sur., vol. 8, p. 5

pect Mountain Gr ryon, Hall, 1863, (C 16th Rep. N. Y. S

157, Potsdam Gr. explanata, Whitfiel lites explanatus,) p. 181, Potsdam G fitchi, Walcott, 1887

ser, vol. 34, p. 197 hartti, Walcott, 1 hartti,) 32d Rep. Hist., p. 130, Calci housensis, Walcott, Sur., No. 30, p. 20

[PTE.-PTY.

82, Bull. Buf. Waterlime Gr. ll. Buf. Soc. aterlime Gr. vol. 3, p. 417,

75, Bull. Buf.). 18, Water-

82, Bull. Buf. p. 42, Water-

), Pal. N. Y., łr. Y., vol. 3, p.

, 1882, Bull. p. 43, Water-

Rep. N. Y. St. [Ety. ptyche, phalic shield essed convex ical, convex, nent in front; : facial suture ler almost in om below the to the base a of the cheek, c near the size ple cheek subened, and ex-ine. Type P.

4, Am. Jour. ol. 37, p. 230,

ikelocephalus wa, and Minn.,

ikelocephalus ., Iowa, and r.

nn. Rep. Geo. . of Wis., vol.

d, 1877, U. S. ol. 4, p. 223,



052.-Ptychaspis sesostris.

in. Rep. Geo. Gr. Prodrom. einer ischen Trilo-

he, fold.] Cegenal angle lla narrow ans four, distinct, sutures widely id converging REM.]

P. striata.

p. 54, Potsdam Gr.

554, Up. Taconic.

32, p. 220, Potsdam Gr.

dam Gr.

forward from the eyes, so as to intersect the anterior margin within a point

where a line would cut it if drawn

through each eye parallel with the axis

(Corda's figure makes the facial sutures

cut the margin laterally, in a line drawn

at right angles to the anterior end of

the glabella); these lines extend them-

selves from the eyes to the posterior

margin by making a double curve, and

cut the margin within or near the lat-

eral angles; fixed cheek arched down-

ward at the sides; occipital ring spined; thoracic segments fourteen; ends of pleuræ pointed or rounded; pygidium

medium size, six or seven articulations

in the axis; surface of test with minute

punctures or scattered tubercles. Type

affinis, Walcott, 1884, Mon. U. S. Geo. Sur.,

anatina, Hall, 1863, (Conocephalites anatinus,) 16th Rep. N. Y. St. Mus. Nat.

Hist., p. 158, Potsdam Gr. (?) annectans, Walcott, 1884, Mon. U. S.

Geo. Sur., vol. 8, p. 91, Pogonip Gr. antiquatus, Salter, 1859, (Conocephalites

arenosa, Billings, 1861, (Conocephalites arenosus,) Pal. Foss., vol. 1, p. 15, Pots-

billingsi, Shumard, 1861, (Conocephalites

binodosa, Hall, 1863, (Conocephalites bi-

Hist., p. 160, Potsdam Gr. breviceps, Walcott, 1884, Mon. U. S. Geo.

calciferus, Walcott, 1879, (Conocephalites calciferus,) 32d Rep. N. Y. St. Mus. Nat.

calymenoides, Whitfield, 1877, Geo. Sur.

clavata, Walcott, 1877, Am. Jour. Sci., 3d ser., vol. 34, p. 198, Up. Taconic.

cordilleræ, Rominger, 1887, (Conocepha-

depressa, Shumard, 1861, (Conocephalites

dissimilis, Walcott, 1884, Mon. U. S. Geo.

pect Mountain Gr. eryon, Hall, 1863. (Conocephalites eryon,)

Sur., vol. 8, p. 51, Up. Taconic, Pros-

16th Rep. N. Y. St. Mus. Nat. Hist., p.

explanata, Whitfield, 1882, (Conocepha-

fitchi, Walcott, 1887, Am. Jour. Sci., 3d

Hist., p. 130, Calciferous Gr. housensis, Walcott, 1886, Bull. U. S. Geo.

ser., vol. 34, p. 197, Up. Taconic. artti, Walcott, 1879, (Conocephalites hartti,) 32d Rep. N. Y. St. Mus. Nat.

Sur., No. 30, p. 201, Up. Taconic.

lites explanatus,) Geo. Sur. Wis., vol. 4,

lites cordilleræ,) Proc. Acad. Nat. Sci.

depressus,) Am. Jour. Sci., vol. 32, p.

Wis., vol. 4, p. 179, Potsdam. Gr.

Sur., vol. 8, p. 49, Potsdam Gr.

Hist., p. 129, Calciferous Gr.

Phil., p. 12, Potsdam Gr.

219, Potsdam Gr.

157, Potsdam Gr.

hartti,

p. 181, Potsdam Gr.

nodosa,) 16th Rep. N. Y. St. Mus. Nat.

billingsi,) Am. Jour. Sci. and Arts, vol.

antiquatus,) Jour. Geo. Soc., vol. 15, p.

- læviceps, Walcott, 1884, Mon. U. S. Geo. Sur., p. 54, Potsdam Gr.
- (?) linnarsoni, Walcott, 1884, Mon. U. S. Geo. Sur. Terr., vol. 8, p. 47, Up. Taconic.
- minor, Shumard, 1863, (Conocephalites minor,) Trans. St. Louis Acad. Sci., vol. 2, p. 105, Potsdam Gr.
- minuta, Bradley, 1860, (Conocephalites minutus,) Am. Jour. Sci., 2d ser., vol. 30, p. 242, Potsdam Gr.
- nasuta, Hall, 1863, (Conocephalites nasu-tus,) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 155, Potsdam Gr.
- occidentalis, Walcott, 1884, Mon. U. S.
- Geo. Sur., vol. 8, p. 51, Potsdam Gr. oweni, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 155, Potsdam Gr. patersoni, Hall, 1863, (Conocephalites pat-ersoni,) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 159, Potsdam Gr.
- pernasuta, Walcott, 1884, Mon. U. S. Geo. Sur., vol. 8, p. 49, Potsdam Gr. perseus, Hall, 1863, (Conocephalites per-seus,) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 153, Potsdam Gr.
- piochensis, Walcott, 1886, Bull. U. S. Geo.
- piochensis, walcott, 1950, Bull. C. S. Geo. Sur., No. 30, p. 201, JUp. Taconic.
 (?) prospectensis, Walcott, 1884, Mon. U. S. Geo. Sur., vol. 8, p. 46, Up. Ta-conic-Prospect Mountain Gr.
 (?) quadrata, Whitfield, 1880, (Conoceph-alites quadratus,) Geo. Sur. Wis.,
- vol. 4, p. 180, Potsdam Gr. rogersi, Walcott, 1884, Bull. U. S. Geo. Sur., vol. 2, p. 283, Up. Taconic.
- shumardi, Hall, 1863, (Conocephalites shumardi,) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 154, Potsdam Gr.
- similis, Walcott, 1884, Monogr. U. S. Geo. Sur., vol. 8, p. 52, Potsdam Gr. similis var. robusta, Walcott, 1884, Mon.
- U. S. Geo. Sur., vol. 8, p. 53, Potsdam Gr.
- Hall & Whitfield, subcoronata. 1877 Conocephalites subcoronatus,) Geo.
- 40th Par., vol. 4, p. 237, Up. Taconic. ucer, Billings, 1861, (Conocephalites teucer, Billings, 1861, (Conocephalites teucer,) Geo. Vt., vol. 2, p. 951, Georgia Gr.

verrucosa, Whit-

field, 1884. (Conocephalites verrucosus,) Bull. Am. Mus.



- Nat. Hist., vol. 1, p. 139, Pots- Fig. 1058.-Ptychoparia zenkeri. zenkeri. dam Gr.
- winona, Hall, 1863, (Conocephalites wi-nona,) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 161, Potsdam Gr.
- zenkeri, Billings, 1860, (Conocephalites zenkeri, Can. Nat. and Geo., vol. 5, and Pal. Foss., vol. 1, p. 398, Up. Taconic.
- REMOPLEURIDES, Portlock, 1843, Rep. Geol. Lond., p. 254. [Ety. remus, oar; pleura, rib.] Cephalic shield subcircular or transversely subelliptical; glabella large, 37

海商

convex, Toval,





canadensis, FIG. 1054 - Remopleurides striatulus. a, b, Hypo-stoma.

1, p. 182, Chazy Gr. panderi, 1865, Pal. Foss., vol. 1, p. 293, Que-

bec Gr. schlotheimi, Billings, 1865, Pal. Foss., vol.

- 1, p. 294, Quebec Gr. striatulus, Walcott, 1875, Cin. Quar. Jour. Sci., vol. 2, p. 347, Trenton Gr.
- Rhabdichinites, Dawson, 1873, Am. Jour. Sci. and Arts, 3d ser., vol. 5, p. 20. A name proposed for certain markings on the rocks which are not the remains of organisms.
- RHACHURA, Scudder, 1878, Proc. Bost. Soc. Nat. Hist., vol. 19, p. 296. [Ety. rachis, ridge; oura, tail.] Type R. venosa.

venosa, Scudder, 1878, Proc. Bost. Soc. Nat. Hist., vol. 19, p. 296, Coal Meas.

RHINOCARIS, Clarke, 1888, Pal. N. Y., vol. 7, p. lviii. [Ety. rhine, file; karis, shrimp.] Cephalothorax univalvular, laterally appressed; outline as in Ceratiocaris; anterior extremity produced into a narrow, vertically flattened prora, continuous with substance of the carapace; axial line with a low ridge; abdomen composed of not less than four subcylindrical somites; post-abdomen bearing three spines, of which the telson is elongate and conical, and the cercopods

flattened. Type R. columbina. columbina, Clarke, 1888, Pal. N. Y., vol, 7, p. 195, Ham. Gr.

scaphoptera, Hall, 1888, Pal. N. Y., vol. 7, p. 197, Ham. Gr.

RIBEIRIA, Sharp, 1853, Jour. Geo. Soc., vol. 9, p. 157. [Ety. proper name.] Elongated, laterally compressed in the form of a Pholas; open at both ends and along the pedal margin, with a thick, transverse, internal plate near the anterior extremity, behind which is a cor-

rugated boss for the attachment of a muscle. Type R. pholadiformis. calcifera, Billings, 1865,

Pal. Foss., vol. 1, p. 340, Calciferous Gr. Whitfield, compressa.

1886, Bull. Am. Mus. Fig. 1055. – Ribei-Nat. Hist. vol. 1, ria calcifera Birdseye Gr.

longiuscula, Billings, Pal. Foss., vol. 1, p. 341, Calciferous Gr.

ventricosa, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 344, Birdseye Gr.



RUSICHNITES, Dawson 1861, Can. Nat. and Geo., vol. 1, p. 363. Ety. rusos, wrinkled; ichnos, track.] posed by the author to be the track of a Crustacean, like the Limulus, and consisting of two undulated,

FIG 1056-Rusichnites carbonarius.

- rounded, contiguous furrows: but the type resembles a fucoid quite as much, if not more, than it does a track, and if related to Rusophycus, which is clearly a fucoid, then it should be referred to the vegetable kingdom. Type R. acadicus.
- acadicus, Dawson, 1861, Can. Nat. and Geo., vol. 1, p. 363, and Acad. Geol., p. 410, Coal Meas.
- carbonarius, Dawson, 1868, Acad. Geol., p. 257, Carboniferous. 7 Salteria, Walcott, 1884. The name was
 - preoccupied, and is a synonym for Bailiella.
- Sao, Barrande, 1846, and Syst. Sil. Boh., vol. 2. Type Sao hirsuta, a primordial form unknown in America.
 - lamottensis, Whitfield, 1886, Bull. Am. Mus. Nat. Hist., vol. 1, p. 334, Birdseye Gr.
- SCHIZODISCUS, Clarke, 1888, Pal. N. Y., vol. 7, p. 62. [Ety. schiza, cleft; diskos, quoit.] Carapace valves separable along the hinge; outline circular or ovate, narrow posteriorly; surface convex or depressed, elevated at the beaks, which are prominent, slightly incurved, and situated anteriorly, hinge-line equaling in length the greatest diameter of the carapace; edge parallel, not gaping, surface concentrically wrinkled. Type S. capsa.
- capsa, Clarke, 1888, Pal. N. Y., vol. 7, p. 207, Ham. Gr.

SHUMARDIA, Billings, 1862, Pal. Foss., vol. 1, p. 92. [Ety. Cephalic proper name.] shield semicircular; glabella convex, subcylindrical, no eyes, pygidium FIG. 1057 semielliptical, axis cylin-Shumardia dro-conical, ribbed, side granulosa. lobes ribbed, distinguished

from Agnostus by the ribs on the pygidium. Type S. granulosa.



lated or tubercu circular; glabel distinct, dorsal tinuous; fixed o middle, front 1 ring bearing a pointed; thorac

ends of pleuræ b ium medium size S. canaliculata.

acadica, Whiteaves Can., p. 157, St. . acadica var. elon Trans. Roy. Sc

John Gr. communis, Billing

2, p. 72, Up. Tac formosa, Hartt, formosus,) Aca John Gr.

halli, Hartt, 1868, Acad. Geol., p. 6 nana, Ford, 1878, A

Jour. Sci. and Ar

3d ser., vol. 15, 126, Up. Taconic. orestes, Hartt, 18 (Conocephalit orestes,) Aca

Geol., p. 649, 1 John Gr. robbi, Hartt, 186

(Conocephalit robbi,) Acad. Geo p. 648, St. John thyrsites, Hartt, thyrsites,) Acad John Gr.

SOL -SPH.]

glacialis, Billings. p. 283, Up. Taco granulosa, Billings p. 92, Quebec G

SoleNocaris, Meek, Sci. Phil., p. 35 of shells; kari end subtruncate but not sinuous. lar tubercle of tions of having along the dorsal gata. This nam

another crustace

in Proc. Nat.

FIG. 1058.—Solenocaris

Cast of interior of lef

strigata, Meek, 187

SOLENOPLEURA, Ang

Ill., vol. 8, p. 15

Phil., p. 335, ar 321, Waverly Gi

p. 171.

Sup-

RHA.-SHU.

566

eves large,

bent down over the

semilunar, reaching

the neck segment;

rostral suture marked;

free cheeks, small,

narrow, subtriangular,

and produced poste-riorly in spines; tho-*

rax with ten segments,

axial lobe very wide,

and gradually taper-

ing posteriorly; side

lobes narrow, pleuræ

short, falcate, directed

backward; pygidium small and terminating

in two short spines.

1865, Pal. Foss., vol.

1865,

Billings.

Billings.

Type R. colbi. affinis, Billings, 1865, Pal. Foss., vol. 1, p.

325, Quebec Gr.

front;

[RHA.—SHU.

achment of a ormis.



1055. - Ribei-'ia calcifera

oss., vol. 1, p.

sull. Am. Mus. Birdseve Gr. Dawson

n. Nat. and pl. 1, p. 363. os, wrinkled: track.] Supv the author he track of a an, like the , and consistvo undulated, rows; but the juite as much, a track, and if hich is clearly be referred to Type R. n.

Can. Nat. and Acad. Geol., p.

, Acad. Geol.,

ne name was synonym for

. Sil. Boh., vol. rimordial form

886, Bull. Am. p. 334, Birds-

Pal. N. Y., vol. cleft; diskos, separable along ular or ovate, face convex or ie beaks, which incurved, and re-line equaling liameter of the l, not gaping, rinkled. Type

N. Y., vol. 7, p.



e ribs on the anulosa.

SOL.-SPH.]

glacialis, Billings, 1865, Pal. Foss., vol. 1, p. 283, Up. Taconic.

granulosa, Billings, 1862, Pal. Foss., vol. 1, p. 92, Quebec Gr. or Up. Taconic.

SOLENOCARIS, Meek, 1872, Proc. Acad. Nat. Sci. Phil., p. 355. [Ety. solen, a genus of shells; karis, shrimp.] Posterior end subtruncated backward from below, but not sinuous, as in Colpocaris; ocular tubercle obsolete, and no indications of having its valves anchylosed along the dorsal margin. Type S. stri-gata. This name was preoccupied for another crustacean by Young, in 1868, in Proc. Nat. Hist. Glasgow, vol. 1, p. 171.



Worthen, 1884, Bull. No. 2, Ill. St. Mus. Nat. Hist. p. 3, and Geo. Sur.

FIG. 1058.-Solenocaris strigata. Cast of interior of left valve.

Ill., vol. 8, p. 153, St. Louis Gr. strigata, Meek, 1872, Proc. Acad. Nat. Sci. Phil., p. 335, and Ohio Pal., vol. 2, p. 321, Waverly Gr.

SOLENOPLEURA, Angelin, 1852, Palæonto-logia Suecica, p. 26. [Ety. selene, moon; pleuron, side.] Body ovate, test granulated or tuberculous; head wide, semicircular; glabella prominent, furrows distinct, dorsal furrows deep and continuous; fixed cheeks, elevated in the middle, front limb convex; occipital ring bearing a tubercle; genal angle pointed; thoracic segments fourteen; ends of pleuræ bluntly rounded; pygidium medium size, few segments. Type S. canaliculata.

acadica, Whiteaves, 1887, Trans. Roy. Soc. Can., p. 157, St. John Gr.

acadica var. elongata, Matthew, 1887, Trans. Roy. Soc. Can., p. 159, St. John Gr.

communis, Billings, 1874, Pal. Foss., vol. 2, p. 72, Up. Taconic. formosa, Hartt, 1868, (Conocephalites

(Conocephalites formosus,) Acad. Geol., p. 654, St. John Gr.

halli, Hartt, 1868, (Conocephalites halli,) Acad. Geol., p. 654, St. John Gr. nana, Ford, 1878, Am.

Jour. Sci. and Arts,

3d ser., vol. 15, p. 126, Up. Taconic. orestes, Hartt, 1868, (Conocephalites orestes,) Acad. Geol., p. 649, St. John Gr.

robbi, Hartt, 1868,

Conoce phalites FIG. 1059.-Solenopleurobbi,) Acad. Geol., ra nana. Magnified. p. 648, St. John Gr.

thyrsites, Hartt, 1868, (Conocephalites thyrsites,) Acad. Geol., p. 653, St. John Gr.

tumida, Walcott, 1887, Am. Jour. Sci. and Arts, 3d ser., vol. 34, p. 196, Up. Taconic.

- SPATHIOCARIS, Clarke, 1882, Am. Jour. Sci. and Arts, 3d ser., vol. 23, p. 477. [Ety. spathe, spathe; karis, shrimp.] Carapace in one piece, oblong elliptical, convex, apical point near the focus of the ellipse, from which point a cleft extends backward, widening to the margin. Type S. emersoni.
 - emersoni, Clarke, 1882, Am. Jour. Sci. and Arts, 3d. ser., vol. 23, p. 478, Portage Gr.
 - lutheri, Clarke, 1882, (Lisgocaris lutheri,) Am. Jour. Sci. and Arts, 3d ser., vol. 23, p. 478, Ham. Gr.
- SPHÆREXOCHUS, Beyrich, 1845, Euber einige Bohm. Tril., p. 21. [Ety. sphaira, ball; exochos, prominent.] Cephalic shield very convex, almost globular; cheeks not scrobiculate; glabella nearly spherical. three furrows on each side, two upper obscure, lower strong and curved down to the neck furrow; eyes faceted minutely; facial suture ending on the external margin near the angles, in front continuous and submarginal; thorax 11 joints; pygidium 3 segments, free at their ends; labrum subtrigonal, with a marginal furrow; no rostral shield. Type S. mirus.

canadensis, Billings, 1866, Catal. Sil. Foss. Antic., p. 64, Anticosti Gr. mirus, not American.



parvus. Upper a view of glabella.

parvus, Billings, 1865, Pal. Foss., vol. 1, p. 180, Chazy or Black Riv. Gr. romingeri, Hall,

Upper and side 1867, 20th Rep. N. Y. St. Mus.

Nat. Hist., p. 425, Niagara Gr. SphærocoryPhe, Angelin, 1852, Palæontologia Scandinavica. [Ety. sphaira, ball; koryphe, top of the head.] Cephalic shield convex, genal angles spined; glabella spheroidal an-

teriorly, two lateral furrows; eyes prominent; facial sutures cut the lateral margins posteriorly; thorax with ten segments, axial lobe narrower than lateral lobes; pleuræ terminate in short spines; pygidium composed of three segments, anterior one produced in two spines. Type S. granulata.

robusta, Walcott, 1875, Cin. Quar. Jour. Sci., Fig.1061.-Sphæro-

vol. 2, p. 273, Trenton coryphe robusta. Gr.

salteri, Billings, 1866, Catal. Sil. Foss. Antic., p. 63, Anticosti Gr.







STROBILEPIS, Clarke, 1888, Pal. N. Y., vol. 7, p. 63. [Ety. strobilos, cone-shaped; p. 63. [Ety. strobilos, cone-shaped; lepis, scale.] Capitulum composed of four vertical ranges of plates having in general a trihedral form. but varying in size and contour; each plate articulated with or overlapping the next preceding; anterior extremity terminated by a large, circular, conical plate; plates thick and ornamented. Type S. spinigera.

spinigera, Clarke, 1888, Pal. N. Y., vol.7, p. 212, Ham. Gr.

STYLONURUS, Page, 1856, Geological Text Book, p. 190. [Ety. styles, a mast or spar; oura, tail.] General form like Eurypterus, but distinguished by the peculiar development of the two posterior foot pairs; these are alike, long, thin, and consist of 9 segments, of which the two last form a small claw; the posterior pair reach to the middle of the long posterior spine. Type S. powriei.

- powriei.
 excelsior, Hall, 1884, 36th Rep. N. Y. St. Mus. Nat. Hist., p. 77, Catskill Gr.
 SYMPHYSURUS, Goldfuss, 1843, Neues Jahrb.f. Mineral. [Ety. symphysis, growing together; oura, tail.] Elliptical; genal angles rounded; cephalic shield semicircular, convex; glabella convex, subquadrate, smooth, no lateral furrows; eyes lunate; facial sutures arching in front of the glabella, and cutting the posterior part of the cephalic shield near the genal angles; 8 thoracic segments; pygidium somewhat semicircular, no segments, border flattened. Type S. læviceps. goldfussi (?), Walcott, 1885, Monogr. U. S.
- Geo. Sur., vol. 8, p. 95, Trenton Gr. This species is founded on a glabella with fixed cheeks, and probably it does not belong to this genus. TELEPHUS, Barrande, 1852, Syst. Sil. Boh.
- [Etv. mythological name.] Glabella strongly convex, margined by deeply impressed bow-shaped furrows; neck segment tumid; cheeks subtriangular, or subreescentiform, small posteriorly, wider in front; pygidium small, strongly convex, hemispherical, margin tumid, axis with three segments. Type T. fractus. Only recognized in America by fragments of glabella. americanus, Billings, 1865, Pal. Foss., vol.

h p. 291, Quebec Gr. TERATASPIS, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 223. [Ety. teras, marvel; aspis, shield.] Distinguished from Acidaspis, which it resembles by the prominent ellipsoidal frontal lobe of the glabella, not posterior spines of the lateral lobes and nodes of the occipital ring, and from Lichas by the spines of

the pygidium being themselves bearers of lateral spines. Type T. grandis. grandis, Hall, 1862, 15th Rep. N. Y. St. Mus. Nat. Hist., p. 82, and Illust. Devon.

Foss., pl. 17, (Lichas grandis,) Schoharie grit.

STR.-TRI.

eriopis, Hall, 1863, (Lichas eriopis,) 16th Rep. N. Y. St. Mus. Nat. Hist., p. 226, and Illust. Devon. Foss., pl. 19, Up. Held. Gr.

Thaleops, Conrad, syn. for Illaenus.

- ovata, see Illaenus ovatus.
- TRIRATHRELLA, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 177. [Ety. diminu-tive of Triarthrus.] Glabella elongate, semioval, with the fixed cheeks wide and spreading in the posterior limb, and very narrow in front, an obscure indentation at the margin; general expression like Triarthrus. Type T. auroralis
 - auroralis, Hall, 1863, 16th Rep. N. Y. St. Mus. Nat. Hist., p. 177, Potsdam Gr.
- TRIRMHRUS, Green, 1832, Monograph of Trilobites, p. 87. [Ety. triarthrus, three-Trilobites, p. 87. [Ety. triarthrus, three-jointed.] Subelliptical; cephalic shield somewhat semicircular or sublunate; glabella moderately convex, sides straight, rounded in front, deeply trilobate on each side by the lateral furrows, with a prominent occipital groove near the base, and occipital ring, from the center of which a spine sometimes arises; eyes small and placed on the anterio-lateral margin; free checks forming a narrow rim; thorax with from 13 to 16 articulations; central axis convex, wider than the lateral lobes; pygidium with 5 to 7 segments in the axis and one or two less in the

In the axis and one or two le lateral lobes. Type T. becki. becki, Green, 1832, Mono-graph of Trilobites, p. 87, and Pal. N. Y., vol. 1, p. 237, Utica Slate Gr. canadencia Smith. 1991 canadensis, Smith, 1861,

Can. Jour., vol. 6, p. 275, Utica Slate Gr.

- fischeri, see Atops fischeri. glaber, Billings, 1859, Can. Nat. and Geol., vol. 4, p.
- 382, and Can. Geol., p. 202, Utica Slate Gr. spinosus, Billings, 1857, Rep.
- of Progr. Geo. Sur. Can., FIG. 1062.-Tri
 - p. 340, and Can. Geol., p. arthrus becki. 202. Útica Slate Gr.
- Trimerus, syn. for Homalonotus. delphinocephalus, see Homalonotus delphinocephalus.

jacksoni, see Homalonotus jacksoni.

TRINUCLEUS, Lhwyd, (or, as he spelt it, Llhwydd,) 1698, Phil. Trans., vol. 20, p. 279. [Ety. trinucleus, three-kerneled.] Cephalic shield highly convex, a wide border impressed with several rows of deep puncta and posterior angles, terminating in spines; glabella pyriform, pointed behind, no lateral furrows; cheeks convex; no eyes or facial su-tures; neck furrow distinct; thorax with six articulations, axis narrow, TRO.-ZAC.]

convex; side lo pleural groove n pygidium subt flected, axis con side lobes flat, number of furr tricus.



FIG. 1063.—Trinucleus concentricus.

TROPIDOCARIS, Beech vol. PPP, p. 15 karis, a shrimi semiovate or se truncated behir as long as wide longitudinal ric indicated by ele end; optic noc two segments o T. bicarinata.

T. Dicarinata. alternata, Beeche vol. PPP, p. 19, bicarinata, Beech vol. PPP, p. 16, interrupta, Beech vol. PPP, p. 18,

many offensive par four pairs of legs a tennæ. The Palæc marti, but a few a Pedipalpi have ari lated abdomen, and a forbidding aspect terminated by a pa a sharp claw; and threatening manne when the animal st scorpions are inhal as follows: Body separable; cephalo

THE animals,

[STR.-TRI.

indis,) Schoeriopis,) 16th Hist., p. 226, pl. 19, Up.

nus.

Rep. N. Y. St. Ety. diminuella elongate, cheeks wide osterior limb. , an obscure ; general ex-Type T. auro-

Rep. N. Y. 177, Pots-

fonograph of arthrus, threeephalic shield r sublunate; nvex, sides , deeply triloe lateral furccipital groove tal ring, from ne sometimes placed on the free cheeks thorax with tions; central n the lateral to 7 segments wo less in the ecki.



• FIG. 1062.-Tri-. arthrus becki

otus. lonotus delphi-

jacksoni. as he spelt it, rans., vol. 20, p. hree-kerneled. convex, a wide several rows of rior angles, terabella pyriform, ateral furrows; es or facial suistinct; thorax , axis narrow, TRO.-ZAC.]

pleural groove not reaching the margin; pygidium subtriangular, margin deflected, axis conical, about six furrows; side lobes flat, with about the same number of furrows. Type T. concentricus.

bellulus, Ulrich, 1878, Jour. Cin. Soc. Nat. Hist., vol. 1, p. 99. The young of T. concentricus.

concentricus, Eaton, 1832, FIG. 1063.-Trinucleus concentri-

cus.

Nuttainia concentrica,) Geo. Text-Book, p. 128, and Pal. N. Y., vol. 1, p. 249, Trenton to Hud. Riv. Gr.

TROPIDOCARIS, Beecher, 1884, Geo. Sur. Pa.,

- vol. PPP, p. 15. [Ety. tropis, a keel; Carapace bivalve, karis, a shrimp.] semiovate or semielliptical, obliquely truncated behind; valves about twice as long as wide, having one or more longitudinal ridges; cephalic region indicated by elevations at the anterior end; optic node situate on a ridge; two segments of the abdomen. Type T. bicarinata.
- alternata, Beecher, 1884, Geo. Sur. Pa., vol. PPP, p. 19, Waverly Gr. bicarinata, Beecher, 1884, Geo. Sur. Pa., vol. PPP, p. 16, Chemung Gr. interrupta, Beecher, 1884, Geo. Sur. Pa.,
- vol. PPP, p. 18, Chemung Gr.

- convex; side lobes wide, flat, straight, | TURRILEPAS, Woodward, 1865, Quar. Jour. Geol. Soc., vol. 21, p. 486. [Ety. turris, tower; lepas, scale.] Elongate, cone-shaped bodies, composed of from 4 to 6 vertical ranges of scale-like, subtriangular plates covered with elevated concentric lines; plates of middle range convex and bearing a median carina. Type T. wrightana.
 - cancellatus, Hall, 1888, Pal. N. Y., vol. 7, p. 216, Up. Held. Gr.
 - devonicus, Clarke, 1882, (Plumulites de-vonicus,) Am. Jour. Sci., 3d ser., vol.
 - 24, p. 55, Ham. Gr. flexuosus, Hall, 1888, Pal. N. Y., vol. 7, p. 215, Up. Held. Gr.
 - foliatus, Hall, 1888, Pal. N. Y., vol. 7, p. 218, Ham. Gr.
 - gracillimus, Ringueberg, 1888, (Plumulites gracillimus,) Proc. Acad. Nat. Sci.
 - Phil., p. 136, Niagara Gr. newberryi, Whitfield, 1882, (Plumulites newberryi,) Ann. N. Y. Acad. Sci., vol. 2, p. 217, Portage Gr.
 - nitidulus, Hall, 1888, Pal. N. Y., vol. 7, p. 218, Ham. Gr.
 - squama, Hall, 1888, Pal. N. Y., vol. 7, p. 217, Ham. Gr.
 - tener, Hall, 1888, Pal. N. Y., vol. 7, p. 219, Ham. Gr.
 - ZACANTHOIDES, Walcott, 1888, Am. Jour. Sci., 3d ser., vol. 36, p. 165. Proposed to receive Olenoides lævis, O. spinosus, O. flagricaudatus, and O. typicalis, but not defined.

CLASS ARACHNIDA.

THE animals, forming the class Arachnida, include the spiders, scorpions, and many offensive parasites and microscopic forms. They are generally possessed of four pairs of legs attached to the anterior division of the body, but have no antennæ. The Palæozic fossils are nearly all referred to an extinct order, Anthracomarti, but a few are referred to the living orders, Pedipalpi and Scorpiones. The Pedipalpi have arm-like prehensile organs, terminating in a movable claw, annulated abdomen, and long flexible limbs. They inhabit tropical countries, and have a forbidding aspect. The Scorpiones have large palpi or arm-like prehensile organs, terminated by a pair of nippers, and an elongated, tail-like abdomen, which ends in a sharp claw; and when the animal is in motion, this is carried over the back in a threatening manner. The poison glands are situated at the base of the claw, and when the animal stings, a portion of the venom is thrown into the wound. The scorpions are inhabitants of tropical countries. The Order Anthracomarti is defined as follows: Body more or less depressed; cephalothorax and abdomen distinctly separable; cephalothorax frequently made up in large part of pedigerous segments,

ARACHNIDA.

ANT.- 105

GER.-PRO.]

carbonarius, Meek Jour. Sci. and A 24, and Geo. S Coal Meas.

FIG. 1066.-Eoscorpius a, body segment en enlarged; m, mandi

GERALINURA, Scud Acad. Arts and old; linon, linen thorax ovate, t third as broad a large and robus first two pairs hinder stout composed of nin rather short, th longer. Type S carbonaria, Scud Acad. Arts and GERAPHRYNUS, Scud Acad. Arts and old; Phrynus, a fusiform, angul large as the abd from a mediar than the legs, le thorax, springin and of uniform domen subfusif segments, roun constriction at angular post-th the middle of ments out of a

more or less wedge-shaped, and visible above as well as below, the arrangement of which corresponds to that of the coxæ. The abdomen forms a single mass, and is composed of a variable number of visible segments, ranging from four to nine. Palpi not much longer than the legs, simply terminated.

ORDER ANTHRACOMARTI.

FAMILY ARCHITARBIDÆ.—Anthracomartus, Architarbus, Geraphrynus. FAMILY ARTHROLYCOSIDÆ. — Arthrolycosa. FAMILY POLIOCHERIDÆ.—Poliochera.

ORDER PEDIPALPI.

FAMILY GERALINURIDÆ.—Geralinura.

ORDER SCORPIONES.

FAMILY EOSCORPIONIDÆ. — Eoscorpius, Mazonia.

ANTHRACOMARTUS, Karsch, 1882, Zeitschr. ARTHROLYCOSA, Harger, 1874, Am. Jour. deutsch. geol. Gesellsch., p. 556. [Ety.] Sci. and Arts, 3d ser., vol. 7, p. 219. anthrax, coal; Martos, proper name.] Cephalothorax quadrate, the front square or scarcely convex, about half the size of the abdomen; coxæ radiating from a broad triangular sternal plate, the base of which forms the posterior margin; sides of body constricted so as to show a distinct though slight separation of cephalothorax and abdomen; abdomen orbicular, composed of seven segments of similar length throughout. Type A. volkelianus.

pustulatus, Scudder, 1884, Proc. Am. Acad. Arts and Sci., p. 13, Low. Coal Meas.

trilobitus, Scudder, 1884, Proc. Am. Acad. Arts and Sci., p. 13, Coal Meas.

ARCHITARBUS, Scudder, 1868, Geo. Sur. Ill., vol. 3, p. 568. [Ety. archaios, ancient; tarbos, object of alarm.] Cephalothorax orbicular, broadly rounded in front,



1064.—Ar-FIG chitarbus rotundatus

much smaller than the abdomen, but not separated from it by a marked lateral constriction ; coxæ radiating from a central pit; abdomen oval, composed of nine segments, of which those on the basal half are very much shorter than the others, and on the dorsal surface are forced still more closely together by the large post-thoracic plate; no abdominal appendages. Type A. rotundatus.

rotundatus, Scudder, 1868, Geo. Sur. Ill., vol. 3, p. 568, Coal. Meas.

[Ety. arthron, a joint lykos, a spider.] Cephalothorax orbicular, twice as large as the abdomen; Coxæ radiating from a central pit; abdomen oval much narrower at the base than the cephalo-



- thorax, with no lon-gitudinal sculptur- Fig. 1065.—Arthr cosa antiqua ing, and composed of seven segments; no abdominal ap-
- pendages. Type A. antiqua.
- antiqua, Harger, 1874, Am. Jour. Sci. and Arts, 3d ser., vol. 7, p. 219, Coal Meas.

Eoscorpius, Meek & Worthen, 1868, Am. Jour. Sci and Arts, 2d. ser., vol. 46, p. 25, and Geo. Sur. Ill., vol 3, p. 560. Ety. cos, dawn; scorpius, a scorpion.] Cephalothorax quadrangular, some-what wider behind than long; mesial and lateral furrows between which the surface bears granules; mandibles stout, without teeth or servations; niovable finger curved and sharp at the point; legs stout, divisions long; abdomen twice as long as as cephalothorax; segments gradually increase in size to the sixth, while the seventh and last is $2\frac{1}{2}$ times as long as the sixth, but rapidly contracts, and is truncated for the attachment of the tail; the anterior margin of each of the first six segments is rounded; the three tail, segments preserved are stout, oblong, and covered with granules; the comb-like organ shows 11 or 12 divisions. Type E. carbonarius.

[ANT.- HOS.

ingement of nass, and is our to nine.

ynus.

4, Am. Jour. vol. 7, p. 219.



1065.—Arthrolyosa antiqua

bdominal apqua. m. Jour. Sci. 7, p. 219, Coal

en, 1868, Am. ser., vol. 46, p. vol 3, p. 560. , a scorpion.] long; mesial een which the mandibles rrations; niovrp at the point; ng; abdomen ephalothorax; ease in size to venth and last the sixth, but truncated for il; the anterior st six segments tail, segments ng, and covered mb-like organ ons. Type E.

carbonarius, Meek & Worthen, 1868, Am. Jour. Sci. and Arts, 2d ser., vol. 46, p. 24, and Geo. Sur. Ill., vol. 3, p. 560, Coal Meas.

GER.-PRO.]



FIG. 1066.—Eoscorpius carbonarius. Natural size; a, body segment enlarged; c, comb; d, same enlarged; m, mandibles; p, pits.

GERALINURA, Scudder, 1884, Proc. Am. Acad. Arts and Sci., p. 13. [Ety. gercs, old; linon, linen; oura, tail.] Cephalothorax ovate, the front rounded, onethird as broad as hinder portion; palpi large and robust, with interior spines; first two, pairs of legs slender, the hinder stout and broad; abdomen composed of nine joints, the basal three rather short, the others subequal and longer. Type S. carbonaria. carbonaria, Scudder, 1884, Proc. Am.

carbonaria, Scudder, 1884, Proc. Am. Acad. Arts and Sci., p. 13, Coal Meas.

GERAPHRYNUS, Scudder, 1884, Proc. Am. Acad. Arts and Sci., p. 13. [Ety. geras, old; Phrynus, a genus.] Cephalothorax fusiform, angulated in front, nearly as large as the abdomen; coxæ radiating from a median line; palpi slenderer than the legs, longer than the cephalothorax, springing from its extreme front, and of uniform size throughout; abdomen subfusiform, composed of nine segments, rounded behind, with no constriction at the base; a large triangular post-thoracic plate, crowding the middle of the first five short segments out of a straight transverse line; readily distinguished from Architarbus by its produced and angulate cephalothorax. Type G. carbonarius.

carbonarius, Scudder, 1884, Proc. Am. Acad. Arts and Sci., p. 13, Coal Meas.

MAZONIA, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 563. [Ety. proper name.] Cephalothorax moderately convex, subquadrangular; anterior lateral margins rounded, and anterior margin truncated on each side of a small mesial triangular projection ; mesial furrow extends forward from the posterior margin, widening and deepening to the front, where it occupies one-third of the breadth, and is partly filled by the oculiferous prominence, which bears on each side a large eye; eyes circular, convex, arranged for looking obliquely forward, outward, and upward; seven or eight abdominal segments, the last one truncated for the tail. Type M. woodana.

woodana, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 563, Coal Meas.

POLIOCMERA, Scudder, 1884, Proc. Am. Acad. Arts and Sci., p. 13. [Ety. polios, hoary; cheras, to be bereft.] Cephalothorax scarcely longer than broad, slightly narrowing anteriorly, the front square; coxæ radiating from a median line; legs stout, moderately long; abdomen full, at base as broad as the cephalothorax, broadening slightly behind, fully rounded, composed of four segments, the first segment about one-third the length of the others, which are equal; no abdominal appendages. Type P. punctulata.

punctulata, Scudder, 1884, Proc. Am. Acad. Arts and Sci., p. 13, Coal Meas.

- Proscorpius, Whitfield, 1855, Bull. Am. Mus. Nat. Hist., vol. 1, p. 183. [Ety. pro, before; scorpius, a genus.] Cephalothorax with large dorsal eye-lobe; eyes small, one on each side of the median line; lateral eyes on ridges, as in living scorpions; sixth ventral segment of the preabdomen, counting from behind, large, equal in length and breadth to the corresponding dorsal segment; anterior walking limb terminating in a bifid claw; postabdomen not reversed as in living scorpions. Type P. osborni. Good authorities say this is merely an Eurypterus, with no affinity or resemblance to a scorpion. With this view the author coincides.
 - osborni, Whitfield, 1885, Bull. Am. Mus. Nat. Hist., vol. 1, p. 184, Waterlime Gr. Synonym, probably, for Eurypterus remipes.

MYRIAPODA.

ACA -ARC.

ARC.—TRI.]

ward, but decre tapering, posteri thorax, and larg those in front; a ible segments, those at the anterior end » wider and ____ those of the middle longer; basal segment has an oblong scar nea crust chitonous. corneus, Matthew, Can., p. 59, Devo



FIG. 1069. - Archiulus xylobioides. An terior part enlarged.

> relative proportion two to three time furnished with contained with contained haps supporting xylobioides.

xylobioides, Scude Soc. Nat. Hist., v Geol., p. 496, Co

Geol., p. 496, Co EnETICUS, Scudder, Hist. [Ety. eilet No spines, but 1 rially arranged; than twice as bu anthracinus.

anthracinus, Scud Nat. Hist., Coal

EUPHOBERIA, Meek & Jour. Sci. and A: 26. [Ety. eu, v dable.] Head se slender, very s terminating abr enty-five or moi



FIG. 1070.-Euphoberia

and half as man half of the segm supporting three slightly -backwa

CLASS MYRIAPODA.

THE animals composing the Class Myriapoda are elongated, and composed of numerous segments, all of which are substantially alike except the first and last. The articulations of the body each bear one or two pairs of jointed legs. The common centipede and long-jointed worms, with numerous legs, found in damp places and on trunks of trees, some of which coil up when alarmed, are examples. Only a few Palæozoic fossils are referred to this Class, and these belong to extinct Orders.

ORDER ARCHIPOLYPODA.

FAMILY ARCHIULIDÆ.—Archiulus, Trichiulus, Xylobius.

FAMILY EUPHOBERIDE.—Acantherpestes, Amynilespes, Anthracerpes, Eileticus, Euphoberia.

FAMILY UNCERTAIN.—Archæoscolex.

ORDER PROTOSYNGNATHA.

FAMILY PALÆOCAMPIDÆ.—Palæocampa.

ACANTHEMPESTES, Meek & Worthen, 1868, Geo. Sur. Ill., vol. 3, p. 559. [Ety. akantha, a spine; erpestes, a creeper.] Spines bifurcate at tip, and arranged in dorsal, pleurodorsal, and lateral rows; segments three, or more than three times as broad as long. Type A. major.

major, Meek & Worthen, 1868. (Euphoberia major,) Am. Jour. Sci. and Arts, 2d. ser., vol. 46, p. 26, and Geo. Sur. Ill., vol. 3, p. 558, Coal Mega.



FIG. 1067.—Acahtherpestes major. Fragment. s, spine; n, base of spine.

AMYNILESPES, Scudder, 1885, in Zittel's Handbuch der Pal., p. 729. [Ety. amuno, to keep off; iluspaomai, to crawl.] Spines simple, arranged in dorsolateral rows; segments four times as broad as long. Type A. wortheni. wortheni.



A N THRACERPES, M e e k & Wortheni.

Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 51. [Ety. anthrax. coal; erpò, to creep, in allusion to its carboniferous age and probable habits.] Founded upon an articulated body of nineteen segments and part of another. The last segment terminates in three or four short, slender, hair-like or spinelike appendages. Below the middle of each segment there is a small prominence, marking the spiracles, or breathing apertures, which pertain to the Myriapoda. Type A. typus.

typus, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 51, and Geo. Sur. Ill., vol. 2, p. 409, Coal Meas.

ARCHÆOSCOLEX, Matthew, 1888, Trans. Roy. Soc. Can., p. 59. [Ety. archaios, ancient; skolex, worm.] Cylindrical, tapering behind the middle, and also at the three anterior segments; head small, somewhat conical; thorax of three joints, increasing in width back-

ACA -ARC.

composed of irst and last. The comdamp places nples. Only g to extinct

acerpes, Ei-

es as broad as



mynilespes heni.

cad. Nat. Sci. anthrax, coal; sion to its carprobable haban articulated segments and The last segthree or four like or spineelow the midat there is a marking the ing apertures, ne Myriapoda.

en, 1865, Proc. l., p. 51, and 2, p. 409, Coal

, 1888, Trans. [Ety. archaios, .] Cylindrical, ddle, and also gments; head al; thorax of n width backMYRIOPODA.

ward, but decreasing in length; limbs tapering, posterior pair as long as the thorax, and larger and stronger than those in front; abdomen of eleven visible segments, those

at the anend we terior wider and _____ those of the middle longer; basal segment has an

FIG. 1069. - Archiulus

rior part enlarged.

vlobioides.

Ante-

ARC.—TRI.]

oblong scar near the posterior edge; crust chitonous. Type A. corneus. corneus, Matthew, 1888, Trans. Roy. Soc. Can., p. 59, Devonian.

ARCHIULUS, Scudder, 1868, Mem. Bost. Soc. Nat. Hist., vol. 2, p. 231, and Acad. Geol., p. 496. [Ety. ar-chaios, ancient; ioulos, wood-louse.] Segments entire. varying much in

relative proportions, but generally from two to three times broader than long, furnished with only a few papillæ, perhaps supporting spiny hairs. Type A. xylobioides.

- xylobioides. xylobioides, Scudder, 1868, Mem. Bost. Soc. Nat. Hist., vol. 2, p. 236, and Acad. Geol., p. 496, Coal Meas. EILETICUS, Scudder, Mem. Bost. Soc. Nat. Hist. [Ety. eiletikos, rolling one's self.]
- No spines, but large, low tubercles, serially arranged; segments few, less than twice as broad as long. Type E. anthracinus.

anthracinus, Scudder, Mem. Bost. Soc. Nat. Hist., Coal Meas.

EUPHOBERIA, Meek & Worthen, 1868, Am. Jour. Sci. and Arts, 2d ser., vol. 46, p. 26. [Ety. eu, very; phoberos, formidable.] Head semicircular; body long, slender, very slightly tapering, and terminating abruptly; segments seventy-five or more on the ventral side



FIG. 1070.-Euphoberia armigera. Part of a large specimen.

and half as many on the dorsal; dorsal half of the segments rounded, and each supporting three or four spines, curved slightly backward, and arranged in rows on the back, spines spinuliferous; ventral half of the segments each bears a pair of small slender-jointed legs. Type E. armigera.

FIG. 1071,-Euphoberia armigera. Entire specimen.

anguilla, Scudder, 1880, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 177, Coal Meas. armigera, Meek & Worthen, 1868, Am.

Jour. Sci. and Arts, 2d ser., vol. 46, p. 26, and Geo. Sur. Ill., vol. 3, p. 556, Coal Meas.



FIG. 1072.-Euphoberia armigera. 1072.—Euphoberia armigera. A, part of an individual; B, enlarged surface pitting.

- carri, Scudder, 1880, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 171, Coal Meas.
- flabellata, Scudder, 1880, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 174, Coal Meas.
- granosa, Scudder, 1880, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 168, Coal Meas. horrida, Scudder, 1880, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 158, Coal Meas.
- Mat. Hist., Vol. 6, p. 196, Ooal meas.
 major, see Acantherpestes major.
 PALEOCAMPA, Meek & Worthen, 1865, Proc.
 Acad. Nat. Sci. Phil., p. 52. [Ety. palaios, ancient; kampe, a caterpillar.] Head small; segments ten, similar, sub-equal, and each bearing a pair of stout clumsy legs, and four bunches of cylin-drical needles or spines; bunches seated on mammillæ, and arranged in dorso-pleural and lateral rows, needles or spines, exceedingly slender, scarcely be pering, blunt at tip, and longitudinally
- serrated. Type P. anthrax. anthrax, Meek & Worthen, 1865, Proc. Acad. Nat. Sci. Phil., p. 52, and Geo. Sur. Ill., vol. 2, p. 410, Coal Meas. TRICHIULUS, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 290. [Ety. trichos, hair; joulos, wood-louse.] Segments en-tive from threa to fine times breder tire, from three to five times breader than long, closely covered with papillæ, arranged in definite series longiudinally, and transversely supporting long, sweeping hairs. Type T. villosus. ammonitiformis, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 292, Coal Meas.

nodulosus, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 292, Coal Meas.

CLASS INSECTA.

one pair of antennæ belong to them in their perfect state. They are the highest

and most complicated class of articulated animals, and abound almost everywhere.

No living order, in this class, is known from the Palæozoic rocks. Indeed, the

fossils consist almost wholly of fragments of wings showing little else than neura-

tion; but they have been studied by Scudder, until he has classified them into an

Order and Families, to the general satisfaction of entomologists, and all must

concede he has accomplished a very difficult task. The Order Palæodictyoptera,

which includes the Orthopteroid and Hemipteroid Palæodictyoptera, has been de-

fined as follows: Body generally elongated; mouth parts variously developed;

antennæ filiform; thoracic joints subequally developed; legs moderately large; meso

and metathoracic wings closely similar, equally membranous; the six principal

veins always developed; the marginal simple, and forming the costal border; the

mediastinal generally simple or with superior branches only; the other veins usually dichotomize; stout and well defined cross veins rare; membrane generally

FAMILY HOMOTHETIDÆ.—Anthracothremma, Cheliphlebia, Didymophleps, Encænus, Genentomum, Genopteryx, Gerapompus, Homothetus. FAMILY MYLACRIDÆ.-Lithomylacris, Mylacris, Necymylacris, Paromylacris,

FAMILY PALEOBLATTINIDE.—Archymylacris, Etoblattina, Gerablattina,

FAMILY PALEOPTERINIDE. - Aethophlebia, Dieconeura, Miamia, Propteticus.

FAMILY PALÆEPHEMERIDÆ.-Ephemerites, Geraphemera, Platephemera.

INSECTS are possessed of head, thorax, and abdomen. Three pairs of legs and

villosus, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 291, Coal Meas. X YLOBIUS, Dawson, 1860, Quar. Jour. Geo.

Soc., vol. 16, p. 268. [Ety. xylobius, liv-ing in wood.] Body crustaceous, cylindrical, elongate, rolling spirally; segments thirty or more, anterior ones smooth, posterior ones furrowed; legs small, numerous; labrum quadrilateral, divided by notches or joints into three portions; mandibles two-jointed, last ovate and pointed; eyes ten or more on each side. Type X. sigillariæ.

dawsoni, Scudder, 1868, Mem. Bost. Soc. Nat. Hist., vol. 2, p. 236, and Acad. Geol., p. 496, Coal Meas.

ple articulated appendages.

Promylacris.

Oryctoblattina, Petrablattina.

fractus, Scudder, 1868, Mem. Bost. Soc. Nat. Hist., vol. 2, p. 234, and Acad. Geol., p. 496, Coal Meas. mazonius, Zittel, Science and Acad.

1885, Handbuch der Pal., p. 730, Coal Meas.

Geo. Soc., vol. 16,

p. 271, Coal Meas. Fig. sigillariæ. similis, Scudder, with palpus, pertain-ing to the mouth, en-1868, Mem. Bost. Soc. Nat. Hist., larged. vol. 2, p. 234, and Acad. Geol., p. 496, FAMILY PHTHA FAMILY PROTO FAMILY XENO FAMILY UNCER

SUPPOSED INSE

ADI. CHR.]

ADIPHLEBIA, Scudder. Nat. Hist., vol. 3 vative; dis, dou Body rather stou all the nervules their stems near subparallel and A. lacoana.

lacoana. Scudder, Nat. Hist., vol. 3 AETHOPHLEBIA, Scud

Soc. Nat. Hist ... aethes, strange; 1 no-median vein t middle of lowe single main bran which is superior dian fork of exte part of main sca continuous adve principal nervule mate offshoots o arise indifferentl and the princip parallel and simi the veins above. singularis, Scudder Nat. Hist., vol. 3

ANTHRACOTHREMMA, Bost. Soc. Nat. H anthrax, coal; the stout; prothorax than long; wings gated; scapular v reaching the tip with numerous mostly simple. robusta, Scudder,

Nat. Hist., vol. 3 ARCHEGOGRYLLUS, S Bost. Soc. Nat.

[Ety. archegos, fi1 cricket.] Relatio stood. Type A. priscus, Scudder, Nat Hist., vol. 11

Soc. Nat. Hist., vo ARCHIMYLACRIS, Scud p. 388. [Ety. are cris, cockroach.]

FIG. 1074.—Archimyla

cris acadicum. wing; internom tively long. Typ

reticulate; wings in repose lying on the abdomen; the anal area of hind wings, though usually of great distal extension, never plaited, though sometimes broadly folded; abdomen usually long and slender, the last joint often furnished with sim-ORDER PALÆODICTYOPTERA. FAMILY GERARIDÆ.-Adiphlebia, Gerarus, Megathentomum, Polyernus. FAMILY HEMERISTIDE.-Chrestotes, Hemeristia, Lithentomum.

Geon, r. mazonius, Zitter, 1995 Handbuch 730, sigillariæ, Dawson, 1860, Quar. Jour.

LYL.

1073. - Xylobius a, Organ

Coal Meas.

ADI CHR.]

INSECTA.

FAMILY PROTOPHASMID.E.-Haplophlebium, Paolia, Titanophasma.

SUPPOSED INSECT TRAILS -- Haplotichnus, Plangtichnus, Treptichnus.

Type

Body

FAMILY PHTHANOCORIDÆ.—Phthanocoris.

ADIPHLEBIA, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 345. [Ety. a, pri-

vative; dis, double; phlebion, vein.]

Body rather stout; wings rather broad; all the nervules simple, arising from

their stems near the base of the wings;

lacoana. Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 345, Coal Meas.

AETHOPHLEBIA, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 338. [Ety.

aethes, strange; phleps, a vein.] Inter-

no-median vein terminating before the

single main branch, beyond its middle

which is superior, and which, with me-

dian fork of externo-median and larger

part of main scapular branch, form a

continuous adventitious vein crossing

principal nervules of the wing; ulti-

mate offshoots of externo-median vein

arise indifferently from the main vein

and the principal branch, and are

parallel and similar to the offshoots of

stout; prothorax several times broader

than long; wings subequal and elon-

gated; scapular vein arcuate and nearly

reaching the tip; externo-median vein

with numerous parallel branches, mostly simple. Type A. robusta. robusta. Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 327, Coal Meas. ARCHEGOGRYLLUS, Scudder, 1868, Proc. Bost. Soc. Nat. Hist., vol. xi, p. 401. [Ety. archegos, first in time; gryllus, a winder 1. Boltime not description

cricket.] Relations not clearly under-stood. Type A. priscus. priscus, Scudder, 1868, Proc. Bost. Soc. Nat Hist., vol. 11, p. 401, and Mem. Bost. Soc. Nat. Hist., vol. 3, p. 323, Coal Meas. Archimylacris, Scudder, 1868, Acad. Geol., p. 388. [Ety. arche, beginning; Myla-

cris, cockroach.] Mediastinal area com-

paratively short;

scapular terminating below the tip,

and with the externo-median, which is

half

paratively

occupying

than

com

less

the

small.

the veins above." Type A. singularis. singularis, Scudder, 1884, Mem. Bost. Soc.

Nat. Hist., vol. 3, p. 338, Coal Meas. ANTHRACOTHREMMA, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 327. [Ety.

anthrax, coal; thremma, reared.]

middle of lower border, emitting

subparallel and longitudinal.

A. lacoana.

FAMILY XENONEURID.E. —Geroneura, Xenoneura. FAMILY UNCERTAIN.—Archegogryllus, Dyscritus.

m. Bost. Soc. 4, and Acad.



073. - Xylobius palpus, pertainthe mouth, en-

Geol., p. 496,

rs of legs and re the highest t everywhere. Indeed, the e than neurathem into an and all must eodictyoptera, , has been de-

y **developed**; y large; meso six principal 1 border; the her veins usuane generally f hind wings, times broadly hed with sim-

olyernus.

Didymophleps, etus.

Paromylacris,

Gerablattina,

a, Propteticus. ephemera.

FIG. 1074.—Archimyla-cris acadicum.

wing; internomedian vein comparatively long. Type A. acadicum.

acadicum, Scudder, 1868, Acad. Geol., p. 388, Coal Meas

parallelum, Scudder, 1879, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 85, Coal Meas. BLATTINA, Burmeister, 1838, Handbuch der Entomologie. [Ety. Blatta, a cockroach.]

A living genus of cockroaches, raised to the rank of a family, and by some naturalists to the rank of an order, to which the name Dictyoptera has been applied. It is not a Palæozoic genus.

bretonensis, see Mylacris bretonense. fascigera, see Gerablattina fascigera.

heeri, see Mylacris heeri.

sepulta, see Petrablattina sepulta.

venusta, see Etoblattina venusta.

CHELIPHLEBIA, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 328. [Ety. chele, forked; phlebion, vein.] Body rather slender, but wings large and coarse. without cross veins, interno-median vein extending far toward the tip of the

wing with many oblique branches. Type C. elongata. carbonaria, Scudder,



1884, Mem. Bost. Soc. Nat. Hist., vol. FIG. 1075. - Cheli-3, p. 328, Coal Meas. phlebia carbonaelongata, Scudder,

1884, Mem. Bost. Soc.Nat. Hist., vol. 3, p. 328, Coal Meas.

CHRESTOTES, Scudder, 1868; Geo. Sur. Ill., vol. 3, p. 567. [Ety. chrestotes, good of its kind.] Wings short, broad, well



FIG. 1076.-Chrestotes lapidea.

rounded; vena scapularis throws several branches downward, commencing before the middle of the wing, and with its branches occupies the upper two-

NYL.

INSECTA.

fifths of the upper wing, and perhaps more of the lower; remainder of wing occupied by the longitudinally divaricating branches of the next two veins; anal area in upper wing distinctly set

off at the basal portion of the wing. Type C. lapidea. lapidea, Scudder, 1868, Geo. Sur.

Ill., vol. 3, p. 567, Coal Meas. DIDYMOPHLEPS, Scudder, 1878, Proc. Bost. Soc. Nat. Hist., vol. 19, p.

- 300. [Ety. didymos, double; phleps, vein.] All the veins and branches above the internomedian longitudinal and nearly parallel; nearly all the lower half of the wing being occupied by the oblique branches of the interno-median vein. Type D. contusa.
- contusa, Scudder, 1878, (Termes contusus,) Bost. Soc. Nat. Hist., vol. 19, p. 300, and Mem. Bost. Soc. Nat. Hist., vol. 3, p. 330, Coal Meas.
- DIECONEURA, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 336. [Ety. dieko, to extend through; neuron, a vein.] Externo-median vein simple; internomedian vein important, arcuate, extending far toward the extremity of the

lower margin. Type D. rigida. arcuata, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 336, Coal Meas. rigida, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 336, Coal Meas.

Dyscritus, Scudder, 1868, Lond. Geo. Mag., vol. 5, p. 176. [Ety. dyscritos, hard to determine.] Founded on a fragment of the middle part of a wing with-out proper definition. Type D. vetustus.

vetustus, Scudder, 1868, Lond. Geo. Mag., vol. 5, p. 176, Devonian.

ENCENUS, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 325. [Ety. en, very; kainos, new, strange.] Body stout, thoracic segments twice as broad as long; abdomen ovate; fore wings with the mediastinal vein straight, terminating before the apical third of the wing with numerous straight branches; scapular with similar branches ending half way between the mediastinal and the tip; externo-median impor-tant with distant branches. Type E. ovalis.

ovalis, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 325, Coal Meas.



FIG. 1077.-Ephemerites affinis.

EPHEMERITES, Scudder, 1868, Geo. Sur. Ill., vol. 3, p. 571. [Ety. Ephemera, a

living genus.] The genus was not defined. It is probably a neurophroid Palecodictyoptera. Type E. simplex. affinis, Scudder, 1868, Geo. Sur. Ill. vol. 3, p. 572, Coal Meas.



FIG. 1078.-Ephemerites gigas.

gigas, Scudder, 1868, Geo. Sur. Ill., vol. 3, p. 571, Coal Meas.

primordialis, Scudder, 1878, Proc. Bost. Soc. Nat. Hist., vol. 19, p. 248, Coal Meas.



FIG. 1079.-Ephemerites simplex.

simplex, Scudder, 1868, Geo. Sur. Ill., vol. 3, p. 571, Coal Meas.

ETOBLATTINA, Scudder, 1882, Proc. Bost. Soc. Nat. Hist., vol. 21, p. 391. [Ety. etos, true; Blattina, a genus.] Mediastinal area comparatively short; scapu-lar not reaching tip of wing and with the externo-median, which is comparatively large, occupying less than half the wing; interno-median vein comparatively long. Type E. mazonana.



FIG. 1080.—Etoblattina primaeva. From Saarbruck in Europe for comparison. From

lesquereuxi, Scudder, 1879, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 67, Coal Meas.

R)

GEN. -HAP.]

DID - ETO,

mazonana, Scudder Nat. Hist., vol. 2



FIG. 1081. - Etoblattin venusta.

> Bost. Soc. Nat. Ety. genos, race, Wings large, elc nation and abun astinal vein ver branches to the very distant and dian separated r from the scapt hind wing. Typ

validum, Scudder, Nat. Hist., vol.



FIG. 1082.-Gene

- GENOPTERYX, Scude Soc. Nat. Hist. genos, kind, race terno-median y similiar to those vein, the outer to the innermos Type G. constr constricta, Scudde Nat. Hist., vol. GERABLATTINA, Scu Soc. Nat. Hist.
 - geras, old; Blat Mediastinal ar scapular and e gether occupy the branches of median vein co G. balteata.
- balteata, Scudd 1879, Mem. J Soc. Nat. Hist., 3, p. 110, and P or Up. Carb. I of Pa., p. 104,

Coal Meas. or mian. fascigera, Scudde era,) Mem. Bo 3, p. 113, Coal

GEREPHEMERA, SCU Mag., vol. 5, p Ephemera, a ge on the fragme Definition - i1 simplex.
[DID - ETO,

is was not deneuropt roid E. simple x. Sur. Ill., vol.



s. Sur., Ill., vol.

8, Proc. Bost.), p. 248, Coal



s simplex.

Geo. Sur. Ill.,

82, Proc. Bost. 1, p. 391. [Ety. genus.] Mediaily short; scapuwing and with hich is comparaz less than half ian vein comparmazonana.



r comparison.



INSECTA.

mazonana, Scudder, 1882, Proc. Bost. Soc. | Nat. Hist., vol. 21, p. 391, Coal Meas.



GEN. -HAP.]

venusta, Lesquereux, 1860, (Blattina venusta,) Geo. Sur. Ark., vol. 2, p. 314, Coal Meas.

FIG. 1081. – Etoblattina GENENTOMUM, Scudvenusta. der, 1884, Mem.

Bost. Soc. Nat. Hist., vol. 3, p. 329. [Ety. genos, race, kind; entomon, insect.] Wings large, elongated with coarse venation and abundant cross veins; mediastinal vein very long, with numerous branches to the costa; other branches very distant and stout; the externo-median separated more widely than usual from the scapular, especially in the hind wing. Type G. validum. Midum. Scudder, 1884, Mem. Bost. Soc.

validum, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 329, Coal Meas.



FIG. 1082.-Genentomum validum.

GENOPTERYX, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 327. [Ety. genos, kind, race; pterux, a wing.] Interno-median vein with branches very similiar to those of the externo-median vein, the outermost in close proximity to the innermost branches of the latter. Type G. constricta.

constricta, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 327, Coal Meas. GERABLATTINA, Scudder, 1879, Mem. Bost.

ABLATTINA, Scudder, 1579, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 110. [Ety. geras, old; Blattina, a genus of insects.] Mediastinal area comparatively long; scapular and externo-median area together occupy less than half the wing, the branches of both superior; internomedian vein comparatively long. Type G. balteata.

balteata, Scudder, 1879, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 110, and Perm. or Up. Carb. Flora



of Pa., p. 104, Up. FIG. 1083.--Gerablat-Coal Meas. or Per- tina balteata. mian.

- fascigera, Scudder, 1879, (Blattina fascigera,) Mem. Bost. Soc. Nat. Hist., vol. 3, p. 113, Coal Meas.
- GEREFHEMERA, Scudder, 1868, Lond. Geo. Mag., vol. 5, p. 175. [Ety. geras, old; *Ephemera*, a genus of insects.] Founded on the fragment of a tip of the wing. Definition incomplete. Type G. simplex.

simplex, Scudder, 1868, Lond. Geo. Mag., vol. 5, p. 175, Upper Devonian.

- GERAPOMPUS, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 326. [Ety. geras, old; ponpos, an escort.] Body slender, the prothorax as long as broad; fore wings well rounded, the mediastinal arcuate like the costa, with infrequent simple branches; scapular ending near the tip. Type G. blattinoides. blatinoides, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 326, Coal
 - Meas. extensus, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 326, Coal Meas.
- GERARUS, Scudder, 1868, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 344. [Ety. geraros, of stately bearing.] Body slender, tapering anteriorly; wings slender; mediastinal vein variable; branches of scapular vein numerous, more or less longitudinal, simple or forked, occupying much more space than the branches of any other vein. Type G. dame.
 - danæ, Scudder, 1868, (Miamia danæ,) Geo. Sur. Ill., vol. 3, p. 566, Coal Meas.



FIG. 1084.-Gerarus danæ.

mazonus, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 344, Coal Meas. vetus, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 344, Coal Meas.

- GERONEURA, Matthew, 1888, Trans. Roy. Soc. Can., p. 57. [Ety. geros, old; neura, a vein.] Anterior wing of the body elliptical elongate, venation strongly marked, scapular ridge conspicuous; mediastinal vein close to the scapular, but curves outward at the extremily; scapular vein and its branches cover a triangular area terminating at the apical end of the wing; main scapular terminates near the end of the costal edge; externo-median vein throws off two branches, the first one stronger than the main vein, and the second one goes with a sinuosity toward the base of the apical margin; nerves regular and simple. Type G. wilsoni.
 - wilsoni, Matthew, 1888, Trans. Roy. Soc. Can., p. 57, Lower Devonian.
- HAPLOPHLEBIUM, Scudder, 1867, Can. Nat. and Geo., 2d ser., vol. 3, p. 202, and Proc. Bost. Soc. Nat. Hist., vol. 11, p. 150. [Ety. haplos, simple; phlebion, a vein.] Wing with simple neuration and intercostal spaces filled with minute reticulations without any cross veins; wing long and slender. Type H. barnesi.

INSECTA.

barnesi, Scudder, 1867, Can. Nat. and Geol. 2d ser., vol. 3, p. 202, and Acad. Geol., p. 386, Coal Meas.



FIG. 1085.-Haplophlebium barnesi. A fern covers part of the wing.

longipennis, Scudder, 1884, Proc. Amer. Acad., vol. 20, p. 172, Coal Meas. HAPLOTICHNUS, n. gen. [Ety. haplotes, plain-

- HAPLOTICHNUS, n. gen. [Ety. haplotes, plainness, simplicity; ichnos, track.] Simple, small, half-cylindrical trails running in any direction. Supposed to have been made by the larva or pupa of some palæodictyopterous insect. Type H. indianensis.
- indianensis, n. sp. A simple half-cylindrical trail, needle-like in size, running in straight or crooked lines, or crossing itself. Found in the upper part of the Kaskaskia Group, at the Whetstone quarries in Orange County, Indiana.



FIG. 1086.-Haplotichnus indianensis.

The remains of insects found in the Palæozoic rocks occur under such circumstances as to induce the belief they were more or less aquatic in their habits, and frequented swamps and shores of bays and inlets. The Whetstone quar-ries of Orange County, Indiana, are yellowish white, slaty mud-rocks resembling, in appearance, the Solenhofen slates, but coarser in texture. They are limited in extent, and may be fairly presumed to represent the muddy shore of some bay or internal sea of Subcarboniferous age. The slaty layers are covered more or less upon the upper surface with trail-furrows, and on the under surface with elevated lines, showing the trails were made in mud, which afterward hardened, and was then covered with a thin deposit of mud which was tracked and hardened and covered, and so on in one series after another throughout the whole thickness of the slaty deposit. Many of the living Dictyoptera are

aquatic in their habits in the larva and pupa state, and it is not until the perfect insect is about to emerge from the

skin of the pupa that it creeps out of the water on the muddy shore or stones, or climbs the stems and leaves of aquatic plants, and from this position the imago springs into an aerial habitat. The trails on the Whetstone slates were évidently

HAP.- LIT.

all the evidence seems to indicate they were made by insects, though the evidence may not be either clear or conclusive in the latter respect. Under these circumstances the author has selected three common but distinct trails, and given then generic names; viz., Haplotichnus, Plangtichnus, and Treptichnus.

- HEMERISTIA, Dana, 1864, Am. Jour. Sci. and Arts, 2d ser., vol. 37, p. 34. [Ety. humera, day; istia, house.] Scapular branch strongly arcuate, at its base distant from the main stem, and at first taking the course of its basal offshoot. Type H. occidentalis.
- occidentalis, Dana, 1864, Am. Jour. Sci. and Arts, 2d ser., vol. 37, p. 34, Coal Meas.

HOMOTHETUS,



lar; thetos, placed.] Mediastinal vein extremely long, scarcely surpassed by the scapular, and with scarcely any branches to the costa; externo-median vein with only a few branches in the outer fourth of the wing; interno-median vein similar to the last. Type H. fossilis.

Geol., p. 525, Upper Devonian.

Libellula, Linnæus. Not a Palæozoic genus. carbonaria, see Cheliphlebia carbonaria.

LITHENTOMUM, Scudder, 1867, Can. Nat. and Geol., 2d ser., vol. 3, p. 202. [Ety. lithos, stone; entomon, an insect.] Main



FIG. 1088.—Lithentomum hartti.

scapular branch with a single, or at most two branches, which are almost wholly longitudinal. Type L. hartti. LIT. -PAO.]

hartti, Seudder, Geol., 2d ser., y Geol., p. 525, U LITHOMYLACRIS, Set Soc. Nat. Hist *lithos*, stone; *M* Mediastinal and occupying mor externo-median scarcely expan angustum.



FIG. 1089. — Lithomyl angustum. Mem. Bost. Soc

Coal Meas. simplex, Scudder Nat. Hist., vol.

Megathentonum, S. 57 Ill., vol. 3, p. 57 ness; entomon, great size, re rounded; veins quent divaricat tion of delica the wing is a

and smaller splatum.



FIG. 1090.-Megathe

pustulatum, Scudd vol. 3, p. 570, Co MIAMIA, Dana, 1864 Arts, 2d ser., vol. name.] Scapula diastinal; straigh near the middle where distant Type M. bronson bronsoni, Dana, 18

Arts, 2d ser., vo danx, see Gerarus Mylachis, Scudder, 1 3, p. 568. [Ety

cockroach.] Wi and scapular are

EHAP.- LIT.

n the larva and until the pernerge from the e pupa that it of the water uddy shore or limbs the stems s of aquatic d from this e imago springs aerial habitat. on the Whetwere evidently animals, and o indicate they though the either clear or espect. Under e author has i but distinct generic names; igtichnus, and

Jour. Sci. and 34. [Etv. h.m. capular branch base distant at first taking offshoot. Type

Am. Jour. Sci. 37, p. 34, Coal



Homothetus silis.

ein extremely by the scapu-1y branches to ian vein with ne outer fourth dian vein simfossilis. an. Nat. and 202, and Acad. onian. alæozoic genus. a carbonaria. , Can. Nat. and p. 202. EEtv. insect.] Main



n hartti.

single, or at ich are almost pe L. hartti.

INSECTA.

hartti, Scudder, 1867, Can. Nat. and Geol., 2d ser., vol. 3, p. 202, and Acad. Geol., p. 525, Upper Devonian. LITHOMYLACRIS, Scudder, 1879. Mem. Bost.

Soc. Nat. Hist., vol. 3, p. 48. [Ety. lithos, stone; Mylakris, a kind of roach.] Mediastinal and scapular areas together occupying more than half the wing; externo-median area small, compressed, scarcely expanding apically. Type L. angustum.



LIT. -PAO.]

angustum, Scudder, 1879, Mem/ Bost. Soc. Nat. Hist., vol. 3, p. 48. Coal Meas. pittstonianum, Scudder, 1879,

FIG. 1089. - Lithomylacris angustum.

Mem. Bost. Soc. Nat. Hist., vol. 3, p. 50, Coal Meas.

simplex, Scudder, 1879, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 51, Coal Meas.

MEGATHENTOMUM, Scudder, 1868, Geo. Sur. 111., vol. 3, p. 570. [Ety. megathos, largeness; entomon, an insect.] Wings of great size, remarkably broad and rounded; veins distant; simple, infrebroad and quent divarications, and cross neuration of delicate, irregular veinlets; the wing is also dotted with larger and smaller spots. Type M. pustulatum.



FIG. 1090 .-- Megathentomum pustulatum.

pustulatum, Scudder, 1868, Geo. Sur. Ill., vol. 3, p. 570, Coal Meas.

MIAMIA, Dana, 1864, Am. Jour. Sci. and Arts, 2d ser., vol. 37, p. 34. [Ety. proper name.] Scapular vein close to the mediastinal; straight, main branch arising near the middle of the wing, and nowhere distant from the main stem. Type M. bronsoni.

bronsoni, Dana, 1864, Am. Jour. Sci. and Arts, 2d ser., vol. 37, p. 34, Coal Meas. dana, see Gerarus danæ.

MYLACRIS, Scudder, 1868, Geo. Sur. Ill., vol. 3, p. 568. [Ety. Mylakris, a kind of cockroach.] Wings broad, mediastinal and scapular areas together occupying

less than half the wing; scapular area larger than the mediastinal. Type M. anthracophilum.

anthracophilum, Scudder, 1868, Geo. Sur. Ill., vol. 3, p. 568, Coal Meas.

antiquum, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 300, Coal Meas.

bretonense, Scudder, 1874, (Blattina bretonensis,) Can. Nat., vol. 7, p. 271. Coal Meas. carbonum, Scudder,

Coal Meas.

heeri, Scudder, 1874, (Blattina, heeri,) . Can. Nat., vol. 7, p. 272, Coal Meas. lucifugum,

FIG. 1092 .- Mylacris a n thracophilum Pronotal shield.

47, Coal Meas. ovale. Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 308, Coal Meas.

pennsylvanicum, Scudder, 1880, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 44, Coal Meas.

priscovolans, Scudder, 1884, Mem. Bost. Soc. Nat. Hist, vol. 3, p. 307, Coal Meas.

NECYMYLACRIS, Scudder, 1880, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 53. [Ety. ne-kus, dead; Mylakris, a roach.] Some of the apical branches of the mediastinal vein arise beyond the base of the wing, and scarcely partake in the radiate arrangement of the others. Type N. lacoanum.

heros, Scudder, 1880, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 54, Coal Meas. lacoanum, 1880, Mem. Bost, Soc. Nat.

Hist., vol. 3, p. 53, Coal Meas. ORYCTOBLATTINA, Scudder, 1885, Proc. Acad.

Nat. Sci. Phil., p. 37. [Ety. oruktos, quarried; Blattina, a genus.] Principal veins widely separated at base; scapular area surpassing apex, and with externomedian occupying more than half the wing, the branches of latter inferior; interno-median vein comparatively short. Type O. occidua.

occidua, Scudder, 1885, Proc. Acad. Nat. Sci. Phil., p. 37, Coal Meas.

PAOLIA, Smith, 1871, Am. Jour. Sci. and Arts, 3d ser., vol. 1, p. 44. [Ety. proper name.] Wings long, slender, branches of veins dichotomizing strongly, and running in a longitudinal direction, so that the externo-median branches og-



1884, Mem. Bost. Soc. Nat. Hist., FIG. 1091.—Mylacris an-yol. 3, p. 304, thracophilum.

Scudder.

Scudder.

1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p.

1880, Mem. Bost. Soc.

Nat. Hist., vol. 3, p.

301, Coal Meas. mansfieldi,

INSECTA.

cupy only a slight portion of the lower margin. Type P. vetusta. gurleyi, Scudder, 1884, Proc. Amer.

Acad. vol. 20, p. 173, Coal Meas.

- lacoana, Scudder, 1884, Proc. Amer. Acad., vol. 20, p. 173, Coal Meas. superba, Scudder, 1884, Proc. Amer.
- Acad., vol. 20, p. 173, Coal Meas. vetusta, Smith, 1871, Am. Jour. Sci. and
- Arts, 3d ser., vol. 1, p. 44, Coal Meas. PAROMYLACRIS, Scudder, 1885, Proc. Acad. Nat. Sci. Phil., p. 35. [Ety. paros, before.
- Nat. Sci. Phil., p. 35. [Ety. paros, before, or forefather; Mylakris, a kind of roach.] Body mitch arched; pronotal shield more than twice as broad as long; wings extremely broad; mediastinal area large and extended, and with the scapular occupying half the wing; externo-median area expanding apically. Type P. rotundum.

rotundum, Scudder, 1885, Proc. Acad. Nat. Sci. Phil., p. 35, Coal Meas.

PETRABLATTINA, Scudder, 1876, Can. Geol., vol. 8, p. 88. [Ety. petra, stone; Blattina, a genus.] Scapular and externomedian areas together covering more than half the wing; the externo-median vein directed toward and terminating near the middle of the inner border of the wing, branches superior; internomedian vein very short. Type P. sepulta.

sepulta, Scudder, 1876, (Blattina sepulta,) Can. Nat. and Geol., vol. 8, p. 88, Coal Meas.

PHTHANOCORIS, Scudder, 1884, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 58. [Ety. phthano, first; kore, pupa.] Front wing differentiated from the hind wing; corium distinct from the membrane,



FIG. 1093.—Plangtichnus erraticus.

narrow clavus; no embolium or cuneus; mediastinal and scapular veins widely separated at base. Type P. occidentalis.

occidentalis, Scudder, 1884, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 58, and Mem Bost. Soc. Nat. Hist., vol. 3, p. 348, Coal Meas.

[PAR.-PRO.

- PLANGTICHNUS, n. gen. [Ety. Plaghtos, wandering; ichnos, track.] A zigzag, half-cylindrical, broken trail, running in any and every direction; sometimes dotted or sunk deeper at the angles than at other places, or most depressed between the angles in some cases. Supposed to have been made by the larva or pupa of some Palæodictyopterous insect. See remarks under Haplotichnus. Type P. erraticus.
 - erraticus, n. sp. A simple, irregularly zigzag, half-cylindrical, broken trail, running in any and every direction, depressed in spots deeper than the general trail. Collected in the upper part of the Kaskaskia Group at the Whetstone guarries, in Orange County, Indiana.

PLATEPHEMERA, Scudder, 1867, Can. Nat.

and Geol., 2d ser., vol. 3, p. 202. [Ety. platys, flat; epheme r a, an insect.] Found ed upon the fragm en t of an upper wing,



showing nervation and a heavy cross vein near the base between two middle veins, from which new prominent veins arise; ancient May-files, in which the lower externo-median stem seems to be formed on the same plan as the upper stem. Type P. antiqua.

- as the upper stem. Type P antiqua. antiqua, Scudder, 1867, Can. Nat. and Geol., 2d ser., vol. 3, p. 202, and Acad. Geol., p. 524, Devonian. POLYERNUS, Scudder, 1884, Mem. Bost. Soc.
 - oLYERNUS, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 343. [Ety. polys, many; ernos, a scion.] Body moderately stout; wings rather broad; mediastinal vein extending nearly to the tip of wing; branches of scapular vein inequidistant at origin, longitudinal, closely crowded and ramose, yet hardly more important than the externomedian vein. Type P. complanatus. complanatus, Scudder, 1884, Mem. Bost.
- Soc. Nat. Hist., vol. 3, p. 343, Coal Meas. laminarum, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 343, Coal Meas. PROMYLACRIS, Scudder, 1885, Proc. Acad. Nat. Sci. Phil., p. 34. [Ety. pro, before; mylakris, a kind of roach.] Body much or bed. wing breach, modification load
 - aoMYLACRIS, Scudder, 1885, Proc. Acad. Nat. Sci. Phil., p. 34. [Ety. pro, before; mylakris, a kind of roach.] Body much arched; wing broad; mediastinal and scapular areas together not occupying more than a third of the wing; scapular area smaller than the mediastinal, the vein running obliquely to the costal margin. Type P. ovale.
 - ovale, Scudder, 1885, Proc. Acad. Nat. Sci. Phil., p. 34, Coal Meas.

PRO.-XEN.]

PROPTETICUS, Scudi Nat. Hist., voi early; pietik s, widely sep trai arcuate, main base of the w the main stem inf rnus, Scudde Nat. Hist., voi TERMES, Linnaeus, p. 610. Not a contusus, see Did



FIG. 1095.—Treptichnu larger than sh

TITANOPHAMA, Bro by Scudder. ately slender; PAR.-PRO.

PRO.-XEN.]

. 3, p. 348, Coal

Plagitos, Ety. A zigzag, k.] trail, running on; sometimes at the angles nost depressed some cases. made by the læodictyopterunder Haplous.

le, irregularly broken trail, ery direction, per than the in the upper Group at the range County,

167, Can. Nat.



latyphemera qua.

a heavy cross veen two midnew promit May-flies, in)-median stem the same plan P. antiqua. Jan. Nat. and 202, and Acad.

em. Bost. Soc. [Ety. polys, Body moderer broad ; menearly to the scapular vein longitudinal, ose, yet hardly the externoomplanatus. I, Mem. Bost. 343, Coal Meas. Mem. Bost. 43, Coal Meas. , Proc. Acad. y. pro, before; Body much ediastinal and not occupying , wing; scapue mediastinal, ly to the costal

c. Acad. Nat. 88.

INSECTA.

- PROPTETICUS, Scudder, 1884, Mem. Bost. Soc. Nat. Hist., vol. 3, p. 334. [Ety. proi, early; pletik s, winged.] Scapular vein widely separated from the mediastinal, arcuate, main branch arising near the base of the wing, parting widely from
- the main stem. Type P infernus. inf rnus, Scudder, 1884, Mem. B st. Soc. Nat. Hist., vol. 3, p. 334, Coal Meas. TERMES, Linnaeus, 1748, Systema Naturæ, p. 610. Not a Palæozof: genus.
 - contusus, see Didymophleps contusa.



- FIG. 1095.—Treptichnus bifurcus. The tal larger than shown by the figure. The trails are
- TITANOPHAMA, Brongniart, as recognized by Scudder. Wing very large, moderately slender; neuration moderately

38

abundant; scapular vein beginning to branch in the middle of the basal half of the wing

jucunda, Scudder, 1884, Proc. Amer. Acad., vol. 20, p. 169, Coal Meas. TREPTICHNUS, n. gen. [Ety. treptos, to be

- turned about; ichnos, track.] A zigzag, half-cylindrical, continuous trail. forked at each angle, and running in any direction; each line is prolonged in the direction in which the animal moved, at the angle, so as to form a short fork or projection. Supposed to have been made by the larva or pupa of some Palæopterous insect. See remarks under Haplotichnus. Type T. bifurcus.
- bifurcus, n. sp. A zigzag, half cylindrical, continuous trail, quite evenly depressed, and forked at each angle; the bifurcation takes place in the direction in which the animal moved, but generally is less sunken than the trail, and sometimes shows simply a dot discon-nected with the angle. Collected in the upper part of the Kaskaskia Group at the Whetstone quarries in Orange County, Indiana.
- XENONEURA. Scudder, 1867, Can. Nat. and Geo., 2d ser., vol. 3, p.202. [Etv. zenos, new, strange; neura, a vein.] M-diastinal and scapular veins as in Palæ p-

terina; externo-median vein amalga-mated at base with the scapular, branching beyond the middle, internomedian divided at base in Type X. two branches. antiquorum.



FIG. 1096, Xenoneura antiquorum

antiquorum, Scudder, 1867, Can. Nat. and Geol., 2d ser., vol. 3, p. 202, and Acad. Geol., p. 525, Upper Devonian.

SUBKINGDOM VERTEBRATA.

THIS is the highest division of the Animal Kingdom, and, until within the last twenty years, the essential character upon which the subking lom was based was the possession of a bony or cartilaginous internal skeleton, having a spine or vertebral column. Since that time the class known as Tunicates, or Ascidians. which have no bony skeleton, has been referred to it; and the Amphioxus lanceolatus, a little, slender, transparent creature, having only a gelatinous cord, no brain cavity, and colorless blood, which was regarded as the lowest type of fishes, and had been elevated into an order called Leptocardia, is now taken out of the Class Pisces and referred to a separate class called Acrania. The Classes Tunicata and Acrania are not, however, known in Palæozoic rocks. Another class, called Cyclostomata, consisting of long, cylindrical, worm-like bodies, with a tough skin, destitute of scales, pectoral and ventral fins, but having a fin at the extremity of the body without any rays, and having a cartilaginous skeleton, and which includes the various species of lampreys that inhabit fresh water, and are also found in the ocean, and which have generally been regarded as an order of fishes, is unknown in Palæozoic rocks. Some authors would, however, place the Conodonts in this class; but if they do not belong to the Annelida, then there are stronger reasons for believing they belong to Crustacea than for thinking they should be referred to the Cyclostomata.

No Palæozoic fossil from an animal as highly organized as the lowest mammal or a bird has ever been found. The fossils are confined to the lowest organizations of fishes, batrachians, and reptiles. The lower forms of fishes have only a cartilaginous cord, resembling the embryonic state of fishes having an osseous skeleton. In higher forms the spine consists of bony vertebræ, united in such manner as to allow flexibility and strength by reason of attaching muscles, and also to protect a spinal nerve that passes through it.

CLASS PISCES, OR FISHES.

The Class Pisces has been divided into four subclasses—Ganoidea, Selachia, Dipnoa, and Teleostia. The Teleostia have been divided into eleven orders, and these into twenty suborders. This subclass embraces a very large majority of the living fishes. All of them have a complete bony vertebral column and skull. Nearly all edible fishes belong to this subclass. Many have a naked skin, but the majority are covered with horny scales of various forms. When the scales are smooth the fish are said to belong to the Cycloidea; when the hinder margins of the scales are denticulated they belong to the Ctenoidea. Fishes have pectoral fins, which are called the representatives of anterior limbs; and ventral fins, representatives of posterior limbs; and also dorsal, caudal, and anal fins. This subclass is unknown in Palæozoic rocks. Agassiz divided the fish into four groups—Cycloids, Ctenoids, Placoids, and Ganoids—based on the character of the scales; but as a single fish has been found bearing two of these types of scales, and as it is now known that the w sification, his syste way to more per quite probable, if as we know the li classes. They are parts, and arrange where the affinitie

The Ganoidea which some of the fossil remains soon to the present, the all fish covered, in were found to bel include all fossil s of the living forms with enamel. In a transverse rows; in is naked. There is the vertebral colur has been divided in Pycnodonta, Crosse

The Order Cl the paddle-fish or s

The Order Ha under the name of no shingle-like fulci as in the Teleostia. dog-fish, etc. It is certainly known in The Order Py

rhomboid scales and The Order Gin

fulcra on the fins. ball and socket join anals. This order ican rivers.

The Order Cro and fossils are refer scales may be cycloi the caudal fin is dip torals and ventrals h

The Order Aca scales, and were arm between the Ganoide

known that the whole structure of animals must be taken into consideration in classification, his system, like that of every other based on a single character, has given way to more perfect knowledge of animal life and physical structure. And it is quite probable, if the characters of Devonian fishes could be completely ascertained, as we know the living forms, they would all be found to belong to extinct subclasses. They are judged, however, only from meager fragments of the ossified parts, and arranged by homologies with the existing species, and classed in orders where the affinities seem most strongly to arrange them.

SUBCLASS GANOIDEA.

The Ganoidea (from ganos, brightness, in allusion to the enameled armor with which some of them are covered) commences in the Devonian strata, where the fossil remains soon become abundant, and continue to occur from that time forward to the present, though very few families now exist. Agassiz included as Ganoids all fish covered, in whole or in part, with bony plates; but some of the living genera were found to belong to the Teleostia, and later classification has been held to include all fossil species falling within the original definition of Agassiz and part of the living forms. The dermal skeleton consists of smooth, bony plates, covered with enamel. In some cases they are rhomboidal, arranged edge to edge in oblique transverse rows; in other cases the scales are rounded; and in a few species the skin is naked. There is much diversity in the skeletons, and all shades of ossification in the vertebral column and skull from cartilaginous to perfect bone. The subclass has been divided into seven orders, viz. : Chondrostea, Halecomorpha, Ginglymoda, Pycnodonta, Crossopterygia, Acanthodea, and Placodermata.

The Order Chondrostea includes the sturgeons of fresh and salt water, and the paddle-fish or spoon-bill cat of the Mississippi River and its tributaries.

The Order Halecomorpha (shad-like) is generally united with the Ginglymoda, under the name of the Holostea; but is distinguished by having large, round scales, no shingle-like fulcra on the fins, and in having the vertebræ concave at both ends, as in the Teleostia. The only living genus is the Amia, called bow-fin, mud-fish, dog-fish, etc. It is common to the lakes and sluggish rivers. The order is not certainly known in Palæozoic rocks.

The Order Pycnodonta has a short, vertically-flattened body, covered with rhomboid scales and peculiar dermal ribs. Tail either heterocercal or homocercal.

The Order Ginglymoda has a bony skeleton, rhomboid scales, and shingle-like fulcra on the fins. The vertebræ are convex in front and concave behind, forming ball and socket joints; tail heterocercal, and ventral fins between the pectorals and anals. This order is represented by the gar-pikes, which are common in American rivers.

The Order Crossopterygia is represented by two genera in the African waters, and fossils are referred to it back in geological time as far as the Devonian. The scales may be cycloid or rhomboid; the throat is protected by two or more plates; the caudal fin is diphycercal; dorsal fin is divided in two or more divisions; pectorals and ventrals have a scaly axis; no fulcra.

The Order Acanthodea had cartilaginous skulls, heterocercal tails, rhomboidal scales, and were armed with a spine before each fin, and are said to occupy a place between the Ganoidea and Selachia. They are all Palæozoic.

of fishes, is e Conodonts are stronger by should be rest mammal organizations y a cartilagus skeleton.

to protect a

Α.

1 within the

n was based

z a spine or r Ascidians,

oxus lanceo-

us cord, no pe of fishes,

1 out of the

lasses Tuni-

other class,

vith a tough

ne extremity

nd which in-

'e also found

ea, Selachia, orders, and majority of n and skull. skin, but the he scales are r margins of pectoral fins, s, representas subclass is sm-Cycloids, es; but as a as it is now

The Order Placodermata had the head and thoracic region inclosed in sculptured, bony plates. In some the tail was naked, in others it was covered with ganoid scales; in some the fins were inclosed in plates, but the vertebræ were not ossified. This order includes the oldest fish remains known to the geologist.

SUBCLASS SELACHIA.

The word Selachia is derived from selachos, the Greek word for shark. This subclass is also called Elasmobranchia and Chondropterygia, and it includes the living sharks, rays, and skates. The skeleton is cartilaginous, and the plates of the skull are united without sutures. There are pectoral and ventral fins, and the caudal fin is usually heterocercal. The surface of the body is naked or covered with calcified papillæ, comparable with teeth, and even spinous. The placoid scales sometimes form a sculptured armor. The dermal spines found fossil are collectively known as Ichthyodorulites. The teeth are never inserted into the jaws, but are sustained in their position by the strong skin of the gums. They sometimes have obtuse crowns, and form a pavement for both jaws; in other cases the teeth are conical, sharp, arranged in rows, with the apices pointed backward. The subclass is divided into the Holocephala and Plagiostomata. The Holocephala is represented in the existing seas by the Family Chimæridæ, and, it is said. combines some of the characters of the Selachia, Ganoidea, and Batrachia. The Plagiostomata is divided into two orders, the Squalina and Raiina, The vertebræ are well developed, and the skin is covered with plates, shields, or spines. The Order Squalina includes the ocean sharks and dog-fishes. The Order Raiina includes the skates and rays of the present seas; one of them is called the saw-fish, and another produces dangerous electrical discharges.

SUBCLASS DIPNOA.

This subclass is said to furnish a connecting link from the Ganoidea to the Batrachia. In external appearance the fish are ganoid-like. The body is long, eellike, covered with scales, and terminates in a compressed caudal fin with weak furays. The head is broad and flat. There are two orders, Monopneumonia and Dipneumonia. The Monopneumonia includes the Ceratodidæ, some of which are living in Australia, and they are common in the Mesozoic rocks, but the existence of them in the Palæozoic rocks is very doubtful.

The Order Dipneumonia contains the living Family Sirenidæ, which contains two genera, the Lepidosiren, from the rivers of Brazil, and the Protopterus, from tropical Africa. There is little reason to believe this order is represented in Palæozoic rocks, though Ctenodus and Dipterus have been referred to it.

SUBCLASS GANOIDEA.

ORDER ACANTHODEA.

FAMILY ACANTHODIDE.—Acanthodes.

ORDER CHONDROSTEA.

FAMILY CHONDROSTEIDE.—Asterosteus, Macropetalichthys. FAMILY PALEONISCIDE.—Chirolepis, Mecolepis, Paleoniscus, Rhadinichthys. FAMILY CŒ FAMILY ; CF Onychoo FAMILY DIF FAMILY HO FAMILY HO FAMILY RHI

FAMILY LEF

FAMILY CEP FAMILY COC FAMILY PTE FAMILY PTE FAMILY UNC

FAMILY PYC FAMILY UNC

FAMILY CHII todus, R

FAMILY Coc. Deltodus Platyodu Tomodus commenc velopmer rodus, is FAMILY HYF sis, Clade sodmodu Thrinaco FAMILY PET Ctenopet dus, Lisg zodus, P

ORDER CROSSOPTERYGIA.

FAMILY CŒLACANTHIDÆ.—Cœlacanthus.

FAMILY CROSSOPTERYGIDE. - Ceratodus, Conchodus, Ctenodus, Heliodus, Onychodus, Peplorhina.

FAMILY DIPTERIDÆ.-Dipterus, Gnathorhizi, Ptyonodus.

FAMILY HOLOPTYCHIDÆ.-Glyptolepis, Holoptychius.

FAMILY PHANEROPLEURONIDE. - Phaneropleuron.

FAMILY RHIZODONTIDE.-Eusthenopteron, Rhizodus.

ORDER GINGLYMODA.

FAMILY LEPIDOSTEIDE. — Acrolepis, Amblypterus, Eurylepis.

Order Placodermata.

FAMILY CEPHALASPIDÆ.—Acanthaspis, Acantholepis, Cephalaspis. FAMILY COCCOSTEIDÆ.—Coccosteus, Dinichthys, Liognathus. FAMILY PTERASPIDÆ.—Diplaspis, Palæaspis. FAMILY PTERICHTHYIDÆ.—Aspidichthys, Bothriolepis, Pterichthys. FAMILY UNCERTAIN.—Mycterops.

ORDER PYCNODONTA..

FAMILY PYCNODONTIDÆ. — Platysomus. FAMILY UNCERTAIN. — Ectosteorachis.

SUBCLASS SELACHIA.

DIVISION HOLOCEPHALA.

ORDER CHIMEROIDIDEA.

FAMILY CHIMEROIDIDÆ.—Cyrtacanthus, Liognathus, Machæracanthus, Ptyctodus, Rhinodus, Rhynchodus.

DIVISION PLAGIOSTOMATA.

ORDER SQUALINA.

- FAMILY COCHLIODONTIDÆ.—Chitonodus, Cochliodus, Cymatodus, Deltodopsis, Deltodus, Deltoptychius, Helodus, Orodus, Orthopleurodus, Petrodus, Platyodus, Pœcilodus, Psephodus, Sandalodus, Stenopterodus, Tæniodus, Tomodus, Trigonodus, Vaticinodus, Xystrodus. The Cochliodontidæ commenced at the base of the Subcarboniferous, reached their greatest development in the same geological system, and only one genus, Orthopleurodus, is found as high as the Coal Measures.
- FAMILY HYBODONTIDÆ.—Agassizodus, Apedodus, Bathychilodus, Carcharopsis, Cladodus, Diplodus, Hybocladodus, Janassa, Lambdodus, Liodus, Mesodmodus, Orodus, Periplectrodus, Phœbodus, Pristicladodus, Stemmatodus, Thrinacodus, Polyrhizodus.
- FAMILY PETALODONTIDÆ.—Antliodus, Calapodus, Cholodus, Chomatodus, Ctenopetalus, Ctenoptychius, Dactylodus, Desmiodus, Fissodus, Harpacodus, Lisgodus, Peltodus, Peripristis, Petalodus, Petalorhynchus, Polyrhizodus, Pristodus, Tanaodus, Venustodus.

osed in sculpcovered with bræ were not plogist.

shark. This includes the the plates of tral fins. and naked or covus. The plas found fossil erted into the gums. They in other cases ted backward. e Holocephala is said. com-The Plaia. vertebræ are The Order includes the 1. and another

lea to the Baly is long, eelwith weak finneumonia and of which are the existence

which contains topterus, from nted in Palæo-

adinichthys.

ACA.-ACO.

Geo. Sur. Louis Gr. rectus, St. Joh Sur. Ill., vol. xiphias, St. Joh Sur. Ill., vol. ACROLEPIS, Agass.

ACR.-ASP.]



FIG. 1100.--Acrolepis wicki. Magnified s

strongly keele ally. Type A hortonensis, Da p. 254, Subcar Agassichthys, Newk talichthys. manni, see Macro sullivanti, see I vanti.

AGASSIZODUS, St. Geo. Sur. Ill. proper name variable, trans usually produc a crest, raised the central one variabilis.

corrugatus, New (Orodus corrug 4, p. 358, Coal scitulus, St. John Sur. Ill., vol. 6.



FIG. 1101.-Ag

variabilis, Newb (Lophodus var vol. 4, p. 361, C virginianus, St. J Geo. Sur. Ill., Meas.

AMACANTHUS, St. Geo. Sur. Ill., ama, backward sal spine firmly ward, laterally face truncated a or denticulate a rounded and tu cave anterior covered with tu A. gibbosus.

FAMILY ICHTHYODORULITES.—Acondylacanthus, Amacanthus, Anaclitacanthus, Asteroptychius, Batacanthus, Bythiacanthus, Compsacanthus, Ctenacanthus, Cyrtacanthus, Drepanacanthus, Edestus, Erismacanthus, Eunemacanthus, Gampsacanthus, Gisacanthus, Glymmatacanthus, Gyracanthus, Homacanthus, Lecracanthus, Listracanthus, Machæracanthus, Marracanthus, Oracanthus, Orthacanthus, Physonemus, Pnigeacanthus, Stenacanthus, Xystracanthus.

ORDER RAIINA.

FAMILY PSAMMODONTIDÆ.-Copodus, Psammodus.

ACANTHASPIS, Newberry, 1875, Ohio Pal., vol. 2, p. 36. [Ety. akantha, spine; aspis, shield.] Cranium plates some-

what quadrangular at one end, then abruptly bending to one side, and prolonged to an acute point; surface carinated and tuber-culated. Type A. armata.

armata, Newberry, 1875, Ohio Pal., vol. 2, p. 37, Up. Held. Gr.

ACANTHODES, Agassiz, 1833, Recherches sur les Poiss. Foss., vol. 1, p. 19. [Ety. akantha, spine.] Fish lepidoid, mouth wide; lower jaw longer than the upper; teeth brushlike; scales small; dorsal fin

opposite anal pectoral FIG. 1097.—Acanthaspis armata. Plate bearing spine from left large; first ray of each fin strong, large, stiff; rays of caudal fin

FIG.1098.-Acantholepis pus-tulosus. Reduced outlines of four plates, robably in their relative

positions.

close. Type A. bronni. affinis, Whiteaves, 1899, Trans. Roy. Soc. Can., vol. 6, p. 77, Low. Devonian. concinnus, Whiteaves,

side of cranium.

1889, Trans. Roy. Soc. Can., vol. 6, p. 77, Low. Devonian.

ACANTHOLEPIS, Newberry, spine; lepis, scale.] Tuberculated cran-

ial or dermal plates, having a prevailing

spatulate outline; some are thin and have the appearance of large, elongated, unsymmetrical scales; others are stronger and produced into points that sometimes become spines. Type A. pustulosa.

pustulosa, Newberry, 1875, Ohio Pal., vol. 2, p. 38, Up Held. Gr.

ACONDVLACANTHUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 432. [Ety. akondylos, without bony knobs; akantha, spine.] Fin rays long, gradually tapering, laterally compressed. moderately curved posteriorly; lateral faces longitudi-nally fluted; costæ smooth, enameled, increasing by bifurcation and implantation; posterior face excavated longitudinally, without median keel; postero-lateral angles bear-

ing a row of downward hooked denticles; pulp cavity occupying the posterior half of the spine. Type A. gracilis.

æquicostatus, St. John & Worthen, 1875, Geo.

- Sur. Ill., vol. 6, p. 434, Keokuk Gr.
- gracilis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 433, Waverly or Kinderhook Gr.
- mudgianus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 244, Up. FIG. 1099.-
- -Acou-Coal Meas. dylacanthus nuperus, St. John & Wor-
- gracilis. Side view of spine mag. ½ diamthen, 1883, Geo. Sur. Ill., vol. 7, p. 242, Up. Coal Meas. eter
- occidentalis, Newberry & Worthen, 1866, (Leptacanthus occidentalis,)



ACA.-ACO.

Anaclitacannthus, Ctenathus, Eune-Gyracanthus. is, Marracan-18, Stenacan

are thin and f large, elonles ; others are to points that Type A. es.

5, Ohio Pal., Up. Held. Gr. St. John & 5, Geo. Sur. b. 432. [Ety. [Ety. ithout bony 1, spine.] Fin adually tapercompressed, irved posteriaces longitudicostæ smooth, reasing by biimplantation; excavated :e without me-



rig. 1099.-Acoudylacanthus gracilis. Side view of spine mag. ½ diam-eter.

& Worthen, identalis,

ACR.-ASP.]

Geo. Sur. Ill. vol. 2, p. 116, St. Louis Gr. rectus, St. John & Worthen, 1883, Geo.

Sur. Ill., vol. 7, p. 241, Up. Coal Meas. xiphias, St. John & Worthen, 1883, Geo.

Sur. Ill., vol. 7, p. 244, Keokuk Gr. ACROLEPIS, Agassiz, 1836, Recherches sur les Poiss. Foss., vol. 2, p. 79. [Ety. akros, sharp.] lepis, scale;



from Pygopterus in the shorter anal fin, the dorsal being a little more anterior in position and the scales more

Distinguished

PISCES.

FIG. 1100.-Acrolepis sedg-wicki. Magnified scale.

strongly keeled and sulcated magonally. Type A. sedgwicki. hortonensis, Dawson, 1868, Acad. Geol.,

p. 254, Subcarboniferous. Agassichthys, Newberry, syn. for Macrope-

talichthys.

manni, see Macropetalichthys manni. sullivanti, see Macropetalichthys sullivanti.

- AGASSIZODUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 311. [Ety. proper name; odous, tooth.] Teeth variable, transversely elongated, base usually produced; crown traversed by a crest, raised into several summits, the central one often large. Type A. variabilis.
- corrugatus, Newberry & Worthen, 1870, (Orodus corrugatus,) Geo. Sur. Ill., vol. 4, p. 358, Coal Meas.
- scitulus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 322, Coal Meas.



FIG. 1101.-Agassizodus variabilis.

variabilis, Newberry & Worthen, 1870, (Lophodus variabilis,) Geo. Sur. 111.,

- vol. 4, p. 361, Coal Meas. virginianus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 321, Coal Meas.
- AMACANTHUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 464. [Ety. ama, backward; akantha, spine.] Dor-sal spine firmly implanted, curved forward, laterally compressed, posterior face truncated and longitudinally keeled or denticulate along the median line; rounded and tuberculated in the concave anterior face; lateral surface covered with tuberculose costæ. Type A. gibbosus.

- gibbosus, Newberry & Worthen, 1866, (Homacanthus gibbosus,) Geo. Sur. Ill., vol. 2, p. 113, St. Louis Gr.
- AMBLYPTERUS, Agassiz, 1833, Recherches sur les Poissons Fossiles, t. 1, p. 28. [Ety. amblys, blunt; pteron, fin.] All fins large and composed of numerous rays; pectoral very large; anal broad; dorsal opposite the anal point of the ventral, which is far back; little rays on the superior lobe of the heterocercal tail; head blunt; scales medium, rhomboid. Type A. macropterus.
- macropterus, Agassiz, 1836, Recherch. Poiss. Foss., vol. 2, p. 28, Coal Meas. ANACLITACANTHUS, St. John & Worthen,
- 1875, Geo. Sur. Ill., vol. 6, p. 442. [Ety. anaklitos, leant upon; akantha, spine.] Fin spine recumbent or imbedded along its inferior extent, laterally compressed, subovate in transverse section ; exposed part constricted along the line of union with the base. Type A. semicostatus. semicostatus, St. John & Worthen, 1875,
- Geo. Sur. Ill., vol. 6, p. 443, Burlington Gr.
- ANTLIODUS, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 33. [Ety. antlia, a depression; odous, a tooth.] Teeth transversely elliptical, compressed, concavo-convex; crown similar to that of Petalodus; root short or obsolete. Type A. mucronatus.
 - Geo. Sur. Ill., vol. 2, p. 41, Keokuk Gr. gracilis, St. John & Worthen, 1875, Geo.

 - Sur. Ill., vol. 6, p. 393, Warsaw Gr. minutus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 43, Keokuk Gr. mucronatus Newberry & Worthen, 1866,
 - Geo. Sur. Ill., vol. 2, p. 38, St. Louis Gr. parvulus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 38, Burling-
 - ton Gr. perovalis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 393, Warsaw Gr.
 - politus, Newberry & Worthen, 1866, Geo.
 - Sur. Ill., vol. 2, p. 42, Keokuk Gr. robustus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 39, Kaskaskia Gr.
 - sarcululus, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 356, Burlington Gr.
- similis, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 41, Keokuk Gr. simplex, Newberry & Worthen, 1866, Geo.
- Sur. Ill., vol. 2, p. 44, Burlington Gr. sulcatus, Newberry & Worthen, 1866, Geo.
- Sur. Ill., vol. 2, p. 45, Keokuk Gr. APEDODUS, Leidy, 1856, Jour. Acad. Nat.
- Sci., 2d ser., vol. 3, p. 162. [Ety. apedos, level, smooth; odous, tooth.] Flattened lancet-shaped teeth. Type'A. priscus, priscus, Leidy, 1856, Jour. Acad. Nat. Sci., 2d ser., vol. 3, p. 162, Chemung Gr.
- Aspidichtrays, Newberry, 1873, Ohio Pal., vol. 1, p. 322. [Ety. aspis, shield; ichthys, fish.] Dorso-median plate of the carapace similar to that of Pte-

stenocephalus.

vol. 2, p. 36, Cornifer us Gr.

Type B. baculiformis.

batos, prickly bush; akantha, spine.]

Spines long, tapering, curved forward;

apex obtuse; transverse section subcircular or oval, with anterior angle

and posts rior face; lateral surfaces

rounded, covered with stellate tubercles with intercostal sulci; base moder-

ately inserted; pulp cavity subcentral.

baculiformis, St. John & Worthen, 1875, Geo. Sur. 111., vol. 6, p. 469, Keo-

kuk Gr. necis, St. John & Worthen, 1883, Geo. Spr. Ill., vol. 7, p. 253, Keokuk Gr. stellatus, Newberry & Worthen, 1866,

Drepanacanthus (?) stellatus,) Geo. Sur. Ill. vol. 2, p. 125, Keokuk Gr. Bathychilopus, St. John & Worthen, 1875,

Grö. Sur. Ill., vol. 6, p. 252. [Ety. bathys, deep; cheilos, lip; odous, tooth.]

Teeth minute, laterally elongated, sub-elliptical, sinuous in front; median

cutp with cutting edges flanked by a

pair of diverging denticles of similar shape, with a minute

Worthen, 1875, Geo. Sur. FIG. 1108. - Ba-

Ill., vol. 6, p. 252, Middle thychilodus

Petersburg. [Ety. bothrion, a furrow;

FIG. 1104.-Bothriolepis canadensis.

lepis, a scale.] Cephalic shield somewhat semielliptical in outline and covered with plates, as in Pterichthys and

BOTHRIOLEPIS, Eichwald, 1840, Bull. Soc. St.

macisascsi.

denticle between the lat-

eral and median cusps. Type B. macisaacsi.

macisaacsi, St. John &

Devonian.

Asterolepis, but course of the i the plates; it h plates in the liml otherwise disting related to both natus.

- Geo. Sur. Ill., bythios, deep; spines deeply im pressed. expos tuberculated; po pulp cavity form the posterior side vanhornii.
- Louis Gr.
- CALOPODUS, St. John like Petalodus, gid, subconical, metrical crown. apicalis.
- then, 1875, Geo. 1 vol. 6, p. 403, Coal Meas.
- CARCHAROPSIS, Agassi



FIG. 1106.--Carcharopsi wortheni.

berry, 1866, Geo. Subcarboniferous. CEPHALASPIS, Agassiz, Foss., t. 2, p. 135. aspis, shield.] En head shield very

richthys, but many times larger and covered with large, hemispherical, smooth, enameled tubercles. Type A. clavatus.

clavatus, Newberry, 1873, Ohio Pal., vol. 1, p. 323, Portage Gr.



FIG. 1102.-Aspidichthys clavatus,

Aspidodus, Newberry & Worthen, 1866, Geo. Sur. 111., vol. 2, p. 92, syn. for Psephodus.

convolutus, see Psephodus convolutus. crenulatus, see Prephodus crenulatus. Asteracanthus siderius, see Bythiacanthus

- siderins. ASTEROPTYCHIUS, McCoy, 1854, British Pal. Rocks, p. 615. [Ety. aster, star; ptyx, wrinkle.] Bony fin-ray compressed, long, slender, gradually tapering to a point at the distal end, and abruptly tapering at the striated proximate end or base of insertion; sides moderately convex, converging to the anterior edge, which is strongly, keeled; posterior face with a moderate cavity, each lateral edge having a row of small, pointed teeth, directed upward; sides with smooth, thread-like ridges, separated by broader, flat, longitudinally striated spaces on which are irregularly scattered, smooth, spinous tubercles. Type A. ornatus.
 - bellulus, St. John & Worthen, 1875, Geo.
 - Sur. Ill., vol. 6, p. 439, Coal Meas. keokuk, St. John & Worthan, 1875, Geo. Sur. Ill., vol. 6, p. 436, Keckuk Gr. stludovici, St. John & Worthen, 1875,
 - Geo. Sur. 111., vol. 6, p. 437, St. Louis Gr.
 - tenellus, St. John & Wortl en, 1883, Geo. Sur. Ill., vol. 7, p. 248, Up. Coal Meas.
 - tenuis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 438, Kaskaskia Gr. triangularis, Newberry & Worthen, 1870,
 - Geo. Sur. 111., vol. 4, p. 370, Burlington Gr.
 - vetustus, St. John and Worthen, 1875, Geo. Sur. 111., vol. 6, p. 435, Waverly or Kinderhock Gr.
- ASTEROSTEUS, Newherry, 1875, Ohio Pal., vol. 2, p. 35. [Ety. as'er, star; ostion, lone.] H. ad lng, narrow, broadening in the occipital region; surface covered by a sheet of tuberculated enamel;

588



BYT.-CHI.]

canadensis,) Am 3d. ser., vol. 20 nian. BYTHIACANTHUS, St. .

- Louis Gr.
- Sur. 111, vol. 6, beautiful; odous, Teeth in genera tinguished by t
- apicalis, St. John
- les Poissons For [Ety. carcharops cipal cusps very pressed in from broadly expande gles sharp, crenu cupied by isola denticles; coron faintly striated v

nasal pits strongly marked; condylelike posterior projections. Type A.

stenocephalus, Newberry, 1875, Ohio Pal.. BATACANTHUS, St. John & Worthen, 1875. Geo. Sur. Ill., vol. 6, p. 468. [Etv.

canadensis, Whitea

erius, Leidy, 18 erius,) Ext. Vei

vanhornii, St. Jol Geo. Sur. Ill., ASP.-BOT

condyle-Type A.

Ohio Pal.

then, 1875, 468. [Etv. ha, spine.] d forward: etion suberior angle al suifaces llate tuberjase modersubcentral.

then, 1875, 469, Keo-

1883. Geo. kuk Gr. then, 1866. s,) Geo. Sur. lir. nthen, 1875, 252. [Etv.

dous, touth.] ngated, subnt; median lanked by a s of similar



1108 - Ra. thychilodus macisascsi. Bull. Soc. St. 1, a furrow;



adensis.

shield somethne and coverichthys and BYT.-CHI.]

Asterolepis, but distinguished by the course of the furrows and shape of the plates; it has longer articulating plates in the limb or arm, and has been otherwise distinguished, though closely related to both genera. Type B. ornatus

- canadensis, Whiteaves, 1880, (Pterichthys canadensis,) Am. Jour. Sci. and Arts. 3d. ser., vol. 20, p. 135, Up. Devonian.
- BYTHIACANTHUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 444. [E'y. bythios, deep; akantha, spine.] Fin spines deeply imbedded, laterally compressed, exposed part recumbent, tuberculated; posterior face low, keeled; pulp cavity forming a deep channel in the posterior side of the base. Type B. vanhornii.
- siderius, Leidy, 1873, (Asteracanthus sid-erius,) Ext. Vert. Fauna, p. 313, St. Louis Gr.
- vanhornii, St. John & Worthen, 1875. Geo. Sur. Ill., vol. 6, p. 445, St. Louis Gr.
- CALOPODUS, St. John & Worthen, 1875, Geo. Sur. III, vol. 6, p. 403. beautiful; odous, tooth.] Ety. kalos.

Teeth in general form like Petalodus, but dis-tinguished by the tur-gid, subconical, unsym-metrical crown. Type C. apicalis.



apicalis, St. John & Wor- FIG. 1105-Calo then, 1875, Geo. Sur. III., Jodus apica-lis. Mag. vol. 6, p. 403, Middle diam. Coal Meas.

CARCHAROPSIS, Agassiz, 1843, Recherches sur les Poissons Fossiles, vol. 3, p. 313. [Ety. carcharopsis, shark-like.] Principal cusps very strong, erect, compressed in front, rounded behind, broadly expanded at base; lateral angles sharp, crenulated; extremities occupied by isolated, conical, lateral denticles; coronal faces smooth or faintly striated vertically; base in out-

line like Cladodus, moder. ately produced and broadly rounded posteriorly; anterior face sinuous, terminating below in a ridge; inferior surface excavated. Type C.

prototypus. wortheni, New-

berry, 1866, Geo. Sur. 111., vol. 2, p. 69, Subcarboniferous.

FIG. 1106 .-- Carcharopsis

wortheni.

CEPHALASPIS, Agassiz, 1836, Recherch. Pois. Foss., t. 2, p. 135. [Ety. kephale, head; aspis.shield.] Entiresk-leton external; head shield very large, subcrescentiform when depressed but in better. condition showing an arching over the top of the

head, covered with discoidal, sculptured. bony plates, with the crescent horns directed backward; eyes large, elliptical, on each side of the upper cen-

tral part of Fig. 1107.—Cephalaspis lyelli, the head; Head shield depressed, and body rapidly showing the jointed angular outline of part of the body. tapering, angular on top.

- and presenting a jointed appearance somewhat like a trilobite; dorsal, anal, and caudal fin, the latter like a paddle or oar. Type C. lyelli. campbeltonensis, Whiteaves, 1881, Can.
- Nat., vol. 10, Devonian.
- dawsoni, Lankester, 1870, London Geo. Mag., Devonian.
- CERATODUS, Agassiz, 1833, Recherches sur les Poissons Fossiles, t. 1, p. 129. [Ety. keras, horn; odous, tooth.] Teeth large, thick, longer than wide, very porous; crown transversely sulcated. Type C. latissimus.
 - favosus, Cope, 1884, Pal. Bull., No. 39, p. 28, Permian.
 - paucicristatus, Cope, 1877, Proc. Am. Phil-Soc., p. 54, Permian.
 - vinslovii, Cope, 1876, Proc. Am. Phil. Soc., p. 410, Permian.
- Chirodus, McCoy, 1848, Ann. and Mag. Nat. Hist., vol. 2, p. 130. [Ety. cheir, the hand; odous, tooth.] Tooth fan-shaped, thick, flattened; anterior broad, margin deeply divided into lobes; inner nearly straight margin has a small, recurved, thumb like lobe projecting nearly at right angles from the middle of its length, preventing the mesial junction of the tritors of each side of the jaw; inner marginal lobe the longer; surface minutely punctured. Type C. pessanæ. Not definitely known in America.
 - acutus, Newberry, 1857, Proc. Acad. Nat. Sci., vol. 8, p. 99, Coal Meas. Too poorly defined to warrant recognition.
- CHIROLEPIS, Agassiz, 1833, Recherches sur les Poissons Fossiles, t. 1, p. 128. [Ety. cheir, hand; lepis, scale.] Bones of the head sculptured; shoulder bone and fins osseous; pectorals large, reaching near the ventral fin, and ventral reaching near the anal fin; dorsal fin small and opposite the posterior part of the anal fin; tail well-developed, principally on the lower side; scales small, sculp-



590

- lines. Type C. trailli. canadensis, Whiteaves, 1881, Am. Jour. Sci. and Arts., 3d ser., vol. 21, p. 496, Up. Devonian.
- CHITONODUS, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 109. [Ety. chiton, a smock or coat; odous, tooth.] Mandibular posterior teeth trapezoidal, arched in the direction of inrollment; median teeth narow, inrolled longitudinally; maxillary posterior teeth subquadrilateral, arched, and inrolled along the outer margin. Type C. spingeri. antiquus, St. John & Worthen, 1883, Geo.
 - Sur. Ill., vol. 7, p. 116, Low. Burlington Gr.
 - latus, Leidy, 1856, (Cochliodus latus,) Trans. Am. Phil. Soc., vol. 11, p. 87, pl. 5, fig. 17, Keokuk Gr.
 - lýratus, St. John & Worthen, 1883. Geo. Sur. IH., vol. 7, p. 119, St. Louis Gr.
 - rugosus, Newberry & Worthen, 1866, (Pecilodus rugosus, P. ornatus, and P. convolutus,) Geo. Sur. Ill., vol. 2, pp.
 - 94, 95; vol. 4, p. 366, Keokuk Gr. spingeri, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 112, Up. Burlington Gr.
 - tribulis, St. John & Worthen, 1883, Geo.

Sur. Ill., vol. 7, p. 117, Keokuk Gr. CHOLODUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 415. [Ety. cholos, defective; odous, tooth.] Distinguished

FIG. 1108.-Cholodus inæqualis. vex face.

from Peltodus and Fissodus, by the eccentrically lobed crest and extreme downward prolongation of the lateral extremities of the coronal fold in the convex

face. Type C. inæqualis, inæqualis, St. John & Worthen, 1875, Geo.

- Sur. Ill., vol. 6, p. 416, Coal Meas. CHOMATODUS, Agassiz, 1843, Recherches sur les Poissons Fossiles, t. 3, p. 107. [Ety. choma, a pile or heap; odous, touth.] Teeth transversely much elongated, compressed, and depressed; crown having the homologous parts of Petalodus, and the form and structure of Polyrhizodus; root short, sometimes obsolete,
 - undivided. Type C. linearis. affinis, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 54, Keokuk Gr.
 - angularis, see Tanaodus angularis.
 - arcuatus, St. John, 1870, Proc. Am. Phil. Soc., vol. 2, p. 435, and Pal. E. Neb., p. 243, Coal Meas.
 - chesterensis, St. John & Worthen, 1875. Geo. Sur. Ill., vol. 6, p. 363, Kaskaskia Gr.
 - comptus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 356, Burlington Gr.
 - costatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 85, Keokuk Gr.

- cultellus, Newberry & Worthen, 1866. Geo. Sur. Ill., vol. 2, p. 52, Kaskaskia Gr.
- elegans, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 86, Keokuk Gr.
- gracillimus, see Tanaodus gracillimus. inconstans, St. John & Worthen, 1875.
- Geo. Sur. Ill., vol. 6, p. 360, St. Louis Gr. incrassatus, St. John
- & Worthen, 1875,
- Geo. Sur. Ill., vol. 6, p. 359, St. Louis

Gr.

FIG. 1109.-Chomatodus incrassatus.

CHI.-CLA.

insignis, Leidy, 1856, Trans. Am. Phil.

Soc., vol. 11, p. 87, St. Louis Gr.

- linearis, Agassiz, 1843, (Psammodus linearis,) Recherches Pois. Foss., t. 3, p. 108, Subcarb.
- loriformis, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 58, Keokuk Gr. molaris, Newberry & Worthen, 1866, Geo.
- Sur. Ill., vol. 2, p. 56, Keokuk Gr. multiplicatus, see Tanaodus multiplicatus. obscurus, see Tanaodus obscurus.
- parallelus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 358, Warsaw Gr.
- pusillus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 53, Keokuk Gr. varsoviensis, St. John & Worthen, 1875,
- Geo. Sur. 111., vol. 6, p. 393, Warsaw Gr. venustus, Leidy, see Venustodus leidyi,
- where the specific name is made to designate the genus, and the author the specific name, contrary to the rules of nomenclature; also see Venustodus venustus.
- CLADODUS, Agassiz, 1843, Recherches sur les Poissons Fossiles, t. 3, p. 196. [Ety. klados, twig; odous, tooth.] Teeth with broad, horizontal, semicircular, thick, bony, coarsely fibrous base, rounded behind, truncated in front; crown divided into long, sharp, subulate, conical points, arranged along the straight truncated edge of the base; medial cone much larger than the secondary ones, of which latter the exernal cones are the larger; all the cones striated longitudinally, and either circular in section or with simple cutting edges, slightly compressed. Type C. mirabilis.

acuminatus, New-berry, 1857, Proc. Acad. Nat. Sci. Phil., vol. 8, p. 99, and Ohio Pal., vol. 2, p. 45, Subcarboniferous. alternatus, St. John & Worthen, 1875,

Geo. Sur. Ill., v

raricostatus, St. Jol Geo. Sur. 111., 1 kuk Gr.



angulatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 24, Keo-

kuk Gr.

bellifer, St. John Sur. Ill., vol. 6, carinatus, St. John Sur. Ill., vol. 6,

concinnus, Newb vol. 2, p. 48, Po costatus, Newberry

- Sur. Ill., vol. 2,
- deflexus, Newber Geo. Sur. Ill., v
- ton Gr. eccentricus, St. J Geo. Sur. Ill.,
- Louis Gr. elegans, Newberry

Sur. Ill., vol. 6, 1 euglypheus, St. Jo

- Geo. Sur. Ill., Louis Gr.
- exiguus, St. John Sur. Ill., vol 6, 1 derhook Gr.
 - exilis, St. John & Sur. Ill., vol. 6, 1
 - derhook Gr. ferox, Newberry d
- Sur. 111., vol. 2, 1
- fulleri, St. John d Sur. Ill., vol. 6, p gomphoides, St. J
- Geo. Sur. Ill., v ton Gr.

gracilis, Newberry Sur. Ill., vol. 2, 1 grandis, Newberry

Sur. Ill., vol. 2, p bertzeri, Newberry 2, p. 46, Portage

intercostatus, St. J Geo. Sur. Ill., v ton Gr. ischypus, Newberry

Sur. Ill., vol. 4, p lamnoides, Newbe Geo. Sur. Ill., vo

magnificus, Tuome Ala., p. 39, Kaska micropus, Newber

Geo. Sur. Ill., vo mortifer, Newberry

Sur. Ill., vol. 2, p newmani, Tuomey, Kaskaskia Gr.

occidentalis, Leidy, Sci. Phil., Up. Cc pandatus, St. John

Sur. Ill. vol. 6, p. parvulus, Newberry 2, p. 48, Portage

pattersoni, Newber vol. 2, p. 47, Way politus, Newberry d

Sur. Ill., vol. 2, p. prænuntius, St. Jol

ton Gr.

[CHI.-CLA.

CLI.—COC.]

orthen, 1866, 52, Kaskas-

en, 1866, Geo. kuk Gr. acillimus. orthen, 1875, p. 360, St.



-Chomatodus crassatus.

iis Gr. mmodus line-Foss., t. 3, p.

Vorthen, 1866, 3, Keokuk Gr. en, 1866, Geo. skuk Gr. multiplicatus. urus.

orthen, 1875, p. 358, War-

orthen, 1866, 3, Keokuk Gr. Vorthen, 1875, 3, Warsaw Gr. stodus leidyi, s made to deshe author the the rules of 'enustodus ve-

perches sur les p. 196. [Ety. Teeth with ircular, thick, base, rounded nt; crown disubulate, conng the straight base; medial the secondary exernal cones cones striated er circular in cutting edges, pe C. mirabilis. natus, Newy, 1857, Proc. id. Nat. Sci. vol. 8, p. 99, Ohio Pal., vol. . 45, Subcarborous.

atus, St. John Vorthen, 1875, . Sur. Ill., vol. 265, Waverly inderhook Gr. Worthen, 1866, p. 24, Keo-

- bellifer, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 270, Burlington Gr. carinatus, St. John & Worthen, 1875, Geo.
 - Sur. Ill., vol. 6, p. 279, Coal Meas.
- concinus, Newberry, 1875, Ohio Pal., vol. 2, p. 48, Portage Gr. costatus, Newberry & Worthen, 1866, Geo.
- Sur. Ill., vol. 2, p. 27, Kaskaskia Gr. deflexus, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 355, Burlington Gr.
- eccentricus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 272, St. Louis Gr.
- elegans, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 6, p. 354, St. Louis Gr.
- euglypheus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 274, St. Louis Gr.
- exiguus, St. John & Worthen, 1875, Geo. Sur. Ill., vol 6, p. 261, Waverly or Kinderhook Gr.
- exilis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 258, Waverly or Kinderhook Gr.
- ferox, Newberry & Worthen, 1866, Geo. Sur. III., vol. 2, p. 26, St. Louis Gr. fulleri, St. John & Worthen, 1875, Geo. Sur. III., vol. 6, p. 276, Coal Meas. gomphoides, St. John & Worthen, 1875, Coo. Sur. 1875, Geo.
- Geo. Sur. Ill., vol. 6, p. 269, Burlington Gr.
- gracilis, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 30, Coal Meas.
- grandis, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 29, Kaskaskia Gr.
- hertzeri, Newberry, 1875, Ohio Pal., vol. 2, p. 46, Portage Gr.
- intercostatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 267, Burlington Gr.
- ischypus, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 354, St. Louis Gr.
- lamnoides, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 30. Keokuk Gr. magnificus, Tuomey, 1858, 2d Rep. Geo. Ala., p. 39, Kaskaskia Gr.
- micropus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 21, Keokuk Gr.
- mortifer, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 22, Coal Meas. newmani, Tuomey, 1858, Geo. Ala., p. 39,
- Kaskaskia Gr.
- occidentalis, Leidy, 1859, Proc. Acad. Nat. Sci. Phil., Up. Coal Meas. pandatus, St. John & Worthen, 1875, Geo.
- Sur. Ill. vol. 6, p. 278, Coal Meas.
- parvulus, Newberry, 1875, Ohio Pal., vol. 2, p. 48, Portage Gr.
- pattersoni, Newberry, 1875, Ohio Pal., vol. 2, p. 47, Waverly Gr. politus, Newberry & Worthen, 1875, Geo.
- Sur. Ill., vol. 2, p. 27, Kaskaskia Gr. prænuntius, St. John & Worthen, 1875,
- Geo. Sur. Ill., vol. 6, p. 270, Burlington Gr. raricostatus, St. John & Worthen, 1875,
- Geo. Sur. 111., vol. 6, p. 271, Keokuk Gr.

- robustus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 20. Keokuk Gr. romingeri, Newberry, 1875, Ohio Pal., vol.
- 2, p. 49, Waverly Gr. spinosus, Newberry & Worthen, 1866, Geo. Sur., Ill., vol. 2, p. 22, St. Louis Gr. springeri, St. John & Worthen, 1875,
- Geo. Sur. Ill., vol. 6, p. 259, Waverly or Kinderhook Gr.
- stenopus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p 23, St. Louis Gr. subulatus, Newberry, 1875, Ohio Pal., vol.
- 2, p. 47, Cuyahoga shale over the Berea grit.
- succinctus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 265, Waverly or Kinderhook Gr.
- turritus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 28, Keokuk Gr. vanhornii, St. John & Worthen, 1875,
- Geo. Sur. Ill., vol. 6, p. 273, St. Louis Gr.
- wachsmuthi, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 263, Waverly or Kinderhook Gr.
- zygopus, Newberry & Worthen. 1866, Geo. Sur. Ill., vol. 2, p. 25, Kaskaskia Gr.
- Climaxodus, McCoy, 1848, Ann. and Mag. Nat. Hist., 2d ser., vol. 2. [Ety. klimax, ladder; odous, tooth.] Tooth longer than wide, gradually narrowing toward the front, with nearly straight sides; anterior part of the crown crossed by broad, imbricating, transverse ridges, at right angles to its length; surface mi-nutely punctured. Type C. imbricatus. Not definitely known in America.
 - brevis, Newberry, 1857, Proc. Acad. Nat. Sci., vol. 8, p. 100, Coal Meas. Too poorly defined to warrant recognition.
- Coccosteus, Agassiz, 1836, Recherch. Pois. Foss., vol. 2, p. 302. [Ety. kokkos, berry; osteon, bone.] H ad rounded; body triangular, with long vertebrated tail. like a rudder, the whole compared in form, by Hugh Miller, to a boy's kite; head and body covered with tuberculated bony plates; central front plate like the keystone of an arch; the posterior body plate is large, saddle-wise toward the center, pointed behind; on the ridge there is a longitudinal groove ending in a perforation, a little behind the apex. It is this plate which has been described as C. occidentalis, but it does not show groove or perforation. Type C. decipiens.
 - acadicus, Whiteaves, 1881, Can. Nat., vol. 10, Upper Devonian.
 - occidentalis, Newberry, 1875, Ohio Pal., vol. 2, p. 32, Up. Held. Gr.
- COCHLIODUS, Agassiz, 1843, Recherches sur les Poissons Fossiles, t. 3, p. 113. [Ety. kochlias, anything spiral; odous, tooth.] Lower jaw thick, short, bony, V-shaped, bearing on each ramus two obliquely twisted and obtusely ridged semicylindrical teeth, strongly inrolled on



costatus, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 364, Burlington Gr. berry & Worthen, 1866, syn.

for Sandalodus lævissimus. latus, see Chitonodus latus.

leidyi, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 127, Kaskaskia Gr. nitidus, see Deltoptychius nitidus.

nobilis, Newberry & Worthen, syn. for Chitonodus latus.

obliquus, St. John & Worthen, 1883, Geo

Sur. Ill., vol. 7, p. 126, St. Louis Gr. occidentalis, see Deltodus occidentalis. vanhornii, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 120, St. Louis Gr.

CŒLACANTHUS, Agassiz, 1836, Rechercher sur les Poissons Fossiles, t. 2, p. 170 [Ety. koilos, hollow; akantha, spine] Head plates sculptured; scales large, imbricated, sculptured, arranged digonally; two small dorsal fins supported on interspinous bones, the anterior one a little forward of the ventral fin and the posterior one nearly opposite the agal fin; caudal fin equi-lobate, and near its extremity a minute supple-



FIG. 1112.—Cœlacanthus elegans.

mental caudal; vertebral column cartilaginous, but neural arches and fin-rays bony; teeth small, numerous, conical. Type C. granulosus.

elegans, Newberry, 1856, Proc. Acad. Nat. Sci. Phil., vol. 8, p. 98, and Ohio Pal., vol. 1, p. 339, Coal Meas.



ornatus, Newberry, 1856, Proc. Acad. Fig. 1118.--Cœiacan-thus granulosus. thus granulosus. Magnified scale. Nat. Sci. Phil., vol.

8, p. 98, and Ohio - Pal., vol. 1, p. 340, Coal Meas.

robustus, Newberry, 1856, Proc. Acad. Nat. Sci. Phil., vol. 8, p. 98, and Ohio Pal., vol. 1, p. 341, Coal Meas.

COMPSACANTHUS, Newberry, 1857, Proc. Acad. Nat. Sci., vol. 8, p. 99, and Ohio Pal., vol. 1, p. 331. [Ety. compsos, elegant; akanthu, a spine.] Spines small, gently curved backward; exposed part smooth, polished; section circular; single row of remote, depressed hooks on the posterior median line. Type C. lævis.

lævis, Newberry, 1857, Proc. Acad. Nat. Sci. Phil., vol. 8, p. 99, and Ohio Pal., vol. 1, p. 332, Coal Meas.



Coy,

Ann.

Mag.

Hist.,

[Ety.

ser., vol. 2.

chos, shell;

odous,tooth.]

1848,

and

Nat.

2d.

con-

FIG. 1114.-Compsacanthus lævis.

Conchiopsis, syn for Cœlacanthus. anguliferus, syn. for Cœlacanthus elegans. exanthematicus, syn. tor Peplorhina anthracina.

filiferus, syn. for Cœlacanthus elegans. CONCHODUS, Mc-



FIG. 1115 -- Conchodus plicatus.

Teeth large, pointed in somewhat semicircular. front, subtruncate behind, deeply concave on the grinding surface; internal margin straight, thickened, edg- ab-ruptly deflected; external border convex, much raised, undulato-plicate, ridges larger in front, smaller posterior; under surface polished, minutely porous. Type C. ostreiformis.

plicatus, Dawson, 1868, Acad. Geol., p. 209, Co-1 Meas. r 10 a

tid.

longitudinal pro-

Type C. cor-

COPODUS, Agassiz, MSS. 1859, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 227. [Ety. kopis, broad, curved knife; odous, tooth.] Teeth bilaterally symmetrical, spanning the jaw without mesial suture, ar-ranged in single, longitudinal series from behind backward; lateral bor. ders converging anteriorly; coronal region arched; rim

at base; anterior Fig. 1116. - Copodus and posterior walls cornutus. Maxilcornutus. lary form. vertical, channeled; urating surface; b, transverse profile; inferior surface concave ; porous c, le file. beneath the enameled coronal surface. nutus.

[CEL.--COP.

Sur. Ill., vol. Fig. a



FIG. 1117.-Copodus on nutus. Mandibu form. a surface; а, Triturat b. transve profile; c, longitudi profile.

transverse sca cealed base r striated. Type angulatus, Newbe Geo. Sur. Ill., v

kia Gr. burlingtonensis, f

1875, Geo. Sur Burlington Gr. buttersi, St. John Sur. 111., vol.

cannaliratus, St. Geo. Sur. Ill., kia Gr.

coxanus, St. Jo Geo. Sur. 111., kuk Gr.

defl-xus, St. John Sur. Ill., vol. 7,

- elegans, Tuomey, Kaskaskia Gr. excavatus, St. Jo
- Geo. Sur. Ill., kuk Gr.

gemmatus, St. J. Geo. Sur. Ill.

gracillimus, Newb Geo. Sur. Ill.,

Louis Gr. grado-costatus, St. Geo. Sur. Ill., 1 ton Gr.

Louis Gr. a, Trit-



Meas. costatus, see Euner



CEL.-COP.

CTE.]

Fig. b

Fig.

1857, Proc. 99, and Ohio compsos, ele-Spines small. exposed part on circular: essed hooks ne. Type C.

Acad. Nat. d Ohio Pal.,



lævis

thus elegans. olorhina an-

s elegans. SCHODUS, MC-

1848, Cov. Ann. and Mag. Nat. Hist., 2d. ser., vol. 2. [Ety. conchos, shell; odous, tooth.] Teeth large, pointed in , deeply conace; internal d, edg+ abborder conulato-plicate, naller posteed, minutely mis. ad. Geol., p.



1116. - Copodus Itus, Maxil-

Maxil-ng surface; b. sverse pro ng surface; b, sverse profile; ngitudinal pro-

Type C. cor-

PISCES.

pusillus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 231, Kaskaskia Gr. vanhornii, St. John Fig. d

& Worthen, 1883, Geo. Sur. 111., vol. 7, p. 229, St. Louis Gr.

CTENACANTHUS, 1843. Agassiz, Recherches sur les Poissons Fossiles, t. 3, p. 11. [Etv. ktenos, comb; akantha. spine.] Fin spine compressed, gradually tapering, arched backward; anterior narrow, face rounded; D08terior face concave, lateral bordered edges by two rows of curved denticles inclined downward; surface

by

FIG. 1117.-Copodus cor-nutus. Mandibular form. a, Triturating surface; b, transverse profile; c, longitudinal profile. ridges furrowed, pectinated transverse scales or tubercles; con-

- cealed base rapidly tapering, finely striated. Type C. tenuistriatus.
- angulatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 118, Kaskaskia Gr.
- burlingtonensis, St. John & Worthen, 1875. Geo. Sur. Ill,, vol. 6, p. 426, Burlington Gr.
- buttersi, St. John & Worthen, 1883, Geo. Sur. 111., vol. 7, p. 240, Lower Coal Meas.
- cannaliratus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 239, Kaskaskia Gr.
- costatus, see Eunemacanthus costatus.
- coxanus, St. John & Worthen, 1883, Geo. Sur. 111., vol. 7, p. 233, Keokuk Gr.
- defl-xus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 234, St. Louis Gr.
- elegans, Tuomey, 1858, Geo. Ala., p. 38, Kaskaskia Gr.
- excavatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 428, Keokuk Gr.
- formosus, Newberry, 1873, Ohio Pal., vol. 1, p. 328, Waverly Gr.
- furcicarinatus, Newberry, 1875, Ohio Pal., vol. 2, p. 54, Waverly Gr.
- gemmatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 429, St. Louis Gr.
- gracillimus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 126, St. Louis Gr.
- grado-costatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 425, Burlington Gr.

harrisoni, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 236, St. Louis Gr. keokuk, St. John & Worthen, 1875, Geo.

- Sur. Ill., vol. 6, p. 427, Keokuk Gr.
- latispinosus, Whiteaves, 1881, Can. Nat. and Geol., vol. 10, Upper Devonian.
- marshi, Newberry, 1873, Ohio Pal., vol. 1, p. 326. Coal Meas.
- mayi, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 372, Burlington Gr.
- parvulus. Newberry, 1875, Ohio Pal., vol. 2, p. 55, Cleveland shale.
- pellensis, St. John & Worthen, 1883, Geo. Sar. Ill., vol. 7, p. 237, St. Louis Gr. pugiunculus, St. John & Worthen, 1875,
- Geo. Sur. HE, vol. 6, p. 430, St. Louis Gr. sculptus, St. John & Worthen, 1875, Geo.
- Sur. Ill., vol. 6, p. 421, Waverly or Kinderhook Gr.
- similis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 431, Kaskaskia Gr.
- speciosus, St. John & Worthen. 1875, Geo. Sur. Ill., vol. 6, p. 424, Waverly or Kinderhook Gr.
- spectabilis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 420, Waverly or Kinderhook Gr.
- triangularis, Newberry, 1873, Ohio Pal., vol. 1, p. 329, Waverly Gr.
- varians, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 422, Waverly or Kinderhook Gr.



FIG. 1118.—Ctenacanthus triangularis.

vetustus, Newberry, 1873, Ohio Pal., vol. 1, p. 326, Waverly Gr.

- wrighti, Newberry, 1884, 35th Rep. N. Y. Mus. Nat. Hist., p. 206, Ham. Gr. CTENODUS, Agassiz, 1843, Recherches sur les
 - Poissons Fossiles, t. 3, p. 137. [Ety. klenos. comb: odous. tooth.] Tooth ktenos, comb; odous, tooth.] somewhat fan like, with closely serrated edges, very porous and sulcated; position in the jaw unknown. Type C. cristatus.

dialophus, Cope, 1878. Proc. Am. Phil. Soc., vol. 17, p. 528, in Pal. Bull. No. 29, Permian.

fossatus, Cope, 1877, Proc. Am. Phil. Soc., p. 54, Permian.

gurleianus, Cope, 1877, Proc. Am. Phil. Soc.,

p. 55, Permian. ohioensis, Cope, 1874, Proc. Acad. Nat. Sci. Phil., p. 91, and Ohio



Pal. Bull. No 29, in Proc. Am. Phil. Scc., vol. 17, p. 527, Permian.



porrectus, Cope, /1878, Pal. Bull. No. 29, in Proc. Am. Phil. Soc., vol. 17, p. 527, Permian.

pusillus, Cope, 1878, Pal. Bull. No. 26, in Proc. Am. Phil. Soc., vol. 17, p. 191, Permian.

reticulatus, Newberry, 1875, Ohio Pal., vol. 2, p. 60, Coal Meas.

serratus, Newberry, 1875, Ohio Pal., vol. 2, p. 59, Coal Meas.

CTENOPETALUS, Agassiz, 1869, Catal. Foss. Fish, Collection of Earl of Enniskillen, in Geo. Mag., vol. 6. [Ety. ktenos, comb; petalos, broad, full-grown.] The serrated or denticulated crest distinguishes it from Petalodus, which it much resembles, and to which it bears about the same relation 'as Petalodus does to Antliodus. Type C. serratus.

bellulus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 398, St. Louis Gr. limatulus, St. John & Worthen, 1875,

Geo. Sur. Ill., vol. 6, p. 399, Kaskaskia Gr. medius, St. John &

FIG. 1120. - Ctenopetalus occident-alis. Concave Concave face.

Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 400, Kaskaskia Gr. occidentalis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 401, Coal Meas.

vinosus, St. John & Worthen, 1875, Geo.

Sur. Ill., vol. 6, p. 396, Keokuk Gr. CTENOPTYCHIUS, Agassiz, 1843, Recherches sur les Poissons Fossiles, t. 3, p. 99. [Ety. ktenos, comb; ptyche, wrinkle.] Teeth small, highly polished, strongly compressed, rounded or obtusely pointed; edge divided into several strong denticulations; base of crown with a few imbricating folds of ganoine; bony root, oblong, flattened in the same direction as the crown. Type C. apicalis.

cristatus, Dawson, 1868, Acad. Geol., p. 209, Coal Meas.

FIG. 1121.-Ctenoptychius cristatus. Natural size and magnified.

digitatus, Leidy, 1856, Trans. Am. Phil. Soc., vol. 11, St. Louis Gr. pertenuis, St. John & Worthen, 1875,

Geo. Sur. Ill., vol. 6, p. 382, Kaskaskia Gr.

semicircularis, see Peripristis semicircularis

stevensoni, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 383, Coal Meas. CYMATODUS, Newberry & Worthen, 1870,

Geo. Sur. Ill., vol. 4, p. 363. cymatos, wavy; odous, tooth.] Teeth small, oblong, or elliptical, thin, forming a flat or arched plate, of which the crown surface is transversely undulated and uniformly punctate; under surface flat, smooth, at the posterior end bearing a narrow, strap-shaped, oblique root. Type C. oblongus.

oblongus, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 364, Up. Coal Meas.

CYRTACANTHUS, Newberry, 1873, Ohio Pal., vol. 1, p. 306. [Ety. kurtos,

curved; akantha, spine.]

Spine curved, tuberculated, single row of con-

ical denticles set on the

posterior side, limited to

the upper portion, and

increasing in size from

below upward. Type

Ohio Pal., vol. 1, p. 307,

Worthen, 1866, Geo.

Sur. Ill., vol. 2, p. 33.

[Ety. daktylos, finger; odous, tooth.] Crown

as in Petalodus; root

conspicuous, and di-

vided into a number of radicles. Type D. prin-

Sur. 111., vol. 6, p. 390, tus.

dentatus, Newberry, 1873,

DACTYLODUS, Newberry &

p. 306.

C. dentatus.

ceps.

kia Gr.

St. Louis Gr.

48, Kaskaskia Gr.

Up. Held. Gr.



[CTE.-DAC.

tour and genera distinguished by the median ridge prominence, whi dus or Chitono affinis, St. John d

Sur. Ill., vol. 7, angusta, Newberr (Deltorlus angus

4, p. 368, Kaskas bialveata, St. John Sur. Ili., vol. 7, p

convexa, St. John Sur. Ill., vol. 7, ton Gr.

convoluta, St. Jol Geo. Sur. Ill., ve lington Gr.

exornata, St. John Sur. Ill., vol. 7, p inflexa, St. John & Sur. Ill., vol. 7, p

keokuk, St. John d Ill., vol. 7, p. 169 stludovici, St. John

Sur. Ill., vol. 7, p DELTODUS, Agassiz, 1 berry & Worth Ill., vol. 2, p. angle; odous, t thick, strong, tri arched, sometime longer and more posite margin; cr

or marked by 1-: from the basal n longer angle. Ty ala/us, Newberry & Chitonodus latus.

angularis, Newberry for Orthopleurodu angustus, see Deltode cinctu us, St. John

Geo. Sur. Ill., vol. cingulatus, Newbern Geo. Sur. Ill., vol. complanatus, see San

fasciatus, see Tæniod giandis, Newberry & Sur. Ill., vol. 2,

Probably syn. fo simus. intermedius, St. Joł

Geo. Sur. Ill., vol. 7 latior, St. John &

Sur. Ill., vol. 7, p. littoni, Newberry & Sur. Ill., vol. 4,

erous. occidentalis, Leidy, 1 cidentalis,) Trans. 11, p. 87, Warsaw parvus, St. John &

Sur. Ill., vol. 7, powelli, St. John & Sur. Ill., vol. 7, p.



Sur. Ill., vol. 2, p. T1, 5t. LOUIS Gr. FIG. 1123. -- Dactylo-minimus, St. John & dus concavus. Con-Worthen, 1875, Geo. vex face. Sur III. such fi

concavus, St. John & FIG. 1122.-Cyrta-

Worthen, 1875, Geo. canthus denta-

Sur. Ill., vol. 6, p. 391, St. Louis Gr. princeps, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 45, St. Louis Gr.









[CTE.-DAC.

DEL.-DES.]

rthen, 1875, 3. Coal Meas. rthen, 1870, 363. [Ety. Teeth oth.] thin, formof which the rsely unductate; under he posterior strap-shaped,)ngus. rthen, 1870,

64, Up. Coal

G. 1122.-Cyrta-anthus denta-18.

rthen, 1875, 392, Kaskas-



123. - Dactylooncavus. Conace. Louis Gr. orthen, 1866, St. Louis Gr. PISCES.

- DELTODOPSIS, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 158. [Ety. from resemblance to Deltodus.] Coronal contour and general aspect near Deltodus, distinguished by the differentiation of the median ridge of the anterior coronal prominence, which approaches Cochliodus or Chitonodus. Type D. angusta. affinis, St. John & Worthen, 1883, Geo.
 - Sur. Ill., vol. 7, p. 160, Warsaw Gr. angusta, Newberry & Worthen 1870, (Deltodus angustus,) Geo. Sur. Ill., vol. 4, p. 368, Kaskaskia Gr.
- bialveata, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 169, Burlington Gr.
- convexa, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 169, Up. Burlington Gr.
- convoluta, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 165, Up. Burlington Gr.
- exornata, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 168, Warsaw Gr. inflexa, St. John & Worthen, 1883, Geo.
- Sur. Ill., vol. 7, p. 167, Keokuk Gr. keokuk, St. John & Worthen, Geo. Sur.
- Ill., vol. 7, p. 169, Keokuk Gr. stludovici, St. John & Worthen, 1883, Geo.
- Sur. Ill., vol. 7, p. 161, St. Louis Gr. DELTODUS, Agassiz, 1859, MSS., and New
 - berry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 95. [Ety. delta, tri-angle; odous, tooth.] Teeth large, thick, strong, triangular, more or less arched, sometimes inrolled from the longer and more acute angle to the opposite margin; crown surface arched or marked by 1-3 prominent ridges from the basal margin toward the longer angle. Type D. sublævis. ala/us, Newberry & Worthen, syn. for
 - Chitonodus latus. angularis, Newberry & Worthen, syn.
 - for Orthopleurodus carbonarius.
- angustus, see Deltodopsis angusta. cinctu us, St. John & Worthen, 1883,
- Geo. Sur. Ill., vol. 7, p. 146, Warsaw Gr cingulatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 99, Kaskaskia Gr. complanatus, see Sandalodus complanatus.
- fasciatus, see Tæniodus fasciatus. grandis, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 101, Keokuk Gr.
- Probably syn. for Sandalodus lævissimus. intermedius, St. John & Worthen, 1883,
- Geo. Sur. Ill., vol. 7, p. 153, St. Louis Gr. latior, St. John & Worthen, 1883, Geo.
- Sur. Ill., vol. 7, p. 145, Keokuk Gr. littoni, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 367, Subcarbonif-
- erous. occidentalis, Leidy, 1856, (Cochliodus occidentalis,) Trans. Am. Phil. Soc., vol. 11, p. 87, Warsaw and St. Louis Grs. parvus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 151, St. Louis Gr. powelli, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 154, Carboniferous.

- propinguus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 56, Coal Meas. rhomboideus, Newberry & Worthen, syn. for Sandalodus spatulatus.
- spatulatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 100, Burlington Gr.
- stellatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 97, Keokuk Gr. trilobus, St. John & Worthen, 4883, Geo.
- Sur. Ill., vol. 7, p. 148, Warsaw Gr.
- undulatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 98, Keokuk Gr.
- TOPTYCHIUS, Agassiz, 1859, MSS., and St. DEI John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 89. [Ety. delta, triangle: ptyx, a wrinkle,] Posterior teeth of lower jaw trigonal, strongly built, and arched in the direction of inrollment; coronal contour in three divisions, narrowing toward the outer extremity; those of the upper jaw subspatulate, inrolled on the outer margin, acute posteriorly. Type D. acutus.
 - expansus, St. John & Worthen, 1883, Geo. Sur. 111., vol. 7, p. 98, St. Louis Gr.
 - nitidus, Leidy, 1856, (Cochliodus nitidus,) Trans. Am. Phil. Soc., vol. 11, p. 87, Kaskaskia Gr.
 - primus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 93, Up. Burlington Gr.
 - varsoviensis, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 96, Warsaw Gr. wachsmuthi, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 93, Keokuk Gr.



FIG. 1124.—Deltoptychius wachsmuthi.

DESMIODUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 337. [Ety. desmos, a ligament; odous, a tooth.] This name was a plied to a genus of bats, in 1826, by Prinz, Neu. Wied. in Beitrage zur Naturg. Brasiliens. Teeth occurring in rows, small, robust; crown laterally elongated, arched vertically, median cusp with lateral crests; base constricted and produced. Type D. tumidus. costelliferus, St. John & Worthen, 1875, Geo. Sur.

Ill., vol. 6, p. 341, St. Louis Gr.



- flabellum, St. John & Wor-then, 1875, Geo. Sur. Ill., Fig. 1125.-Des-miodus cosmiodus vol. 6, p. 343, Keokuk Gr. telliferus. ligoniformis, St. John & Convex Worthen, 1875, Geo. Sur. pect.
- Ill., vol. 6, p. 342, Keokuk Gr.
- minusculus, Newberry & Worthen, 1866, (Orodus minusculus,) Geo. Rep. Ill., vol. 2, p. 67, Keokuk Gr.

tumidus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 339, St. Louis Gr.

DINICITIIVS, Newberry, 1873, Ohio Pal., vol. 1, p. 313, and vol. 2, p. 3. [Evy. deinos terrible; ichthys, a fish.] Cranium composed of thick bony plates, strengthened with internal arches anchylosed together, occipital bone in the type species three inches in thickness; relatively small maxillaries bearing a number of acute, conical, anchylosed teeth, which interlocked with a similar series on the mandibles; premaxillaries large, strong, triangular plates or teeth; mandibles of great length, flattened and spatulate behind, turning up anteriorly to form a strong triangular tooth, with its fellow of the opposite mandible, interlocked with the great, divergent, premaxillary teeth; vital parts of the body covered with large, thick plates which formed a carapace. Type D. terrelli.

hertzeri, Newberry, 1873, Ohio Pal., vol. 1, p. 316, Portage Gr.



F1g. 1126.—Dinichthys hertzeri.

terrelli, Newberry, 1873-75, Obio Pal., vol. 1, p. 313, and vol. 2, p. 3, Portage Gr.

DIPLASPIS, Matthew, 1888, Can. Rec. Sci., vol. 2, p. 251. [Ety. diplos, double; as-pis, shield.] Small, having plates on the head, back, and sides, and one ventral plate; plates bearing very fine ridges. Type D. acadica.

acadica, Matthew, 1888, Can. Rec. Sci., vol. 2, p. 251, Up. Silurian or Low. Devonian.

- DIPLODUS, Agassiz, 1843, Recherches sur les Poissons Fossiles, t. 3, p. 204. [Ety. diploos, double; odous, a tooth.] This name was used by Rafinesque for a genus of Sparidæ in 1810, Indice d'Lit tologia Siciliana. Teeth having a flattened or rounded base, from which spring two lateral and sometimes a small central denticle; each jaw bore several hundred teeth in radiating rows, the points projecting inward. They belong to sharks possessed of spines, described under the names of Oracanthus and Xenacanthus. Type D. gibbosus.
- acinacis, Dawson, 1860, Acad. Geol., p. 211, and Can. Nat. Geol., vol. 5, Coal Meas.
- compressus, Newberry, 1857, Proc. Acad. Nat. Sci. Phil., vol. 8, p. 99, and Ohio Pal., vol. 1, p. 335, Coal Meas.

duplicatus, see Thrinacodus duplicatus.

gracilis, Newberry, 1857, Proc. Acad. Nat. Sci. Phil., vol. 8, p. 99, and Ohio Pal., vol. 1, p. 335, Coal Meas.

incurvus, see Thrinacodus incurvus.

DIN.-ECT.

latus, Newberry, 1857. Proc. Acad, Nat. Sci. Phil., vol. 8, p. 99, and Ohio Pal., vol. 1, p. 336, Coal Meas. penetrans. Dawson, 1860, Acad. Geol.,

p. 211, and Can. Nat.

and Geol., vol. 5.

FIG. 1127.-Diplodus latus.

Coal Meas. DIPTERUS, Sedgwick & Murchison, 1835, Geo. Trans., 2d ser., vol. 3. [Ety. dipteros, two-winged.] Diptera is an order of insects established by Linnaus. Small fusiform fishes; heads compressed, tails heterocercal; two dorsal

fins opposite two similar anal fins. the second of each the larger; a strongly marked lateral line: scales circular, thickest in the middle, variously curved with concentric lines or longitudinal ridges. Type

b. brachypygopterus. sherwoodi, Newberry, Fie. 1128.-Dipte-1875, Ohio Pal. vol. 2, rus sherwoodi p. 61. Catskill Gr.

DREPANACANTHUS, Newberry & Worthen, 1866. Geo. Sur. Ill., vol. 2, p. 120. [Ety. drepane, a sickle: akantha, spine.] Fin spines compressed laterally, gradually tapering to an acute point, curved forward; anterior margin with a row of flattened or conical tubercles; lateral surfaces with tubercles in longitudinal rows; posterior margin without hooks, sometim's with tubercles. Type D. gemmatus.

anceps, see Xystracanthus anceps.

gemmatus, Newberry & Worthen, 1866. Geo. Sur. Ill., vol. 2, p. 123, Keokuk Gr. reversus, St. John & Worthen, 1875, Geo.

Sur. Ill., vol. 6, p. 456, St. Louis Gr. stellatus, see Batacanthus stellatus.

- ECIOSTE BACHIS, Cope, 1880, Pal. Bull. No. 32, p. 19. [Ety. ektos, without; ortion, bone; rachis, a ridge, backbone.] Base of the skull consists of ossified parachordals, which embrace the chorda dorsalis posteriorly, and are continued for a short distance posteriorly as a tube; anteriorly the chordal groove is open; trabeculæ not ossified; cranial structure embryonic; above and in front of the opening for the chorda the neural canal enters the groove; parachordals subtriangular. Type E. nitidus. ciceronius, Cope, 1883, Pal. Bull. No. 36,
 - in Proc. Am. Phil. Soc., p. 628, Permian.

EDE. -FIS.

nitidus, Cope, 188 19, Permian.

EDESTUS, Leidy, 185 2d ser., vol. 3, devourer.] Ma segments bevel vated posterior teeth resemblin one co-ossified v ment. Type E. giganteus, Newbe Acad. Sci., vol. heinrichsi. Newbe Geo, Sur. Ill., vo minor, Newberry vol. 2, p. 84, Cos vorax, Leidy, 1856

FIG

Elonichthys peltigerus, gerus.

ERISMACANTHUS, MC(Mag. Nat. Hist., [Ety. ereisma, a spine.] Spine of pressed, finely st the flesh; the second rapidly tapering sides with longitu rows of downward posterior concave prop-like part ext at right angles w compressed at the distally, and cov and some spines Type E. jonesi.

beautiful; nema, a Distinguished fro the plain dorsal r the denticles on th terior face. Type

(Ctenacanthus cos vol. 2, p. 120, St. I

Geo. Sur. Ill., vol. EUNEMACANTHUS, St. J Geo. Sur. Ill., vol

tercostal sulci, and

maccoyanus, St. Joł

costatus, Newberry

EURYLEPIS, Newberry Nat. Sci. Phil. [E

Phil., vol. 3, 20 Meas.

[DIN.-ECT.

)c. Acad. Nat. d Ohio Pal.,

see Thrinaincurvus. wberry, 1857, Acad, Nat. iil., vol. 8, p.

d Ohio Pal., p. 336, Coal

Dawson, Acad. Geol,, and Can. Nat. ieol., vol. 5, leas.

chison, 1835, ol. 3. [Ety.)iptera is an 1 by Linnæus. heads com-1; two dorsal



G. 1128.—Dipte-rus sherwoodi.

& Worthen, p. 120. [Ety. spine.] Fin Ily, gradually t, curved forwith a row of rcles; lateral 1 longitudinal ithout hooks, les. Type D.

nceps. Vorthen, 1866, 3, Keokuk Gr. en, 1875, Geo. Louis Gr. llatus. Pal. Bull. No. ithout; ortion, kbone.] Base ossified parae the chorda are continued steriorly as a ordal groove is sified; cranial bove and in the chorda the groove; paraype E. nitidus. . Bull. No. 36, ., p. 628, PerEDE.-FIS.]

nitidus, Cope, 1880, Pal. Bull. No. 32, p. 19, Permian.

EDESTUS, Leidy, 1856, Jour. Acad. Nat. Sci., 2d ser., vol. 3, p. 159. [Ety. edestes, a devourer.] Maxillary bone segmented; segments beveled anteriorly and excavated posteriorly for co-adaptation; teeth resembling those of Carcharodon, one co-ossified with each maxillary segment. Type E. vorax. giganteus, Newberry, 1888, Ann. N. Y.

Acad. Sci., vol. 4, p. 1, Coal Meas. heinrichsi, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 350, Coal Meas. minor, Newberry, 1866, Geo. Sur. Ill., vol. 2, p. 84, Coal Meas.

vorax, Leidy, 1856, Jour. Acad. Nat. Sci. Phil., vol. 3, 2d series, p. 159, Coal Meas.

FIG. 1129.-Edestus vorax.

McCoy, 1848, Ann. and

Elonichthys peltigerus, see Palæoniscus pelti-

Mag. Nat. Hist., 2d series, vol. 2, p. 119.

[Ety. ereisma, a prop or stay; akantha, spine.] Spine of three parts; one com-

pressed, finely striated, which entered

the flesh; the second short, compressed,

rapidly tapering, curved backward, sides with longitudinal ridges, and two

rows of downward curved teeth on the

prop-like part extending forward nearly

at right angles with the base, arched,

compressed at the basal half, depressed

distally, and covered with tubercles

and some spines on the under side.

maccoyanus, St. John & Worthen, 1875.

Geo. Sur. Ill., vol. 6, p. 461, St. Louis Gr. EUNEMACANTHUS, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 120. [Ety. eu, beautiful; nema, a line; akantha, spine.] Distinguished from Ctenacanthus by

the plain dorsal ridge, tuberculated in-

tercostal sulci, and upward direction of

the denticles on the angles of the pos-

costatus, Newberry & Worthen, 1866,

vol. 2, p. 120, St. Louis Gr. EUBYLEPIS, Newberry, 1856, Proc. Acad. Nat. Sci. Phil. [Ety. eurys, broad; lepis,

(Ctenacanthus costatus,) Geo. Sur. Ill.,

39

terior face. Type E. costatus.

posterior concave margin; the third, a

gerus.

ERISMACANTHUS,

Type E. jonesi.

PISCES.

scale.] Small; body fusiform; head obtuse; tail elongated, lobes unequal; fins small, with delicate fulcra; dorsal and anal fins opposite, and far back on the body; ventrals near middle of abdo-men; cranial surface tubercular; maxillary, mandibular, and jugular plates corrugated; scales smooth, ornamented, or serrated; teeth numerous, conical,

- short. Type E. tuberculata. corrugata, Newberry, 1856, Proc. Acad. Nat. Sci. Phil., and Ohio Pal., vol. 1, p. 350, Coal Meas.
- granulata, Newberry, 1856, Proc. Acad. Nat. Sci. Phil., and Ohio Pal., vol. 1, p. 352, Coal Meas.
- insculpta, Newberry, 1856, Proc. Acad. Nat. Sci. Phil., and Ohio Pal., vol. 1, p. 351, Coal Meas.

lineata, Newberry, 1856, Proc. Acad. Nat. Sci. Phil., and Ohio Pal., vol. 1, p. 353, Coal Meas.

minima, Néwberry, 1873, Ohio Pal., vol. 1, p. 353, Coal Meas.

ornatissima, Newberry, 1856, Proc. Acad. Nat. Sci. Phil., and Ohio Pal., vol. 1, p. 352, Coal Meas. ovoidea, Newberry, 1856, Proc. Acad. Nat. Sci. Phil., and Ohio Pal., vol. 1, p. 351, Coal Meas. striolata, Newberry, 1873,

Ohio Pal., vol. 1, p. 355, Coal Meas. tuberculata, Newberry, 1856, Proc. Acad. Nat. Sci., and Ohio Pal., vol. 1, p. 350, Coal Meas.



FIG. 1130.-Eurylepis tuberculata.

- EUSTHENOPTERON, Whiteaves, 1881, Am. Jour. Sci. and Arts, 3d ser., vol. 21, p. 495. [Ety. eu, very; sthenes, stout; pteron, a fin.] Fin rays of anal and second dorsal fins supported by three osselets articulated to a broad interspinous apophysis; vertebral centers not ossified; caudal osselets articulated to modified hæmal spines. Type E. foordi.
 - foordi, Whiteaves, 1881, Am. Jour. Sci. and Arts, 3d ser., vol. 21, p. 495, Upper Devonian.
- Fissodus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 413. [Ety. fissus, split; odous, tooth.] Teeth small, in the form of root and general contour

 \bigcirc

like Peltodus, but distinguished by the cleft condition of the crest. Type F. bifidus.

bifidus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 414, Kaskaskia Gr.

tricuspidatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol 6, p. 415, Kaskas-

FIG. 1181.-Fiskia Gr. sodus bi-fidus.

598

- Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 471. [Ety. gampsos, curved; akantha, spine.] Spines long, laterally compressed, tapering, costate, with larger and smaller tubercles; posterior margin denticulate; base expanded; pulp cav-ity large. Type G. typus.

FIG. 1132.—Gampsacanthus typus. Side view of a spine magnified 2 diam., and transverse section.

latus, St. John & Worthen, 1875, Geo. GYRACANTHUS, Agassiz, 1833, Recherches Sur. Ill., vol. 6, p. 474, Keokuk Gr. squamosus, St. John & Worthen, 1875,

Geo. Sur. Ill., vol. 6, p. 473, St. Louis Gr.

Geo. Sur. III., vol. 6, p. 473, St. Louis Gr.
Sur. III., vol. 6, p. 472, St. Louis Gr.
GISACANTHUS, St. John & Worthen, 1875, Geo. Sur. III., vol. 6, p. 440. [Ety. geison, a border; akantha, a spine.] Spine curved posteriorly, anterior angle a simple raised keel; lateral faces bearing longitudinal rows of tubercles; pos-terior face longitudinally keeled. Type G. stellatus.

bullatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 441, Kaskaskia Gr. stellatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 440, St. Louis Gr.



FIO. 1133.-Glymmatacanthus irishi. Fragment of spine.

GLYMMATACANTHUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 446. [Ety. glymmatos, engraved; akantha, spine.] Fin ray vertically elongated, posteriorly arched, laterally compressed; lateral faces covered with stellate or striated tubercles. Type G. irishi.

irishi, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 447, Kinderhook or Waverly Gr.

GIS.-HAR.

- petrodoides, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 250, Kaskaskia Gr.
- rudis, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 249, Keokuk Gr.
- GLYPTOLEPIS, Agassiz, 1836, Poiss. Foss. vol. 2, p. 179. [Ety. glyptos, sculptured; lepis, scale.] Fins long, sometimes pen-dulous; anterior dorsal opposite ventral, and posterior dorsal opposite anal; tail fin long, spreading below ; shoulder bones huge; teeth minute; scales of great size in proportion to the animal, and deeply sculptured. Type G. elegans.
 - microlepidotus, Agassiz, 1836, Poiss. Foss., vol. 2, p. 179, Devonian. quebecensis, Whiteaves, 1889, Trans.
 - Roy. Soc. Can., vol. 6, p. 77, Low. Devonian.
 - ATHORHIZA, Cope, 1883, Proc. Am. Phil. Soc., vol. 20, p. 629. [Ety. gnathos, jaw; rhiza, root.] Founded upon some ganoine teeth. The definition is too meager for identification, and the genus may never again be recognized. Type G. serrata. serrata, Cope, 1883, Proc. Am. Phil.

Soc., vol. 20, p. 629, Permian.

sur les Poissons Fossiles, t. 1, p. 87.

[Ety. gyros, a circle; akantha, spine.] Fin spines very large, gradually ta-pering to the apex, and slightly arched back-ward; inserted base small, rapidly tapering; posterior margin feebly armed with two rows of small denticles; surface of the sides covered with very oblique ridges, which meet at an angle on the auterior face. Type G. formosus.

- alleni, Newberry, 1873, Ohio Pal., vol. 1, p. 331, Cuyahoga shale.
- compressus, Newberry, 1873, Ohio Pal., vol. 1, p. 230, Cuyahoga shale.
- cordatus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 251, Keokuk Gr.
- duplicatus, Dawson, 1868, Acad. Geol., p. 210, Coal Meas
- magnificus, Dawson, 1868, Acad. Geol., p. 210, Subcarboniferous.
- FIG. 1134.-Gy-HARPACODUS, Agassiz, 1869, racanthus al leni. Anterior Catal. Foss. Fish, Collecface. tion of Earl of Enniskil
 - len, and St. John & Worthen, in Geo. Sur. Ill., vol. 6, p. 354. [Ety. harpe, 8

HEL.-HOL.]

hook; odous, elongated, ver curved outward margins nearly pressed along panded below posite face con produced inbey liquely produce defined. Type properly, H. occ

FIG. 1135.-Harpacodus occidentalis.

HELIODUS, Newberry 2, p. 62. [Ety. h Distinguished fr the upper palate rounded, semicin bearing radiatin Type H. lesleyi. land, regards H for Palædaphus

Koninck, 1864, 17, p. 143.



FIG. 1136. -H

p. 64, Chemung (HELODUS, Agassiz, 184 Poissons Fossiles helos, a nail or Transversely elor elevated along th tuse, circular ridg into a line of seve diminishing from porous as in Psam crown raised in th inner and outer root vertically simplex.

angulatus, Newberr Geo. Sur. Ill., vol. biformis, Newberry Geo. Sur. Ill., vol.

Kinderhook Gr. carbonarius, Newber Geo. Sur. Ill., vol.

lesleyi, Newberry,

GIS.-HAR.

n. 1875, Geo. inderhook or

Vorthen, 1883, 250, Kaskas-

n, 1883, Geo. eokuk Gr. Poiss. Foss., s, sculptured : metimes penopposite ven-

opposite anal; low; shoulder ite; scales of to the animal, Type G. el-

, 1836, Poiss. evonian. 1889, Trans. 6, p. 77, Low.

3, Proc. Am. p. 629. [Ety. ot.] Founded eth. The deffor identificaay never again G. serrata. oc. Am. Phil. ermian. 3, Recherches es, t. 1, p. 87.



-Gy 1134 FIG. racanthus alleni. Anterior face.

orthen, in Geo. [Ety. harpe, a HEL.-HOL.]

hook; odous, tooth.] Teeth laterally elongated, vertically arched, gently curved outward in the concave face; margins nearly parallel; crown compressed along the crest; serrated, ex-panded below; convex face low, opposite face concave; coronal borders produced inbeveled; base strong, obliquely produced; lateral angles well defined. Type H. dentatus, or, more properly, H. occidentalis.



compactus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 355, Kaskaskia Gr.

PISCES.

FIG. 1135.-Harpacodus occidentalis.

occidentalis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 355, St. Louis Gr.

HELIODUS, Newberry, 1875, Ohio Pal., vol. 2, p. 62. [Ety. helios, sun; odous, tooth.] Distinguished from Dipterus by having the upper palate teeth united, forming a rounded, semicircular, triturating plate, bearing radiating tuberculated ridges. Type H. lesleyi. Dr. Traquair, of England, regards Heliodus as a synonym for Palædaphus, Van Beneden & De-Koninck, 1864, Bull. Acad. Belg., vol. 17, p. 143.



FIG. 1136. -Heltodus lesleyi.

lesleyi, Newberry, 1875, Ohio Pal., vol. 2, p. 64, Chemung Gr.

HELODUS, Agassiz, 1843, Recherches sur les Poissons Fossiles, t. 3, p. 104. [Ety. helos, a nail or rudder; odous, tooth.] Transversely elongate, crown convex, elevated along the middle into an obtuse, circular ridge, sometimes divided into a line of several compressed cones diminishing from the center; surface porous as in Psammodus; margin of the crown raised in the middle on both the inner and outer sides, and it and the root vertically plicated. Type H. simplex.

angulatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 83, Burlington Gr. biformis, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 77, Waverly or Kinderhook Gr.

carbonarius, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 75, Coal Meas.

compressus, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 360, Burlington Gr. compressus, see Hybocladodus compressus.

coniculus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 75, Burlington Gr. Geo. Sur. Ill., vol. 2, p. 75, Burlington Gr. Geo. Sur. Ill., vol. 2, syn. for Chitono-

dus latus.

crenulatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 82, Keokuk Gr. denshumani, Newberry & Worthen, 1866,

Geo. Sur. Ill., vol. 2, p. 76, Keokuk Gr. denticulatus, Newberry & Worthen, 1866,

Geo. Sur. Ill., vol. 2, p. 81, Keokuk Gr. sur. Ill., vol. 2, p. 78, Keokuk Gr. gibbosus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 78, Keokuk Gr.

& Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 79, Keokuk Gr.



gibbus, Leidy, 1856, Trans. Am. Phil. Soc., vol. 11, p. 87, FIG. 1137.-Helodus gibbosus Keokuk Gr.

limax, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 80, Burlington Gr.

nobilis, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, same as Chitonodus latus.

placenta, see Psephodus placenta.

politus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 79, Keokuk Gr.

Sur. III., vol. 2, p. 79, Keokuk Gr. rugosus, Newberry & Worthen, 1866, Geo. Sur. III., vol. 4, p. 359, Coal Meas. sulcatus, Newberry & Worthen, 1866, Geo. Sur. III., vol. 2, p. 82, Keokuk Gr. undulatus, Newberry & Worthen, 1866, Geo. Sur., III., vol. 2, p. 82, Keokuk Gr. HOLOPTYCHIUS, Agassiz, 1836, Recherches sur les Poissons Fossiles, 4. 2, p. 179. [Ety. holos, entire; ptyx, wrinkle.] Body thick. short. rounded. bones of the

thick, short, rounded, bones of the head granulated; scales large, very thick, subrhomboidal, rounded, imbricating, composed of numerous bony layers, exposed surface marked with large, longitudinal, flexuous wrinkles and tubercles; teeth small, numerous, conical, longitudinally sulcated at base; tail heterocercal, caudal fin triangular, obliquely truncated; dorsal fin opposite a similar anal one close to the base

of the caudal; ventral behind the middle of the body. Type H. giganteus.

americanus, Leidy, 1856, Jour. Acad. Nat. Sci., 2d series, vol. 3, p. 159, Catskill Gr.

nobilissimus, Agassiz, 88 identified by Hall, 1843, Geo. Rep. 4th Dist. N.Y. is described as H. americanus.

taylori, Hall, 1843, (Sauripteris taylori,) Geo. Rep. 4th Dist. N. Y., p. 282, Catskill Gr.

FIG. 1138-Holop-

tooth.

tychius ameri-canus. Single



Homacanthus, Agassiz, 1845, Pois. Foss. [Ety. homos, similar; akantha, spine.] gibbosus, see Amacanthus gibbosus.

PISCES.

- gracilis, Whiteaves, 1889, Trans. Roy Soc., Can., vol. 6, p. 77, Low. Devonian.
- rectus, see Marracanthus rectus.
- Hybocladodus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 284. [Ety. hybos, hump; Cladodus, a genus.] .Teeth small, strongly cuspidate, base resem-bling that of a Cladodus, being elliptical and broadly expanded, with a more or less prominent antero-posteriorly compressed median cone, both surfaces of which are plicated and resemble the crown of a Hybodus; anterior face nearly straight, curved laterally, terminating below in a well defined marginal border or ridge, posterior margin broadly rounded, inferior surface excavated immediately behind the marginal border, with a beveled space extending along the posterior margin, superior face more or less convex and beveled to the posterior edge; both coronal surfaces vertically marked with plicæ. Type H. plicatilis.
 - compressus, Newberry & Worthen, 1866, (Helodus compressus,) Geo. Sur. Ill., vol. 2, p. 78, Burlington Gr.

intermedius, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 287, Keokuk Gr.



nitidus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 288, Kaskaskia Gr.

- FIG. 1139.-Hybo-cladodus plica-tilis. plicatilis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 286, Burlington Gr.
 - tenuicostatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 286, Keokuk Gr.
- JANASSA, Munster, 1839, Beitrage Petrefaktenkunde, vol. 1, and Agassiz in Poiss. Foss., t. 3, p. 375. [Ety. mythological name.] Teeth have a tabulated structure and enameled, wavy crown; small in front and larger toward the posterior part of the jaw; jaw-bone rough and granular. Type J. angulata.
 - gurleiana, Cope, 1877, (Strigillina gurlei-ana,) Proc. Am. Phil. Soc., p. 191, Permian.
- linguiformis, Cope, 1877, (Strigillina linguiformis,) Proc. Am. Phil. Soc., p. 53, Permian.
- LAMBDODUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 280. [Ety. Lambda, a Greek letter; odous, tooth.] Teeth small, base posteriorly produced and laterally expanded, broadest behind the cornua; a single strong, slightly sigmoidally curved, recurved, eccentric cornua arises from the anterior angle of the base, terminates in a sharp apex, compressed in front, broadly rounded behind, with more or less distinct cutting edges and vertical costæ. It is distinguished from Cladodus by the

- calceolus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 281, Burlington Gr. calceolus var. robustus, St. John & Wor-
- then, 1866, Geo. Sur. Ill., vol. 6, p. 282, Keokuk Gr.

reflexus, St. John & Worthen, 1875, Geo. Sur. 111., vol. 6, p. 284, Kaskaskia Gr. transversus, St. John & Worthen, 1875,

Geo. Sur. Ill., vol. 6, p. 282, St. Louis Gr.

Geo. Sur. Ill., vol. 6, p. 475. [Ety.

lekroi, the antlers of a stag; akantha,

spine.] Spines long, tapering, curved,

laterally compressed, stellate tubercles

LECRACANTHUS, St. John & Worthen, 1875.

costatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 280, Burlington Gr. ton Gr. hamulus, St. John & Wor- Fig. 1140. – Lamb. dodus costatus.

then, 1875, Geo. Sur. Ill., vol. 6, p. 283, Kaskaskia Gr.

Louis Gr.

[HOM.-LIO.

abbreviated stror crested, and som rated ; basal mar

FIG. 1142.-Liogr



vertical to the prolonged, equal crown; inferior from either face slightly beveled i opposite border; ameled, worn o Type L. curtus.

- Leptacanthus, Agassiz, 1837, Poiss. Foss., vol. 3. [Ety. leptos, slender; akantha, spine.] occidentalis, see Acondylacanthus occidentalis.
- Liopus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 335. [Ety. leios, smooth; odous, tooth.] Teeth resen bling Orodus; crown arched, laterally and vertically; basal margins constructed and sharply defined from the base; apex with obscurely defined lateral crests; convex in either face; anterior face produced beneath the median cone, and both faces occupied with faint vertical sulci, producing obscure secondary prominences; surface smooth, punctate, or verrucose; base as in Orodus, relatively deep. Type L calcaratus.

calcaratus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6. p. 336, Bur-6, p. 336, lington Gr. calcaratus var. grossipunctatus,

John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 337, Keokuk Gr.

LIOGNATHUS, Newberry, 1873, Ohio Pal., vol. 1, p. 306. [Ety. lis, smooth; gnathor, the jaw.] Jaw the only part yet known; spatulate, dentate only at and near the anterior extremity ; resembles Coccosteus. Type L. spatulatus. spatulatus, Newberry, 1873, Ohio Pal., vol. 1, p. 306, Up. Held. Gr.

FIG. 1141.-Liodus calca-

ratus.





curt

FIG. 1143. -- Lis-W godus curtus. IIILouis Gr.

serratus, St. John & Sur. Ill., vol. 6, p LISTRACANTHUS, Newl Geo. Sur. Ill., vol tron, shovel; ak small, gently arc sides marked by gitudinal carinæ. gent, slender, acu

ous on the conve base expanded an Type L. hystrix. hildrethi, New-

berry, 1875, Ohio Pal., vol. 2, p. 56, Coal Meas.

hystrix, New- Fig berry & Wor-

then, 1870, Geo. S Coal Meas.

Lophodus, Newberry & Sur. Ill., vol. 4. cupied by Roman variabilis, see Agassi MACHÆRACANTHUS, N Nat. Inst., p. 6, a

LIS.-MAR.]

Liscobus, St. John & Sur. Ill., vol. 6,



HOM.-LIO.

d the absence basal portion o Thrinacodus.

hen. 1875. Geo. Jurlington Gr. John & Worvol. 6, p. 282,



FIG. 1140. -Lambdodus costatus.

skia Gr. ien, 1875, Geo. askaskia Gr. Worthen, 1875, 32. St. Louis Gr. Worthen, 1875, p. 475. [Ety. stag; akantha, pering, curved, ellate tubercles base thin, exge; apex transmed with strong uiculus. Worthen, 1875.

3, p. 476, St.

Poiss. Foss., vol. akantha, spine.] anthus occiden-

nen, 1875, Geo. 35. [Ety. leios, 35. [Ety. Teeth resemrched, laterally margins conefined from the in either face; d beneath the 1 faces occupied i, producing obinences; surface rrucose; base as deep. Type L.

aratus, St. John Worthen, 1875, eo. Sur. Ill., vol p. 336, Burington Gr. caratus var. gros-SI ipunctatus, ohn & Worthen, 1. 6, p. 337, Keo-

.873, Ohio Pal. smooth ; gnathos, only part yet state only at and mity; resembles spatulatus. 73, Ohio Pal., vol. LIS.-MAR.]

Lisgodus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 363. [Ety. *lisgos*, a spade; odous, tooth.] Teeth laterally



FIG. 1142.-Liognathus spatulatus.

abbreviated strong; crown thick, sharpcrested, and sometimes obscurely serrated ; basal margins well defined ; base p. 302. [Ety. machaira, a saber, akan-tha, a spine.] Spines large, flattened, curved, ancipital, unsymmetrical; edges and point acute; base narrowed, with a rough and irregular extremity; central cavity reaching nearly to the apex; external surface enameled, smooth or punctate, and striate microscopic structure dense. Type M. major.

major Newberry, 1857, Bull. Nat. Inst., p. 6, and Ohio Pal., vol. 1, p. 304, Up. Held. Gr.

peracutus, Newberry, 1857, Bull. Nat. Inst., p. 6, and Ohio Pal., vol 1, p. 305, Up. Held Gr.

FIG. 1145.-Machæracanthus peracutus.

vertical to the crown, rectangular, prolonged, equal to the elevation of the crown; inferior surface well defined from either face above; and generally slightly beveled from the concave to the opposite border; coronal surface enameled, worn crest striato-punctate. Type L. curtus.



curtus, St. John & Wor-then, 1875, Geo. Sur. Ill., vol. 6, p. 364, Burlington Gr. selluliformis, St. John & Worthen, 1875, Geo. Sur. FIG. 1143. -- Lis-Ill., vol. 6, p. 366, St.

godus curtus. Louis Gr.

serratus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 365, Burlington Gr. LISTRACANTHUS, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 371. [Ety. *listron*, shovel; *akantha*, spine.] Spines small, gently arched, flattened, thin; sides marked by numerous sharp, longitudinal carinæ, edges set with divergent, slender, acute teeth; most numerous on the convex margin; and largest base expanded and obliquely truncated. Type L. hystrix.

hildrethi, Newberry, 1875, Ohio Pal. vol. 2, p. 56, Coal Meas.

hystrix, New- FIG. 1144. - Listracanthus hystrix berry & Wor-

then, 1870, Geo. Sur. Ill., vol. 4, p. 372, Coal Meas.

Lophodus, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4. This name was preoccupied by Romanowsky in 1864. variabilis, see Agassizodus variabilis.

MACHÆRACANTHUS, Newberry, 1857, Bull. Nat. Inst., p. 6, and Ohio Pal., vol. 1,

sulcatus, Newberry, 1857, Bull. Nat. Inst., p. 6, and Ohio Pal., vol. 1, p. 305, Up. Held. Gr.

MACROPETALICHTHYS, Norwood & Owen, 1846, Am. Jour. Sci., 2d ser., vol. 1, p. 367. [Ety. makros, large; petalos, ex-panded or spread out; ichthys, fish.] Cranium composed of large polygonal plates, united by double sutures ; sur- Fie face enameled, tubercled, ornamented; eye orbits con-

1146.-Macropetalichthys sulli-vanti. One-fifth natural size.

spicuous; nasal plate wedge-shaped ?. occipital plate oblong, emarginate behind, and prolonged anteriorly, where it meets the nasal plate. Type M. rapheidolabis.

manni, Newberry, (Agassichthys manni,) 1857, Bull. Nat. Inst., p. 3, Up. Held. Gr.

- rapheidolabis, Norwood & Owen, 1846, Am. Jour. Sci., 2d ser., vol. 1, p. 367, Up. Held. Gr.
- sullivanti, Newberry, 1857, (Agassichthys sullivanti,) Bull. Nat. Inst., p. 3, and Ohio Pal., vol. 1, p. 294, Up. Held. Gr. MARRACANTHUS, St. John & Worthen, 1875, Coor Sar U. vol. 6, 465 [Efty models] Geo. Sur. Ill., vol. 6, p. 465. [Ety. marron, a spade; akantha, spine.] Dorsal spine nearly straight, or with a forward curvature, obtusely terminated, rounded in front, truncated behind, or rounded into the posterior face, which is longitudinally ridged in apparent continuity with the lateral costæ; lateral face and anterior margin fongitudinally ridged, the costæ being tuberculated, those in front more or less strongly



602

developed, with their apices directed upward, and especially in their upper part, where they gradually increase in size, forming strong, more or less deflected hooks, transversely carinated; intercostal spaces minutely ridged and striato-punctate; base moderately inserted, forming a comparatively thin plate, more or less laterally expanded posteriorly from the angular ridge in front, with more or less prominent marginal angles behind; pulp-cavity moderately large, similar in section to the body, and occupying the posterior two-thirds of the spine. In costation and the expanded base it is like Amacanthus, but distinguished in all other respects. Type M. rectus.

FIG. 1147.—Marracanthus rectus. Anterior part of spine.

rectus, Newberry & Worthen, 1866, (Homacanthus (?) rectus,) Geo. Sur. Ill., vol.

2, p. 115, St. Louis Gr. MECOLEPIS, Newberry, 1857, Proc. Acad. Nat. Sci., vol. 8, p. 96. [Ety. mekos, large; lepis, a scale.] Heterocercal lepidoids of small size; body fusiform; head obtuse; tail elongated; lobes unequal; fins small, provided with delicate fulcra; dorsal opposite anal, both far back on the body; crania corrugated or tu-berculated; opercular maxillary and hyoid plates ornamented; scales smooth or ornamented; posterior margin serrated; scales of median line crenulated; two rows of scales extending back to near anal fin; teeth conical, short, brush-like. Distinguished from Palæoniscus by small size, posterior position of dorsal fin, and the high lateral scales. Type M. corrugata. Probably a syn. for Palæoniscus, but not figured, and species poorly defined.

corrugata, Newberry, 1856, Proc. Acad. Nat. Sci., vol. 8, p. 96, Coal Meas.

granulata, Newberry, 1856, Proc. Acad. Nat. Sci., vol. 8, p. 97, Coal Meas. insculpta, Newberry, 1856, Proc. Acad.

Nat. Sci., vol. 8, p. 97, Coal Meas. lineata, Newberry, 1856, Proc. Acad. Nat. Sci., vol. 8, p. 97, Coal Meas.

ornatissima, Newberry, 1856, Proc. Acad. Nat. Sci., vol. 8, p. 97, Coal Meas.

ovoidea, Newberry, 1856, Proc. Acad.

Nat. Sci., vol. 8, p. 97, Coal Meas. serrata, Newberry, 1856, Proc. Acad. Nat. Sci., vol. 8, p. 97, Coal Meas.

tuberculata, Newberry, 1856, Proc. Acad. Nat. Sci., vol. 8, p. 96, Coal Meas. MESODMODUS, St. John & Worthen, 1875,

Geo. Sur. Ill., vol. 6, p. 290. [Ety. mesodme, something between; odous, tooth.] Teeth laterally elongated; base

PISCES.

consisting of one inferior flattened; posterior obliquely produced, massive plate, of which the posterior face slopes downward and slightly backward, at an obtuse angle, to the posterior crown face; anterior face slightly produced along the shoulder, which extends parallel with the base of the crown, vertical or beveled, and occupied by a more or less prominent median protuberance, which extends to the edge of the interior surfaces; both faces are more or less roughened or pitted, lateral angles truncated or rounded, and more or less constricted above, equaling the lateral diameter of the crown; crown rising along the anterior border, sharply constricted in front and laterally, and well defined, sometimes constricted from the posterior basal face, nearly equaling the base in anteroposterior diameter; but more or less compressed along the crest, which rises into a more or less prominent median or submedian cusp, vertical or laterally deflected and recurved, usually compressed, with distinct, sometimes sharp, cutting edges; the lateral portions of the crown denticulated, extremities bearing slightly more prominent cusps than intermediate spaces; both faces ridged vertically; outer face of median cone often strongly buttressed; coronal surface enameled. Type M. exculptus. explanatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 293, Waverly or

& Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 291, Wa-Fro. 1148.-Mesodmodus exculptus.

ornatus, St. John & Worthen, 187

MYCTEROPS, Cope, 1888, Am. Nat., p. 87

Geo. Sur. Ill., vol. 6, p. 294, Burling

[Ety. mukter, nose; ops, eye.] Founded

upon the cast of the cranial and nuchal buckler of a placoderm fish; the eye-

holes resemble those of Cephalaspis, and they are separated by a nose-hole,

which is divided by a narrow bridge.

Poissons Fossiles. [Ety. onchos, bent, or

Cranium composed of a great number of plates covered with an enameled

and tuberculated surface; jaws set with

numerous conical, acute, recurved teeth; maxillary forming a low trian-

ordinata, Cope, 1888, Am. Nat., p. 876,

Onchus, Agassiz, 1837, Recherches sur les

hooked like a talon or arrow-barb.]

Onverhouses, Newberry, 1857, Bull. Nat. Inst., p. 5, and Obio Pal., vol. 1, p. 296. [Ety. onyx, a claw; odous, tooth.]

deweyi, see Ceratiocaris deweyi.

exculptus.

Kinderhook Gr.

exculptus, St. John

Type M. ordinata.

Coal Meas.

hook Gr.

ton Gr.

- FIG. 1149. symphysis, wh ter-mandibular

FIG. 1150.-Onychodus sigmoides. One-half nat. size of inter-mandib-ular crest with 6 teeth.

> p. 5, and Ohio Held. Gr.



Fig. 1151.-Onychodu the rigi

ORACANTHUS, Agass les Poissons Fo oraios, beautiful sal rays large, base, hollow, w culated; no pos Type O. milleri. abbreviatus, New Inst., p. 5, Up. consimilis, St. John Sur. Ill., vol. 6,

fragilis, Newberry p. 5, Up. Held.

gle; dentary where they ar ular portions and narrow,



ORA.-ORO.] [MEC.-ONY.

MEC.-ONY.

erior flattened; duced, massive rior face slopes ackward, at an osterior crown htly produced ch extends parhe crown, veroccupied by a t median prods to the edge both faces are l or pitted, latrounded, and l above, equalof the crown; anterior border, iront and latersometimes conerior basal face, ase in anterot more or less est, which rises minent median ical or laterally , usually commetimes sharp, eral portions of ed, extremities prominent cusps es; both faces face of median ressed; coronal pe M. exculp-

Worthen, 1875, 293, Waverly or



148.-Mesodmodus exculptus. Worthen, 1873 p. 294, Burling

m. Nat., p. 876. eye.] Founded inial and nuchal n fish; the eyeof Cephalaspis, by a nose-hole, narrow bridge.

m. Nat., p. 876,

cherches sur les y. onchos, bent, or arrow-barb.] eweyi.

857, Bull. Nat. Pal., vol. 1, p. w; odous, tooth.] a great number th an enameled ce; jaws set with acute, recurved ning a low trian-

ORA.-ORO.]

gle; dentary bones posteriorly acute, where they are overlapped by the articular portions of the mandibles, long and narrow, curving upward to the



FIG. 1149.-Mycterops ordinata

symphysis, where they support an in-ter-mandibular arch of bone, to which is attached a series



Fig. 1150.--Onychodus sigmoides. One-half nat. size inter-mandibular crest with 6 teeth.

O.'sigmoides. hopkinsi, Newberry, 1857, Bull. Nat. Inst., p. 5, Chemung Gr. sigmoides,

of large, curved, con-

ical teeth; body cov-

ered with imbricated

circular scales. Type

Newberry, 1857, Bull. Nat. Inst., 5, and Ohio Pal., vol. 1, p. 299, Up.



FIG. 1151.—Onychodus sigmoides. Fragment of the right mandible.

- ORACANTHUS, Agassiz, 1843, Recherches sur. les Poissons Fossiles, t. 3, p. 13. [Ety. oraios, beautiful; akantha, spine.] Dorsal rays large, conical, without solid base, hollow, walls thin, surface tuberculated; no posterior rows of denticles. Type O. milleri.
- abbreviatus, Newberry, 1857, Bull. Nat. Inst., p. 5, Up. Held. Gr. consimilis, St. John & Worthen, 1875, Geo.
- Sur. Ill., vol. 6, syn. for O. vetustus.
- fragilis, Newberry, 1857, Bull. Nat. Inst., p. 5, Up. Held. Gr.

- granulatus, Newberry, 1857, Bull. Nat. Inst., p. 5, Up. Held. Gr.
- multiseriatus, Newberry, 1857, Bull. Nat. Inst., p. 5, Up. Held. Gr. (?) obliquus, St. John & Worthen, 1875,
 - Geo. Sur. Ill., vol. 6, p. 477, Keokuk Gr.
 - pnigeus. This species is made the type of the genus Pnigeacanthus. See P. deltoides.
 - rectus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 257, Kaskaskia Gr. vetustus, Leidy, 1856, Jour. Acad. Nat.
- Sci. Phil., 2d ser., vol. 3, p. 162, St. Louis Gr.
- ORODUS, Agassiz, 1843, Recherches sur les Poissons Fossiles, t. 3, p. 97. [Ety. oraios, beautiful; odous, tooth.] Teeth laterally elongated, middle more elevated than extremities, forming an obtuse transverse cone; longitudinal diameter greatest and marked by a medial ridge with oblique secondary ridges. Type O. cinctus. alleni, St. John & Worthen, 1875, Geo.
 - Sur. Ill., vol. 6, p. 310, Coal' Meas. carinatus, St. John & Worthen, 1875,
 - Geo. Sur. Ill., vol. 6, p. 307, Keokuk Gr. corrugatus, see Agassizodus corrugatus.
 - dædaleus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 301, Waverly or Kinderhook Gr.
- decussatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 300, Waverly or Kinderhook Gr.
- elegantulus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 64, Burlington Gr.
- fastigiatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 306, Burlington Gr.
- major, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 302, Burlington Gr. mammillaris, Newberry

& Worthen, 1866, Geo.

Sur. Ill., vol. 2, p. 66, Keokuk Gr.



- minusculus, see Desmio- FIG. 1152 -- Orodus dus minusculus. mammillaris. minutus, Newberry &
- Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 68, Keokuk Gr.
- multicarinatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 62, Waverly or Kinderhook Gr.
- neglectus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 308, St. Louis Gr. ornatus, Newberry & Worthen, 1886, Geo.
- Sur. Ill., vol. 2, p. 65, Keokuk Gr. parallelus, St. John & Worthen, 1875,
- Geo. Sur. Ill., vol. 6, p. 295, Waverly or Kinderhook Gr.
- parvulus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 309, St. Louis Gr.
- plicatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 63, St. Louis Gr.
- tuberculatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 66, Burlington Gr.

604

100

PISCES.

turgidus, St. John & Worthen, 1875, Geo. Sur HI., vol. 6, p. 310, Kaskaskia Gr.

variabilis, Newberry, 1875, Ohio Pal., vol. 2, p. 50, Waverly Gr. St. variocostatus.

John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 304, Burlington Gr.

whitii, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 297, Waverly or Kinderhook Gr.

FIG. 1153.-Orodus

variabilis.

ORTHACANTHUS, Agassiz, 1843, Poiss. Foss., t. 3, p. 330, [Ety. orthos, straight; akantha, spine.] Spines straight or gently curved; two or more rows of denticles on the posterior face. Type O. cylindricus.

FIG. 1154 -Orthacanthus gracilis.

- arcuatus, Newberry, 1857, (Pleuracanthus arcuatus.) Proc. Acad. Nat. Sci. Phil., -, and Ohio Pal., vol. 1, p. 332, Coal Meas.
- gracilis, Newberry, 1875, Ohio Pal., vol. 2, p. 56, Coal Meas.
- quadriseriatus, Cope, 1877, Pal. Bull. No. 26, in Proc. Am. Phil. Soc., vol. 17, p. 192. Permian.
- ORTHOPLEURODUS, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 190. [Ety. orthos, straight; pleuron, side; odous, tooth; in allusion to the straight postero-lateral border of the maxillary posterior tooth.] Posterior teeth of upper jaw subspatulate in outline; postero-lateral border straight, or nearly so, and probably gently curved down-ward and inward at the outer extremity, and gently arched in the same direction, terminating posteriorly in an acute angle or spur, whence the inner margin, which is greatly thickened or massive, is broadly rounded into and merges with the thin antero-lateral border toward the extremity; coronal surface occupied by a prominent principal fold or ridge rising nearest the straight border, and flanked on the anterior slope by an obscure secondary ridge; the punctate enamel forms a narrow fold along the thickened straight border; teeth supposed to have occupied a similar position on the man-dibles, distinguished by their trigonal outline, somewhat strong and spiral inrollment of the extremity, toward which the antero and postero-lateral borders regularly converge, inner margin more or less obliquely rounded, and sigmoidally curved from front toward the posterior angle; coronal surface pre-

senting a more or less well-defined plane: anterior fold, abruptly broken down on that side, where the coronal enamel forms a wide belt sharply defined from the deep basal rim, and limited behind by the more or less deep longitudinal depression from which rises the alate posterior lobe, which is limited exteriorly by a narrow fold of enamel separating the crown from the basal portion of the tooth: mandibular median or second teeth characterized by their triangular outline, rather strong inrollment of the outer extremity ; straight postero-lateral border, which is similarly enameled to the antero-lateral border of last above described posterior dental plates: anterolateral border rapidly and irregularly converging from the subacute angle of the broad, slightly arched inner margin: coronal surface forming a broad. low arch, or nearly plane transversely Type O. carbonarius.

- carbonarius, Newberry & Worthen, 1866 Sandalodus carbonarius,) Geo. Sur. Ill., vol. 2, p. 104, Up. Coal Meas. convexus, St. John & Worthen, 1883, Geo.
- Sur. Ill., vol. 7, p. 193, Coal Meas. novomexicanus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 195, Subcarboniferous.
- PALEASPIS, Claypole, 1885, Quar. Jour. Geo. Soc. Lond. [Ety. palaios, ancient; aspis, shield.] Plates or scutes ornamented. Only single dorsal plates discovered. Type P. americana.
 - americana, Claypole, 1885, Quar. Jour. Geo. Soc. Lond., Up. Silurian or Low. Devonian
 - truncata, Claypole, 1885, Quar. Jour. Geo. Soc. Lond., Up, Silurian or Low. Devonian.
- PALEOBATIS, Leidy, 1856, Trans. Am. Phil. Soc., vol. 11, p. 87. [Ety. palaios, ancient; batis, a prickly kind of roach or ray.] Type P. insignis.
 - insignis, Leidy, 1856, Trans. Am. Phil. Soc., vol. 11, p. 87, Keokuk Gr.
- PALEONISCUS, Agassiz, 1833, Recherches sur les Poissons Fossiles, t. 1, p. 4. [Ety. palaios, ancient; oniscus, a wood-louse. Small, fusiform, deep between ventral and pectoral fins; tail heterocercal, forked, upper lobe longer and narrower than lower; fins small; jaws large; teeth minute; scales rhomboidal, smooth or striated. Type P. fultus.
 - alberti, see Rhadinichthys alberti. brainerdi, Thomas, 1853, Bost Soc. Nat. Hist., vol. 4, Ohio Pal., vol. 1, p. 346, Berea grit.
 - browni, Jackson, 1851, Rep. on Albert Coal Mine, Coal Meas.

cairnesi, see Rhadinichthys cairnesi. gracilis, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 347, Coal Mess.

jacksoni, Dawson, 1877, Can. Nat. Quar. Jour. Sci., vol. 8, Carboniferous.

PEL.-PET.]

ORT.- PAL

leidvanus, Lea, Sci., 2d ser., v modulus, see Rha peltigerus, Newl peltigerus.) Pr 8. p. 98. and O Meas.



scutigerus, New Nat. Sci. Phil. PELTODUS, Newber Sur. Ill., vol.

half-moon shie small and low in outline, arc tions, concave crown surface from front to 1 terior margin punctate thro bony and roug regular where thickened and contact when less flat, smo than Psammo than Cochliod

plicomphalus, St Geo. Sur. Ill., kia Gr. quadratus, St.

Geo. Sur. Ill., transversus, St. Geo. Sur. Ill.,

unguiformis, Neu Geo. Sur. Ill., PEPLORHINA, Cope.

Sci. Phil., p. 3 Rhine, a kind anthracina. anthracina, Cope

Sci. Phil., p. 3

arctata, Cope, 18 p. 55, Permian PERIPLECTRODUS, St Geo. Sur. Ill., v near by; Plectr panded lateral metrically inr ward, inferior s

ORT. PAL.

well-defined uptly broken e the coronal t sharply desal rim, and more or less ression from posterior lobe, y by a narrow ng the crown of the tooth; second teeth riangular outllment of the postero-lateral y enameled to of last above plates; anterond irregularly acute angle of ed inner marming a broad, e transversely.

Worthen, 1866 Geo. Sur. 3,) oal Meas. hen, 1883, Geo. loal Meas. & Worthen, 7, p. 195, Sub-

1ar. Jour. Geo. ancient; aspis, es ornamented. es discovered.

i, Quar. Jour. urian or Low.

uar. Jour. Geo. n or Low. De-

ans. Am. Phil. ty. palaios, annd of roach or

ans. Am. Phil. uk Gr. Recherches sur 1, p. 4. [Ety. a wood-louse. etween ventral 1 heterocercal, r and narrower l; jaws large; rhomboidal, pe P. fultus. alberti. Bost Soc. Nat. vol. 1, p. 346,

lep. on Albert

s cairnesi. then, 1870, Geo. Coal Meas. an. Nat. Quar. niferous.

PEL.-PET.]

peltigerus, Newberry, 1857, (Elonichthys peltigerus,) Proc. Acad. Nat. Sci., vol. 8, p. 98, and Ohio Pal., vol. 1, p. 345, Coal Meas.



FIG. 1155.-Palæoniscus peltigerus.

PISCES.

scutigerus, Newberry, 1857, Proc. Acad. Nat. Sci. Phil., Coal Meas.

- PELTODUS, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 362. [Éty. pelte, a half-moon shield; odous, tooth] Teeth small and low, round oval or elliptical in outline, arched above in both directions, concave or flattened below; crown surface most strongly arched from front to rear, highest near the anterior margin; more or less evenly punctate throughout; under surface bony and rough; margins thin and irregular where the teeth are separated, thickened and even along the lines of contact when closely set. They are less flat, smooth and pavement-like than Psammodus, and less convoluted than Cochliodus. Type P. unguiformis. plicomphalus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 411, Kaskaskia Gr.
 - quadratus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 410, St. Louis Gr. transversus, St. John & Worthen. 1875, Geo. Sur. Ill., vol. 6, p. 412, Coal Meas. unguiformis, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 363, Coal Meas.
- PEPLORHINA, Cope, 1873, Proc. Acad. Nat. Sci. Phil., p. 343. [Ety. peplos, a robe; Rhine, a kind of dog-fish.] Type P. anthracina.
 - anthracina, Cope, 1873, Proc. Acad. Nat. Sci. Phil., p. 343, Coal Meas.
 - arctata, Cope, 1877, Proc. Am. Phil. Soc., p. 55, Permian Gr.
- PERIPLECTRODUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 324. [Ety. peri, near by; *Plectrodus*, a genus.] Base expanded laterally or compressed; symmetrically inrolled from within outward, inferior surface excavated ; crown

consisting of transverse, strong, median cusps, flanked by denticles; one on either side, and then regularly increase in size from the outer to the inner extremity or with age; coronal cusps enameled, smooth or vertically striated. Type P. warreni.

compressus, St. John & Worthen, 1875, Geo. Sur. Ill. vol. 6, p. 326, St. Louis Gr.

expansus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 327, Kaskaskia Gr. warreni, St. John

& Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 325, Burlington Gr.

PERIPRISTIS, Agassiz, 1870, Proc.

Am. Phil. Soc., vol. 11, p. 434. [Ety. peri, around; pristis, saw.] Small, crown com-

pressed, acuminate, serrate, curved laterally; coronal cavity; root as in Petalodus. crown and coronal cavity covered with ga. noine. Type P. semicircularis.



semicircularis, Newberry FIG. 1156 .- Peri-& Worthen, 1866, (Cten- pristis semicir-optychius semicircu- cularis. laris,) Geo. Sur. Ill., vol, 2, p. 72, Coal Meas.

PETALODUS, Owen 1840, Odontography, p. 60. [Ety. petalos, spread out; odous, tooth.] Teeth transversely elongated, compressed, thin, petal-shaped, cutting edge serrated; base of crown with imbricating folds of enamel, descending lower on the posterior than anterior face; root large, oblong, truncated be-

low; lower edge ob-tuse, tumid. Type P. hastingsi. alleghaniensis, Leidy, 1856, Jour. Acad. Nat. Sci., 2d series, vol. 3, p. 161, and Geo. Sur. Ill., vol. 2, p. 35, Coal Meas. curtus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 6, p. 355, Keokuk Gr.

destructor, Newberry & Worthen, 1866, syn. for P. alleghaniensis.

hybridus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 394, St. Louis Gr.

1157.-Petalodus

alleghaniensis.

FIG

linguifer, Newberry & Worthen, 1856. Geo. Sur. Ill., vol. 2, p. 37, Kaskaskia Gr. proximus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 395, Coal Meas.

- PETALORHYNCHUS, Agassiz, 1855, in British Pal. Rocks. [Ety. *petalos*, spread out; *rhynchos*, a beak.] Teeth small, crown compressed, thin, concavo-convex, petal-shaped; higher and narrower thin, concavo-convex, than Petalodus; imbricating folds on
- 5 posterior face forming a short trans-verse band, not extending to the lateral angles of the crown; root long, un-
- divided. Type P. sagittatum. distortum, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 406, St. Louis Gr.
- pseudosagittatum, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 405, St. Louis Gr.
- spatulatum, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 408, St. Louis Gr. striatum, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 40, Burling-
- ton Gr. PETRODUS, McCoy, 1848, Ann. and Mag. Nat. Hist., 2d series, vol 2, p. 132. [Ety. petros, a rock; odous, a tooth.] Conical; base round or subtrigonal; apex rudely
 - pointed; sides radiatingly ridged; osseous base wider than the crown. Type P. patelliformis.
 - acutus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 72, Coal Meas.
 - occidentalis, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 70, Coal Meas. pustulosus, Newberry & Worthen, 1870,
 - Geo. Sur. Ill., vol. 4, p. 369, Burlington Gr.
- PHANEROPLEURON, Huxley, 1871, 10th Decade Geo. Sur. of Gt. Britain. [Ety. phaneros, open ; pleuron, side.] curtum, Whiteaves, 1881, Am. Jour. Sci.
 - and Arts, 3d ser., vol. 21, p. 495, Upper Devonian.
- PHŒBODUS, St. John & Worthen, 1875, Geo.

Sur. Ill., vol. 6, p. 251. [Ety. mythological name; odous, a tooth.] Teeth small; base irregularly elliptical, strongly produced in front and faintly excavated at the median line; the cavated at the median line; the antero-inferior angles approxi-mate, and laterally curve to the rounded extremities; broadly though irregularly rounded be-hind; the angles in front are occupied by a strong, lateral, and bits provide accession bick is pad-like prominence, which is more or less distinctly bilobed and beyeled to the deeply excavated inferior surface; posterior margin slightly burled; postero-superior surface mod

moderately convex, and surmounted by a later-ally elongated, well-defined promi-nence, which is situated nearly midway between the base of the crown and the posterior border, to which the surface abruptly slopes, and extending

laterally nearly half the diameter of the base; the coronal region consists of three strong cusps, of which the exterior pair are largest, strongly diverging and moderately recurved or nearly vertical, antero-posteriorly compressed or suboval in section, apparently without distinct cutting edges; median cone similar in shape, erect, more or less

produced in front and continued to the shallow median depression in the border; a rudimentary denticle between the me-



dian and lateral cusps. FIG. 1158. - Phoebodus sophim. Type P. sophiæ. sophiæ, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 251, Devonian.

- PHYSONEMUS, Agassiz, 1843, Recherches sur les Poissons Fossiles, t. 3, p. 176. [Ety. physa, bladder; nema, thread.] Dorsal spine strong, laterally compressed, deeply imbeded, curved; apex directed toward the front; lateral faces bearing coste and tubercles; pulp cavity large; base notched. Type P. subteres. altonensis, St. John & Worthen, 1875,
 - Geo. Sur. Ill., vol. 6, p. 454, St. Louis Gr.
 - carinatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 452, Waverly or Kinderhook Gr.
 - chesterensis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 455, Kaskaskia Gr.
 - depressus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 452, Waverly or Kinderhook Gr.
- falcatus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 252, St. Louis Gr. gigas, Newberry & Worthen, 1870, Geo.
- Sur. Ill., vol. 4, p. 373, Burlington Gr.
- parvulus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 453, Keokuk Gr.



FIG. 1159.-Platyodus lineatus. Crown surface.

- proclivis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 451, Waverly or Kinderhook Gr.
- PLATYODUS, Newberry, 1875, Ohio Pal., vol. 2, p. 58. [Ety. platys, broad; odous, tooth.] Teeth elliptical in outline; crown arched in both directions; sur-

PLA.-POL.]

face punctate without folds eatus. lineatus, Newbe

2, p. 58, Wave PLATYSOMUS, Agas

les Poissons platys, broad boidal, compi fins nearly e small; ventra crown dilated constricted at scales large, o ridge at anter at the upper

notch of the a striatus. circularis, Newl

Geo. Sur. Ill Meas.

Pleuracanthus, Ag vol. 3, p. 66. tha, spine.]] upon a spine a Order Raiina. edge, curved a on the inferior in this genus poorly defined Type P. lævis

arcuatus, see Ort biserialis, Newbe

Nat. Sci., vol. dilatatus, Newber

- Sci., vol. 8, p. RNIGEACANTHUS, SI Geo. Sur. Ill., the specific nar akantha, spine laterally comp panded before sertion, rapidl apex, which transverse sec into the slight terior border margin; pulp tending nearly very thin, sli margins; exte irregularly dis tured tubercles obscure or inte diagonal order thus pnigeus, c which St. Joh
- deltoides. deltoides, St. Joh Sur. Ill., vol. 6, why should th canthus pniger trigonalis, St. Joh Sur. Ill., vol. 7 POECILODUS, Agassia Foss., vol. 3, p
 - riegated ; odou Cochliodus: to trigonal, convo

PET.-PLA.

PET.-PLA.

ameter of the consists of n hich the exongly divergved or nearly y compressed arently withmedian cone more or less



TG. 1158 -Phœbodus sophiæ.

n, 1875, Geo. vonian. echerches sur p. 176. [Etv. ead.] Dorsal compressed, apex directed faces bearing cavity large; ibteres.

orthen, 1875, p. 454, St.

en, 1875, Geo. werly or Kinorthen, 1875,

455, Kaskasen, 1875, Geo. werly or Kin-

en, 1883, Geo. Louis Gr. en, 1870, Geo. 373, Burling-

en, 1875, Geo. eokuk Gr.



n surface. en, 1875, Geo. Waverly or

Ohio Pal., vol. broad; odous, in outline; rections; surPLA.-POL.]

face punctate in undulate lines, but without folds or ridges. Type P. lineatus.

PISCES.

- lineatus, Newberry, 1875, Ohio Pal., vol. 2, p. 58, Waverly Gr.
- PLATYSOMUS, Agassiz, 1833, Recherches sur les Poissons Fossiles, t. 1, p. 6. LEtv. platys, broad; soma, body.] Rhom-boidal, compressed; dorsal and anal fins nearly equal, opposite; pectorals small; ventrals small; teeth clavate; crown dilated, flattened; base slender, constricted at the base of the ganoine scales large, oblong, articular internal ridge at anterior edge; beveled spine at the upper corner received in a notch of the adjoining scale. Type P. striatus.
- circularis, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 347, Coal Meas.
- Pleuracanthus, Agassiz, 1843, Poiss. Foss., vol. 3, p. 66. [Ety. pleura, side; akan-tha, spine.] The genus was founded upon a spine supposed to belong to the Order Raiina. It is serrated on one edge, curved at the base, and furrowed on the inferior side. The species named in this genus from America are too poorly defined to warrant recognition. Type P. lævissimus.

arcuatus, see Orthacanthus arcuatus.

biserialis, Newberry, 1857, Proc. Acad. Nat. Sci., vol. 8, p. 100, Coal Meas.

dilatatus, Newberry, 1857, Proc. Acad. Nat. Sci., vol. 8, p. 100, Coal Meas. RNIGEACANTHUS, St. John & Worthen, 1875,

- Geo. Sur. Ill., vol. 6, p. 480. [Ety. from the specific name in Oracanthus pnigeus; akantha, spine.] Spine short, conical, laterally compressed; base broadly expanded before and behind, without insertion, rapidly tapering to the obtuse apex, which is directed posteriorly; transverse section elliptical, rounded into the slightly sigmoidally curved anterior border and concave posterior margin; pulp cavity very large, ex-tending nearly to the tip; lateral walls very thin, slightly thickened in the margins; external surface occupied by irregularly disposed, radiatingly sculptured tubercles, sometimes arranged in obscure or interrupted longitudinal and diagonal order. The type is Oracanthus pnigeus, of Newberry & Worthen, which St. John named Pnigeacanthus deltoides.
- deltoides, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 480, Keokuk Gr. But why should this species not be Pnigeacanthus pnigeus?
- trigonalis, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 259, St. Louis Gr.
- PECLIDUS, Agassiz, 1843, Recherches Poiss. Foss., vol. 3, p. 174. [Ety. poikilos, va-riegated; odous, tooth.] Teeth as in Cochlidus; terminal tooth obliquely trigonal, convoluted; median tooth nar-

row, convoluted; all teeth wrinkled at right angles to the articular edges; surface porous. Type P. jonesi.

- carbonarius, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 139, Coal Meas.
- cestriensis, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 135, Kaskaskia Gr.
- ornatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 95, syn. for Chitonodus rugosus.

rugosus, see Chitonodus rugosus.

- springeri, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 138, Subcarboniferous.
- stludovici, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 132, St. Louis Gr.
- varsoviensis, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 131. Warsaw Gr.
- wortheni, St. John, 1883, Geo. Sur. Ill., vol. 7, p. 136, Kaskaskia Gr.
- POLYRHIZODUS, McCoy, 1848, Ann. and Mag. Nat. Hist., 2d series, vol. 2, p. 125. [Ety. polys, many; rhiza, root; odous, tooth.] Crown like Petalodus, but more elongated, transversely lower and thicker; root divided into numerous short, robust radicles. Type P. magnus.
 - amplus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 387, St. Louis Gr.
 - carbonarius, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 389, Coal Meas.
 - dentatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 50, Kaskaskia Gr.
 - littoni, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 357, St.

Louis Gr.

modestus, Newberry, 1875,



Ohio Pal., vol. 2, p. 50, Cleve- Fig. 1160.-Polyrhizodus littoni. Concave face, land shale. nanus, St. John & Worthen, 1875, Geo.



FIG. 1161.-Polyrhizo-

dus modestus.

Sur. Ill., vol. 6, p. 386, Keokuk Gr. piasensis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 386, Warsaw Gr.

- ponticulus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 51, Kaskaskia Gr.
- porosus, Newberry & Worthen, 1866. Geo. Sur. Ill., vol. 2, p. 49, Burlington Gr.
- truncatus, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 357, Burlington Gr.
- williamsi, St. John & Worthen, 1875. Geo. Sur. Ill., vol. 6, p. 384, Keokuk Gr.

PRISTICLADODUS, McCoy, 1855, British Pal. Rocks, p. 642. [Ety. from the two genera Pristis and Cladodus.] Teeth re-



608

de.

FIG. 1162.--Pristicladodus springeri.

semble Cladodus; median and lateral cusps strong; lateral edges sharp and more or less undu-lated. Type P. dentatus. springeri, St. John & Worthen.

1875, Geo. Sur. Ill., vol. 6, p. 255, Waverly or Kinderhook Gr.

PRISTODUS, Agassiz. [Ety. pristis, a saw; odous, a tooth.] This genus has been only doubtfully identified in America. (?) acuminatus, St. John & Worthen, 1875,

Geo. Sur. Ill., vol. 6, p. 402, Waverly or Kinderhook Gr.

PSAMMODUS, Agassiz, 1843, Recherches sur les Poissons Fossiles, t. 3, p. 112. [Ety. psammos, sand; odous, tooth.] Teeth quadrilateral or trapezoidal in general outline, variable, usually thick and massive; the coronal region presents a more or less plane surface, according to the position the form occupied upon the jaws, always arched, generally moderately in the longitudinal direction or from behind forward, transversely concave (maxillary teeth), or more or less convex (mandibular teeth), sometimes raised into a low ridge along the exterior lateral border, also along the articular inner border, or showing a more or less wide convexity in the latter region, and sometimes presenting a more or less well-defined transverse prominence in mature maxillary form; the marginal limits of the crown are well defined, rounded along the exterior of lateral border, and usually inbeveled, and almost always making an angulation at the articular inner border and along the anterior and pos-terior margins, the enamel extending well down, and more or less distinctly defined from the coarse, vermicularly pitted base which constitutes the greater part of the height of the tooth; in front and behind, the basal wall is nearly exactly vertical to the plane of the coronal surface, and moderately channeled or concave; the inner articular face is also vertical and slightly excavated, presenting generally at one or the other extremity an obliquely truncated articular facet for co-adaptation with the contiguous tooth of the opposite series, the extent and obliquity of the truncation varying greatly according to the species; the exterior lateral border, in typical forms, shows an expansion of the basal portion beyond the coronal limits, increasing in breadth and terminating in a more or less produced spur at the postero-outer angle of the tooth; the coronal surface exhibits under an ordinary lens a distinct, vertical, prismatic structure, each of the vertical columns inclosing a medullary tube, the appearance of which at the surface produces the exceedingly minute punctation usually observed in these teeth; the exceedingly elegant vermiculose rugosity exhibited in the less worn surfaces of certain species is produced by the wrinkling of the enamel or external laver, and which apparently has no other relation to the medullary tubes than to rudely define them in irregular and transverse or longitudinal rows,

1

Ъ C

FIG. 1163.-Psammodus crassidens. a. Median dental plates; b, transverse profile; c, longitu-dinal profile.

the punctæ rarely confluent, and the rugose appearance becoming obsolete or more or less obscured over the more exposed parts of the triturating surface; the impression also prevails that the tendency to rugosity of the coronal surface increases with age, since this appearance, so far as observed, seems to be most prevalent and conspicuous in large individuals belonging to the series which have received several accessions, the innermost individuals of which have suffered little from the abrading effects of trituration while in use; but it is not an essential character, as some species evidently always remained quite smooth in their coronal areas; the

PSA.]

PRI.-PSA.

inferior surfa way conform and even pos teristics as ap in the perfe thin layer, p than structurs cellulose mid bulk of the ba more or le grooves, or si nearest the Type P. poro angularis, New Geo. Sur. Ill kia Gr.

antiquus, New Inst., Up. He bretonensis, W vol. 10, Carbo



cælatus, St. Joh Sur. Ill., vol. crassidens, St. Geo. Sur. J Louis Gr. glyptus, St. Joh Sur. Ill., vol. ton Gr.



FIG. 1165.—Diagram a, Mandibular ser longitudinal profi

> grandis, St. Joh Sur. Ill., vol. lovianus, St. Jol Sur. Ill., vol.

[PRI.-PSA.

postero-outer onal surface y lens a disucture, each inclosing a pearance of luces the extion usually the exceedrugosity exsurfaces of ced by the or external ntly has no lullary tubes a in irregular idinal rows,

ns. a, Median file; c, longitu-

ent, and the ning obsolete over the more ating surface; vails that the the coronal re, since this rved, seems to onspicuous in g to the series ral accessions, als of which the abrading e in use; but racter, as some emained quite l areas; the PSA.]

inferior surface is plane, in a general way conforming to that of the crown, and even possessing distinctive characteristics as applied to species; it shows in the perfect state a rather dense, thin layer, perhaps in degree rather than structurally differing from the more cellulose middle layer composing the bulk of the base, and usually marked by more or less distinct longitudinal grooves, or smooth and faintly keeled nearest the inner articular border. Type P. porosus. angularis, Newberry & Worthen, 1866,

- ngularis, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 107, Kaskaskia Gr.
- antiquus, Newberry, 1857, Bull. Nat. Inst., Up. Held. Gr.

bretonensis, Whiteaves, 1881, Can. Nat., vol. 10, Carboniferous.



FIG. 1164 -Psammodus porosus.

cælatus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 217, St. Louis Gr. crassidens, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 218, St. Louis Gr.

glyptus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p, 209, Up. Burlington Gr.



FIG. 1165—Diagram of Psammodus springeri. a, Mandibular series; b, transverse profile; c, longitudinal profile.

grandis, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 211, Keokuk Gr. lovianus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 207, Burlington Gr. plenus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 213, St. Louis Gr.





FIG. 1166.—Diagram of Psammodus springeri. a, Maxillary series; b, transverse profile; c, longitudinal profile.

porosus, Agassiz, 1843, Recherch. Poiss. Foss., t. 3, p. 112, Kaskaskia Gr.



FIG. 1167.—Hypothetical diagram, showing median dental plates of Psammodus springeri.

reticulatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 109, Kaskaskia Gr.



FIG. 1168.—Hypothetical diagram of Psammodus turgidus.

rhomboideus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 110, syn. for Sandalodus lævissimus.

- semicylindricus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 109, syn. for Sandalodus lævissimus.
- springeri, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 202, Upper Burlington Gr.
- tumidus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 205, Up. Burlington Gr.
- turgidus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 206, Keokuk Gr. PSEPHODUS, Agassiz, 1862, Quar. Jour. Geo.
 - Soc., vol. 18, p. 102. [Ety. psephos, a peb-ble; odous, a tooth.] Heavy, more or less spirally inrolled triturating or crushing plates invest the median range of the rami of the jaws; they are trapezoidal in outline, with undulated articular surfaces. Type P. magnus.
 - convolutus, Newberry & Worthen, 1866, (Aspidodus convolutus,) Geo. Sur. Ill., vol. 2, p. 94, Kaskaskia Gr.
 - crenulatus, Newberry & Worthen, 1866, (Aspidodus crenulatus,) Geo. Sur. Ill., vol. 2, p. 93, Kaskaskia Gr. cunulatus, see P. lunulatus. latus, St. John & Worthen, 1883, Geo.

 - Sur. Ill., vol. 7, p. 72, St. Louis Gr.
 - lunulatus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 74, (misprinted cunulatus,) Kaskaskia Gr.
 - obliquus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 66, Waverly or Kin-
 - derkook Gr. placenta, Newberry & Worthen, 1866, (Helodus placenta,) Geo. Sur. Ill., vol. 2, p. 80, Waverly or Kinderkook Gr.
 - reticulatus, St. John & Worthen, 1875. Geo. Sur. 111., vol. 6, p. 417, Waverly or Kinderhook Gr.
 - symmetricus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 71, Waverly or Kinderhook Gr.
- PTERICHTHYS, Agassiz, 1835, Recherches sur les Poissons Fossiles, t. 1, p. 302. [Ety. pteron, fin; ichthys, fish.] The outline of this genus reminded Hugh Miller of the figure of a man rudely drawn in black on a gray ground, the head cut off at the shoulders, the arms spread at full as in the attitude of swimming, the body rather long than otherwise, and narrowing from the chest downward, one of the legs cut away at the hip-joint, and the other as if to preserve the balance, placed directly under the center of the figure, which it seems to support. The under part of the body was flat, the upper rose toward the center into a roof like ridge, and both under and upper were covered with a strong armor of plates; the plates on the under side are divided by a longitudinal suture and a transverse suture, and they would cut at right angles were it not for a lozenge-shaped plate in the center; there are therefore five plates on the under side, all of which are

thickly tuberculated; the upper side is covered with a large, long, hexagonal plate in the central part, that is surrounded by a row of unequal and variously formed plates, all of which are strongly tuberculated: the cephalic shield is rounded in front, and truncated behind where it joins the body carapace, having a transverse median open-ing; nuchal region occupied by a plate somewhat like the lateral view of a

PSE.-PTV.



FIG. 1169.-Pterichtbys milleri.

- coronet or crown; one post-median plate, another in front, one lateral occipital on each side, two lateral and one postero lateral on each side. and an angular plate on each posterolateral side articulating with the limb; the oblong carapace is cov-ered by the large, hexagonal anteromedian plate, and a smaller posterior median dorsal, and two dorso-lateral plates on each side; tail thick, conical, covered with rhomboidal scales; surface covered with granules. Type P. milleri.
- canadensis, see Bothriolepis canadensis. norwoodensis, Owen, syn. for Macropetalichthys rapheidolabis.
- rugosus, Claypole, 1883, Proc. Am. Phil.
- Soc., p. 664, Upper Chemung Gr. Prycropus, Pander Uber die Ctenodipterinen des Devonischens Systems, p. 48. [Ety. ptyktos, folded; odous, tooth.] Elongated; base expanded, subconical; crown flattened or furrowed; enameled; tubes in transverse furrows, with low intervening ridges. Type P. obliquus.
 - calceolus, Newberry & Worthen, 1866, (Rinodus calceolus,) Geo. Sur. Ill., vol. 2, p. 106, Ham. Gr.
- PTYONODUS, Cope, 1877, Proc. Am. Phil. Soc., p. 192. [Ety. ptyon, a fan; odous, a tooth.]
 - paucicristatus, Cope, 1877, Proc. Am.
 - Phil. Soc., p. 54, Permian.
 vinslovi, Cope, 1877, Proc. Acad. Nat. Sci. Phil., p. 410, Permian.

PYG.-RHY

Pygopterus, Agassi p. 10. [Ety. Body large, el



Fra

with fulcral se opposite dorsa rals small, falca upper jaw lon skeleton stroi boidal. Type nitely known scutellatus, Newl Nat. Sci., vol. poorly defined



FIG. 1171.—Pygopteris under surface

RHADINICHTHYS, T Geo. Soc. Lond rhadinos, slend slender; jaws Janiaries, outsi smaller teeth ; fin as in Pygo nearly opposi ornatissimus.



FIG.

alberti, Jackson, berti,) Rep. on New Brunswicl cairnsi, Jackson cairnsi,) Rep. New Brunswic modulus, Daws modulus,) Can Sci., vol. 8, Car

RHIZODUS, Owen, [Ety. rhiza, a ro massive, bear double-edged to [PSE.—PTV.

upper side is g, hexagonal ; that is surnal and variof which are the cephalic and truncated ie body caramedian opened by a plate al view of a



nilleri.

post-median , one lateral two lateral on each side, each posterog with the upace is covgonal anterouler posterior dorso-lateral thick, conical, scales; surface Type P. mil-

canadensis. r Macropetal-

oc. Am. Phil. ung Gr. Ctenodipteriystems, p. 48. odous, tooth.] d, subconical; ed; enameled; arrows, with s, Type P.

orthen, 1866, Sur. Ill., vol.

oc. "Am. Phil. , a fan; odous,

7, Proc. Am.

c. Acad. Nat. n. PYG.-RHY

PISCES.

Pygopterus, Agassiz, 1833, Poiss. Foss., t. 1, p. 10. [Ety. pyge, rump; pteron, fin.] Body large, elongate, ovate; fins large,

with fulcral scales; anal fin long, nearly

opposite dorsal; ventrals small; pectorals small, falcate; caudal large, notched;

upper jaw longer than the lower; endoskeleton strong; scales small, rhomboidal. Type P. humboldti. Not defi-

scutellatus, Newberry, 1857, Proc. Acad. Nat. Sci., vol. 8, p. 98, Coal Meas. Too poorly defined to warrant recognition.

FIG. 1171.—Pygopteris mandibularis. Outside and under surface of scale magnified.

RHADINICHTHYS, Traquair, 1877, Quar. Jour. Geo. Soc. Lond., vol. 33, p. 548. [Ety.

rhadinos, slender; ichthys, fish.] Body

slender; jaws with a row of incurved

faniaries, outside of which there are

smaller teeth; principal rays of pectoral

fin as in Pygopterus; dorsal far back,

nearly opposite the anal. Type R.

alberti, Jackson, 1851, (Palæoniscus alberti,) Rep. on the Albert Coalmine,

cairnsi,) Rep. on Albert Coal-mine, New Brunswick, Coal Meas.

modulus, Dawson, 1877, (Palaeoniscus modulus,) Can. Nat. and Quar. Jour. Sci., vol. 8, Carboniferous.

RHIZODUS, Owen, 1840, Odontography.

[Ety. rhiza, a root; odous, tooth.] Jaws

massive, bearing large, compressed,

double-edged teeth, with sulcated bases

New Brunswick, Coal Meas.

FIG. 1172 .-- Rhadinichthys alberti.

Jackson, 1851, (Palæoniscus

ornatissimus.

cairnsi,

nitely known from America.

in each dental bone, and numerous smaller ones; scales large, rotundatoquadrate, thin, inner surface concentric-

ally lined; outer surface tuberculate. Type R. hibberti.

angustus, Newberry, 1857, Proc. Acad. Nat. Sci. Phil., vol. 8, p. 99, Coal Meas. Poorly defined. hardingi, Dawson, 1868, Acad. Geol., p. 254, Subcarboniferous.

incurvus, Newberry, 1857, Proc. Acad. Nat. Sci., vol. 8, p. 99, Coal Meas. Poorly defined.



FIG. 1173.-Rhizodus occidentalis. Scale.

lancifer, Newberry, 1857, Proc. Acad. Nat. Sci. Phil., vol. 8, p. 99, and Ohio Pal., vol. 1, p. 342, Coal Meas.

occidentalis, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 19, Coal Meas. quadratus, Newberry, 1873, Ohio Pal., vol. 1, p. 343. Coal Meas.

reticulatus, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 349, Coal Meas.

RHYNCHODUS, Newberry, 1873, Ohio Pal., vol. 1, p. 307. [Ety. *rhynchos*, beak; *odous*, tooth.] Teeth somewhat half-circular, compressed, exterior margins curved; one cornua produced, the

other obtuse; straight side the triturating or cutting edge. Type R. secans.



FIG. 1174.—Rhynchodus frangens.

crassus, Newberry, 1873, Ohio Pal., vol. 1, p. 312, Up. Held. Gr.



FIG. 1170.-Ptyctodus calceolus. Side view.

- excavatus, Newberry, 1877, Geo. of Wis., vol. 2, p. 397, Ham. Gr. frangens, Newberry, 1873, Ohio Pal., vol.
- 1, p. 311, Up. Held. Gr.
- secans, Newberry, 1873, Ohio Pal., vol. 1, p. 310, Up. Held. Gr.
- Rinodus, Newberry & Worthen, 1866, syn. for Ptyctodus.
- calceolus, see Ptyctodus calceolus.

612

- SANDALODUS, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 102. Etv. sandalon, a sandal; odous, tooth.] Teeth thick, strong, subtriangular or clubshaped, with one or two pointed extremities; twisted and arched; base concave, surface punctate. Type S. parvulus.
 - angustus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 103, Keokuk Gr. carbonarius, see Orthopleurodus carbonarius.
 - complanatus, Newberry & Worthen, 1866, (Deltodus complanatus,) Geo. Sur. Ill., vol. 2, p. 98, Upper Burlington Gr.
 - crassus, Newberry & Worthen, 1870, Geo. Sur. Ill., vol. 4, p. 369, syn. for S. spatulatus.
 - grandis, Newberry & Worthen, 1866. Geo. Sur. Ill., vol. 2, p. 105, syn for S. lævissimus.
 - lævissimus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 104, Keokuk Gr. minor, Newberry & Worthen, 1866, (Tri-
 - gonodus minor,) Geo. Sur. Ill., vol. 2, p. 112, Keokuk Gr.
 - parvulus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 102, St. Louis Gr. In part Stenopterodus parvulus. spatulatus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 103, St. Louis Gr.



F1G. 1175.-Sandalodus spatulatus.

- Sauripteris, Hall, 1843, Geo. Rep. 4th Dist. N.Y. [Ety. sauros, lizard; pteron, wing.] taylori, see Holoptychius taylori.
- Sicarius extinctus, Leidy, 1855, Proc. Acad. Nat. Sci., vol. 7. Not satisfactorily defined.
- STEMMATODUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 328. [Ety. stemmatos, a wreath; odous, tooth.] Teeth variable, anomalous, some triangular with three or more rows of denticles, others simple with narrower base and a single row of coronal cusps. Type S. chiriformis.
 - bicristatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 331, Burlington Gr.
 - bifurcatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 330, Burlington Gr.

- chiriformis, St. John & Worthen, 1875. Geo. Sur. Ill., vol. 6, p. 330, Burlington Gr.
- compactus, St. John & Worthen, 1875. Geo. Sur. Ill., vol. 6, p. 334, Kaskas kia Gr.
- keokuk. St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 334, Keokuk Gr. simplex, St. John & Worthen, 1875, Geo.
- Sur. Ill., vol. 6, p. 332, Burlington Gr. symmetricus, St. John & Worthen, 1875,
- Geo. Sur. Ill., vol. 6, p. 333, Burlington Gr.
- STENACANTHUS, Leidy, 1856, Jour. Acad. Nat. Sci., 2d ser., vol. 3, p. 162. [Ety. stenos, narrow; akantha, a spine.] Nar-row denticulated spine. Type S. ni tidus.
- nitidus, Leidy, 1856, Jour. Acad. Nat. Sci., 2d ser., vol. 3. p. 162, Carboniferous.
- STENOPTERODUS, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 100. [Ety. stenos, narrow; pteron, wing; odous, tooth.] Teeth distinguished by their long elliptical outline, strongly arched and spiral inrollment of the outer extremity. Crown with a lobe in the di-rection of inrollment. Type S. planus.
 - elongatus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 106, Warsaw Gr. parvulus, Newberry & Worthen, 1866.
 - (Sandalodus parvulus,) Geo. Sur. Ill., vol. 2, p. 102, St. Louis Gr.
 - planus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 102, Upper Burlington Gr.
- Strigillina, Cope, syn. for Janassa.
- gurleiana, see Janassa gurleiana.
- linguiformis, see Janassa linguiformis. TENIODUS, De Koninck, MSS., and St. John
 - & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 75. [Ety. tænia, ribbon; odous, tooth.] Trapezoidal, arched from within outward, inrolled obliquely outward and forward; distinguished from Psephodus by the differentiation of the coronal contour of the maxillary median forms. Type T. contortus.
 - fasciatus, Newberry & Worthen, 1870, (Deltodus fasciatus,) Geo. Sur. Ill., vol. 1870. , p. 366, Keokuk Gr.
- obliquus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 78, Kaskaskia Gr. regularis, St. John & Worthen, 1883, Geo.
- Sur. Ill., vol 7, p. 77, Warsaw Gr. TANAODUS, St. John & Worthen, 1875, Geo.
 - Sur. Ill., vol. 6, p. 367. [Ety. tanaos, long; odous, a tooth.] In the laterally extended linear outline of the crown it resembles Chomatodus; in the disproportionate depth of the coronal surfaces and marginal position of the root it resembles Antliodus from which it is distinguished by the linear outline of the crown and the inferior surface
 - of the root. Type T. gracillimus. angularis, Newberry & Worthen, 1866, (Chomatodus angularis,) Geo. Sur. Ill., vol. 2, p. 55, Coal Meas.

THO.-VEN.]

bellicinctus, St. Geo. Sur. Ill. kia Gr.

depressus, St. Geo. Sur. Ill. kia Gr.



FIG. 1176.-Tanaodi cillimus.

2, p. 51, Burli grossiplicatus, S Geo. Sur. Ill. kia Gr.

multiplicatus.

1866, (Chomat Sur. Ill., vol. obscurus, Leidy scurus,) Trans

p. 87, Keokuk polymorphus, St Geo. Sur. Ill., kia Gr.

prænuntius, St. Geo. Sur. Ill., pumilus, St. Joh Sur. Ill., vol. 6 sculptus, St. Joh

Sur. Ill., vol. 6 sublunatus, St.

Geo. Sur. I Louis Gr.

THORACODUS, CODE Sci., p. 108. [odous, tooth.] on middle lin verse grooves border all rou eurydinus, Cope,

Sci. Phil., p. 10 THRINACODUS, St. Geo. Sur. Ill.

thrinakos, three Teeth small; b in a long some flattened, or la vate plate, lon face narrow, an the basal line extremity more inferior surface excavated; su convex, concar corresponding inferior surface rior extremity more or less equal, trenchar curved cusps t gent, the centra cal, slightly sig verse section su in front, round

cutting edges, a

costate in eithe

dus. Type T. I

RIN.-TAN.
[RIN.-TAN.

lorthen, 1875, 330, Burling-

orthen, 1875, 334, Kaskas-

en, 1875, Geo. Ceokuk Gr. nen, 1875, Geo. urlington Gr. Vorthen, 1875, 333, Burling-

Jour. Acad. p. 162. [Ety. Type S. ni-

Acad. Nat. Sci., rboniferous. Worthen, 1883, p. 100. [Ety. wing; odous, shed by their trongly arched the outer exlobe in the di-Type S. planus. then, 1883, Geo. Varsaw Gr. Worthen, 1866. Geo. Sur. Ill., 3r.

ien, 1883, Geo. Upper Burling-

nassa.

eiana. nguiformis. S., and St. John Sur. Ill., vol. 7, ribbon; odous, hed from within quely outward shed from Psentiation of the maxillary mentortus. 1870, Worthen, o. Sur. Ill., vol.

then, 1883, Geo. laskaskia Gr. then, 1883, Geo. Varsaw Gr. then, 1875, Geo. 7. [Ety. tanaos, In the laterally e of the crown us; in the disthe coronal surtion of the root is from which it e linear outline inferior surface

racillimus. Worthen, 1866, ,) Geo. Sur. Ill., THO.-VEN.]

- PISCES.
- bellicinctus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 376, Kaskaskia Gr.
 - depressus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6. p. 378, Kaskaskia Gr.



mus,)

Sur. Ill., vol.

FIG. 1176.--Tanaodus gra cillimus.

2, p. 51, Burlington Gr.

- grossiplicatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 375, Kaskaskia Gr.
- multiplicatus, Newberry & Worthen, 1866, (Chomatodus multiplicatus,) Geo.
- Sur. Ill., vol. 2, p. 57, Burlington Gr. obscurus, Leidy, 1856, (Chomatodus ob-scurus,) Trans. Am. Phil. Soc., vol. 11, p. 87, Keokuk Gr.
- polymorphus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 380, Kaskaskia Gr.
- prænuntius, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 371, St. Louis Gr. pumilus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 369, St. Louis Gr.
- sculptus, St. John & Worthen, 1875, Geo.
- Sur. Ill., vol. 6, p. 373, St. Louis Gr. sublunatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 368, St. Louis Gr.
- THOBACODUS, Cope, 1883, Proc. Acad. Nat. Sci., p. 108. [Ety. thoracos, protected; odous, tooth.] Jaws plate-like, divided on middle line, each half with transverse grooves and ridges, and a smooth border all round. Type T. eurydinus. eurydinus, Cope, 1883, Proc. Acad. Nat.
- Sci. Phil., p. 108, Permian Gr. THRINACODUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 289. [Ety. thrinakos, three-pronged; odous, tooth.] [Ety. Teeth small; base produced posteriorly in a long sometimes twisted vertically flattened, or laterally compressed, clavate plate, longer than wide, anterior face narrow, and abruptly beveled from the basal line of the crown; posterior extremity more or less obtusely rounded; inferior surface narrow, plain or faintly excavated; superior surface gently convex, concave antero-posteriorly, or corresponding to the curvature of the inferior surface; from the antero-superior extremity of the base spring three more or less relatively stout, nearly equal, trenchant, acutely pointed, recurved cusps the exterior pair divergent, the central one more or less vertical, slightly sigmoidally curved, transverse section sublenticular, compressed in front, rounded behind, with simple cutting edges, and more or less strongly costate in either face. Allied to Diplodus. Type T. nanus.

- duplicatus, Newberry & Worthen, 1866, (Diplodus duplicatus,) Geo. Sur. Ill.,
- vol. 2, p. 61, Keckuk Gr. incurvus, Newberry & Worthen, 1866, (Diplodus incurvus,) Geo. Sur. Ill., 1866.
- vol. 2, p. 62, Keokuk Gr. nanus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 289, Waverly or Kinderhook Gr.
- TOMODUS, Agassiz, 1859, MSS. and St. John & Worthen, 1883, Geo. Sur, Ill., vol. 7, p. 171. [Ety. tomos, sharp; odous, tooth.] Distinguished from Xystrodus by the great convexity of the coronal ridge, abrupt articular border, and absence of transverse punctæ on the trit
 - urating surface. Type T. convexus. limitaris, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 173, Upper Burlington Gr.
- Trigonodus, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 111. [Ety. trigonos, three-cornered; odous, tooth.] Syn. for sandalodus.
 - major, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 112, syn. for Sandalodus complanatus.

minor, see Sandalodus minor.

- VATICINODUS, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 80. [Ety. vaticinus, prophetical; odous, tooth.] Pos-terior teeth distinguished from Deltoptychius by the absence of the secondary lobe, the anterior part of the tooth forward of the posterior prominence being plain, as in Stenopterodus. Type V. vetustus.
 - carbonarius, St. John & Worthen 1883, Geo. Sur. Ill., vol. 7, p. 88, Coal Meas.
 - discrepans, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 83, Upper Burlington Gr.
 - lepis, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 88, Up. Coal Meas.
 - similis, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 86, Kaskaskia Gr.
 - simplex, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 84, St. Louis Gr.
 - vetustus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 82, Waverly or Kinderhook Gr.
- VENUSTODUS, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 344. [Ety. ve-nustus, beautiful; odous, tooth.] Teeth laterally elongated, vertically arched; crown constricted at the base, defined by imbricating folds; crest elevated, uniform, or with median prominence; denticulations lateral; base forming a shallow plate. Type V. robustus.
 - argutus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 352, Kaskaskia Gr.
 - leidyi, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 350, St. Louis Gr. This name is a syn. for V. venustus.

robustus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 345, Burlington Gr. John 1870, Proc. Am. Phil. Soc., vol. Sur. Ill., vol. 6, p. 345, Burlington Gr.

8

tenuicristatus, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 348, Keokuk Gr. John &

FIG. 1177.-Venustovariabilis, St. John & Worthen, 1875, Geo. dus robustus.

Sur. Ill., vol. 6, p. 346, Burlington Gr. venustus, Leidy, 1856, (Chomatodus ve-nustus,) Trans. Am. Phil. Soc. Phil., vol. 11, p. 87, St. Louis Gr.

XYBTRACANTHUS, Leidy, 1859, Proc. Acad. Nat. Sci. Phil, p. 3. [Ety. xystra, a tool for scraping; akantha, spine.] Dis-tinguished from Physonemus by the elender, straight outline, and less pre-ponderance of the antero-inferior shoul-

der. Type X. arcuatus. acinaciformis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 459, Coal Meas. anceps, Newberry & Worthen, 1866, (Dre-

panacanthus anceps,) Geo. Sur. Ill., vol. 2, p. 122. Coal Mees

2, p. 122, Coal Meas. arcuatus, Leidy, 1859, Proc. Acad. Nat. Sci. Phil, p. 3, Up. Coal Meas. mirabilis, St. John & Worthen, 1875, Geo. Sur. Ill., vol. 6, p. 458, Coal Meas.

- 11, p. 436. [Ety. xystra, an instrument for scraping; odous, tooth.] Mandibu-lar posterior teeth triangular; great transverse breadth of the inner margin as compared with the longitudinal diameter; coronal surface plain, de-pressed, and alated posteriorly; maxillary posterior teeth cuneiform, and narrow transverse diameter at the inner margin. Type X. striatus. bellulus, St. John & Worthen, 1883, Geo.
- Sur. Ill., vol. 7, p. 183, Coal Meas. imitatus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 180, St. Louis Gr.
- inconditus, St. John & Worthen, 1883, Geo. Sur. Ill, vol. 7, p. 179, Keokuk Gr.

occidentalis, St. John, 1870, Palæontology of Eastern Nebraska, p. 244, syn. for Orthopleurodus carbonarius.

simplex, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 178, Upper Burlington Gr.

verus, St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 181, Kaskaskia Gr.

CLASS BATRACHIA.

[Ety. batrachos, frog.]

THE Batrachia live a double life-that is, both on land and in water-and are called Amphibia. [Amphi, on both sides, around; bios, life.] They approach the fishes in their early stages of growth, and resemble the true Reptilia in their more mature development. All possess lungs, but during their young or larval condition they are always furnished with branchize, and in some orders these remain throughout the life of the animal. They form a distinct transition from aquatic fishes to exclusively air-breathing reptiles. They are all strictly oviparous, although in some species the eggs are retained in or upon the body of the parent until the young have attained some degree of growth. After leaving the egg, the animals undergo a series of transformations before arriving at their complete or perfect state. In their early stage they are known as tadpoles, little, fish-like animals, with broad heads, sack-like body, and long, compressed tail. The mouth is at the lower part of the front of the head, and is furnished with a pair of horny jaws, with which they feed upon the animalculæ that furnishes the food. They are vertebrated animals, with cold blood and naked skin, and undergo a metamorphosis or change of condition from an aquatic respiration by gills to an atmospheric respiration by lungs, and a consequent alteration in general structure and mode of life.

In the tad stance between concave articul orders are fishrudimentary co higher orders t gression, until habitual resider chorda dorsalis. inferior arches others the vert bræ are usually place of ribs; ri skull is formed pletely continue tions of the occi is always of a b one constant cha Reptile; namely fit into correspon upper jaw and skull; the maxi

the mouth, and skull without in All Batrach both the upper a The jaw teeth a about forty on e and below; the jaw teeth. The less tail; the bod into a single imi

newts, have a lo

aquatic life. Th

transparent and i

in contact, and or

largely in those

ment of the respi

a scaly covering.

moistened by the

of the skin secre

species are covere

phosis goes on, th

monary respiration

the organs of the

They begin li

The Batrach

[XYS

R

[XYS.

i9, and St. I. Soc., vol. instrument Mandibuular; great iner margin itudinal diplain, deorly; maxsiform, and at the inner

, 1883, Geo. Meas. then, 1883, p. 180, St.

rthen, 1883, 179, Keo-

alæontology 44, syn. for

s. n, 1883, Geo. per Burling-

, 1883, Geo. skaskia Gr.

6

ter-and are approach the in their more larval condithese remain from aquatic ous, although rent until the , the animals perfect state. ls, with broad he lower part s, with which rtebrated anior change of tion by lungs,

BATRACHIA.

In the tadpole and the genera which retain their gills through life, the substance between the vertebræ is soft, and contained in cup-like hollows formed by the concave articular surfaces of contiguous bones, precisely as in fishes. The lower orders are fish-like in possessing permanent branchize, the limbs are reduced to a rudimentary condition, and the tail is flattened and surrounded by a fin. In the higher orders the limbs are more and more developed and fitted for terrestrial progression, until they are capable of active motion and the animals can take their habitual residence in trees. The spinal column in some is composed of a continuous chorda dorsalis, inclosed in a fibrous sheath, but furnished with bony superior and inferior arches for the protection of the spinal cord and principal blood-vessels. In others the vertebræ are articulated by a sort of ball-and-socket joint. The vertebræ are usually furnished with long, transverse processes which appear to take the place of ribs; ribs are generally deficient. In those having a chorda dorsalis the skull is formed of a simple cartilaginous capsule, with which the chorda is completely continuous, and the only indications of ossification are in the lateral portions of the occipital bone. In the higher forms the skull is completely ossified; it is always of a broad and flattened form, with enormous, large orbits, and possesses one constant character which distinguishes the skull of a Batrachia from that of a Reptile; namely, the occipital bone is always furnished with two lateral condyles that fit into corresponding sockets in the first vertebra of the neck. The bones of the upper jaw and palate form a broad arch, which is always firmly attached to the skull; the maxillary and intermaxillary bones assist in the formation of the edge of the mouth, and are much developed, transversely expanding the general form of the skull without involving any enlargement of the brain cavity, which is very small.

All Batrachia have teeth on the palate; the salamanders have them also in both the upper and lower jaws, the frogs in the upper only, and the toads in neither. The jaw teeth are always slender, sharp-pointed, and closely set. The frog has about forty on each side of the upper jaw; the salamander has about sixty above and below; the palatine teeth are generally arranged transversely parallel to the jaw teeth. The hind legs of the frog are developed for leaping, and it has no useless tail; the body is contracted into a short space, and the few vertebræ are united into a single immovable piece, unprovided with ribs. The water salamanders, or newts, have a long tail, a slender flexible body, and all their organs are fitted for aquatic life. The structure of the bones is more compact and calcareous, and less transparent and flexible, than in fishes. The bones of the skull have their margins in contact, and occasionally united, but never overlapping. The hyoid bone changes largely in those genera undergoing metamorphosis in accordance with the development of the respiratory organ.

The Batrachia are generally distinguished from the Reptilia by the absence of a scaly covering. The skin of aquatic genera is soft and smooth, and constantly moistened by the cutaneous secretions; in land genera, as frogs and toads, the glands of the skin secrete a thick, whitish fluid. The cuticle is shed frequently. A few species are covered with horny scales.

They begin life with the single heart and gills of fishes; but as their metamorphosis goes on, the heart assumes the compound character necessary for the pulmonary respiration of the reptiles. In the development of the nervous system and the organs of the senses, they exhibit a slight advance upon the fishes. In the first

stages the circulation through the branchial apparatus is exactly the same as in the fishes; but later pulmonary arteries make their appearance, lungs are developed, and aerial respiration commences.

The class has been divided into five orders, namely : Amphipneusta, Anura, Urodella, Abranchia, and Apoda. None of the Palæozoic fossil families are referred to any of these orders except the Cocytinidæ, and the correctness of that reference is exceedingly doubtful. All other Palæozoic fossils are referred to orders which have become extinct. The change, either by progression into higher classes of the vertebrate kingdom, or by retrogression to an inferior state, is strongly marked. The Urodella, to which the Cocytinidæ are referred, have long, slender bodies, four limbs, which are sometimes very small, and occasionly the toes are furnished with claws, and a long, persistent tail; no external branchiæ, but in some species there is a branchial aperture on each side of the neck, within which are the branchial arches, with their laminæ; lungs well developed, skin smooth, or covered with warty prominences, and furnished with numerous glands, which belong to the Reptilia. The aquatic and land salamanders belong to this order.

The first Batrachia are found in the Coal Measures. They increase rapidly in numbers, and spread out in progressive evolution through the Permian Group, and reach their highest development and largest size in the Triassic, and since that time they have declined or retrograded, and now constitute a very inferior grade of the Vertebrata. The Animal Kingdom has been divided into classes and orders upon a basis which constitutes, as it is supposed, a natural system, and the more recent study of embryology has demonstrated that this natural system corresponds with the phases of embryonic history in all, or nearly all, its parts, and the study of Paleontology has proven beyond all peradventure that there has been a succession of organic types from the earliest geological time to the present, which is stamped upon the embryonic growth of living animals, and coincides with the grades established by the natural system of classification.

It follows that when the Palæozoic orders are distinct from the living, the class has been more comprehensive than the definition given by zoologists. Indeed, all the fossils can not be strictly embraced within the prescribed limits of the Batrachia. Many of them might be included within the Reptilia, because they combine Batrachian and Reptilian characters, and where the latter prevail probably they should be classed with the Reptilia. Some of them, however, rise a step higher in the animal system, and include Batrachian and Mammalian characteristics, and for this reason it is urged by the evolutionists that the Mammalia descended from the Batrachia, without having passed through the Reptilian stage. In other words, what is here included is a comprehensive type of animal existence not limited by the bounds which define the living Batrachia.

The arrangement of the fossils into orders and families must be regarded as provisional, and only approximating the present learning, for the following reasons, in addition to those which will be apparent to the specialist: 1. There are several synonyms of orders and families. 2. No one has published a complete classification from which the author could compile the learning. 3. The author has never had an opportunity to study the fossils of this class and have an opinion of his own to assert or defend. FAMILY AR

ACH.]

FAMILY COL

FAMILY BAI FAMILY TRI

FAMILY DII FAMILY EOS FAMILY MO FAMILY PEI FAMILY PHI FAMILY PT Thyrsid FAMILY TUI

FAMILY BOI FAMILY DIA FAMILY CLI nodon, pleura. FAMILY ED.

FAMILY ERY orachis,

FAMILY COC ORDER AND Ophiacoe

ACHELOMA, Cope, and Proc. Am. a, without; a dible without subequal, rati pterygoid bon curved edge a bone; palating

ne as in the • developed, ACH.]

Anura, Uroe referred to reference is rders which lasses of the gly marked. bodies, four rnished with ecies there is he branchial covered with ete an acrid, t to the Rep-

se rapidly in Group, and nce that time grade of the l orders upon more recent responds with the study of a succession ch is stamped grades estab

ving, the class Indeed. all

the Batrachia. ombine Batraly they should higher in the s, and for this from the Baer words, what imited by the

e regarded as ving reasons, in re are several te classification has never had of his own to ORDER ARCHEGOSAURIA.

FAMILY ARCHÆGOSAURIDÆ—Brachydectes, Hylerpeton.

Order Ganocephala.

FAMILY COLOSTEIDÆ.—Amphibamus, Colosteus, Sauropleura.

ORDER LABYRINTHODONTIA.

FAMILY BAPHETIDÆ.—Baphetes. FAMILY TREMATOSAURIDÆ.—Cricotus.

ORDER MICROSAURIA.

FAMILY DIPLOCAULIDÆ. -Diplocaulus.

FAMILY EOSAURIDÆ.—Eosaurus.

FAMILY MOLGOPHIDÆ.—Molgophis, Pleuroptyx.

FAMILY PELIONIDÆ.—Hylonomus, Pelion.

FAMILY PHLEGETHONTIIDÆ.—Phlegethontia.

FAMILY PTYONIDE.—Ceraterpeton, Hyphasma, Oestocephalus, Ptyonius, Thyrsidium.

FAMILY TUDITANIDÆ.—Dendrerpeton, Leptophractus, Tuditanus.

ORDER PELYCOSAURIA.

FAMILY BOLOSAURIDÆ.-Bolosaurus, Chilonyx, Lysorophus.

FAMILY DIADECTIDÆ.—Diadectes, Helodectes.

FAMILY CLEPSYDROPSIDE.—Archæobolus, Clepsydrops, Dimetrodon, Ectocynodon, Embolophorus, Empedias, Metarmosaurus, Pariotichus, Theropleura.

FAMILY EDAPHOSAURIDÆ.—Edaphosaurus, Pantylus.

ORDER RHACHITOMA.

FAMILY ERYOPSIDÆ.—Acheloma, Anisodexis, Eryops, Ichthyacanthus, Trimerorachis, Zatrachys.

ORDER URODELLA.

FAMILY COCYTINIDÆ.—Cocytinus.

ORDER AND FAMILY UNCERTAIN.—Chirotherium, Collettosaurus, Nothodon, Ophiacodon, Sauropus, Sphæropezium, Sphenacodon, Thenaropus.

ACHELOMA, Cope, 1882, Pal. Bull. No. 35, and Proc. Am. Phil. Soc., p. 455. [Ety. a, without; cheloma, a notch.] Mandible without angular process; teeth subequal, rather larger anteriorly; pterygoid bone ending in a free, recurved edge anterior to the quadrate bone; palatines and pterygoids narrow; palatal foramen wide, posterior border of cranium entire; without notch on the external side of the epiotic bone; vertebræ rhachitomous. Type A. cumminsi.

cumminsi, Cope, 1882, Pal. Bull. No. 35, and Proc. Am. Phil. Soc., p. 456, Permian.

AMPHIBAMUS, Cope, 1865, Proc. Acad. Nat. Sci. Phil., p. 134. [Ety. amphi, both; bama, a step; from its two modes of

FIG. 1178.—Amphibamus grandiceps. Two diam.

progressing, swimming, and walking.] Teeth small, simple. equal on margins of jaws; sclerotic plates on eye; table of vertex produced; no horns; propodial bones distinct; tarsus cartilaginous; neural spines of caudal vertebræ well developed; (?) centra. Type A. grandiceps. grandiceps, Cope, 1865, Proc. Acad. Nat. Sci.

Phil., p. 134, and Geo. Sur. Ill., vol. 2, p. 135, Coal Meas. ANISODEXIS, Cope, 1882, Pal. Bull. No. 35, and Proc. Am. Phil. Soc., p. 459. [Ety. anisos, unequal; dexis, a bite.] Teeth on premaxillary; maxillary, and dentary bones of unequal lengths, some very large, others very small; dentinal inflections straight, nearly reaching the pulp-cavity; cranial bones sculptured ; vertebræ rhachitomous. Type A. imbricarius. imbricarius, Cope, 1882, Pal. Bull. No. 35, and Proc. Am. Phil. Soc., p. 459, Permian.

- ARCHÆOBELUS, Cope, 1877, Proc. Am. Phil. Soc., vol. 17, p. 192. [Ety. archaios, ancient; belos, a weapon.] Maxillary bone with a large, hollow tooth, with. two opposite shallow grooves at the base; crown hollow; skeleton un-known. Type A. vellicatus.
 - vellicatus, Cope, 1877, Proc. Am. Phil. Soc., vol. 17, p. 192, Permian.

BAPHETES, Owen, 1853, Jour. Geo. Soc. London, vol. 10, p. 207. [Ety. bapto, I dip or dive, a diving animal.] Teeth conical, curved; outer series one or two lines in diameter, inner series three lines or more; implanted and anchylosed in shallow sockets; lower third of teeth longitudinally striated; corrucranial bones gated; head b Type B. planiceps. broad. minor, Dawson, 1870, Can. Nat. and Geol., Coal

Meas. planiceps, Owen, 1853,

Jour. Geo. Soc. London, vol. 10, p. 207, and Acad. Geol., p. 359, Coal Meas. BOLOSAURUS, COPE, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 506. [Ety. bolos, a lump; sauros, a lizBRA.-COC.]

ard.] Teeth with crowns the jaw, swol and divided internal half low and horis portion form lower jaw th ledge and cu striatus.



rapidens, see Ch striatus, Cope, Proc. Am. F

Permian.



FIG. 1180.-Br

BRACHYDECTES, CO Sci. Phil., p. 2 dektes, a bite teeth subequa with acute t pulp-cavity la Type B. Newl newberryi, Cope Sci. Phil., p. 2 p. 388, Coal M



FIG. 1181.-

CERATERPETON, HU erpeton, reptile on outside of lary bones p processes; cr

[AMP.-BOL.

audal verteentra. Type

Cope, 1865, d. Nat. Sci. 34, and Geo. ol. 2, p. 135,

pe, 1882, Pal. 15, and Proc. Soc., p. 459. os, unequal; e.] Teeth on ry; maxillentary bones nal lengths, large, others ll; dentinal straight, eaching the y; cranial lpured; verhachitomous. mbricarius.

Cope, 1882, No. 35, and I. Phil. Soc., rmian. , Cope, 1877.

b) Phil. Soc.,
p. 192. [Ety. incient; belos,
Maxillary
a large, holh, with. two hallowgrooves
base; crown
skeleton un-Type A, velli-

Cope, 1877, n. Phil. Soc., p. 192, Per-

ven, 1853, Jour. . London, vol. [Ety. bapto, 7 dive, a diving Teeth conical, outer series two lines in inner series nes or more; d and anchyhallow sockets; hird of teeth nally striated; corrubones broad. head planiceps. rson, 1870, Can. d Geol., Coal

Owen, 1853, vol. 10, p. 207, Coal Meas. Bull. No. 29, oc., vol. 17, p. ; sauros, a liz-

BRA.—COC.]

ard.] Teeth fixed in shallow alveoli, with crowns expanded transversely to the jaw, swollen at the base, apex low and divided vertically; the posterointernal half in the maxillary series is low and horizontal, the antero-external portion forms a curved cusp; in the lower jaw the relative position of the ledge and cusp is reversed. Type B. striatus.



FIG. 1179.—Baphetes planiceps.

rapidens, see Chilonyx rapidens. striatus, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 507, Permian.



FIG. 1180.—Brachydectes newberryi.

- BRACHYDECTES, Cope, 1868, Proc. Acad. Nat. Sci. Phil., p. 214. [Ety. brachys, short; dektes, a biter.] Rami short, stout; teeth subequal, elongate, cylindric cones with acute tips turned posteriorly, pulp-cavity large; skeleton unknown. Type B. Newberryi.
 - newberryi, Cope, 1868, Proc. Acad. Nat. Sci. Phil., p. 214, and Ohio Pal., vol. 2, p. 388, Coal Meas.



FIG. 1181.—Ceraterpeton tenuicorne.

CERATERPETON, Huxley. [Ety. keras, horn; erpeton, reptile.] Teeth simple, equal on outside of jaws; angles of intercalary bones produced into horn-like processes; cranial bones sculptured, vertebræ undivided ; carpus and tarsus osseous.

- lineopunctatum, Cope, 1875, Ohio Pal., vol. 2, p. 372, Coal Meas.
- tenuicorne, Cope, 1875, Ohio Pal., vol. 2, p. 372, Coal Meas.
- CHIROTHERIUM, Kaup, 1835, in Leonhard und Bronn Neues Jahrbuch fur Mineralogie. [Ety. cheir, the hand; therion, beast.] Represented by foot impressions only. Toes robust, the internal shorter and divergent from the others. Sole (or palum) short, wide. Type C. barthi.
 - reiteri, Moore, 1873, Am. Jour. Sci. and Arts, 3d ser., vol. 5, p. 292, Coal Meas.
- CHILONYX, Cope, 1883, Proc. Am. Phil. Soc., vol. 20, p. 631. [Ety. cheilos, lip; onyx, claw.] Long diameter of the crowns of the teeth transverse to the jaw, and each crown contracting to a slightly incurved apex; maxillary teeth short; temporal fosse roofed; superior surface of cranium divided in areas by grooves. Type C. rapidens.
 - rapidens, Cope, 1878, (Bolosaurus rapidens,) Proc. Am. Phil. Soc., vol. 17, p. 506. and vol. 20, p. 631, Permian.
- 506, and vol. 20, p. 631, Permian.
 CLEPSYDROPS, Cope, 1876, Proc. Acad. Nat.
 Sci. Phil., p. 407. [Ety. klepsydra, an hour-glass; ops, appearance.] Intercentra present; neural spines only elongate posteriorly; premaxillary teeth not especially elongate; one or two long maxillary teeth; no grinding teeth. Type C. colletti.
 - colletti, Cope, 1876, Proc. Acad. Nat. Sci. Phil., p. 407, Permian.

gigas, see Dimetrodon gigas.

leptocephalus, Cope, 1884, Pal. Bull. No. 39, p. 30, Permian.

limbatus, Cope, 1877, Proc. Am. Phil. Soc., p. 196, Permian of Triassic.

macrospondylus, Cope, 1884, Pal. Bull. No. 39, p. 35, Permian.

natalis, Cope, 1878, Pal. Bull., No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 509, Permian.

pedunculatus, Cope, 1877, Proc. Am. Phil. Soc., p. 63, Permian.

- vinslovi, Cope, 1877, Proc. Am. Phil. Soc. p. 62, Permian.
 - p. 02, rerman. Cocytinus, Cope, 1871, Proc. Am. Phil. Soc., p. 177, and Ohio Pal., vol. 2, p. 360. [Ety. mythological name.] Vertebræ and ribs osseous; teeth on the premaxillary bone; none on the maxillary; axial hyal with basibyal on each side united with corresponding ceratohyal at the end of which is an element in position

of stylohyal; hæmal or basal branchihyals three, the anterior two each supporting one pleural branchihyal and the third supporting one; hæmal branchihyal on the inner side of the ceratohyal, approaching the me-

[COL.-DIM.

DIP.-EPI.]

incisivus, Cope, and Proc. An 512, Permian. rectiformis, Cop and Proc. An 514, Permian. semiradicatus, C Sur. Terr., vol DIPLOCAULUS, Cop and Proc. An 187. [Ety. dip. Vertebral cer perforated by salis, co-ossifi and supportin zygosphen art lations, one be atlas united by is not roofed neural spine, extended into squamosal re horn. Skull se mandroides.

magnicornis, Con 35, and Proc. Permian.

salamandroides. No. 26, and P

17, p. 187, Per ECTOCYNODON, COI 29, and Proc. [Ety. ektos, et tooth.] Cran post frontal b sculptured but dont, crowns anterior and one between larger and long lying outside

bone; mandib tural but liga dinatus. aguti, Cope, 1882 Proc. Am. Phil

ordinatus, Cope, and Proc. Am. mian.

EDAPHOSAURUS, CO 35, and Proc.

[Ety. edaphos, ard.] Tempora cranial bones p ular and max mandibular ram supporting nur or malar bones of teeth corresp lower jaw; tes spines greatly E. pogonias.

microdus, Cope, 1 37, Permian.

pogonias, Cope, Proc. Am. Phil. EMBOLOPHORUS, Cop 29, and Proc. A 518. [Ety. 'ball



FIG. 1182.-Cocytinus gyrinoides.

gyrinoides, Cope, 1874, Trans. Am. Phil. Soc., and Ohio Pal., vol. 2, p. 364, Coal Meas.

COLLETTOSAURUS, Cox, 1874, Geo. Sur. Ind., 5th Ann. Rep., p. 247. [Ety.

proper name; sauros, a lizard.] Founded upon tracks having five digits, and supposed to be related to Batrachians and Salamanders. Type C. indianensis.

indianensis, Cox, 1873, Geo. Sur.

COLOSTEUS, Cope, 1869, Trans. Am.

Phil. Soc., p. 22. [Ety. kolos, imperfect; osteon, a bone.] No vertebral centra, spines, or sclerotic bones; short ribs; two pairs of short limbs; three sculptured pectoral bones; abdominal region protected by scales in chevron; ? anterior teeth longer than posterior, basal half incised sulcate, except two behind the dentary. Type C. foveatus. crassisculatus, Cope, syn. for C. scutellatus.

foveatus, Cope, 1869, Trans. Am. Phil. Soc., p. 24, and Ohio Pal., vol. 2, p. 406, Coal Meas.

marshi, see Ptyonius marshi.

pauciradiatus, Cope, 1874, Trans. Am. Phil. Soc., p. 10, and Ohio Pal., vol. 2,

p. 408, Coal Meas.

scutellatus, Newberry, 1856, (Pygopterus scutellatus,) Proc. Acad. Nat. Sci. Phil., p. 98, and Ohio Pal., vol. 2, p. 407, Coal Meas.

CRICOTUS, Cope, 1876, Proc. Acad. Nat. Sci. Phil., p. 405. [Ety. krikotos, ringed.] Centra undivided, equal to the disciform intercentra in the caudal region, intercentra a little smaller in the dorsal region; neural spines and zygapophyses; developed foramen; chordæ dorsalis persistent; teeth equal, except probably the palatines; limbs short, a facial lyra. Type C. heteroclitus.

crassidiscus, Cope, 1884, Pal. Bull. No. 39, p. 28, Permian.

discophorus, Cope, syn. for C. heteroclitus. gibsoni, Cope, 1877, Pal. Bull. No. 26, and Proc. Am. Phil. Soc., vol. 17, p. 185,

Permian. heteroclitus, Cope, 1876, Proc. Acad. Nat. Sci. Phil., p. 405, Permian. hypantricus, Cope, 1884, Pal. Bull. No. 39.

p. 30, Permian.

dian line, and with elongate pleural DENDRERPETON, Owen, 1853, Quar. Jour. element. Type C. gyrinoides. Geo. Soc., vol. 9, p. 58. [Ety. dendron, a tree; erpeton, a lizard, from the circumstance under which the reptile was found.] Teeth in double series; outer simple, flattened, conic; inner series conical, with inflected folds of cement; teeth on the vomer; skull-bones corrugated; body protected below with ovate or rhomboidal bony scales, imbricated, horny scales above; fore-limbs the larger; tail natatory; vertebræ bicon-cave; neural arches and bones ossified. Type D. acadianum.

acadianum, Owen, 1853, Quar. Jour. Geo. Soc., vol. 9, p. 58, and Acadian Geology, p. 362, Coal Meas.



Ind., 5th Ann. Rep., p. 247, Fig. 1183-Dendrerpeton acadianum. (a) Cross section of Coal Meas.

obtusum, see Tuditanus obtusus.

- oweni, Dawson, 1863, Quar. Jour. Geo. Soc., vol. 19, p. 469, and Acad. Geol., p. 368, Coal Meas.
- DIADECTES Cope, 1878, Pal. Bull. No. 29, and Proc, Am. Phil. Soc., vol. 17, p. 505. [Ety. dia, crosswise; decktos, a biter.] Teeth with much compressed crowns, with bracket-shaped edge, longer axis transverse to the jaws, edges of crowns obtuse, no sculpture on the face. Alveoli not separated. External alveolar border more elevated than the internal, inner alveolar border pierced by a fossa behind the inner extrem-ity of each tooth. Type D. sideropelicus.

latibuccatus, see Empedias latibuccatus. molaris, see Empedias molaris.

phaseolinus, see Empedias phaseolinus.

- sideropelicus, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 505, Permian.
- DIMETRODON, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. [Ety. dimetros, two measures; 512 odous, tooth.] Dentition with enormously long incisors and two or three long maxillaries; the pubic bone not distinct from ischium; humerus with trochlear condyles and a defined proximal articular surface; neural spines of dorsal and lumbar vertebræ enormously elongate; intercentra present. Type D. incisivus.
 - cruciger, Cope, 1878, Am. Naturalist, vol. 12, p. 830, Permian.
 - gigas, Cope, 1878, Am. Nat., p. 327, (Clepsydrops gigas,) and Proc. Am. Phil. Soc., vol. 17, p. 515, Permian.

[COL.-DIM.

DIP.-EPL.]

Quar. Jour. Ety. dendron. from the cirne reptile was series; outer

inner series ds of cement; -bones corruow with ovate s, imbricated. pre-limbs the rtebræ biconbones ossified.

ar. Jour. Geo. dian Geology.



Cross section of

sus. r. Jour. Geo. Acad. Geol., p.

Bull. No. 29, c., vol. 17, p. se; decktos, a ch compressed ed edge, longer jaws, edges of ted. External vated than the border pierced inner extrem-B D. sideropel-

latibuccatus.

aris. phaseolinus. Pal. Bull. No.

Soc., vol. 17, p.

1. Bull. No. 29, loc., vol. 17, p. two measures; n with enord two or three pubic bone not humerus with a defined proxineural spines vertebræ enorcentra present.

Naturalist, vol.

t., p. 327, (Cleproc. Am. Phil. rmian.

- incisivus, Cope, 1878, Pal. Bull. No. 29. and Proc. Am. Phil. Soc., vol. 17, p. 512, Permian.
- rectiformis, Cope, 1878, Pal. Bull. No. 29. and Proc. Am. Phil. Soc., vol. 17, p. 514, Permian.
- semiradicatus, Cope, 1881, Bull. U. S. Geo. Sur. Terr., vol. 6, No. 1, p. 80, Permian. DIPLOCAULUS, Cope, 1877, Pal. Bull. No. 26, and Proc. Am. Phil. Soc., vol. 17, p.
 - 187. [Ety. diploos, double; kaulos, stem.] Vertebral centra contracted medially, perforated by the foramen chordæ dorsalis, co-ossified with the neural arch and supporting transverse processes; zygosphen articulation; two rib articulations, one below the other; axis and atlas united by a long zygosphen which is not roofed by the zygantrum; no neural spine, atlas insegmented; arch extended into the foramen magnum; squamosal region developed into a horn. Skull sculptured. Type D. salamandroides.
 - magnicornis, Cope, 1882, Pal. Bull. No. 35, and Proc. Am. Phil. Soc., p. 453, Permian.
- salamandroides, Cope, 1877, Pal. Bull. No. 26, and Proc. Am. Phil. Soc., vol. 17, p. 187, Permian.
- Ecrocynobox, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., p. 508. [Ety. ektos, eternal; kuon, dog; odous, tooth.] Cranium short, wide, large post frontal bones, large orbit; bones sculptured but no lyra; teeth rhizodont, crowns elongated, compressed, anterior and posterior cutting edges; one between the orbit and nostril larger and longer than the others, and lying outside of the closed dentary bone; mandibular symphysis not sutural but ligamentous. Type E. ordinatus.
 - aguti, Cope, 1882, Pal. Bull. No. 35, and Proc. Am. Phil. Soc., p. 451, Permian. ordinatus, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., p. 508, Permian.
- EDAPHOSAURUS, Cope, 1882, Pal. Bull. No. 35, and Proc. Am. Phil. Soc., p. 448. [Ety. edaphos, pavement; sauros, a liz-ard.] Temporal fossæ not overroofed; cranial bones not sculptured; mandibular and maxillary teeth subequal; mandibular ramus expanded inward and supporting numerous teeth; pterygoid or malar bones supporting a dense body of teeth corresponding to those in the lower jaw; teeth subconical. Neural spines greatly elongate, hollow. Type E. pogonias.
 - microdus, Cope, 1884, Pal. Bull. No. 39, p. 37, Permian.
- b) and b)
 - 518. [Ety. 'ballo, I throw; em, into;

- phoros, bearing.] Neural arch co-ossi-fied, zygapophyses and diapophyses well developed; centra not ochordal; intercentra narrowed and transversely extended; ribs two-headed, the capitulum is received into a fossa of the posterior border of the intercentrum, in advance of the vertebra which supports the diapophysis, to which the tubercu-lum is attached. Type E. fritillus. fritillus, Cope, 1878, Pal. Bull. No. 29,
- and Proc. Am. Phil. Soc., vol. 17, p. 518, Permian.
- EMPEDIAS, Cope, 1883, Proc. Am. Phil. Soc., vol. 20, p. 63. Proposed instead of Empedocles of Cope in 1878, which was preoccupied. Teeth with elongate crowns, with flat grinding surface but bracket-shaped in transverse vertical section, arranged transversely to the long axis of the jaws; no canines; incisors wearing chisel-shaped; temporal fossa covered; vertebræ with hyposphen on the posterior and hypantrum on the anterior face and short quadrate neural
 - spines. Type E. alatus. alatus, Cope, 1878, (Empedocles alatus,) Proc. Am. Phil. Soc., vol. 17, p. 516, Permian.

 - Issus, Cope, 1883, (Empedocles fissus,)
 Proc. Am. Phil. Soc., p. 634, Permian.
 latibuccatus, Cope, 1878, (Diadectes latibuccatus,)
 Proc. Am. Phil. Soc., vol. 17, p. 505, Permian.
 - molaris, Cope, 1878, (Diadectes molaris,) Am. Nat., vol. 12, p. 565, and Pal. Bull. No. 32, p. 10, Permian.
 - phaseolinus, Cope, 1880, (Diadectes pha-seolinus,) Pal. Bull. No. 32, p. 9, Permian.
- Empedocles, Cope, 1878, Proc. Am. Phil. Soc., vol. 17, p. 516. The name was preoc-cupied, see Empedias.

alatus, see Empedias alatus.

fissus, see Empedias fissus.

Eosaureus, Marsh, 1862, Can. Nat. and Geo., vol. 7, and Acadian Geol.,

p. 382. [Ety. eos, the dawn; sauros, a sea-fish.] Founded upon vertebræ, with biconcave centra and free neural arch, and closed not ochordal foramen. Type E. acadianus. acadianus, Marsh,



Epicordylus, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 515. [Ety. epi, upon; kordylos, a water-lizard.] Syn. for Eryops.





- vol. 17, p. 188. [Ety. eruo, I protect; ope, view.] Vertebræ rhachitomous throughout; teeth of external series equal; some larger ones on the palatine bones; table of cranium produced, bounded by a notch on each side; no
- horns nor mucous grooves; pelvic elements co-ossified; no foramen. Type E. megacephalus.
- erytholeticus, Cope, 1878, (Epicordylus erytholeticus,) Proc. Am. Phil. Soc., p. 515, Permian.
- ferricolus, Cope, 1878, (Parioxys ferrico-lus,) Proc. Am. Phil, Soc., p. 521, Permian.

megacephalus, Cope, 1877, Proc. Am. Phil. Soc., vol. 17, p. 188, Permian or Triassic.

platypus, Cope, 1877, (Ichthycanthus platypus,) Proc. Am. Phil. Soc., vol. 17, p. 574, Coal Meas.

reticulatus, Cope, 1881, Am. Nat., p. 1020, Permian.

- EURYTHOBAX, Cope, 1875, Ohio Pal., vol. 2, p. 401. [Ety. eurys, broad; thorax, the breast.] Established on a thoracic shield, having broad, smooth surfaces on the outer borders for the contact of the overlapping margins of the lateral plates. Subround, with a large excavation from the posterior margin on each side; narrowed portion left in the middle behind has a convex outline; no sculpture. Type E. sublævis.
 - sublevis, Cope, 1871, Proc. Am. Phil. Soc., p. 177, and Ohio Pal., vol. 2, p. 402, Coal Meas.



FIG. 1185.—Hylerpeton dawsoni. Mandible and portion of cranial bone.

HELODECTES, Cope, 1880, Pal. Bull. No. 32, p. 11. [Ety. helos, a nail; dektes, a biter.] Two rows of subround molari-

form teeth in each jaw. Type H. paridens.

isaaci, Cope, 1880, Pal. Bull. No. 32, p. 12, Permian.

paridens, Cope, 1880, Pal. Bull. No. 32, p. 11, Permian.

HYLERPETON, Owen, 1862, Quar. Jour. Geo. Soc., vol. 18, p. 5. [Ety. hyle, wood; erpeton, reptile.] Teeth simple, bluntly conical, with large pulp-cavity; about 18 on one side of a jaw; two of the anterior ones of the upper jaw twice as large as the others and deeply sunk in the jaw. Length of lower jaw 1 inch; bones of skull puncto-striate. Type H. dawsoni.

ERY.-ICH.

- curtidentatum, Dawson, 1876, Am. Jour. Sci. and Arts, vol. 12, Coal Meas. dawsoni, Owen, 1862, Quar. Jour. Geo.
- Soc., vol. 18, p. 5, and Acadian Geology, p. 380, Coal Meas.
- longidentatum, Dawson, 1876, Am. Jour. Sci. and Arts, vol. 12, Coal Meas.
- HYLONOMUS, DAWSON, 1860, Quar. Jour. Geo. Soc., vol. 16, p. 268. [Ety. hyle, wood; nomos, an abode; forest dweller.] Cranial bones thin, smooth; parietal bones arched; about 26 teeth in each maxillary, elongated, conical, set in a single series, in a furrow, protected externally by an alveolar ridge; teeth longer in intermaxillaries and extremities of mandibles than elsewhere; vertebræ ossified, biconcave, with spinous processes; ribs long and curved; pelvis large; ilium long, expanded below, ischium expanded; publs expanded, triangular where it joins the ischium, round and arched toward the symphysis; femur thick, nearly straight; tibia short, stout; fibula slender; phalanges broad. Dermal covering of ovate bony scales. Type H. lyelli.

Type H. Iyen. aciedentatus, Daw-son, 1860, Quar. vol. 16, p. 268,

vol. 10, p. 208, Fig. 1186. – Hylonomus aciedentatus. Maxil-lary bone magnified; a, natural size.

- lyelli, Dawson,
 - 1860, Quar. Jour. Geo. Soc., vol. 16, p. 268, and Acad. Geol., p. 370, Coal Meas.
- wymani, Dawson, 1860, Quar. Jour. Geo. Soc., vol. 16, p. 268, and Acad. Geol., p. 378, Coal Meas.
- HYPHASMA, Cope, 1875, Proc. Acad. Nat. Sci., p. 16, and Ohio Pal., vol. 2, p. 387. [Ety. hyphasma, a web.] Vertebræ osseous; posterior dorsals with fan-like neural spines, ventral armature con-sisting of rhomboidal scuta, forming packed rows arranged in chevrons, directed backward, on top of which are the usual rod-like scales arranged in packed chevrons with the angle directed forward. Type H. lævis.



FIG. 1187.-Hyphasma lævis.

lævis, Cope, 1875, Proc. Acad. Nat. Sci., p. 16, and Ohio Pal., vol 2, p. 387, Coal Meas.

ICHTHYACANTHUS, Cope, 1877, Pal. Bull. No. 24, and Proc. Am. Phil. Soc., p. 573.

LEP. -OES.

[Ety. ichthys, a Founded on (caudal verteb Posterior limb tibia, fibula, digits; ribs e abdominal arm in anteriorly d vertebræ shor spines; tail lar furnished with which termin neural spines ward, caudal bling that of a fi

Type I. ohioen ohioensis, Cope, and Proc. Am. Meas.

platypus, see Ery LEPTOPHRACTUS, C Nat. Sci., p. 340 399. [Ety. lept mored.] Foun of the cranium round in sectio compressed, ac ting edge on an cately grooved gate tooth in position of a c cranium little marked with Type L. obsole

lineolatus, Cope, and Proc. Am. Meas.

obsoletus, Cope, Sci., p. 341, and 400, Coal Meas. LYSOROPHUS, Cope, and Proc. Am.

187. [Ety. lyse Founded upon amphiccelian, p chordæ dorsalis ticulated to the ral canal deep cesses or costa centrum, which tudinal fossæ; Type L. tricarit

tricarinatus, Cop 26, and Proc. A 187, Permian.

METARMOSAURUS, (29, and Proc. A 516. [Ety. meta sauros, lizard.] bræ. Centrum deeply biconcas below the base short, with sma pitular facet; small, and is ex extremity of th neural canal la anterior (zygopo ward and outwa

ERY.-ICH.

er jaw 1 inch; iate. Type H.

876, Am. Jour. oal Meas. ar. Jour. Geo. adian Geology,

876, Am. Jour. al Meas. uar. Jour. Geo. ty. hyle, wood; dweller.] Cra-

parietal bones in each maxilset in a single cted externally eeth longer in emities of manvertebræ ossinous processes; pelvis large; below, ischium ided, triangular um, round and physis; femur bia short, stout;

es broad. Dere bony scales.



86. — Hylonomus entatus. Maxilone magnified ; a, ral size.

Soc., vol. 16, p. , p. 370, Coal

Juar. Jour. Geo. I Acad. Geol., p.

roc. Acad. Nat. al., vol. 2, p. 387. .] Vertebræ osils with fan-like armature conscuta, forming

in chevrons, diop of which are les arranged in he angle directed ris.



Acad. Nat. Sci. rol 2, p. 387, Coal

377, Pal. Bull. No. nil. Soc., p. 573. LEP. -OES.]

[Ety. ichthys, a fish; akantha, a spine.] Founded on the posterior dorsal and caudal vertebrae and adjacent parts. Posterior limbs well-developed, with tibia, fibula, osseous tarsus and five digits; ribs elongate, simple, curved; abdominal armature in bristle-like rods, in anteriorly directed chevrons; dorsal vertebræ short, with simple neural spines; tail large, vertebræ ossified and furnished with slender chevron bones, which terminate in a hæmal spine; neural spines slender, directed backward, caudal series somewhat resembling that of a fish; centra amphicoelian. Type I. ohioensis.

obioensis, Cope, 1877, Pal. Bull. No. 24, and Proc. Am. Phil. Soc., p. 573, Coal Meas.

- platypus, see Eryops platypus. LEPTOPHRACTUS, Cope, 1873, Proc. Acad. Nat. Sci., p. 340, and Ohio Pal., vol. 2, p. 399. [Ety. leptos, delicate; phraktos, ar-mored.] Founded on various portions of the cranium; jaws bear large teeth, round in section at the base, but with compressed, acute apex, and with cutting edge on anterior face; enamel delicately grooved; there is a large elongate tooth in the upper jaw in the position of a canine; sculpture of the cranium little marked; lower jaw marked with inosculating grooves. Type L. obsoletus.
 - lineolatus, Cope, 1877, Pal. Bull. No. 24, and Proc. Am. Phil. Soc., p. 576, Coal Meas.
- obsoletus, Cope, 1873, Proc. Acad. Nat. Sci., p. 341, and Ohio Pal., vol. 2, p. 400, Coal Meas.
- LYSOROPHUS, Cope, 1877, Pal. Bull. No. 26, and Proc. Am. Phil. Soc., vol. 17, p. 187. [Ety. lysos, free; orophos, roof.] Founded upon the centra. Vertebræ amphicœlian, perforated by the foramen chordæ dorsalis; neural arch freely articulated to the centrum ; floor of neural canal deeply excavated; no pro-cesses or costal articulations on the centrum, which is excavated by longitudinal fossæ; centrum not shortened. Type L. tricarinatus.
- tricarinatus, Cope, 1877, Pal. Bull. No. 26, and Proc. Am. Phil. Soc., vol. 17, p. 187, Permian.
- METARMOSAURUS, Cope, 1878, Pal. Bull., No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 516. [Ety. meta, down; harmos, a joint; sauros, lizard.] Founded upon verte-bræ. Centrum shorter than wide, deeply biconcave; diapophyses project below the base of the neural arch, are short, with small tubercular facet; capitular facet; facet for intercentrum small, and is excavated at the anterior extremity of the base of the centrum; neural canal large; articular faces of anterior zygopophyses directed down-ward and outward. Type M. fossatus.

fossatus, Cope, 1878, Pal. Bull., No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 516, Permian.



FIG. 1188.-Molgophis brevicostatus.

- MOLGOPHIS, Cope, 1868, Proc. Acad. Nat. Sci., p. 220. [Ety. molges, a salamander; ophis, serpent.] Body long, serpentine, without dermal armature; vertebræ long, broad, with prominent zygopophyses and moderate neural spines; ribs large, curved, with tubercle and head on the dilated extremity. Type M. macrurus.

 - brevicostatus, Cope, 1875, Ohio Pal., vol. 2, p. 369, Coal Meas. macrurus, Cope, 1868, Proc. Acad. Nat. Sci., p. 220, and Ohio Pal., vol. 2, p. 368, Coal Meas.
- wheatleyi, Cope, 1875, Ohio Pal., vol. 2, p. 369, Coal Meas.
- Norhodon, Marsh, 1878, Am. Jour. Sci. and Arts, 3d ser., vol. 15, p. 410. [Ety. no-thos, spurious; odous, tooth.] Type N. lentus.
 - lentus, Marsh, 1878, Am. Jour. Sci. and Arts, 3d ser., vol. 15, p. 410, Permian.



FIG. 1189.-Oestocephalus rectidens.

- OESTOCEPHALUS, Cope, 1868, Proc. Acad. Nat. Sci. Phil., p. 217, and Ohio Pal., vol. 2, p. 380. [Ety. oistos, an arrow; kephale, the head.] Form slender, snake-like; caudal vertebræ with dilated and sculptured neural and hæmal spines; cranium lanceolate; teeth numerous, subequal; no pectoral shields; abdomen protected by bristle-like rods, which converge forward; no scales; a pair of weak posterior limbs; branchihyal bones present. Type O. remex. amphiuminus, Cope, 1868, Proc. Acad. Nat.
 - Sci., syn. for O. remex.

pectinatus, Cope, see Ptyonius pectinatus. rectidens, Cope, 1874, Trans. Am. Phil. Soc.,

BATRACHIA.

and Ohio Pal., vol. 2, p. 386, Coal Meas. remex, Cope, 1868, Proc. Acad. Nat. Sci. p. 217, (Sauropleura remex,) Ohio Pal., vol. 2, p. 381, Coal Meas.

serrula, see Ptyonius serrula.

- vinchellanus, see Ptyonius vinchellanus. Ophiacodon, Marsh, 1878, Am. Jour. Sci. and Arts, 3d ser., vol. 15, p. 411. [Ety.
 - ophiakos, belonging to serpents; odous, tooth.] Type O. grandis. grandis, Marsh, 1878, Am. Jour. Sci. and
 - Arts, 3d ser., vol. 15, p. 411, Permian. mirus, Marsh, 1878, Am. Jour. Sci. and
- Arts, 3d ser., vol. 15, p. 411, Permian. Ornithicknites, Hitchcock, 1836, Am. Jour. Sci. and Arts, vol. 29. [Ety. ornithos, a bird; ichnos, a footstep.] This is not properly a generic name. No bird-tracks are known in Palæozoic rocks. The Batrachian tracks referred to it belong to another genus.
 - culbertsoni, King, 1845, Am. Jour. Sci. and Arts, vol. 48, p. 345, Coal Meas. gallinuloides, King, 1845, Am. Jour. Sci.
- and Arts, vol. 48, p. 344, Coal Meas. PANTYLUS, Cope, 1881, Bull. U. S. Geo. Sur. Terr., vol. 6, No. 1, p. 79. [Ety. pan, all; tylos, a knob.] Founded upon the crania; ossification complete, leaving only orbits, nostrils, and parietal fontanel; surface sculptured; mandible with an angular process; teeth conic, obtuse, larger anteriorly; mandible supporting several rows of teeth, which oppose a pavement of obtuse teeth on the palate; these are situated on the palatine or anterior part of pterygoid bones; quadratojugal and malar bones
- bones; quadratojugal and maiar bones well developed; no lyra or mucous grooves. Type P. cordatus.
 cordatus, Cope, 1881, Bull. U. S. Geo. Sur. Terr., vol. 6, p. 79, Permian.
 PARIOTICHUS, Cope, 1878, Pal. Bull., No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 508.
 [Fity carging the obsets togics a well.] [Ety. pareia, the cheek; teichos, a wall.] Founded on the cranium. Temporal fossæ were covered by a roof continuous with the postorbital region; zygomatic arch extends low down; orbits lateral; muzzle short, with terminal nares; teeth rooted, crowns obtuse, with outting edge. Type P. brachyops. brachyops, Cope, 1878, Pal. Bull., No. 29.
 - and Proc. Am. Phil. Soc., vol. 17, p. 508, Permian.
 - megalops, Cope, 1883, Pal. Bull., No. 36, and Proc. Am. Phil. Soc., vol. 20, p. 630, Permian.
- Parioxys, Cope, 1878, Pal. Bull., No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 521. [Ety. pareia, cheek; oxys, sharp.] Syn. for Eryops.
- ferricolus, see Eryops ferricolus. PELION, Wyman, 1868, Proc. Acad. Nat. Sci. Phil., p. 211. [Ety. proper name.] Founded upon an inferior view of part of the skeleton; head as broad as long,

semielliptical; angles of mandibles project backward; mandibular rami slender, curved; vertebræ have centra as broad as long, and medially contracted; fore limbs stout; humeri long, thickened proximally, flattened and dilated distally; ulna and radius united proximally, narrowing the arm proximally while expanded distally; left hand exhibits four digits, of which the third from the inner is the longer; number of phalanges is 2, 3, 4?; carpus not osseous. Type P. lyelli.



FIG. 1190.-Pelion lyelli.

lyelli, Wyman, 1858, (Raniceps lyelli,) Am. Jour. Sci. and Arts, 2d ser., vol. 25, p. 158, and Ohio Pal., vol. 2, p. 389, Coal Meas.



FIG. 1191. -Phlegethontia linearis.

PHLEGETHONTIA, Cope, 1871, Proc. Am. Phil. Soc., p. 177. [Ety. Phlegethon, s burning river of hell.] Head elongate,

PLE.-SAU.]

OPH.-IHI.

triangular; bod elongate ; dorsa caudals without vertebræ armat P. linearis.

linearis, Cope, 18 p. 177, and Of Coal Meas.

p. 177, and Of Coal Meas.

PLEUROPTYX, Cope, p. 370. [Ety. p. wing.] Founde column and ribe length, zygapo short neural spi not sculptured support a wing vex border, whi and then abru shaft; it is broa cludes a medull with cancellated clavatus, Cope, 18 370, Coal Meas. PTYONIUS, Cope, 187 373. [Ety. ptyo



FIG. 1192.—Ptyonius s

Pal., vol 2, p. nummifer, Cope, p. 374, Coal Me [OPH.-IHI.

mandibles prollar rami slenave centra as Ily contracted; ori long, thicked and dilated s united proxirm proximally ; left hand exhich the third onger; number carpus not os-



yelli. ceps lyelli,) Am. r., vol. 25, p. 158, 389, Coal Meas.



tia linearis. 871, Proc. Am. ty. Phlegethon, s Head elongate, PLE.—SAU.]

triangular; body and tail extremely elongate; dorsal vertebræ without ribs, caudals without dilated spines; no vertebræ armature; no limbs. Type P. linearis.

linearis, Cope, 1871, Proc. Am. Phil. Soc., p. 177, and Ohio Pal., vol. 2, p. 367, Coal Meas.

serpens, Cope, 1871, Proc. Am. Phil. Soc., p. 177, and Ohio Pal., vol. 2, p. 367, Coal Meas.

PLEUROPTYX, Cope, 1875, Ohio Pal., vol. 2, p. 370. [Ety. pleura, a rib; ptyx, a fold, wing.] Founded upon the vertebrak column and ribs; vertebræ of moderate length, zygapophyses well developed, short neural spine in the dorsal region, not sculptured; ribs short, stout, and support a wing on the posterior or convex border, which expands downward, and then abruptly contracts to the shaft; it is broad and truncate, and includes a medullary cavity partially filled with cancellated tissue. TypeP. clavatus. clavatus, Cope, 1875, Ohio Pal., vol. 2, p. 370, Coal Meas.

PTYONIUS, Cope, 1875, Ohio Pal., vol. 2, p. 373. [Ety. ptyon, a fan.] Form elongate, with



cranium; limbs weak, only poste-rior known; three pec-toral shields; abdomen protected by packed osseous rods arranged in chevron with angle directed forward neural and hæmal spines of caudal vertebræ expanded and fan-like ; ribs well developed; teeth small, numerous, simple or grooved. Type P. nummifer. marshi, Cope, 1875, (Colosteus marshi,) Trans. Am. Phil. Soc., vol. 14, p. 24, and Ohio

long tail and

lanceolate

1192.—Ptyonius serrula.

Pal., vol 2, p. 375, Coal Meas. nummifer, Cope, 1875, Ohio Pal., vol. 2, p. 374, Coal Meas.

BATRACHIA.

- pectinatus, Cope, 1868, (Sauropleura pectinata, Proc. Acad. Nat. Sci., p. 216, and Ohio Pal., vol. 2, p. 377, Coal Meas.
- serrula, Cope, 1871, (Oestocephalus serrula,) Proc. Am. Phil. Soc., p. 177, and Ohio Pal., vol. 2, p. 379, Coal Meas.
- vinchellanus, Cope, 1871, (Oestocephalus vinchellanus,) Proc. Am. Phil. Soc., p. 177, and Ohio Pal., vol. 2, p. 376, Coal Meas.
- Pygopterus, Agassiz, 1833, Recherch. Poiss. Foss.

scutellatus, see Colosteus scutellatus.

- Raniceps, Wyman, 1858, Am. Jour. Sci. and Arts. The name was preoccupied by Cuvier, and Pelion has been substituted. *lyelli*, see Pelion lyelli.
- Rhachitomus, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 526. [Ety. rachis, the backbone; tomos, cut.] Syn. for Eryops.

valens, syn. for Eryops megacephalus.

- SAUBOPLEURA, Cope, 1868, Proc. Acad. Nat. Sci. Phil., p. 215, and Ohio Pal., vol. 2, p. 402. [Ety. sauros, a lizard; pleuron, a rib.] Vertebre and ribs well developed; limbs four, large; five digits in the fore foot; carpus cartilaginous; ventral armature of closely arranged rhomboidal scuta, arranged in lines closely placed in chevrons, with the angle anterior; teeth of Labyrinthodont type, with deeply inflected enamel and acute apex. Type 8. digitata.
 - digitata, Cope, 1868, Proc. Acad. Nat. Sci. Phil., p. 216, and Ohio Pal., vol. 2, p. 403, Coal Meas.

longipes, see Tuditanus longipes.

newberryi, Cope, 1875, Ohio Pal., vol. 2, p. 404, Coal Meas.

pectinata, see Ptyonius pectinatus.

remex, see Oestocephalus remex. SAUROPUS, Lea, 1849, Trans. Am. Phil. Soc.,

vol. 10. [Ety. sauros, a lizari, pous, foot.] Founded upon tracks; five robust toes, the inner having the same direction as the others, and not divergent as in Chirotherium; palm or sole short, wide. Type S. primævus.



FIG. 1193.-Sauropus primævus.

- primævus, Lea, 1849, Trans. Am. Phil. Soc., vol. 10, Coal Meas.
- sydnensis, Dawson, 1868, Acad. Geol., p. 358, Coal Meas.
- unguifer, Dawson, 1872, Geo. Mag. Lond., vol. 9, Coal Meas.

SPHENACODON, Marsh, 1878, Am. Jour. Sci., and Arts, 3d ser., vol. 15, p. 410. [Ety. sphen, a wedge; akis, a barb; odous, tooth.] Type S. ferox. ferox, Marsh, 1878, Am. Jour. Sci. and

626

- Ierox, Marso, 1878, Am. Jour. Sci. and Arts, 3d ser., vol. 15, p. 410, Permian. SpHжRoPEzium, King, 1845, Am. Jour. Sci. and Arts, vol. 48, p. 345. [Ety. sphaira, sphere; pezia, sole of the foot.] Founded upon tracks representing a round de-pression for the ball of the foot, and five depressions for digits. Type S. leptodactvlum.
 - leptodactylum, King, 1845, Am. Jour. Sci.

 - and Arts, vol. 48, p. 345, Am. Jour. Sci. and Arts, vol. 48, p. 345, Coal Meas. ovidactylum, King, 1845, Am. Jour. Sci. and Arts, vol. 48, p. 347, Coal Meas. pachydactylum, King, 1845, Am. Jour. Sci. and Arts, vol. 48, p. 346, Coal Meas
- thærodactylum, King, 1845, Am. Jour. Sci. and Arts, vol. 48, p. 346, Coal Meas.
- THERAROPUS, King, 1845, Am. Jour. Sci. and Arts, vol. 48, p. 343. [Ety. thenaros, palm of the hand; pous, foot.] Founded upon tracks. Type T. heterodactylus.
 heterodactylus, King, 1845, Am. Jour. Sci. and Arts, vol. 48, Coal Meas.
 leptodactylus, King, 1845, Am. Jour. Sci. and Arts, vol. 48, Coal Meas.
 ovidactylus, King, 1845, Am. Jour. Sci. and Arts, vol. 48, Coal Meas.
 ovidactylus, King, 1845, Am. Jour. Sci. and Arts, vol. 48, Coal Meas.
 pachydactylus, King, 1845, Am. Jour. Sci. and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour. Sci. and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour. Sci. and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour. Sci. and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour. Sci. and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour. Sci.
 and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour. Sci.
 and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour.
 sci. and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour.
 sci. and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour.
 sci. and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour.
 sci. and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour.
 sci. and Arts, vol. 48, Coal Meas.
 sphærodactylus, King, 1845, Am. Jour.
 sci. and Arts, vol. 48, Coal Meas. THENAROPUS, King, 1845, Am. Jour. Sci. and

 - 519. [Ety. thero, to burn ; pleura, side.] Pelycosaurian reptiles with free neural arch, and a capitular costal articulation on the centrum, and no known inter-centrum; neural spines not elongate; teeth equal. Type T. retroversa
 - obtusidens, Cope, 1880, Pal. Bull. No. 32, p. 4, Permian.
 - retroversa, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 519, Permian.
 - triangulata, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 520, Permian.
 - uniformis, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 519, Permian.
- THYRSIDIUM, Cope, 1875, Ohio Pal., vol. 2, p. 365. [Ety. thyrsos, a rod with leaves.] Founded upon a latero-inferior view of the spinal column; diapophyses enlarged, fan-like; centra contracted; abdomen protected by hair-like rods in chevron, with angle directed forward. Type T. fasciculare.
 - fasciculare, Cope, 1875, Ohio Pal., vol. 2, p. 365, Coal Meas.
- TRIMERORACHIS, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 524. [Ety. trimeros, tripartite; rachis,

thé backbone.] Centrum rhachitomous. represented by three cortical ossifications of the chorda-sheath, a median inferior and two lateral': the lateral are distinct. and in contact with the neurapophyses above, and the posterior border of the median segment in front: neural arch joins the lateral elements. and is in slight contact with the lateral summits of the inferior element; the halves of the neural arch are co-ossified, and support zygapophyses, but no neural spine; cranial bones sculptured; parasphenoid flat; external nostrils large, superior; angle of mandible little produced; glenoid cavity transverse; deep internal pterygoid fossa; no coronoid process; symphysis short; teeth conic, two series in the upper jaw, the large ones anterior; ribs short, heads expanded. Type T. insignis.

- bilobatus, Cope, 1883, Pal. Bull. No. 36, and Proc. Am. Phil. Soc., vol. 20, p. 629, Permian.
- insignis, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 524, Permian.
- TUDITANUS, Cope, 1871, Proc. Am. Phil. Soc., p. 177, and Ohio Pal., vol. 2, p. 391. [Ety. proper name.] Cranium broad, flat, bones sculptured; teeth on pre-maxillary and maxillary bones of nearly equal sizes; three pectoral shields, sculptured externally; form lizard-like; two pairs of medium limbs; no chevron abdominal rods. Type T. punctulatus.



FIG. 1194.-Tuditanus radiatus

- brevirostris, Cope, 1874, Trans. Am. Phil. Soc., vol. 14, p. 10, and Ohio Pal., vol. 2, p. 393, Coal Meas.
- huxleyi, Cope, 1874, Trans. Am. Phil. Soc., p. 10, and Ohio Pal., vol. 2, p. 397, Coal Meas.
- longipes, Cope, 1874, (Sauropleurs longi-pes,) Trans. Am. Phil. Soc., vol. 14, p. 10, and Ohio Pal., vol. 2, p. 398, Coal Meas.

SPH.-TUD

mordax, Cope, 18 syn. for Cerate obtusus, Cope, 1 tusum,) Proc. 213, and Ohio Meas

punctulatus, Cop Soc., vol. 14, p 2, p. 392, Coal radiatus, Cope, Soc., vol. 14, p 2, p. 394, Coal tabulatus, Cope, Soc., p. 577, Co ZATRACHYS, Cope, and Proc. Am SPH.-TUD.

ZAT.]

m rhachitoe cortical osheath, a me-I': the lateral act with the the posterior nent in front; ral elements, th the lateral element; the are co-ossihyses, but no s sculptured; rnal nostrils nandible little r transverse; ssa; no coroshort; teeth pper jaw, the short, heads

nis. Bull. No. 36, vol. 20, p. 629,

11. No. 29, and d. 17, p. 524,

m. Phil. Soc., vol. 2, p. 391. anium broad, teeth on preones of nearly toral shields, m lizard-like; s; no chevron punctulatus.



ans. Am. Phil. Ohio Pal., vol.

Am. Phil. Soc., 2, p. 397, Coal

ropleura longi-soc., vol. 14, p. 2, p. 398, Coal

mordax, Cope, 1875, Ohio Pal., vol. 2, p. 395, syn. for Ceraterpeton punctolinatum.

- otrusus, Cope, 1868, (Dendererpeton ob-usum,) Proc. Acad. Nat. Sci. Phil., p. 213, and Ohio Pal., vol. 2, p. 396, Coal Meas.
- Meas. punctulatus, Cope, 1874, Trans. Am. Phil. Soc., vol. 14, p. 10, and Ohio Pal., vol. 2, p. 392, Coal Meas. radiatus, Cope, 1874, Trans. Am. Phil. Soc., vol. 14, p. 10, and Ohio Pal., vol. 2, p. 394, Coal Meas.
- tabulatus, Cope, 1877, Proc. Am. Phil. Soc., p. 577, Coal Meas.
- ZATRACHYS, Cope, 1878, Pal. Bul. No. 29, and Proc. Am. Phil. Soc., vol. 17, p.

523. [Ety. za, an intensive; trachys, rough.], Teeth in single series, and anchylosed to the bottom of a shallow groove, the external boundary of which is most prominent, so the attachment of the teeth is shortly pleurodont; teeth have conic crowns and basal grooves; cranium sculptured, its table with a notch on each side; two occipital condyles: no intercalary horns. Type Z. serratus.

- apicalis, Cope, 1881, Am. Naturalist, vol. 15, p. 1020, Permian.
- serratus, Cope, 1878, Pal. Bull. No. 29, and Proc. Am. Phil. Soc., vol. 17, p. 523, Permian.

SPECIFIC NA

Every adjective a hence, the not chang the genus Glossary, I reduced to

Abacus—A table Abbreviatus, a, ened.

Abnormis, e—At Abruptus, a, um-Abscissus, a, um-Acanthophorus, a Acanthoptera—Sj Accinctus, a, um-Acervulosus, a, gether.

Acervus—A heap Acicula—A small Acicularis, e—Fu acicular.

Aciculatus, a, um Aciedentatus, a, u toothed.

Acies—The edge Acinaciformis, e-Acinus—Any ber berry.

berry. Aclis—A small jav Acmea—Edge, poi Acrocarpus, a, um Acuarius, a, um— Aculeolatus, a, um— Aculeolatus, a, um Acuminatus, a, um Acus—A pin or ne Acutangulus—Acu Acuticosta—Sharp Acutidactylus—Sh Acutifolius, a, um— Acutifolius, a, um-Acutifoliatus, a, um Acutiradiatus, a, um Acutiradiatus, a, um—Ac Acutus, a, um—Ac Adiantites—From 1 Adiantoides—Like

GLOSSARY

SPECIFIC NAMES IN USE IN NORTH AMERICAN PALÆONTOLOGY.

Every adjective specific name must agree in gender with the genus to which it belongs; hence, the masculine, feminine, and neuter endings are indicated. Nouns do not change the termination, but remain the same, no matter what the gender of the genus may be. The names of persons and places are not included in this Glossary, because they should be known by the terminations they take when reduced to specific names.

Adductus, a, um-Stretched, contracted. Abacus-A table divided into squares. Abbreviatus, a, um-Abbreviated, short-Adjunctivus, a, um-Joined, united. Adjunctus, a um-Joined, connected. ened. Adnascens-Growing upon. Abnormis, e-Abnormal. Abruptus, a, um-Abrupt, broken. Adnatus, a, um-Adnate. Abscissus, a, um—Steep, abrupt. Acanthophorus, a, um—Thorn bearing. Acanthoptera—Spine-wing. Adorabilis, e-Worthy of adoration. Adultus, a, um-Adult. Aduncus, a, um-Bent inward, hooked. Accinctus, a, um-Girded. Ægilops-An acorn. Acervulosus, a, um-Many clustered to-Æmulus, a, um-Emulous, vying with. Ænigma-Obscure, a riddle. gether. Acervus—A heap considered as a body. Acicula—A small pin or needle. Equalis, e-Equal, like. Æquibrachiatus, a, um-Equal-armed. Equicostatus, a, um—Equal-ribbed. Equidistans—Equidistant. Acicularis, e-Full of small pins or needles, acicular. Aciculatus, a, um-Like a small needle. Æquilateralis, e-Equilateral. Equiradiatus, a. um—Equal-rayed. Equivalvis, e—Equal-valved. Equus, a. um—Plain, even, level, equal. Aciedentatus, a, um-Needle-toothed, sharptoothed. Acies-The edge or sharp point. Acinaciformis, e-Scimitar-shaped. Affinis, e-Related, or near to. Acinus-Any berry, or the kernel in the Agellus-A small field. Agglomeratus, a, um-Gathered into a mass. berry. Aggregatus, a, um—Aggregated. Aggilis, e—Agile, nimble. Agrarius, a, um—Pertaining to fields or Aclis-A small javelin. Acmea-Edge, point. Acrocarpus, a, um-Pointed fruit. Actuarius, a, um—Swift, agile. Aculeatus, a, um—Thorny, pointed, sharp. country. Agrestis, e-Pertaining to the country. Aculeolatus, a, um-Thorny. Alatus, a, um-Winged. Albus, a, um-White. Acuminatus, a, um-Sharp-pointed. Alcicornis, e-Elk-horned. Acus-A pin or needle. Acutangulus-Acute angle. Alectiformis, e-In form like Alecto. Acuticosta—Sharp rib. Acutidactylus—Sharp-fingered. Aliger, gera, gerum—Bearing wings. Alsus, a, um—Cold. Alternans-Alternating. Acutifolius, a, um-Having acute leaves. Alternatus, a, um—Alternate. Alterniradiatus, a, um—Alternately rayed. Acutiliratus, a, um-Sharp-ridged. Acutiplicatus, a, um-Sharp-plicated. Alternistriatus, a, um—Alternately striated. Alternus, a, um—Alternate. Altiis, e—Flattene l. Acutiradiatus, a, um-Sharp-rayed. Acutirostris-Sharp beak. Acutulus, a, um-Somewhat pointed. Altidorsatus, a, um—High backed. Altiplicatus, a, um—Having high plications. Altirostris—High beak. Acutus, a, um-Acute, sharpened. Adiantites-From resemblance to Adiantum. Adiantoides-Like Adiantum. 41 629

Altus, a, um—High, great, deep. Alveatus, a, um—Hollowed out like a trough. Araneolus-A small spider. Aratus, a, um-Plowed. Alveolaris, e-Small-channeled. Alveolatus, a, um-Hollowed out. A veolus-A small cavity. Amarus, a, um-Bitter, brackish. Ambiguus, a, um—Doubtful, changeable. Amœnus, a, um—Pleasant, charming. Amphibolus, a, um-Ambiguous. Amplexicaulis, e-Embracing the stalk or stem. Amplexus-An encircling, surrounding. Ampliatus, ø, um-Enlarged. Amplus, a, um-Ample, spacious, roomy. Ampullaceus, a, um—In the form of a flask. Amygdaliformis, ϵ —In form like the almond. Anabathra-A ladder. Analogus, a, um—Analogous. Anatiformis, e—Like Anatifa. Anatinus, a, um-Of or pertaining to the duck. Anceps—Double, two-headed, doubtful. Anchoralis, e—Of or pertaing to an anchor. Ancilla—A hand-maid. Anellus-A little ring. Anguineus, a, um-Serpent-like. Angularis, e-Angular, cornered. Angulatus, a, um-Having corners. Angulosus, a, um-Full of corners. Angustatus, a, um-Narrowed. Angustifolius, a, um-Narrow-leaved. Angustipinna-A narrow feather. Angustus, a, um-Narrow, straight, not spacious. Annectans-Connected together. Annulariifolius, a, um--Having ring-shaped leaves. Annulatus, a, um-Annulated, ringed. Annuliferus, a, um-Ring-bearing. Anomalus, a, um-Anomalous, not coming under the rule. Anonymus, a, um-Nameless. Ant ceptus, a, um-Anticipated. Antennarius, a, um-Pertaining to the antennæ. Antheloideus, a, um-Like Anthelia. Anthracinus, a, um-Coal-black. Antiquarius, a, um-Pertaining to antiquity. Antiquatus, a, um-Antiquated, ancient. Antiquus, a, um-Ancient, old. Annularis, e-Relating to the signet ring. Annularius, a, um-Of or pertaining to the signet ring. Annulatus, a, um-Annulated, ring d. Annulus-A ring. Apertus, a, um-Opened, uncovered. Apicalis, e-Sharp pointed. Apiculatus, a, um-Having a pointed termination. Aplatus, a. um-Flattened. Appendiculatus, a, um-Having lateral appendages. Approximatus, a, um-Approximated, approaching near to. Aprinus, a, um-Pertaining to a wild boar. Aquilinus, a, um-Pertaining to the eagle, aquiline. Arachniformis, e-In form like a spider. Arschnoideus, a, um-Like a cobweb.

Arborescens-Tree-like, arborescent. Arboreus, a, um-Pertaining to a tree. Arbuscula-A shrub. Arcanus, a, um-Closed, shut up. Archimediformis, e-Archimediform. Arcticus, a, um -Arctic. Arctifossa-Close-wrinkle. Arctiporus, a, um-Having narrow pores. Arctostriatus, a, um Closely striated. Arctirostratus, a, um-Narrow-beaked. Arctisegmentus, a, um-Having narrow segments. Arctus, a, um-Closed, pressed together, short. Arcuatus, a, um-Bent, curved like a bow. Arcuosus, a, um-Full of arches, bent over. Arenaceus, a, um-Sandy. Arenarius, a, um-Pertaining to sand. Arenosus, a, um-Sandy. Areolatus, a, um-Divided into irregular squares, or angular spaces. Argentarius, a, um-Of or pertaining to silver. Argenteus, a, um—Of or made of silver. Argenturbicus, a, um—Of or belonging to Silver City. Argutus, a, um-Sharply defined, distinct. Arietinus, a, um-Of or from a ram. Armatus, a, um-Armed, equipped. Armiger, era, erum-Armed, war-like. Armosus, a, um-Many armed. Arrectarius, a, um-Erect. Arrectus, a, um-Erect, steep. Arrosus, a, um-Gnawed. Articulatus, a, um-Furnished with joints, articulated. Articulosus, a, um-Full of knots, or divisions. Artemisiifolius, a, um - Like the plant Artemisia. Arundinaceus, a, um-Like a reed. Aspectans-Expected, looked for. Asper, era, erum-Rough, uneven. Asperatus, a, um—Roughened, irregular. Aspersus, a, um—Scattered, dispersed. Aspratilis, e-Rough. Assimilia, e-Similar. Atavus-Ancestor. Attenuatus, a, um-Made thin, attenuited. Attritus, a, um-Worp. Aucella-A little bird. Audaculus, a, um-Bold. Augustatus, a, um-Majestic. Augustus, a, um-August. Auleticus, a, um-That is suitable for a pipe. Aureatus, a. um—Adorn d. Auricula—The ear. Auritus, a, um-Eared. Australis, e-Southern. Auxiliariu«, a, um-Helping Avicula-A small bird. Avitus, a, um-Ancestral. Avus-Grandfather.

Bacca-A berry, a small, round fruit. Bacillum-A small staff. Baculiformis, e-Staff-shaped.

BAC.-BUL.]

Baculum-A staff Bilinoides-Like Balanus-An acor Balteatus, a, um-Ba batus, a, um-Barydactylus, a. u Basalis, e-Pertain Basalticus, a, um-Basilaris, e-Relat Basilicus, a, um-Belemnura-Havi Bellarugosus, a, u Bellatrema-Beau Bellatulus, a, um-Bellicinctus, a, un Bellicosus, a, um-Bellifer, era, erum Bellilineatus, a, u Bellipunctus, a, u Bellistriatus, a, ui Bellulus, a, um-Bellus, a, um-Be Bertholletiformis, Biacutus, a, um-Bialveatus, a, um-Biangulatus, a, un Bicarinatus, a, um Bicarpus, a, um-Biceps-Two-head Bicinctus, a, um-Biclavatus, a, um-Bicorniger, era, er Bicornis, e—Two-ł Bicornutus, a, um Bicostatus, a. um-Bicristatus, a, umcrested. Bicuspidatus, a, u Bidens-Having tv Bidentatus, a, um-Bidorsalis, e—Dou Bidorsatus, a, um-Bifarius, a, um-double. Bifidatus, a, um-(Bifidus, a, um-Bi Bifissus, a, um-Cl Bifoliatus, a, um-Biforatus, a, doored. um-Biformatus, a, um-Biformis, e-Two-f Bifrons-With two Bifurca-A two-pro Bifurcatus, a, um-Bifurcus, a, um-T Biimbricatus, a, un Bijugus, a, um-Ye Bilabiatus, a, um-

Bilamellatus, a, u mellæ. Bilateralis, e-Two-Bilineatus, a, um-Biliratus, a, um-T Bilix-Woven with

threaded. Bilobatus, a, um-7 Bilobus, a, um-Tw Bimesialis, e-Havi

[ALT.-BAC.

a tree.

p. iform.

row pores. riated. beaked. r narrow seg-

ed together,

like a bow. s, bent over.

o sand.

ito irregular

ertaining to

of silver. belonging to

ned, distinct. 1 ram. pped. var-like.

I with joints,

knots, or di-

te the plant

reed. for. ven. , irregular. spersed.

n, atter unted.

able for a pipe.

nd fruit.

BAC.-BUL.]

GLOSSARY.

Baculum-A staff or cudgel. Bilinoides-Like Balanus. Balanus-An acorn. Balteatus, a, um-Belted. Ba batus, a, um-Bearded. Barydactylus, a, um-Heavy fingered. Basalis, e-Pertaining to the base. Basalticus, a, um—Basaltic. Basilaris, e—Relating to the base. Basilicus, a, um-Splendid. Belemnura-Having a tail like a dart. Bellarugosus, a, um—Beautifully wrinkled. Bellatrema—Beautiful opening. Bellatulus, a, um-Pretty, neat. Bellicinctus, a, um-Beautifully banded. Bellicosus, a, um-Warlike. Bellifer, era, erum-Warlike Bellilineatus, a, um—Beautifully lined. Bellipunctus, a, um—Beautifully dotted. Bellistriatus, a, um-Beautifully striated. Bellulus, a, um-Very beautiful, pretty. Bellus, a, um-Beautiful. Bertholletiformis, e-Like Bertholletia. Biacutus, a, um-Two-pointed. Bialveatus, a, um-Two-channeled, Bialveatus, a, um—1 wo-enannete Biangulatus, a, um—Two-angled. Bicarinatus, a, um—Two-keeled. Bicarpus, a, um—Two-fruited. Biceps—Two-headed. Bichnetus, a, um—Two-banded. Biclavatus, a, um-Two-clubbed. Bicorniger, era, erum—Two-horned. Bicornis, e—Two-horned. Bicornutus, a, um-Two-horned. Bicostatus, a, um-Two-ribbed. Bicristatus, a, um-Double-peaked or twocrested. Bicuspidatus, a, um-Two-pointed. Bidens-Having two teeth, two-pronged. Bidentatus, a, um—Double-toothed. Bidorsalis, e—Double-backed. Bidorsatus, a, um—Having a double back. Bifarius, a, um—In two ways or parts, double. Bifidatus a, um-Cleft into two parts. Bifidus, a, um-Bifid, cloven in two parts. Bifissus, a, um-Cleft into two parts. Bifoliatus, a, um-Two-leaved. Biforatus, a, um—Two-holed or doubledoored. Biformatus, a, um—Two-shaped. Biformis, e—Two-formed. Bifrons—With two foreheads. Bifurca—A two-pronged fork. Bifurcatus, a, um—Bifurcated, forked. Bifurcus, a, um—Two-pronged. Biimbricatus, a, um—Double-imbricated. Bijugus, a, um—Yoked two together. Bilabiatus, a, um-Two-lipped. Bilamellatus, a, um-Having double lamellæ. Bilateralis, e-Two-sided. Bilineatus, a, um—Two-lined. Biliratus, a, um—Two-furrowed. Bilix—Woven with a double thread, twothreaded. Bilobatus, a, um-Two-lobed. Bilobus, a, um-Two-lobed. Bimesialis, e-Having two middle parts.

Bimucronatus, a, um-Two-pointed. Binervis, e-Two-nerved. Binodus-Double knot. Binumbonatus, a, um - Having double umbones. Bipartitus, a, um—Two-parted. Bipennis, e—Two-winged. Biplicatus, a, um-Two-plicated, or in twofolds. Bipunctatua, a, um-Bipunctate. Bipyramidalis, e-Double-pyramidal. Bisectus, a, um-Divided. Biserialis, e-In two series. Biseriatus, a, um-Having two rows or series. Biserrulatus, a, um-Double-serrulated. Bisinuatus, a, um-Having two depressions or furrows. Bispinulatus, a, um—Two-spine l. Bispiralis, e—Two-whorled. Bistriatus, a, um-Two-striated. Bisulcatus, a, um-Two furrowed. Bisulcus, a, um-Cloven. Bituberculatus, a, um - Double-tuberculated. Biturbinatus, a, um-Double-turbinated. Bivertex-Double head. Bivius, a, um-Having two ways or passages. Bivittatus, a, um – Two-banded. Bivolvis, e – Two-rolled. Blatta-A cockroach or moth. Blattinoides-Like Blattina. Bombifrons-Having a hollow front. Borassifolius, a, um—Leaved like Borassus. Borealis, e—Northern. Bovidens-Ox tooth. Bovipedalis, e-Ox-footed. Brachialis, e-Having arms. Brachiatus, a, um-Having arms. Brachium-An arm. Brachynotus, a, um-Short-ridged. Brachyops-Short sight. Bracteatus, a, um-Covered with plates, beautiful. Breviceps-Short head. Brevicornis, e-Short-horned. Brevicostatus, a, um-Short-ribbed. Breviculus, a, um-Somewhat shortened. Brevicurvatus, a, um-Short-curved. Brevifolius, a, um-Short-leaved. Brevilineatus, a, um—Short-lined. Brevilobatus, a, um—Short-lobed. Brevilobus—Short lobe. Brevimarginatus, a, um—Short-margined. Brevinodus—Short node or short knot. Breviplicatus, a, um-Short-plicated. Breviposticus, a, um-Made short behind. Breviradiatus, a, um-Short-rayed. Brevirostris, e-Short beak. Brevis, e-Short. Brevisulcatus, a, um-Short-furrowed. Breviusculus, a, um-Very short. Brisa-Grape-skins. Bryonoides-Like moss. Buccinum-A trumpet or horn. Bucculentus, a, um-Wide-mouthed. Bufo-A toad. Bulbaceus, a, um-Bulbous.

GLOSSARY.

Capularis, e—Pertaining to a coffin. Capuloides—Like a capulus.

Capulus—A coffin or a handle.

Caput-serpentis-Serpent-head.

Caput-testitudinis-Turtle-head.

Carabus-A small wicker boat.

Bulbosus, a, um—Bulbous. Bulbus—A bulb. Bulimiformis, e—Like Bulimus. Bulla—A round object, bubble. Bullatue, a, um—Studded with knobs. Bulloides—Like a bubble. Bullulatus, a, um—Little vesicled. Bursa—A purse. Bursiformis, e—Purse-shaped.

Cadens—Falling, terminating. Caduceus-The herald's staff. Cæcigenus, a, um-Born blind. Cælamen-A bass relief. Cælator-A carver. Cælatus, a, um-Engraved, carved. Cæspitosus, a, um-Turf-like. Calamitoideus, a, um—Like a Calamite. Calamus—A reed. Calantica-A covering for the head. Calathus-A wicker basket. Calcaratus, a, um-Spurred, spur-shaped. Calcariformis, e-Like a spur. Calceolus-A small shoe Calciferus, a, um-Calciferous. Calculus-A small stone. Caliculus-A small cup. Calix-A cup. Callicephalus, a, um-Having a beautiful head. Calliteles-A beautiful tail. Callosus, a, um-Thick-skinned, callous. Calycinus-A little calyx. Calycularis, e-Like a little cup or flowerhud. Calyculoides-Like a little cup. Calyculus-A flower-cup. Calymenoides-Like Calymene. Calyx-The cup of a flower. Cameratus, a, um-Arched. Cameriferus, a, um-Chambered. Cammarus-A lobster. Campaniformis, e-Bell-formed. Campanulatus, a, um-Bell-shaped. Camurus, a, um-An arch, turned inward. Canaliculatus, a, um-Channeled, canaliculated. Canalis--A channel or groove. Cancellatus, a, um-Cross-barred, cancellated. Cancellosus, a, um-Finely cancellated or latticed. Canna-A reed. Canneus, a, um-Made of reeds. Canniformis-Like Canna. Cannaliratus, a, um-Reed-furrowed. Cannula-A small reed. Capax-Large, spacious. Capillaceus, a, um-Similar to hair, stringy. Capillaris, e-Of or pertaining to the hair. Capillatus, a, um-Having hair. Capillosus, a, um-Very hairy. Capitalis, e-Relating to the head. Capitatus, a, um-Having a head. Capitellum-A small head. Capitolinus, s, um-Pertaining to the capitol, a tower. Caponiformis, e-Capon-formed.

Capreolus-Props, stays.

Carbonarius, a, um-Of or relating to coal. Carcharidens-Dog-fish tooth. Cardiiformis, e-Like a cardium. Cardinalis, e-Of or pertaining to a doorhinge, or principal. Cardinatus, a, um - Jointed, fitted to, hinged. Cardineus, a, um-Of or pertaining to a door-hinge. Carica-A kind of fig. Carinatus, a, um-Keeled. Cariniferus, a, um—Keel-bearing. Carnosus, a, um—Fleshy. Carus, a, um-Precious, valued. Castanea-A chestnut. Catactus, a, um-Frail, easily broken. Catastomus, a, um-Gaping at the lower end. Catenoides-Chain-like. Catenulatus, a, um-A little chain. Catilliformis, e-Dish-shaped. Catilloides-Dish-like. Catillus—A small dish. Catinus—A bowl. Caudagalli-Tail of a cock. Caudatus, a, um-Having a tail. Cauliculus-Small stalk or stem of a plant. Cavernosus, a, um-Full of hollows. Cavifolius, a, um—Hollow-leaved. Cavumbilicatus, a, um—Having a hollow umbilicus. Cavumbona-Hollow umbo. Cavus, a, um-Hollow, concave. Celator-A concealer, hider. Celebrus, a, um-Abundant. Celer-Swift, fleet. Cellulosus, a, um-Full of cells. Celsipora-High pore. Celeus, a, um-High. Centennialis, e-The 100th year. Centralis, e-In the middle, central. Centratus, a, um-Central. Centrilineatus, a, um-Central-lined. Centronatus, a, um-Having knots or points. Centrosus, a, um-In the central point. Cerasiformis, e-Like a dried cherry. Cerithioides-Like Cerithium. Cervicornis, e-Deer-horned. Cervinus, a, um-Pertaining to a deer. Cessator-An idler, loiterer. Cetratus, a, um-Shield-bearing. Chærophylloides-Like Chærophyllum. Chiriformis, e- Hand-shaped. Chiromorphus, a, um-Hand-formed. Chromaticus, a, um-Chromatic, colored. Chrysalis-Chrysalis. Cicatricosus, a, um—Full of scars. Ciceronius—Having warts. Ciliatus, a, um-Haired on the margin, fringed. Cinctosus, a, um-Full of bands, girded. Cinctulus-A small girth

Ν.

CIN. - COR.]

Cinctura-A gire Cinctus, a, um-Cinctutus, a, um Cingulatus, a, t girded. Cingulosus, a, u zones. Cingulum-A zo Circinatus, a, um Circinctus, a, um Circularis, e-Cii Circulus-A circl Circumliratus, a, Cistella-A small Cistula-A little c Citus, a, um-Sw Clarus, a, um-Cl Clathratus, a, um Clausus, a, um-(Clava-A stick. Clavacoideus, a, 1 Clavatulus-A lit Clavatus, a, um-Clavicula-A sma Clavifrons-Havin Claviger-A club-Clavigerus, a, um Clavis-A bar. Clavulus-A little Clavus—A nail, s Clinatus, a, um—I Clinocameratus, a, Clipeatum-Furni Clipeiformis, e-S Clivosus, a, um-1 Clivulatus, a, um-Clivulus—A little Clymenioides-Lik Clypeatus, a, um-Clytis-Celebrated Coalescens-Growi Coalitus, a, um-G Coaptus, a, um-C Coarctatus, a, um-Cochlearis, e-In t Cochleatus, a, um-Cochleola-A smal Cognatus, a, um-1 Cohærens-Adheri Collatus, a, um-Je Collectus, a, um-(Colliculus-A little Colligatus, a, um-I Collinus, a, um-H Colon-The great in Colubrellus-A littl Colubrinus, a, um-Colubrosus, a, um-Columella-A small Columellatus, a, un Columnaris, e-Colu Comes-A compani Comis, e-Friendly, Communis, e-Com Commutatus, a, um-Comosus, a, um—H Compactilis, e—Pres Compactus, a, um-Compertus, a, um-

[BUL.-CIN coffin.

d. ating to coal. Im. ig to a doord, fitted to,

rtaining to a

ng.

٠d.

broken. at the lower

hain.

sil. em of a plant. pllows. wed. ing a hollow

ve.

lls.

Bar. central.

al-lined. ng knots or

itral point. i cherry. ۱.

to a deer.

iug. rophyllum. -formed. atic, colored.

scars.

n the margin,

nds, girded.

CIN. - COR.]

GLOSSARY.

Cinctura-A girdle. Cinctus, a, um-Banded, girded. Cinctutus, a, um-Girded. Cingulatus, a, um-Encircled with lines, girded. Cingulosus, a, um-Covered with lines or zones. Cingulum-A zone. Circinatus, a, um-Compassed, rounded. Circinctus, a, um-Encompassed. Circularis, e-Circular, round. Circulus-A circle. Circumliratus, a, um-Circular-lined. Cistella-A small box. Cistula-A little chest or coffer. Citus, a, um-Swift, speedy. Clarus, a, um-Clear, brilliant, distinct. Clathratus, a, um-Cross-barred, latticed. Clausus, a, um-Closed up. Clava—A stick. Clavacoideus, a, um—Club-shaped. Clavatulus—A little club. Clavatus, a, um-Knotted, club-shaped. Clavicula-A small twig. Clavifrons-Having a club-like front. Claviger-A club-bearer. Clavigerus, a, um-Club-bearing. Clavis-A bar. Clavulus-A little club, a small swelling. Clavus—A nail, spike. Clinatus, a, um—Inclined, bent. Clinocameratus, a, um—Curve-chambered. Clipeatum—Furnished with a shield. Clipeiformis, e-Shield-like. Clivosus, a, um-Full of hills. Clivulatus, a, um—Having little hills. Clivulus—A little hill. Clymenioides-Like Clymenia. Clypeatus, a, um—Armed with a shield. Clypis—Celebrated. Coalescens-Growing together. Coalitus, a, um-Grown together. Coaptus, a, um-Closely joined. Coarctatus, a. um-Compressed, joined. Cochlearis, e-In the form of a snail shell. Cochleatus, a, um-Spiral. Cochleola-A small snail. Cognatus, a, um-Near to, cognate. Cohærens-Adhering together. Collatus, a, um-Joined together, collected. Collectus, a, um-Collected. Colliculus-A little hill. Colligatus, a, um—Bound together, fastened. Collinus, a, um—Hilly. Colon—The great intestine. Colubrellus-A little snake. Colubrinus, a, um-Like a snake. Colubrosus, a, um-Winding. Columella-A small column. Columellatus, a, um-Pillared. Columnaris, e-Columnar. Comes-A companion. Comis, e-Friendly, nice, delicate. Communis, e-Common. Commutatus, a, um-Changed, altered. Comosus, a, um—Hairy. Compactilis, e—Pressed together. Compactus, a, um—Compact. Compertus, a, um-Discovered, ascertained. Coralliferus, a, um-Coral-bearing.

Complanatus, a, um-Leveled, smoothed. Complexatus, a, um-Encircled. Complexus, a, um-Snrrounded, encircled. Compressus, a, um-Compressed. Comptus, a, um-Ornamented, elegant. Conatus-An effort. Concavus, a, um-Concave. Concentricus, a, um-Concentric. Concinnulus, a, um-Small and beautiful. Concinnus, a, um-Beautitul, neat. Conditus, a, um-Joined. Confectus, a, um-Completed. Confertus, a, um-Pressed close together. Confervoides-Like Conferva. Confirmatus, a, um-Made firm, establishe l. Conflexus—a, um--Bent. Confluens—Running together, blended. Conformalis, e-Similar. Confragosus, a, um-Rough, uneven. Confragus, a, um-Rough. Confusus, a, um-Mixed together, confused. Congener, eris-Congeneric. Congestus, a, um-Accumulated, heaped. Conglobatus, a, um-Gathered in a round mass. Conglomeratus, a, um-Gathered together. Congregatus, a, um—Assembled tog ther. Congregalis, e—Uniting together. Congruens—Corresponding, coinciding, run ing together. Coniculus-A little cone. Conicus, a, um-Conical, cone-shaped. Conifollis-An inflated cone. Conifer, era, erum-Bearing conical fruit. Coniformis, e-Cone-shaped. Coniforns-Having a conical front. Coniger, era, erum-Bearing fruit of a conical form. Conjugans-Joined, united Conjunctivus, a, um-Connecting. Connatus, a, um—Connate, united, Connivens—Dissembling, closing. Conoideus, a, um-Somewhat conical. Consinilis, e-Wholly similar. Consobrinus-A cousin, relative, remotely allied. Consolidatus, a, um--Consolidated. Consolidus, a, um--Very firm. Consors-Living in common. Conspicuus, a, um--Visible, conspicuous. Constans-Standing firm. Constellatus, a, um-Very starry. Constrictostriatus, a, um-Constricted and striated. Constrictus, a, um-Constricted. Consuetus, a, um-Customary, related to. Contextus, a, um-Entwined. Continens—Holding together. Contractus, a, um—Contracted. Contritus, a, um—Worn out. Conulatus, a, um—Having little cones. Conulus—A little cone. Conus-A cone. Convergens-Converging. Convexus, a, um-Convex Convolutus, a, um-Rolled up, spiralwhorled.

Convolvans-Rolled together.

GLOSSARY.

Corallinum-Like red coral. Coralloides-Like coral. Corbis-A basket. Corbula-A little basket. Corbuliformis, e-Like a basket. Cordatoovatus, a, um—Cordate ovate. Cordatus, a, um—Cordate, heart-shaped. Cordiformis, e-Heart-shaped. Coriaceus, a, um-Coriaceous, having the texture of rough skin. Coriformis, e-1.ike Coris. Corinthius, s, um-Corinthian. Corium-A leather strap, bark. Corniculum-A little horn. Corniger, era, erum-Horned. Cornuformis, e-In the form of a horn. Cornu-A horn. Cornulum-A little horn. Cornutiformis, e-Horn-shaped. Cornutus, a, um-Horned. Coronarius, a, um-Of or belonging to a wreath. Coronatus, a, um-Crowned. Corpulentus, a, um-Corpulent. Corrugatus, a, um-Corrugated, wrinkled. Corticatus, a, um-Covered with bark. Corticosus, a, um-Having thick bark. Corvlus-A hazel. Cosciniformis, e-Like Coscinium. Costa-A rib. Costalis, e-Ribbed. Costatiformis, e-Rib shaped. Costatulus, a, um—Small ribbed. Costatus, a, um—Having ribs, ribbed. Costelliferus, a, um-Bearing faint ribs. Crassibrachiatus, a, um—Thickened. Crassibrachiatus, a, um—Thick-armed. Crassicardinalis, e-Having a thick hinge. Crassicauda-Thick-t+il. Crassicaulis, é-Having a thick stem. Crassicostatus, a, um-Thick-ribbed. Crassidens-Having a thick tooth. Crassidiscus-A thick disk. Crassifrons-Having a thick front. Crassimarginatus, a. um-Thick-margined. Crassinervis, e-Having thick or dense nerves. Crassiradiatus, s, um-Having thick rays. Crassitestus, a, um-Like a thick vessel or pot-lid. Crassolaris, e-Thickened. Crassus, a, um-Thick. Cratera-A bowl. Crateriformis, e-Cup shaped. Cratigulus, a, um-Composed of lattice-work. Cratis-Wicker work. Crebescens-Frequent, increasing. Crebratus, a, um-Made thick, clove. Crebripora-Having the pores very close. Crebrirama-Having dense branches. Crebriseptus; a, um-Having many septa. Crebristriatus, a, um-Closely striated. Crenatocinctus, a, um—Notched around. Crenatus, a, um—Crenated, notched. Crenistriatus, a, um-Having writkled lines. Crenulatus, a, um-Crenulated. Crepidula-A small sandal. Crepiformis, e-Boot-shaped Cretaceous, a, um-Cl alk l ke.

634

C

sieve. Cribrarius, a, um-Pertaining to a sieve. Cribrosus, a, um-Full of holes like a sieve. Crineus, a, um-Hairy. Crispatus, a, um-Curled, crisped. Crispus, a, um-Curled, wavy. Cristatus, a, um—Tufted, crested. Cristula—A small crest. Cristulatus, a, um—Small-tufted. Crossotus, a, um— Fringed. Crotaliformis, e-Shaped like a bell. Crotalum—A bell, a rattle. Cruciatus, a, um—Cross-shaped, twisted. Cruciferous, a, um-Cross-bearer. Cruciformis, e-Cruciform. Cruciger, era, erum-Cross bearer. Crustosus, a, um-Crusted. Crustula-A little shell, crust. Cryptatus, a, um—Concealed. Cryptodens—Hidden tooth. Cucullus—A cap, covering. Culeus—A leather bag. Culmula—A little stalk or stem. Culmus—A stem. Cultellatus, a, um-Like a little knife. Cultellus—A small knife. Cultidactylus, a, um—Elegantly fingered. Cultratus,, a, um—Knife-formed. Cultriformis, e—Shaped like a pruningknife. Cumulatus, a, um—Heaped. Cumulus—A heap. Cuneatus, a, um—Wedge-form d. Cuneiformis, e—Wedge-shaped. Cuneolus—A little wedge. Cuneus-A wedge. Cuniculosus, a, um-Full of caves. Cuniculus-A cradle, cavity. Cunulæ-A little cradle. Curiosus, a, um-Curious Curticardinalis, e-Short-hinged. Curtidentatus, a, um-Short-toothed. Curtilobus, a, um-Short-lobed. Curtirostratus, a, um—Short-beaked. Curtus, a, um—Shortened. Curvatus, a, um—Curved. Curvidens—Having curved teeth. Curvijuncturus, a, um—Joining in a curve. Curvilineatus, a, um—Having curved lines. Curvirostrum—A bent beak. Cuspidatus, a, um-Pointed. Cyahus—A cup. Cyathiformis, e—Cup-shaped. Cyclas—Of a round form. Cyclonemioides-Like a Cyclonema. Cyclopora-Round pore. Cycloptera-Circle-wing. Cyclopteroides—Like Cyclopteris. Cyclostegium—Circular covering. Cyclostigma-Having round scars, rounddotted. Cyclostomus, a, um-Having a round mouth. Cylindraceus, a, um—Like a cylinder. Cylindricus, a, m—Cylindrical. Cymatoides—Wave-like. Cymbalum-A cymbal.

Crebriformis, e-Full of openings like a

CYM.-DUP.]

Cymbiformis, e Cymbula—A sr Cymbula—A sr Cymosus, a, um Cynodon—Dog-Cyrtiniformis, e Cyrtodontoides-Cyrtolites—A ct Cysticus—A litt

Dactyliformis, Dactyloides—Lii Dactyloides—Lii Dactyloides—Lii Dactylus—Grow Debilis, e—Wea Decabrachiatus, Decemplicatus, a, Decemplicatus, a, Decernis—Dece Declivis, e—Slop Decoratus, a, um Decornis—Witha Decornis—Witha Decornis, a, um Decorticatus, a, um ful.

Decrescens—Dec Decurrens—Decu Decursus, a, u down.

Decurtatus, a, un Decussatus, a, un cross each oth Defiguratus, a, un Deflectus, a, um-Deflexus, a, um-Deformatus, a, un-Deformatus, a, un-

Deformis, e—Def Degener, eris—D cestors. Delicatulus, a, um

Delicatus, a, um-Delphinocephalus Deltoideus, a, un Delta.

Deminutivus, a, u Demissus, a, um-Demum-At last, Denarius, a, um-Densifolius, a, un Densmammillatus lated teeth.

Densus, a, um—D Dentalium—A plo Dentatus, a, um— Denticulatus, a, u small teeth.

Dentilineatus, a, u Denudatus, a, um— Deparcus, a, um— Deparcus, a, um— Deprestus, a, um— Depressus, a, um— Dessertus, a, um— Dessmopleura—A s Desquamatus, a, um Desvexus, a, um—S Diadematus, a, um COR.-CYM

penings like a

; to a sieve. holes like a

isped. y. sted.

ted.

a bell.

ned, twisted. arer.

earer.

t. I.

tem.

ittle knife.

ntly fingered. med. ke a pruning.

rm.d. ped.

f caves.

nged. t-toothed. bed. t-beaked.

teeth. ining in a curve. ing curved lines. k. 1.

ed.

vclonema.

opteris. vering. nd scars, roundaving a round

a cylinder. rical. CYM.-DUP.]

GLOSSARY.

Cymbiformis, e-Boat-shaped. Cymbium-A small drinking cup. Cymbula-A small boat. Cymosus, a, um—Full of shoots. Cynodon—Dog-tooth. Cyrtiniformis, e-Like Cyrtina. Cyrtodontoides-Like Cyrtodonta. Cyrtolites-A curved stone. Cysticus-A little bladder. Dactyliformis, e-Finger-shaped. Dactylodus, a, um—Finger-toothed. Dactyloides—Like thimble punctures. Dactylus—Growing like a fing-r. Debilis, e—Weak, feeble. Decabrachiatus, a, um-Ten-armed. Decadactylus, a, um-Ten-fingered. Decemplicatus, a, um-Ten-plicated. Decipiens—Deceiving, doubtful. Declivis, e—Sloping. Decoratus, a, um—Decorated. Decornis—Without horns. Decorosus, a, um—elegant. Decorticatus, a, um-Barked, decorticated. Decorus, a, um-Seemly, suitable, beautiful. Decrescens—Decreasing, growing less. Decurrens—Decurring, hanging down. Decursus, a, um — Dowuward, running down. Decurtatus, a, um-Curtailed. Decussatus, a, um-Arranged in pairs that cross each other. Defiguratus, a, um—Disfigured. Deflectus, a, um—Deflected. Deflexus, a, um-Bent, turned aside. Deformatus, a, um—Deformed. Deformis, e—Deformed, ugly-shaped. Degener, eris-Degenerate, unlike the ancestors. Delicatulus, a, um—Quite delicate. Delicatus, a, um—Delicate, thin. Delphinocephalus-Dolphin-headed. Deltoideus, a, um-Like the Greek letter Delta. Deminutivus, a, um-Diminutive. Demissus, a, um—Hanging down. Demum—At last, solely. Denarius, a, um-Containing ten. Densifolius, a, um—Dense-leaved. Densmammillatus, a, um—Having mammillated teeth. Densus, a, um-Dense, thick. Dentalium-A plow-share. Dentatus, a, um—Toothed. Denticulatus, a, um—Denticulated, having small teeth. Dentilineatus, a, um-Tooth-lined. Denudatus, a, um-Denuded. Deparcus, a, um-Very scarce. Depauperatus, a, um-Impoverished. Deperditus, a, um-Impoverished. Depressus, a, um—Depressed. Desertus, a, um—Deserted, forsaken. Desideratus, a, um — Desired, forsakt Desmopleura—A side band. Desquamatus, a, um-Scaled off. Devexus, a, um-Sloping.

Diadematus, a, um-Wearing a diadem.

Dialophus—Through the neck. Dianthus, a, um—Double-flowered. Diatretus, a, um—Pierced with holes. Dichotomus, a, um—Divided. Dictyopteroides—Like Dictyopteris. Dictyota—Net-worked. Dictyum—A net. Difficilis, e-Difficult, rough. Diffidens-Diffident, distrusting. Diffluens—Flowing every way, loose. Diffusus, a, um—Diffused, extended. Digitalis, e-Belonging to the finger. Digitatus, a, um-That has fingers, toes, or claws. Dignatus, a, um-Excellent. Digonus, a, um-Two-angled. Dikrocheilus, a, um-Two-edged. Dilatatus, a, um-Dilated, widened. Dilatus, a, um-Spread out. Diluculum—Day-break, dawning of day. Diminutivus, a, um—Diminutive. Dimorphus, a, um—Two-formed. Diplostegioides—Like Diplostegium. Diplotesta-Having two tests. Disciformis, e-Shaped like a quoit. Discoidalis, e-Discoidal. Discoideus, a. um—Discoid, disk-like. Discophorus—Disk-bearer. Discrepans—Different. Disculus-A little disk. Discus-A quoit. Disjunctus, a, um—Separated, disjoined. Dispalans—Straggling, stray. Dispandus, a, um—Spread out, stretched. Dispansus, a, um—Stretched out. Dispar—Different. Disparilis, e-Different, unequal. Disparses, a, um—Extended, spread out. Dispersus, a, um—Dispersed. Dissectus, a, um—Cut up, dissected. Dissimilaris, e—Dissimilar, unlike. Dissolutus, a, um—Weak, broken. Distans-Distant, standing apart. Distensus, a, um—Distended. Distinctus, a, um—Distinct. Distortus, a, um-Distorted, crooked, irregular. Divaricans—Severed, straddling. Divaricatus, a, um—Divaricated, wide apart. Divergens—Diverging. Diversifolius, a, um—Diverse-leaved. Diversus, a, um—Diverse, different, unlike. Divisus, a, um—Dividing. Docens—A teacher. Dodecadactylus, a, um—Twelve-fingered. Dolabriformis, e—Like a mattock or pick-axe. Dolatus, a, um-Hewed. Dolorosus, a, um—Wretched. Donaciformis, e—Like a Donax. Dorsalis, e-Dorsal. Dorsatus, a, um-High-backed. Dotis-An ornament. Drepanaspis—Having a sickle-shield. Dubius, a, um—Doubtful. Dumalis, e-Bushy. Dumosus, a, um-Bushy. Duodenarius, a, um-Containing twelve. Duplicatus, a, um—Duplicated, doubled. D.plicostatus, a, um—Double-ribbed.

GLOSSARY.

Eboreus, a, um-Made of ivory. Ebracteatus, a, um-Without scales or bracts. Eburneolus, a, um—Of ivory. Eccentricus, a, um—From the center. Echinatus, a, um—Set with spines. Ectypus, a, um—Engraved in relief, embussed. Edax-Voracious. Edentulus, a, um-Toothless. Egenus, a, um—Destitute of, very poor. Elegans—Elegant, handsome. Elegantissimus, a, um-Very handsome. Elegantulus, a, um-Quite elegant. Elevatus, a, um—Elevated. Ellipticus, a, um—Elliptical. Elongatus, a, um—Elongated. Elytra—The wing covering. Elytroides—Like the elytra of beetles. Emaceratus, a, um—Thin. Emaciatus, a, um—Emaciated, thin. Emarginatus, a, um-Notched. Eminens-Prominent, standing out in relief. Eminulus, a, um-Projecting a little. Enormis, e-Very large. Ensiformis, e-Sword-formed. Eos-The dawn. Epidermatus, a, um-Covered with a crust or skin. Equilaterus, a, um—Equal-sided. Equisetiformis, e—Like Equisetum. Frectifolius, a, um—Having leaves erect. Erectipora—Having erect pores. Erectus, a, um—Erect, straight. Erodus, a, um—Eroded, jagged, gnawed. Erosus, a, um—Eroded, bitten away. Erraticus, a, um—Wandering, erratic. Erythroliticus—Red stone. Escharoides—Like Eschara. Eucharis, e-Graceful, beautiful. Euconus-Perfect cone. Euginum—Fertile. Euglypheus, a, um-Well-carved, distinctly marked. Euomphaloides-Like Euomphalus. Euphemia—Of good omen. Euruteines—Extending widely Euzona-Beautifully girdled. Evax-An exclamation of delight. Exacutus, a, um-Pointed. Exanthematus, a, um-Covered with eruptions. Excavatus, a um-Made hollow, excavated. Excellens—Excellent, high-rising. Excelsior—Elevated, lofty. Excelsus, a, um—Elevated, high. Excerptus, a, um—Selected, picked out. Excrescens—Growing out, increasing. Exculptus, a, um—Adorned, chiseled out. Exfoliatus, a, um—Exfoliated. Exiguus, a, um—Small, petty. Exilis, e—Thin, lean, slender, creeping. Eximius, a, um-Choice, select, excellent. Exornatus, a, um—Adorned. Exortivus, a, um—Eastern. Expansus, a, um-Expanded, widely spread. Expansion, an um-Spread out. Explanatus, a, um-Made plain, spread out. Explicatus, a, um-Unfolded, spread out.

Explorator-A scout, an examiner. Exporrectus, a, um-Smooth, stretched out. Exsculptus, a, um—Carved. Exsertus, a, um—Projecting, thrust forth. Exsul—A wanderer. Extans-Standing out. Extensus, a, um-Stretched out, extended. Extenuatus, a, um-Made thin, slender, drawn out. Extumidus, a, um-Swelled up. Exutus, a, um-Divested, stripped off. Faba—A bean. Fabalis, e—Bean-stalks. Fabula—A little bean. Fabulites—A little stone bean. Facetus, a, um-Elegant. Falcatus, a, um-Hooked. Falciformis, e-Like a sickle, pruning-knife, or hook. Fallax-Deceptive. Falx-A hook, pruning-knife, or sickle. Famelicus, a, um—Famished. Fasciatus, a, um—Banded. Fascicularis, e-Small-bundled. Fasciculatus, a, um—Bundled. Fasciculus—A bundle. Fascigerus, a, um-Bearing fasces. Fastigatus, a, um—Sloping up to a point. Faustus, a, um—Fortunate, lucky. Favositoideus, a, um—Like Favosites. Favosus, a, um—Honeycomb-like. Fax—A torch, taper. Fecundus, a, um—Fruitful. Felix, icis—Fertile. Fenestella—A little window. Fenestelliformis, e-Like Fenestella. Fenestratus, a, um-Reticulated, having open windows. Fenestrula- 1 little window. Ferox—Fierce, hardy, stout. Ferratus, a, um—Hard as iron, covered with iron. Ferricolus—Iron distaff. Ferrugineus, a. um-Of the color of iron, rusty. Fertilis, e-Fertile, fruitful. Ferus, a, um-Wild, cruel, fierce. Festinatus, s, um-Hastened, before the time. Fibratus, a, um-Having small threads hanging to it. Fibristriatus, a, um-Fiber-lined. Fibrosus, a, um—Full of fibers or threads. Ficoides—Like a fig. Ficus—A fig. Fidelis, e—Sure, faithful. Filiciformis, e—Fern-like. Filicosta—Having thread-like costa. Filicula-Fern of trees, wall-fern. Filiculme-Thread-straw. Filiformis, e-Filiform. Filistriatus, s, um - Having thread-like striæ. Filitextilis, e-Woven like thread. Filitextus, a, um—Woven like thread. Filosus, a, um—Thready. Fimbriatus, a, um—Fringed, jagged, scal-

loped.

FIS.-GLY.]

Fiscellostriatus,

striæ. Fiscellus-A smi

twigs. Fissicosta-Havin Fissiplica—Havin Fissuratus, a, um Fissurellus, a, un Fisus, a, um-Di Fistulosus, a, um Flabellatus, a, un Flabellifer, era, e

Flabelliformis, e-Flabellites—A sto Flabellum—A fai Flaccidus, a, um-

ging, flaccid. Flagellaris, e—Li Flagellum-A wh Flagricaudus, a, Flavus, a, um—G Flexicaulis, e—H Flexifolius, a, un Flexilis, e-Plian Flexuosus, a, um Florealis, e—Flov Floridus, a, um

flowers, gay. Florifer, era, eru Floriformis, e-F Flos-A flower. Fluctus-A wave, Fluctuosus, a, u veiny.

Fluitans-Flowin Fœcundus, a, um Fœtoideus, a, um Foliaceus, a, um leafy.

Foliatus, a, um-Foliosus, a, um-Folium-A leaf. Folliculus-A sm Follis-A leather Fonticola-Fount Fontinalis-A fou Formosus, a, um-Fornacula—A litt Fornax—A furna Fornicatus, a, um Forulatus, a, um-Fossatus, a, um-

Fossilis, e—That earth, fossil. Fossula—A little Foveatus, a, um-Fractus, a, um—E Fragarioides—Lik Fragilis, e-Brittle Fragosus, a, um-Frangens-A brea Fraternus, a, um-Fraxiniformis, e-Frequentatus, a, 1 Fringilla—A smal Fritillus—A dice-Frondosus, a, um-Frutex—A shrub.

EBO.-FIM.

iner. tretched out.

thrust forth.

at, extended. in, slender.

ped off.

runing-knife,

or sickle.

sces. to a point. icky. like.

estella. lated, having

, covered with

color of iron,

rce. d, before the small threads ned. ers or threads.

costa. fern.

ng thread-like pread. te thread.

, jagged, scal-

FIS.-GLY.]

GLOSSARY.

Fiscellostriatus, a. um - Having divided strim Fiscellus-A small basket woven of slender twigs. Fissicosta-Having divided costa. Fissilis, e-Split. Fissiplica-Having divided plications. Fissuratus, a, um-Fissured. Fissurellus, a, um—Having a little cleft. Fisus, a, um—Divided, cleft, split. Fistulosus, a, um-Full of holes, spongy. Flabellatus, a, um-Fan like. Flabellifer, era, erum-That bears a fan. Flabelliformis, e-Shaped like a fan. Flabellites-A stone fan. Flabellum-A fan. Flaccidus, a, um-Withered, hanging, flagging, flaccid. Flagellaris, e—Like a whip. Flagellum—A whip. Flagricaudus, a, um—Whip-tailed. Flavus, a, um—Golden, yellow. Flexicaulis, e—Having a flexible stem. Flexifolius, a, um—Having recurved leaves. Flexifis, e—Pliant, flexible. Flexuosus, a, um—Flexuous, full of turns. Florealis, e—Flower-like. Floridus, a, um-Flowery, adorned with flowers, gay. Florifer, era, erum-Flower-bearing. Floriformis, e-Flower-shaped. Flos-A flower. Fluctus-A wave, a billow. Fluctuosus, a, um-Full of waves, wavy, veiny. Fluitans—Flowing, floating. Fœcundus, a, um—Fruitful, abundant. Fœtoideus, a, um-Like a tumor. Foliaceus, a, um-Foliaceous, like leaves, leafy. Foliatus, a, um-Leaved, having leaves. Foliosus, a, um—Leafy, full of leaves. Folium—A leaf. Folliculus-A small sack. Follis—A leather sack. Fonticola-Fountain-dwelling. Fontinalis—A fountain or spring. Formosus, a, um—Beautiful, handsome. Fornacula—A little oven. Fornax-A furnace. Fornicatus, a, um—Arched, vaulted over. Forulatus, a, um—Having narrow furrows. Fossatus, a, um—Dug out. Fossilis, e—That may be dug out of the earth, fossil. Fossula-A little trench or ditch. Foveatus, a, um—Pitted. Fractus, a, um—Broken, effeminate. Fragarioides—Like a strawberry. Fragilis, e—Brittle, frail. Fragosus, a, um-Fragile. Frangens-A breaker. Fraternus, a. um—Brotherly, fraternal. Fraxiniformis, e—Like fraxinus. Frequentatus, a, um-Frequent. Fringilla—A small bird. Fritillus—A dice-box. Frondosus, a, um—Full of leaves. Frutex—A shrub.

Fruticosus, a, um-Shrubby, full of shoots. Fucoides-Like Fucus. Fulgidus, a, um—Stayed with props. Fulgidus, a, um—Shining. Fulgur—A thunder-bolt. Funatus, a. um-Corded. Fungosus, a, um—Spongy. Fungulus—A small mushroom. Funiculus-A small cord or line. Furcatus, a. um-Forked. Furcicarinatus, a, um—Forked and keeled. Furtivus, a, um—Secret, hard to find. Fusibrachiatus, a. um-Having fusiform arms Fusiformis, e-Fusiform, tapering at both ends. Fustiformis, e-Club-formed. Fustis-A club, staff. Futilis, e-Trivial. Galeatus, a, um-That wears a helmet. Galericulatus, a, um-Having a small covering. ering. Galerum—A cap, hat, or tuft of feathers. Gallinuloides—Like a pullet, Gemellipara—Twin-bearing. Geminispinosus, a, um—Twin-spined. Gemma—A young bud, a gem. Gemmatus, a, um—Budded, set with gems. Gemmicula—A little bud. Gemmifer, era, erum-That bears buds or gemmules. Gemmiformis, e-Shaped like a bud. Gemmula-A little bud. Geniculatus, a, um—Knotted, jointed. Geniculosus, a, um—Knotty. Genitivus, a, um—Natural, belonging to the same stock. Geometricus, a, um—Geometrical. Germanus, a, um—Near of kin. Gibber, era, erum-Bossed, hunchbacked. Gibberosus, a, um-Badly hunchbacked. a, um-Somewhat hunch-Gibberulus, backed. Gibberus, a, um—Humpbacked. Gibbosus, a, um—Gibbous, full of hunches, or humped. Gibbus, a, um—Hunched, gibbous. Giganteus, a, um—Giant-like, very large. Gigas-A giant. Glabellus, a, um—Smooth. Glaber, bra, brum—Smooth, bare. Glacialis, e-Frozen, icy. Gladiolus-A small sword. Glandulosus, a, um-Full of kernels, glandular. Glandulus, a, um-Having kernels, glandular. Glans-An acorn, chestnut, or pellet. Glanscerasi-Fruit of the cherry-tree. Glansfagea-Fruit of the beech-tree. Globatus, a, um—Made round. Globosus, a, um—Round as a ball, globose. Globularis, e—Globular. Globuliformis, e-Globe-shaped. Globulus—A little ball. Glomeratus, a, um—Confused, out of order. Gloriosus, a, um—Glorious.

Glyptus, a, um-Sculptured.

GLOSSARY.

Gomphoides-Like a stake or club. Gomphus-A pile, stake, or club. Goniocercus, a, um—Angular, tailed. Goniolobus, a, um—Having angular lobes. Goniopteroides-Like Goniopteris. Goniurus, a, um-Angular-tailed. Gonopleura-Angular rib. Gothicus, a, um—Gothic. Gracilens, entis—Slen ler, thin. Gracilentus, å, um-Slender, thin. Gracilis, e-Small, slender, thin, weak. Gracilius, a, um-More slender. Gracillimus, a, um-Very slender, thin, or weak. Gracillistriatus, a, um-slender, striated. Gradatus, a, um-Made with steps. Gradicosta-Having steps and ribs. Gradocostatus, a, um-Having steps and ribs. Gramineus, a, um-Grassy or belonging to grass. Grandiceps—Big-headed. Grandiculus, a, um—Rather large. Grandifolius, a, um-Large-leaved. Grandis, e-Grand, large. Graniferus, era, erum-That bears grains of corn. Granilineatus, a, um—Lined with granules. Granilineus, a, um—Granule-lined. Granosus, a, um—Full of grains or kernels. Granulatus, a, um-Granulated, granular. Granuliferus, era, erum-Granule-bearing. Granulostriatus, a, um-Having granular striæ. Granulosus, a, um-Covered with small granules. Graphicus, a, um-Perfect, excellent, done to the life, written on. Gratiosus, a, um-Agreeable. Gratus, a, um—Acceptable. Gravis, e—Weighty, full, old. Graviusculus, a, um—Rather deep. Gregalis, e—Of the common sort. Gregarius, a, um-Of the common sort, common, gregarious. Grossiplicatus, a, um—Thick-plaited. Grumus—A little heap. Gypseus, a, um-Covered or plastered with gypsum. Gyracanthus—Round spine. Gyrinoides—Like a tadpole. Gyroceras-Circular horn. Hæsitans-Doubting. Haliotoides-Like Haliotus. Hamatilis, e-Furnished with hooks. Hamatus, a, um-Crooked, hooked. Hamulosus, a, um-Full of hooks. Hamulus—A small hook. Harpago—A hook. Hastatus, a, um-Bearing spears, halbertshaped. Hastifolius, a, um—Spear or lance-leaved. Hastula—A little spear. Helicoides-Like a helix. Heliciteres—A round, smooth spire. Heliolitiformis, e—Like Heliolitics. Helios-The sun.

Hemicyclus-A half-circle. Hemicylindrus-A half-cylinder. Hemiplicatus, a, um-Half plaited. Hemisphericus, a, um—Hemispherical. Hemiteloides—Like Hemiteles. Hemitrypa - Having half-openings. Herbaceus, a, um-Grassy. Herculaneus, a, un-Belonging to Hercules, large of its kind. Heterocinctus, a, um-Irregularly girded or banded. Heteroclitus, a, um-Extraordinary. Heterodactylus, a, um-Irregular-toed or irregularly fingered. Heterophyllus, a, um-Irregularly or differently leaved. Heteropora-Having irregular pores. Heteropteris-Irregular fern. Hexadactylus, a, um-Six fingered. Hexagonus, a, um-Having six angles. Hexagonalis, e-Hexagonal Hians-Gaping, disjointed. Hipparionyx-A colt's hoof. Hirsutus, a, um-Rough, hairy, shaggy. Hirtus, a, um-Rough, hairy, shagey. Hispidus, a, um-Rough, bristly, rugged. Hiulcus, a, um-Gaping, cleft. Holopyga—Entire rump, whole back. Homalonotoides—Like Homalonotus. Horizontalis, e—Horizontal. Horridus, a, um-Rough, bristly. Hospitalis, e-Of a guest, hospitable. Humerosus, a, um-Humped, full of humps. Humerulus-A little shoulder. Humilis, e—Small, poor. Hyalina—Of glass. Hybrida—Intermediate between two species, a hybrid. Hydraulicus, a, um—Hydraulic. Hymenophylloides--Like Hymenophyllites. Hyperbolæus, a um-Extreme. Hyperboreus, a, um-Very far north. Hypniformis, e-Like Hypnum. Hystricosus, a, um—Thorny. Hystriculus, a, um—Somewhat covered with spines. Hystrix—Covered or beset with spines. Ichthyoderma—Having a fish-skin. Ichthyolepis—Having fish-scales. Icosidactylus, a, um—Twenty-fingered. Idoneus, a, um—Suitable. Ignobilis, e—Ignoble, strange, unknown. Ignorabilis, e—Overlooked, unknown. Ignotus, a, um—Unknown, strange. Ilicifolius, a, um—Oak-leaved. Illænoides—Like an Illænus. Illibatus, a, um-Unimpaired. Imago—An image, picture, also a sheath. Imbecillus, a, um—Feeble, frail. Imbricarius, a, um-Having imbrications. Imbricato-articulatus, a, um-Having imbricated articulations. Imbricatus, a, um—Laid one on another like tiles, imbricated. Imitator-A resembler. Immaturus, a, um—Immature, abortive. Immersus, a, um—Immersed.

IMP.—ISO.]

Impar—Odd, un Imparilis, e—Di Imperator—A c Implexus, a, un Implicatus, a, un tangled.

Impolitus, a, un Impositus, a, un Impressus, a, un Improcerus, a, i Impudicus, a, u Inæquabilis, e— Inæqualis, e— Inæqualis, e, a, u Inæquicostatus, Inæquilateralis, Inæquilateralis, Inæquistriatus, ated.

Inceptus, a, cipient. Incertus, a, um-Incilis, e—Belo

furrow, or g Incipiens—The Incisivus, a, u cutting or bi

Inciso-lobatus, Incisus, a, um-Inclinatus, a, u Iuclinis, e-Ber Incluspora-Ha Inclusus, a, um Incompletus, a, Incomptus, a, i Inconditus, a, u Inconspicuus, a Inconstans-No Inconsuetus, a, Incrassatus, a, a Increbescens-A Incrustans-Inc Incultus, a, um Incurvus, a, un Indagator—A d Indagatus-End Indentatus, a, u Indentus, a, um Indeterminatus Indolatus, a, un Inelegans-Una Inermis, e-Un Inexpectans-N Infelix-Useles Infernus-Unde Infertus, a, um-Inferus-Below Inflatua, a, um-Inflexus, a, um Informis, e-Sh Infrequens-Ra Infula-A band Infundibularius funnel.

funnel. Infundibuliforn Intundibulum, Ingens-Very la Ingentior-Larg [GOM -IMM.

IMP.-ISO.]

ler. aited. spberical. s. nings.

g to Hercules,

arly girded or

d**inary.** alar-toéd or ir-

larly or differ-

r pores.

gered. ix angles.

ry, shaggy. shagyy. tly, rugged.

le back. lonotus.

stly. spitable. full of humps.

een two spe-

lic. Hymenophyl-

e. r north. m.

t covered with

ith spines.

h-skin. ales. y-fingered.

e, unknown. Inknown. trange.

. so a sheath. ail. imbrications. —Having im-

e on another

e, abortive.

GLOSSARY.

Impar-Odd, unequal, disproportioned. Imparilis, e-Different. Imperator-A commander. Implexus, a, um-Interlaced, interwoven. Implicatus, a, um-Wrapped together, entangled. Impolitus, a, um-Rough, unpolished. Impositus, a, um-Laying over. impressus, a, um-Impressed. Improcerus, a, um-Undersized, not tall. Impudicus, a. um-Shameless, immodest. Inæquabilis, e-Uneven, unequal. Inæqualis, e-Unequal. Inæquatus, a, um-Unequal. Inæquicostatus, a, um—Unequally ribbed. Inæquidactylus, a, um—Unequal-fingered. Inæquilateralis, e-Inequilateral. Inæquiplicatus, a, um-Unequally rayed. Inæquistriatus, a, um -- Unequally striated. Inceptus, a, um-An undertaking, incipient. Incertus, a, um-Uncertain, inconstant. Incilis, e-Belonging to, or like a trench, furrow, or gutter. Incipiens—The beginning. Incisivus, a, um—Having the quality of cutting or biting. Inciso-lobatus, a, um—Cut into lobes. Incisus, a, um—Incised. Inclinatus, a, um-Inclined, bent. Iuclinis, e-Bending. Incluspora-Having inclosed perforations. Inclusus, a, um-Closed up. Incompletus, a, um-Incomplete. Incomptus, a, um-Untrimmed, rough. Inconditus, a, um-Irregular, disordered. Inconspicuus, a, um-Not conspicuous. Inconstans-Not constant. Inconsuetus, a, um-Unusual. Incrassatus, a, um-Tnickened. Increbescens-Abundant. Incrustans-Incrusting. Incultus, a, um-Neglected. Incurvus, a, um-Incurved. Indagator-A diligent hunter. Indagatus-Encircling. Indentatus, a, um-Indented, notched. Indentus, a, um-Indented, notched. Indeterminatus, a, um—Not determined. Indolatus, a, um—Unhewn. Inelegans—Unadorned. Inermis, e-Unarmed. Inexpectans-Not expected. Infelix-Useless, unhappy, miserable. Infernus-Underground, the lower. Infertus, a, um-Filled up. Inferus-Below, underground. Inflatu³, a, um—Spread, swollen, inflated. Inflexus, a, um—Bowed, made crooked. Informis, e-Shapeless, rude. Infrequens-Rare, infrequent. Infula-A band, an ornament. Infundibularius, a, um-Pertaining to a funnel. Infundibuliformis, e-Funnel-shaped. Intundibulum, e-A funnel, hopper. Ingens-Very large, huge, prodigious.

Ingentior-Larger, enormous.

um - Unexpected, Inopinatus, una, thought of. Inops-Poor, friendless, unburied. Inoptatus, a, um-Undesired, not wanted. Inordinatus, a, um-Disordered. Inornatus, a, um—Unadorned. Insculptus, a, um—Engraven, carved. Insectus, a, um-Uncut. Insertivus, a, um—Inserted. e-Marked, naturally remark-Insignis, able. Insignitus, a, um-Marked, clear. Insitus, a, um Tinserted, introduced. Insculptus, a, um-Engraved. Insolens-Unusual, rare. Insolitus. a, um-Rare, hard to find. Insons-Harmless. Inspeciosus, a, um—Not handsome. Insperatus, a, um—Unexp cted. Instabilis, e-Not firm, changing. Insuetus, a, um—Unusual. Insularis, e—Upon an island: Intectus, a, um-Uncovered. Integrifolius, a, um—Whole-leaved. Intercalaris, e—Intercalated. Intercedens-Intervening. Intercellatus, a, um-Being intercellular. Intercostalis, e-Lined between costæ. Intercostatus, a, um - Ridged between ribs. Interlineatus, a, um-Interlined. Intermedius, a, um-Intermediate, the middle. Intermittens-Intermitting, ceasing for a time. Internascens-Growing between. Internodius, a, um-Space between two knots or joints. Interplicatus, a, um—Plicated between. Interruptus, a, um—Broken asunder, interrupted. Intersculptus, a, um-Engraved in the middle. Interscapularis, e-Spaced between the shoulder pieces. Interstinctus, a, um-Divided. Interstrialis, e-Having striæ between. Interstrictus, a, um-Drawn together. Intertextus, a, um-Interwoven, interlaced. Intervesicula-Having little vesicles between. Intextus, a, um-Plaited, woven. Intortus, a, um-Twirled, entangled, curled. Iutralineatus, a, um-Lined, between lines. Inutilis, e-Not useful, very poor, insignificant. Invaginatus, a, um-Invaginated, sheathed, enwrapped. Invalidus, a, um-Weak, feeble. Invenustus, a, um-Unhandsome. Inversus, a, um—Inverted. Investis, e—Unclothed. Involutus, a, um-Involute. Irrasus, a, um-Unpolished, not smooth. Irregularis, e-Irregular. Islandicus, a, um-From an island.

Ischypus, a, um—Strong-footed. Isosceles—Having equal legs.

Is gramma-Equal weight.

lations.

¢

Jaculum—A dart, javelin. Lejunus, a, um—That has not eaten, hungry. Jubatus, a, um—Crested. Latibrachiatus, a, um-Wide-armed. Latibuccatu³, a, um-Wide-cheeked. Laticeps-Broad head. Jucundus, a, um-Pleasant, agreeable, de-Laticosta-Having wide ribs. Laticostatus, a, um—Wide-ribbed. Latidactylus—Wide-fingered. Latidarsatus, a, um—Wide-backed. Latifasciatus, a, um—Wide-bundled, or widelightful. Jugalis, e-Yoked together. Juglans-A walnut. Jugosus, a, um-Full of ridges, mountbanded. ainous. Junceus, a, um-Made of bulrushes, like a bulrush. Junciformis, e-Shaped like a bulrush. Junctus, a, um—Joined, coupled. Juvenis, e—Young. Latior-Wider. Labecula-A little spot. Labiatus, a, um—Lipped. Labiosus, a, um—Full lipped. Labrosus, a, um-Having large lips, bordered. Labyrinthicus, a, um-Labyrinthine. Laceratus, a, um-Torn, mangled, ragged. Lachrymosus, a, um—Full of tears. Laciniatus, a, um—Fringed. Laciniosus, a, um-Full of plaits, jagged, lated. crumpled. Lactuca-Lettuce. Lacunosus, a, um-Full of holes, pitted, Lens-A lentil. uneven. Lacus-A vat, a basin. Lacustris, e-Pertaining to a lake or swamp. Lætus, a, um-Fertile, pleasant, agreeable. Lævicosta-Having a smooth rib. Lævicostatus, a, um-Smooth-ribbed. Læviculus, a, um—Nearly smooth. Lævigatus, a, um—Planed, made smooth. Lævis, e-Smooth. Lepis-A scale Lævissimus, a, um-Very smooth. Lævistriatus, a, um-Having smooth striæ. Læviusculus a, um-Quite smooth. Lagena—A flask. Laguncula—A little flask. Lamellatus, a, um-Having thin plates. Lamellosus, a, um—In very thin plates. Laminatus, a, um—Laminated. Lamnoides—Like Lamna. Lanatus, a, um—Woolly. Lanceolatus, a, um—Spear-shaped. Lancifer, era, erum—Lance-bearer. Lancifolius, a, um—Lance-leaved. Lanosus, a, um—Woolly. Lapideus, a, um—Consisting of stone. (Lapideus, a, um—Consisting of stone. (Lapillus—A little stone, a pebble. Laqueatus, a, um—Arched, vaulted, fluted, paneled. Lima-A file. a little file. Largissimus, a, um-Very large, the largest. Largus, a, um-Plentiful, large. Laricinus, a, um-Resembling the larchtree. Larvatus, a, um-Frightened, masked. Latealatus, a, um-Broad-winged. Lateralis, e-Belonging to the side. Laterarius, a, um-Of or belonging to the sides. Lateriformis, e-Shaped like a lantern.

Latifolius, a, um-Broad-leaved. Latifrons-Having a wide front. Latijuncturus, a, um-Wide-jointed. Latimarginatus, a, um-Broad-margined. Latipes-Broad-footed. Latiradius, a, um—Wide-rayed. Latirspinosus, a, um—Wide-spined. Latissimus, a, um—Very wide, the widest. Latitruncatus, a, um—Broadly truncated. Lativentrus, a, um—Having a wide cavity. Latus, a, um-Broad, wide, large. Latusculum-A little side. Lautus, a, um-Neat, elegant, splendid. Laxatus, a, um-Made wider, extended, di-Laxus, a, um—Loose, slack, spacious. Ledoides—Like Leda. Lenticularis, e—Lens-shaped, lenticular. Lentiformis, e—Lens-shaped. Lentus, a, um—Flexible, pliant, sluggish. Leperditioides—Like Leperditia. Lepidodendrifolius, a, um—Having leaves like Lepidodendron. Lepidorachus, e—Having a scaly ridge. Lepidus, a, um—Pretty. Leptænoides-Dike Leptæna. Leptocephalus, a, um-Slender-headed. Leptodactylus, a, um-Slender-toed. Leptoderma—A thin skin. Leptogaster—A smooth belly. Leptonotus, a, um-Slender-backed. Levatus, a, um-Lifted up. Leviculus, a, um-Very small. Levigatus, a, um-Smooth. Levinodatus, a, um-Having smooth knots. Levis, e-smooth. Lichenoides-Like lichen. Lichenoideus, a, um-Like a lichen. Ligoniformis, e-Like a mattock. Liliiformis, e-Shaped like a lily. Limabrachiatus, a, um-File-armed. Limatulus, a, um-Neat, fine, polished, like Limatus, a, um-Polished, neat, elegant. Limax-A snail, slug. Limbatus, a, um—Bordered. Limiformis, e—Lima-shaped. Limitaris, e—Bounded, limited. Limulurus-Limulus, tail. Lineanodus, a, um-Having lined knots. Linearifolius, a, um—Having linear leaves. Linearis, e—Pertaining to a line, linear. Linearius, a, um-Belonging to lines. Lineatoides-Like *lineatus*, a specific name. Lineatus, a, um-Drawn out, lined. Latiannulatus, a, um-Having wide annu-Lineolatus, a, um-Fine lined.

LIN.-MEL.]

Lineopora-Hav perforations. Lineopunctatus,

line-dotted. Lingualis, e-To

Linguifer, era, er Linguiformis, e-Lingulatus, a, gulate.

Linteum-A nap Lioderma-A sm Liosoma-A smo Liratus, a, um-1 Lithofactor-Stor Litoreus, a, um-Lobatus, a, um-Locellus-A little Loculosus, a, um

places, partiti Lonchitis-Spleen tongue."

Longævus, a, um Longicameratus, Longicaudatus, a, Longicollis-Lon Longicostalis, e-Longidactylus, a, Longidentatus, a, Longifolius, a, un Longipes-Long-Longirostris-Ha Longispinus, a, u Longispira-Havi Longissimus, a, u Longiusculus, a, Longulus, a, um-Longus, a, um—I Loriformis, e—Li Lotoblastus-Loti Lucifugus, a, um-Lunatus, a, um-horned.

Lunulatus, a, um-Luxus, a, um-Di Lycoperdon-Puf Lynx—An anima Lyra—A harp. Lyratifolius, a,

leaves.

Macer, cra, crum Machæriformis, e-Macilentus, a, um M.crocephalus, a, Macrochirus, a, un Macrodactylus, a Macrodentus, a, u Macrolepidotus, a, Macrolineatus, a u Macromphalus, a, bilicus.

Macronotus, a, um Macropetalus, a, leaves.

Macrophorus, a, u Macrophyllus, a, u Macropleura – Hay Macropora – Havin Macrops--Having [JAC .-- LIN.

LIN.-MEL.]

rmed.

ped.

:ked. dled, or wide-

d. t. inted. margined.

, the widest. truncated. wide cavity. ge.

splendid. extended, di-

enticular.

acious.

nt, sluggish. ia. aving leaves

ly ridge.

-headed.

icked.

mooth knots.

ichen. ck. ily.

rmed. polished, like

t, elegant.

۱.

ined knots. linear leaves. ne, linear. o lines. pecific name. lined. Lineopora-Having line-pores, lined with perforations. Lineopunctatus, a, um-Line-punctured or line-dotted. Lingualis, e-Tongue-shaped. Linguifer, era, erum—Tongue-bearing. Linguiformis, e—Tongue shaped. Lingulatus, a, um-Tongue-shaped, lingulate. Linteum-A napkin, girdle. Lioderma-A smooth skin. Liosoma-A smooth body. Liratus, a, um-Furrowed. Lithofactor-Stone-maker. Litoreus, a, um—On the shore or sea-side. Lobatus, a, um—Lobed. Locellus—A little purse or bag. Loculosus, a, um -- Full of holes or distinct places, partitioned. Lonchitis-Spleenwort, the fern "Adders-tongue." Longævus, a, um-Ancient, aged. Longicameratus, a, um-Long chambered. Longicaudatus, a, um-Long-tailed. Longicollis-Long-ridged. Longicostalis, e-Long-ribbed. Longidactylus, a, um-Long-fingered. Longidentatus, a, um-Long-toothed. Longifolius, a, um-Long-leaved. Longipes-Long-foo ed. Longirostris-Having a long proboscis. Longispinus, a, um—Long spined. Longispira—Having a long spire. Longissimus, a, um-Very long, the longest. Longiusculus, a, um-Rather long. Longulus, a, um-Rather long. Longus, a, um-Long. Loriformis, e-Like a thong or whip. Lotoblastus-Lotus bud. Lucifugus, a, um-Light-shunning. Lunatus, a, um-Made like a half-moon, horned. Lunulatus, a, um-Crescentiform. Luxus, a, um—Dislocated. Lycoperdon—Puff-ball shaped. Lynx-An animal called a lynx. Lyra-A harp. Lyratifolius, a, um-Having lyre shaped leaves. Macer, cra, crum-Lean, meager. Machæriformis, e-Sword shaped. Macilentus, a, um-Meager, thin, lean. M.crocephalus, a, um-Long-headed. Macrochirus, a, um-Long handed. Macrodactylus, a um-Long-fingered. Macrodentus, a, um-Long-toothed. Macrolepidotus, a, um-Having long scales. Macrolineatus, a um-Long-lined. Macromphalus, a, um-Having a large umbilicus. Macronotus, a, um--Long known. Macropetalus, a, um-Having long flower leaves. Macrophorus, a, um-Long-bearing. Macrophyllus, a, um-Long-leaved. Macropleura-Having long sides. Macropora-Having long porcs.

Macrops--Having large eyes.

GLOSSARY.

finned

Macropthalmus, a, um--Long-eyed. Macrospira-Having a long spire. Macrospondylus, a, um-Having long vertebræ. Macrostomus, a, um-Having a long mouth. Macrostriatus, a, um--Having long striæ. Macrostylus, a, um-Having long spines or columns. Macrothyris-Having a long foramen. Macrurus, a, um--Long-tailed. Mactriformis, e-Shaped like Mactra. Mactroides-Like Mactra. Maculatus, a um-Spotted, speckled. Maculosus, a, um-Full of spots, spotted. Magister-A chief, master. Magnicornis, e-Large-horned. Magnicostatus, a, um-Large-ribbed. Magnificus, a, um-Magnificent, stately. Magnifolius, a, um-Large-leaved. Magnisulcatus, a, um- Deep-furrowed. Magniventrus, a. um—Large-bellied. Magnoliiformis, e—Shaped like magnolia. Magnus, a. um—Great, large. Major-Greater, larger. Majus, a, um-Greater, larger. Malvaceus, a, um-Like or pertaining to mallows. Mamillanus, a, um—Swelling, protuberant. Mammatus, a, um—Covered with protuberances. Mammiferus, a, um-Teat or nipple bearing. Mammillaris, e-Mammillated. Mammillatus, a, um-Covered with nipples. Maniformis, e-Hand-like. Manticula-A little wallet. Manus-A hand. Marcidus, a, um-Hanging, flagging, withered Marginalis, e—Marginal. Marginatus, a, um—That has a border, broad rim, or margin. Marginicinctus, a, um-Having a banded margin. Marinus, a, um-Inhabiting the sea. Maritimus, a, um-Of or belonging to the 828 Masculus, a, um-Stout, hardy, masculine. Materiarius, a, um-Of or belonging to timber. Maturus, a, um-Ripe, mature. Matutinus, a, um-In the morning. Maximus, a, um—Greatest, largest. Medialis, e—Middle. Medianus, a, um-Middle. Mediocris, e-Middling, ordinary. Medius, a, um-Middle, ordinary. Medullaris, e-In the marrow or middle part, like a pith. Megacephalus, a, um-Large-headed. Megalops-Having large eyes. Megambonatus, a, um-Having a great umbo. Megambonus, a, um—Having a large umbo. Megastomus, a um—Having a large mouth. Megastylus, a, um—Having large spines. Megistus, a, um—Very large.

Macropterus, a, um--Long-winged, or large-

Melaniiformis, e-Shaped like Melania.

Melanioides-Like Melania. Meliniformis, e-Purse-+h ped. Melo-An apple-shaped melon. Melonicus, s, um-Like a small melon. Melonoides—Like a melon. Membranaceus, a, um-Like a parchment, skinny. Meniscus, a, um—A crescent-shaped body. Merianopteroides—Like Merianopteris. Meristoides-Like Merista. Mesacosta—Having middle ribs. Mesacostalis, e—Middle-ribbed. Mesambonatus, a, um-Having a middle umbo. Mesastrialis, e-Middle striated. Mesalsialis, e-Middle parted. Mesolobus-Having a middle lobe. Meta-Any thing in a conical form. Metallicus, a, um-Metallic. Metula-A little butt or small pyramid. Mica-A crumb or little thing. Micans-Stretching out, glittering Microbasalis, e-Having a small base. Microcarpus, a, um-Small fruited. Microdentus, a, um-Small-tooth+d. Microlobus, a, um—Having small teeth. Microlobus, a, um—Small-lobed. Micronema—A small thread. Microphorus, a, um—Small-bearing. Microphyllus a, um—Small-leaved. Micropleura—Having a small rib. Micropterus, a, um-Small-winged. Microptalmus, a, um—Small-vytd. Micropus—Small foot. Microscopicus, a, um—Microscopic. Microstigma—Small dot. Microstylus-Small spile or pale. Micrurus, a, um-Small-tailed. Micula-A little crumb or grain. Millebrachiatus, a, um—Many-armed. Milleporaceus, a, um—Having innumt rable pores. Millepunctatus, a, um—Many-dotted. Mimicus, a, um—Mimic. Minimus, a, um-The least or smallest. Minor-Less, smaller. Minuens-Diminishing, making less. Minus, a, um-Less. Minusculus, a, um-Rather less, rather small. Minutisectus, a, um-Finely marked or divided. Minutissimus, a, um-Very minute. Minutulus, a, um-Very small. Minutus, a, um-Diminished, small, minute. Mirabilis, e-Extraordinary, wonderful, strange. Mirus, a, um-Wonderful, astonishing, ex-traordinary. Miser, era, erum-Wretched, unfortunate. Mitella-A head-band, a kind of turban. Mithrax-A precious stone. Mitigatus, a, um—Tamed, civilized, softened. Mitis, e—Ripe, flexible, placid. Mitra-A head-band, turban. Mixtus, a, um-Mixed. Modestus, a, um-Moderate, modest.

measure. Modioliformis, e-Like a small measure. Modulatus, a, um-Symmetrical, well-proportioned. Modulus—A small measure. Molaris, e—Pertaining to grinding. Molestus, a, um-Troublesome, difficult. Mollis, e-Flexible, delicate, effeminate. Moniliferus, a, um-Bead-bearing. Moniliformis, e-Like a necklace. Monostigma Single dot. Monstruosus, a, um-Strange, monstrous. Monticola-A dweller in the mountains. Monticuliferus, a, um-Little mountainbearing. Monticulus-A small mountain. Morbillianus, a, um—Measly, spotted. Mordax—Biting, given to biting. Morsum—That which is bitten off. Mortifer, era, erum—Deadly. Mucro-A sharp point or edge. Mucronatus, a, um-Pointed. Mucrospinus, a, um-Sharp-spined. Multattenuatus, a, um-Much attenuated. Multibrachiatus, a, um—Many-armed. Multicalicatus, a, um—Much plastered. Multicameratus, a, um-Many-chambered. Multicarinatus, a, um-Many-keeled. Multicaulis, e-Many-stalked. Multicinctus, a, um-Many-girded or banded. Multicornis, e-Many-horned. Multicostatus, a, um—Many-ribbed. Multicosta—Having many ribs. Multifasciatus, a, um--Many-bundled. Multigranosus, a, um-Many-grained. Multigrumus, a, um—Much heaped up. Multilamella—Having many thin plates. Multilamellosus, a, um-Having many lamellæ. Multilineatus, a, um—Many-lined. Multiliratus, a, um—Many-furrowed. Multinodosus, a, um-Many-noded. Multinotatus, a, um-Having many marks or tracks. Multiplicatus, a, um-Many-folded. Multipora-Having many pores. Multiporatus, a, um-Having many pores or openings. Multipunctatus, a, um-Many dotted or punctured. Multiradiatus, a, um-Many-rayed. Multiramosus, a, um - Having many branches. Multisectus, a, um-Having many divisions or divided folds. Multisegmentatus, a, um-Having many segments. Multiseptus, a, um-Having many divisions. Multiseriatus, a, um-Having many rows or series. Multisinuatus, a, um-Many-furrowed. Multispinosus, a, um—Many-spined. Multistriatus, a, um—Many-striated. Multituberculatus, a, um—Haying many tub+ rcles.

Modiolaris, e-Like Modiola, or a small

Mu'titubulatus, a, um—Having many pipes. Multivolvis, e—Many whorled or rolled. MUM.—OCU.]

Mummiformis, e Mundus, a, um-Mundulus, a, um Muralis, e-Of or Muricatus, a, un pointed.

Musculosus, a, un Mutabilis, e—Inc Mutatus, a, um—D Mutus, a, um—D Myriophyllus, a, u Myrimecophorus, Mytiliformis, e—I Mytilimeris, e—P Mytiloides—Like

Nacrea-Iridesce Nactus, a, um-O Naiadiformis, e-Nanus-A dwarf. Nassa-A net, we Nassula-A little Nasutus, a, um-Natalis, e-Native Natator-A swimt Naticoides-Like Nautiloides-Like Navalis, e—Of or Navicella—A sma Naviformis, e-Sh Navigiolum-A lit Nebulosus, a, um-Necis-Death. Neglectus, a, um-Nervatus, a, m-F Nervosus, a, um-Neuropteroideus, teris. Nexilis, e-Knit, t twining. Nexus, a, um—Lin Nitela—Brightness Nitens-Shining, 1 Nitidulus, a, umtrim. Nitidus, a, um-N Nobilis, e-Famou

Nobilissimus, a, un Nodocarinatus, a, un Nodocostatus, a, un Nodocostatus, a, un Nodocosta—Havin Nodootratus, a, un Nodomarginatus, a, un Nodostriatus, a, um-K Nodostriatus, a, um-K Nodulatus, a. um-Noduliferus, a, um Nodulatus, a, um-Noduliferus, a, um

Nodulosus, a, umknots.

Normalis, e-Made Notabilis, e-notew traordinary.

Notans-Noting, m Notatus, a, um-M dotted. MEL.-MUL.

or a small

l measure. cal, well-pro-

ding e, difficult. ffeminate. ring. ace.

monstrous. nountains. le mountain-

in. spotted. ng. n off.

e. pined. attenuated. v-armed. plastered. -chambered. -keeled.

ny-girded or

ibbed.

bundled. -grained. leaped up. thin plates. ving many la-

lined. rrowed. noded. ; many marks

olded. res. g many pores

ny dotted or

raved. laving many

nany divisions

Having many

nany divisions. many rows or

-furrowed. -spined. striated. Having many

ng many pipes.

Mummiformis, e-Resembling a mummy. Mundus, a, um-Neat, trim, delicate. Mundulus, a, um-Neat, trim, delicate. Muralis, e-Of or belonging to a wall. Muricatus, a, um-Full of sharp points,

MUM.-OCU.]

GLOSSARY.

pointed. Musculosus, a, um—Full of muscles. Mutabilis, e—Inconstant, variable. Mutatus, a. um-Altered, changed. Mutus, a, um-Dumb, si ent. Myriophyllus, a, um-Many-leaved. Myrinecophorus, a, tim Many-leaved. Myrinecophorus, a, tim, wart-bearing. Mytiliformis, e—Like Mytilus. Mytilimeris, e—Pertaining to Mytilus. Mytiloides-Like Mytilus.

Nacrea-Iridescent, like mother-of-pearl. Nactus, a, um-Obtained, stumbled upon. Naiadiformis, e-Like a water-nymph. Nanus-A dwarf. Nassa-A net, weel, wicker-basket. Nassula-A little bag-net. Nasutus, a, um—Large-nosed. Natalis, e—Native, produced, natural. Natator-A swimmer. Naticoides-Like Natica Nautiloides-Like Nautilus. Navalis, e—Of or belonging to ships, naval. Navicella—A small vessel. Naviformis, e-Ship-formed. Navigiolum-A little boat. Nebulosus, a, um-Full of mist, hazy Necis-Death. Neglectus, a, um-Neglected, overlooked Nervatus, a, m-Full of nerves or fibers. Nervosus, a. um-Full of fibers, sinewy. Neuropteroideus, a, um - Like Neuropteris. Nexilis, e-Knit, tied or wreathed together, twining. Nexus, a, um-Linked together, interlaced. Nitela-Brightness, splendor. Nitens-Shining, neat, beautiful. Nitidulus, a, um-Somewhat spruce, rather trim. Nitidus, a, um-Neat, shining, polished. Nobilis, e-Famous, celebrated, noble. Nobilissimus, a, um-Most celebrated. Nodobrachiatus, a, um-Knotty-armed. Nodocarinatus, a, um-Knotty-keeled. Nodocostatus, a, um-Knotty-ribbed. Nodocosta-Having knotty-ribs. Nododorsatus, a, um-Knotty-backed. Nodomarginatus, a, um-Knotty-margined. Nodosarius, a, um-Knotty. Nodostriatus, a, um-Having knotty striæ. Nodosus, a, um-Knotty, full of knots.

Nodulatus, a. um-Knotted. Noduliferus, a, um-Knot or node bearing. Nodulostriatus, a, um-Having small knotty striæ. Nodulosus, a, um-Full of little nodes or

knots. Normalis, e-Made by the square or rule.

Notabilis, e-noteworthy, remarkable, extraordinary.

Notans-Noting, marking.

Notatus, a, um-Marked, branded, noted, dotted.

Notus, a, um-Well known, notorious. Nuciformis, e-Nut-shaped. Nucleatus, a, um-Deprived of the kernel. stoned. Nucleiformis, e-Kernel-shaped. Nucleolatus, a, um—Like a little nut. Nucleus—A kernel, nut. Nuculiformis, e-Shaped like Nucula. Nuculoides-Like Nucula. Nudus, a, um-Naked, uncovered, empty, alone Numerosus, a. um-Numerous, manifold. Nummifer, era, erum-Coin or disk bearing. Nummiformis, e-Coin-shaped. Nummularius, a, um-Of or pertaining to money Nummularis, e-Like a little coin. Nuntius-A messenger. Nuperus, a, um-Late, newly come or taken, recent. Nuptialis, e-Nuptial. Nutans-Nodding, bending backward and forward. Nutrix-A nurse, the breast or pap. Nux-A nut. Nymphalis, e-Of or belonging to a fountain. Obcordatus, a, um-Inversely heart shap d. Obesus, a, um—Fat, plump, swollen. Oblatus, a, um—Showing, exhibiting. Obliquatus, a, um-Bent, oblique. Obliquinodus-Oblique-knot. Obliquus, a, um-Oblique, sidewise. Oblongifolius, a, um-Oblong-leaved. Oblongus, a, um-Rather long, oblong. Obmaximus, a, um-Large in from Obyvramidalis, e. Inversely ovate. Obyvramidalis, e. Inversely pyramidal. Obscurus, a, um-Hidden, not understood, obscure. Obsolescens-Grown old. Obsoletus, a, um—Antiquatéd, obsolete. Obtectus, a, um—Covered, disguised. Obtusidens—Blunt-toothed.

Nothus, a, um-Spurious, not genuine, of mixed breed.

Obtusifolius, a, um-Obtuse-leaved. Obtusilobus, a, um—Obtuse-lobed. Obtusiplicatus, a, um—Obtuse-plaited. Obtusispira-Having a blunt spire. Obtusus, a, um-Blunted, obtuse. Obuncus, a, um-Bent in, hooked. Obvius, a, um-Meeting, laying open, exposed. Occasus, a, um-Crushed, stricken to the ground. Occidaneus, a, um-Western. Occidens-The west, western. Occidentalis, e-Western. Oceanus, a, um-Of or belonging to the

ocean. Ocellatus, a, um—Having little eyes. Octobrachiatus, a, um—Eight-armed. Octocostatus, a, um-Eight-ribbed. Octonar us, a, um-Of the number eight.

Octonotatus, a, um-Having eight marks or tracks. Ocula'us, s, um-Having eyes.

Oculinus, a, am-Like an eye. Odontopteroides—Like Odontopteris. Offula—A small piece. Oliviformis, e-Shaped like an olive. Oligospiratus, a, um-Having few whorls. Olla—A pot. Ollicula—A little pot. Omphaloides—Like a navel or boss. Onustus, a, um-Filled, loaded, burdened. Ophioglossoides-Like Ophioglossus. Opimus, a, um-Fertile, fruitful, fat, large, plump. Oppletus, a, um-Filled. Oppositus, a, um—Opposite, placed before. Optatus, a, um—Wished, desired, longed for. Opusculum-A little fabric. Orbicaudatus, a, um-Having a circular Orbicella-A little circle. Orbicularis, e-Circular, orbicular. Orbiculatus, a, um-Of a round or circular form, orbiculate. Orbiculostoma-Having a circular mouth. Orbipora-Having round pores. Ordinatus, a, um-Set in order, regular. ranged in rows. Oreopteroides-Like Oreopteris. Organum-An instrument, implement, or pipe. Oriens-Rising, beginning. Orientalis, e-Eastern. Originarius, a, um-Original. Ornatissimus, a, um-Very ornate, highly adorned. Ornatus, a, um-Adorned, embellished. Ornigranulus, a, um—Having granules. Ornithicnoides—Like bird-tracks. Orthambonites—Having a straight umbo. Orthidoideus, a, um-Like Orthis. Orthonotus, a, um-Straight-backed. Osculum-A pretty little mouth. Ostiolatus, a, um-Having small openings. Ovalis, e-Oval, egg-shaped. Ovatifolius, a, um—Ovate-leaved. Ovatifolius, a, um—Ovate-leaved. Ovatipora—Ha ving oval pores. Ovatus, a, um—Shaped like an egg, ovate. Ovidos—The musk ox. Ovidactylus-Having ovate toes. Oviformis, e-Egg-shaped. Ovoidactylus-Having ovoid toes. Ovoides—Having an egg shape, ovoid. Ovoideus, a, nm—Having a form like an egg, ovoid. Pabulocrinus - Crinoid-food. word founded on the erroneous opinion that crinoids lived on Gasteropoda. Pacator—A peace-maker. Pachycl irus—Having a thick hand. Pachydactylus, a, um—Having thick fingers or thick toes. Pachyderma-A thick skin. Pachynervis, e-Having thick veins or

thick nerves. Pachypteroides—Like Pachypteris. Pachytesta—Having a thick shell. Palæotrochus-Ancient Trochus. Paliformis, e-Shosel-like or støke-like.

Palmatus, s, um-Marked with the palm of a hand, palmate. Palmipes—Broad-footed. Palpebra—The cyclid. Paludiniformis, e-Shaped like Paludina. Palum-A pale, stake. Pandatus, a, um-Bent, bowed down in the middle. Pandoriformis, e-Shaped like Pandora. Pandonormis, e-Shaped nice radiona. Pandus, a, um-Bent, crooked, curved. Panicum-A grain, panic-grass. Panneus, a, um-Ragged, tattered. Pannosus, a, um-Full of rags, ragged. Papilioniformis, e-Shaped like a butterfly. Papillatus, a, um-Bud-shaped, covered with papilli. Papillosus, a, um-Full of buds, verrucose. Papulatus, a, um-Covered with nipples. warty. Papulosus a, um-Full of pimples. Paradoxicus, a, um-Paradoxical. Paradoxus, a, um-Strange, contrary to received opinions. Paralius, a, um-That grows by the seaside. Parallelus, a, um--Parallel. Parallelodontus, a, um-Having parallel teeth. Parasiticus, a, um—Parasitic. Paridens—Having equal teeth. Parilis, e-Equal, like, proportionate. Partitus, a, um-Proportionably divided. Parvibrachiatus, a, um-Small-armed. Parvinodus—Having a small knot. Parvirostris—Having a little beak. Parvispira—Having a small spire. Parvituba—Having a small tube. Parviusculus, a, um-Quite small. Parvulipora-Having small pores. Parvulus, a, um-Very small. Parvus, a, um-Small, narrow, short, little. Patellarius, a, um--Belonging to a plate, plated. Patellifer, a, um-Dish-bearer. Patelliformis, e- Dish-shaped. Patens-Open, wide, extending, spreading, Paternus, a, um--Paternal. Patulus, a, um-Standing open or opened. wide, large. Paucicristatus, a, um-Few-crested. Paucidactylus, a, um-Few-fingered. Paucinodus, a, um-Having few nodes. Pauciradiatus, a, um-Few-rayed. Pauciramus, a, um—Having few branches. Pauciseptus, a, um—Having few septa. Pauper-Poor, small, impoverished Pauperatus, a, um-Poor, impoverished. Pauperculus, a, um-Poor Pectenitormis, e-Shaped like a Pecten. Pectenoideus, a, um-Like a Pecten. Pectinaceus, a, um-Ot or belonging to a comb, or to the Pecten. Pectinatus, a, um-Sloping two ways like a comb. Pectinellus, a, um-Like a little comb. Pectiniferus, a, um-Comb-bearing. Pectunculoides-Like Pectunculus. Peculiaris, e-Peculiar, remarkable, singu'ar.

Palmatifilus, a, um-Divided like a hand.

PED.-PIS.]

Peduncularis, efoot.

Pedunculatus, a, Pelagicus, a, um-Pellicula-A sms Pellucidus, a, um Peloris-A shell Peltatus, a, um-Peltigerus, a, um Pendens-Hangin Pendulus, a, um-

pendulous. Penetrans-Pierc Penicilliformis, e Penicillus-A pa Pennatus, a, um-Pennatulus, a, un Penniformis, e-1 Pentadactylus, a, Pentagonus, a, ut Pentalobus, a, un Pentaspinus, a, u Peracutus, a, um Peramplus, a, um Perangulatus, a, Perannulatus, a,

annular. Perantiquus, a. u Perarctus, a, un

slender. Perasper, a, um-Perattenuatus, a

drawn out. Percarinatus, a. u

Percingulatus, a, lines, many-gi Perdentatus, a, ui Peregrinus, a, um Perelegans-Very Perextensus, a. u Perforator-A bor Perforatus, a, um Perfossulatus, a,

ditches.

Pergibbosus, a, ui Pergracilis, e-Ve Perhumerosus, a

shoulders. Perinflatus, a, u

len. Periprion-A rout

Perizomatus, a, ui Perlamellosus, a, ing very thin p

Perlatus, a, um-Permarginatus, a, Permultus, a, um-Pernasutus, a, um Perniformis, e-Sl Pernodosus, a, um Perobliquus, a, un Peroblongus, a, ui Peroccidens-From Perovalis, e-Rath Perovatus, a, um

round. Perparvus, a, um-Perplanus, a, um-

644

tail.

Oculiferus, a, um-Eye-bearing.

OCU -PEC

like a hand. th the palm of

ce Paludina

d down in the

e Pandora. d, curved. 18. tered. s, ragged. ke a butterfly. ped, covered

ads, verrucose. with nipples,

mples. ical. contrary to re-

s by the sea-

aving parallel

rtionate. bly divided. ill-armed. knot. beak. spire. tube. small. pores. 1. w, short, little. ng to a plate, er. d. ing, spreading. en or opened, crested. fingered. few nodes. rayed. r few branches. few septa. erished. poverished. ke a Pecten. a Pecten.

belonging to a

two ways like

ittle comb. bearing. nculus. rkable, singu'ar. PED.-PIS.]

GLOSSARY.

Peduncularis, e-Of or belonging to a little | Perplexus, a, um--Confused, entangled, foot. Pedunculatus, a, um-Little-footed. Pelagicus, a, um-Belonging to the sea. Pellicula-A small skin or hide. Pellucidus, a, um-Clear, transparent. Peloris-A shell fish. Peltatus, a, um-Armed with shields. Peltigerus, a, um-Shield-bearing. Pendens—Hanging, depending. Pendulus, a, um—Hanging down, pendent, pendulous. Penetrans—Piercing, penetrating. Penicilliformis, e—Brush or pencil-shaped. Penicillus-A painter's brush or pencil. Pennatus, a, um—Winged, feathered. Pennatulus, a, um—Provided with wings. Penniformis, e-Feather-shaped. Pentadactylus, a, um—Five-fingered. Pentagonus, a, um—Pentagonal. Pentalobus, a, um-Five-lobed. Pentaspinus, a, um—Five-spined. Peracutus, a, um—Very sharp, very acute. Peramplus, a, um-Very large. Perangulatus, a, um-Very angular. Perannulatus, a, um-Many-ringed, very annular. Perantiquus, a, um-Very ancient. Perarctus, a, um-Very close, small, or slender. Perasper, a, um-Very rough. Perattenuatus, a, um-Very attenuated, drawn out. Percarinatus, a, um-Very strongly keeled. Percingulatus, a, um-Encircled with many lines, many-girded. Perdentatus, a, um-Many-toothed. Peregrinus, a, um-Strange, foreign. Perelegans—Very neat, very elegant. Perextensus, a, um--Very much extended. Perforator-A borer through. Perforatus, a, um-Bored through. Perfossulatus, a, um--Having many little ditches. Pergibbosus, a, um-Very gibbous. Pergracilis, e-Very slender. Perhumerosus, a, um - Having angular shoulders. Perinflatus, a, um-Much inflated, swollen. Periprion-A round saw. Perizomatus, a, um-Girdled, banded. Perlamellosus, a, um-Very lamellose, having very thin plates. Perlatus, a, um-Very wide. Permarginatus, a, um-Large-bordered. Permultus, a, um--Very many. Pernasutus, a, um-Very nasute. Perniformis, e--Shaped like a Perna. Pernodosus, a, um--Very nodose, knotty. Perobliquus, a, um--Very oblique. Peroblongus, a, um-Somewhat oblong. Peroccidens-From the far West. Perornatus, a, um—Very ornate. Perovalis, e—Rather oval. Perovatus, a, um--Very ovate, or nearly round. Perparvus, a, um--Very small. Perplanus, a, um--Very plain.

intricate. Perplicatus, a, um--Interlaced, entangled, many-folded. Perpusillus, a. um-Verv small. Perrostellatus, a, um-Having a very little beak. Persicaria – A genus of plants. Persimilis, e–Very similar. Persinuatus, a, um-Very sinuate or channeled. Personatus, a, um-Masked, assumed, disguised. Persiphonatus, a, um-Having a large siphuncle. Perspectivus, a, um—Thoroughly viewed. Perspicator—Sharp-sighted. Perspinulatus, a, um-Having many little thorns or spines. Perstrialis, e-Having many striæ. Perstriatus, a, um-Very much striated. Persulcatus, a, um-Very much furrowed. Pertenuis, e-Very thin, small, or fine. Pertextus, a, um-Interwoven. Pertinax-That holds fast, clings to. Perumbonatus, a, um-Having a very convex umbo. Perumbrosus, a, um-Very shady. Perundatus, a, um-Very wavy. Perundulatus, a, um-Very wavy. Perversus, a, um-Turned around. Pervetus, a, um-Very old. Pervetustus, a, um-Very old. Pervicax-Immovable, stern. Pervolutus, a, um-Very much rolled. Pescapreoli-Having a stock supported by a small tendril. Pescervæ-Having deer-feet. Pesovis - Having sheep-feet. Petasiformis, e—Cap-shaped. Petechialis, e—Spotted. Petilus, a, um—Thin, slender. Petrifactor-Stone-maker. Petrodoides-Like Petrodus. Pexatus, a, um-Clothed in a garment with a nap on it. Pharovicinus, a, um—Near the light-house. Phaseolus—A kidney-bean. Phaseolinus—Like a bean. Phlyctainodes-Pimply, pustulous. Phoca-A seal, sea-dog. Pholadiformis, e-Like Pholas. Pholadis-Like a Pholas. Phragmoceras-Partitioned horn. Phycoides-Like sea-weed. Piger, gra, grum-Sluggish. Pileatus, a, um—Covered with a cap. Pileiformis, e—Cap-shaped. Pileolus-A skull-cap, a little cap. Pileolum-A little cap. Pileus-A cap or hat. Pilosus, a, um-Hairy, shaggy. Pinaster-A wild pine. Pinguis. e-Fat, plump, fertile. Pinnatifidus-Having cleft pinnæ. Pinnatus, a, um-Feathered, plumed, winged.

Pinniformis, e-Like Pinna.

Piscator-A fisher.

GLOSSARY.

a,

Pisiformis, e-Pea-shaped. Pistilliformis, e-In the form of a pestle. Pistillus-A pounder, pestle. Pisum—A pea. Placenta—A cake. Placenta—A cake. Placidus, a, um—Placid, smooth. Plagosus, a, um—Full of wounds or stripes. Planiceps—Flat-headed. Planicosta—Having flat ribs. Planidorsalis, e-Flat or smooth-backed. Planidorsatus, a, um-Flat or smoothbacked. Planifrons—Having a plane front. Planimarginatus, a, um—Flatmargined. Planiramosus, a, um—Having flat branches. Planirostris—Having a smooth beak. Planispira—Having a flat spire. Planistria—Having flat striæ. Planistriatus, a um-Having flat striæ. Planobasalis, e-Having a flat base. Planobrachiatus, a, um-Smooth-armed. Planoconvexus, a, um-Flat, convex. Planocostatus, a, um-Flat-ribbed. Planodiscus-Flat disk. Planodorsalis, e-Smooth or flat-backed. Planodorsatus, a, um-Having a smooth or flat back. Planogyratus, a, um-Flat-whorled. Planorbiformis, e-Like Planorbis. Planosulcatus, a, um-Plane-furrowed. Planovolvis, e-Flat-whorled. Planulatus, a, um-Rather flat. Planumbonus, a, um-Having a smooth umbo. Planus, a, um-even, level, flat, plane. Platymarginatus, a, um-Flat-margined. Platybasis-Having a flat base. Platycephalus—Having a flat head. Platynervis, e—Flat-nerved. Platynotus—Having a flat ridge or back. Platypleurus-Having flat sides. Platypus—Broad-footed. Platyrachis—Having a flat rachis. Platys-Broad. Platystigma-Having flat scars, dots, or pits. Platystomus, a, um-Having a broad mouth. Plebeiformis, e-Like a plebeian. Plebeius, a, um-Common. Pleiopleura—Having wide ribs. Plenissimus, a, um—The largest. Plenus, a, um—Full, plump. Pleurexanthemus-Having the pleura extending out. Pleurites—The side, lateral. Pleurodictyoides—Like Pleurodictyum. Pleuropistha—Having the side behind. Pleuroptera—Having side wings. Pleuropteryx-Having side wings. Pleurovimineus, a, um-Having side wickerwork. Plicatellus, a, um—Having small folds. Plicatilis, e—That may be folded, flexible. Plicatulus, a, um—Having little plications or folds. Plicatus, a, um—Plaited, folded. Pliciferus, a, um—Fold-bearing or plaited. Plicomphalus-Folded in the middle. Pluma-A small feather.

Plumarius, um-Embroidered with feathers. Plumosus, a, um—Full of feathers, feathery Plumula—A little feather Plumulosus, a, um-Full of feathers. Pluriradialis, e-Many-rayed. Pocillatus, a, um-Little-cupped. Pocilliformis, e-Cup-shaped. Pocillum-A little cup. Poculum—A cup, bowl, or goblet. Pogonias—A kind of comet. Politus, a, um-Polished, smoothed. Polydoctylus, a, um—Having many angles, polygonias, a, um—Having many angles, polygonal. Polygyratus, a, um—Many coiled or whorled. Polymorphus, a, um—Many-formed. Polyphyllus, a, um—Many-leaved. Polypleurus, a, um—Having many ribs. Polysporus—Having many spores. Polystomellus, a, um—Having many little months. Ponderosus, a, um—Heavy, ponderous. Ponticulus—A little bridge. Porcatus, a, um—Fall of pores. Porrectus, a, um—Fall of pores. spread out. Posticus, a, um—Posterior. Postremus, a, um—The last, hindmost, worst Poststriatus, a, um-Having a striated posterior. Potens-Powerful. Poterium—A° drinking vessel, a cup. Præcedens—Going before, surpassing. Præciptus, a, um—Anticipated, going before. Præcursor-A forerunner. Prælongus, a, um-Very long. Præmaturus, a, um-Very early, untimely premature. Præmorsus, a, um-Bitten off, jagged. Prænuntius, a, um-That foretells, or forebodes. Præumbonus, a, um-Very protuberant. Prateriformis, e-Prateriform. Pravus, a, um-Crooked, deformed, distorted. Preciosus, a, um-Precious, splendid. Precius, a, um-That brings forth ripe grapes before other vines. Pressulus, a, um-Somewhat pressed in, compressed. Pressus, a, um-Pressed. Pretiosus, a, um-Precious, valuable. Primaevus, a, um-Primeval. Primarius, a, um-One of the first, remarkable, principal. Primigenius, a, um-First of its kind, original, primitive. Primitivus, a, um-First of its kind, primitive. Primordialis, e-Primordial, original, first of all. Princeps—The first, chief, original, principal. Principalis, e-First, original, principal.

Priscus, a, um-Ancient, old.

Procerus, a, um Proclivis, e-Sle Productus, a, un Profundus, a, u Projectus, a, un Prolatus, a, um enlarged. Prolificus, a, un Prolifer, era, e fruitful. Prolixus, a, um broad. Prolongatus, a, 1 Prolongus, a, t out. Prominulus, a. rather promi Promissus, a, un forth. Pronis, e-Bent ward. Pronus, a, uminclined. Propinquus, a, lated to. Proporoides-Lil Proprius, a, um-Prora—The prow Proteiformis, e— Protensus, a, um Protextus, a, um Protuberans—Pro

PRI.-RAD.]

Pristiniformis,

Pristinus, a, un Pristis—Any se

Problematicus, settled, unce Proboscidialis,

Proboscidiatus,

Proximus, a, um-Pseudogaleatus-Pseudolineatus, a Pseudo-marginal Pseudomurrayan anus, Pseudosagittatus

Psilophlœus-Ha Pterineiformis, e-Pterocephalus-H Pteroides-Wing-Pterotus, a, um-Pudicus, a, um-S Pugiunculus-A si Pugnax-War-like Pugnus-A fist, a Pulcellus, a, um-Pulchellus, a, um

what beautiful. Pulcher, a, um-B Pulex—A flea. Pulicaris—Like a f Pulmoneus, a, um Pumilus, a, um little.

Punctatus, a, um-Punctiferus, a, um Punctifrons-Dotte Punctillatus, a, um Punctipora-Havin PIS.-PRI.

PRI.-RAD.]

idered with

hers, feathery

athers.

ed.

blet.

othed. ngered. many angles,

ed or whorled. ormed. aved. nany ribs. ores. g many little

onderous.

owed.

stretched, or

st, hindmost,

striated pos-

a cup. assing. ed. going be-

rly, untimely f, jagged. etells, or foreotuberant. eformed, displendid. gs forth ripe t pressed in, aluable. e first, remarkof its kind, ts kind, primi-

original, first

inal, principal. , principal.

Pristiniformis, e—An ancient form. Pristinus, a, um—Primitive, early. Pristis-Any sea monster or saw-fish.

Problematicus, a, um-Problematical, unsettled, uncertain. Proboscidialis, e—Having a proboscis. Proboscidiatus, a, um—Having a proboscis. Procerus, a, um—High, tall. Proclivis, e-Sloping, steep. Productus, a, um-Drawn out, produced. Profundus, a, um—Deep, profound. Projectus, a, um—Thrown out, projected. Prolatus, a, um-Brought forth, extended, enlarged. Prolificus, a, um-Prolific, fruitful. Prolifer, era, erum-Prolific, productive, fruitful. Prolixus, a, um-Stretched far out, long, broad. Prolongatus, a, um-Prolonged. Prolongus, a, um - Prolonged, stretched out. Prominulus, a, um-Projecting a little, rather prominent. Promissus, a, um-Hanging down, putting forth. Pronis, e-Bent forward, inclined down-

ward. Pronus, a, um-Turned forward, bent or

inclined. Propinquus, a, um-Near, hard by, related to.

Proporoides-Like Propora. Proprius, a, um—Peculiar, proper. Prora—The prow of a ship. Proteiformis, e-Having many shapes. Protensus, a, um-Stretched out.

Protextus, a, um-Closely woven. Protuberans-Projecting, protuberant. Proximus, a, um—Nearest. Pseudogaleatus—False Galeatus.

Pseudolineatus, a. m. False-lined. Pseudo-marginalis, e. False-margined. Pseudomurrayanus, a, um-False Murrayanus, Pseudosagittatus – False Sagittatus Psilophlœus-Having rough bark. Pterineiformis, e-Shaped like Pterinea. Pterocephalus-Having a winged head. Pterotes – Wing-like. Pterotus, a, um – Winged, feathered. Pudicus, a, um – Shamefaced, modest. Pugiunculus – A small dagger. Pugnax-War-like, combative. Pugnus—A fist, a handful. Pulcellus, a, um—Beautiful little. Pulchellus, a, um-Beautiful little, or somewhat beautiful. Pulcher, a, um-Beautiful. Pulex-A flea.

Pulicaris-Like a flea. Pulmoneus, a, um—Spongy like the lungs. Pumilus, a, um—Dwarfish, diminutive, little.

Punctatus, a, um-Punctured, dotted. Punctiferus, a, um—Puncture-bearing. Punctifrons—Dotted in front. Punctillatus, a, um—Finely dotted. Punctipora—Having dotted pores.

GLOSSARY.

dotted striæ. Punctulatus, a, um-Marked with small spots. Punctuliferus, a, um-Bearing punctures or dots. Pusillus, a, um-Very small, petty, insignificant. Pustulatus, a, um-Blistered, covered with pustules. Pustuliferus, a, um-Bearing blisters or pustules Pustulosus, a, um-Full of blisters, pimples, or pustules. Puteatus, a, um-Having little pits or wells.

Punctolineatus, a, um-Having dotted or

Punctostriatus, a, um-Having pricked or

Puteolatus, a, um—Pitted. Putillus—A child or dwarf.

pitted lines or furrows.

Pygmæus, a, um—Dwarfish. Pyramidalis, e—Pyramidal, pointed like a pyramid.

Pyramidatus, a, um—Pyramidal, made like a pyramid.

Pyriformis, e-Pyriform, pear-shaped. Pyxidatus, a, um-Box-like.

Pyxidicula-A small box.

Pyxidiformis, e-Box-shaped.

Quadrangularis, e-Quadrangular. Quadrangulatus, a, um-Quadrangular. Quadrans-A quarter or a fourth part. Quadraticaudatus, a, um-Square-tailed. Quadratifolius, a, um-Quadrate-leaved. Quadratus, a, um-Four-cornered, squared,

quadrate. Quadribrachiatus, a, um-Having four arms.

Quadriceps-Square-headed.

Quadricinctus, a, um-Four banded or girdled.

Quadricostatus, a, um-Four-ribbed.

Quadrilateralis, e - Quadrilateral, foursided.

Quadrimucronatus, a, um-Having four sharp points or spines.

Quadripartitus, a, um-Four-parted.

Quadriseriatus, a, um-Having four series.

Quadrispinus, a, um-Four-spined.

Quadrisulcatus, a, um – Four-furrowed. Quadrivolvis, e – Four-whorled. Quadrula – A little square.

Quasillus--- A little basket.

- Quaternarius, a, um-Containing four, quaternary
- Quatuordecembrachialis, e-Having fourteen arms.

Quercifolius, a, um-Oak-leaved. Quincuncialis, e-Made in the form of a quincunx.

Quinquelobus, a, um, five-lobed. Quinquenodus, a, um—Having five nodes or knots.

Quinquepartitus, a, um-Five-parted. Quinquesulcatus, a, um-Five-furrowed.

Racematus, a, um-Having clusters. Racemosus, a, um-Full of clusters, clustering.

Radians-Radiating, glittering.

GLOSSARY.

Radiatoplicatus, a, um-Rayed and plaited. | Remotiseptum-Having distant barriers or Radiatus, a, um-Rayed. Radicans-Rooting. Radiciformis, e-Root-like. Radicosus, a, um—Full of roots. Radicula—A small root. Ramifer, era, erum-Branch-bearing. Ramosissimus, a, um—Very branchy. Ramosus, a, um—Full of branches, ramose. Ramulosus, a, um—Full of little branches. Ramulus—A little branch. Rana-A frog. Ranunculus—A tadpole. Rapax—Grasping, rapacious. Raphanus-A radish-root. Rapheidolabis-Needle-like forceps. Rapidens-Having grasping teeth. Raptor-A robber. Raricosta-Having few ribs. Raricostatus, a, um-Having few ribs. Rarinervis, e—Few-nerved or few-veined. Raripora—Having few pores. Rarispinus-Having few spines. Rarus, a, um-Having wide interstices, thin, scattered, rare. Recedens-Falling back, receding. Receptaculum-A receptacle. Rectangularis, e-Rectangular. Rectangulus, a, um-Rectangular. Rectiannulatus, a, um-Having straight annulations. Recticameratus, a, um-Straight-chambered. Recticardinalis, e-Having a straight cardinal line. Rectidorsatus, a, um-Straight-backed. Rectidens-Having straight teeth. Rectiformis, e-Straight-formed. Rectilatera-Having straight sides. Rectilateralis, e-Straight-sided. Rectilaterarius, a, um-Straight-sided. Rectilinea-Having straight lines. Rectinodus, a, um-Having a straight knot or node. Rectiplicatus, a, um-Having straight plaits or folds. Rectirostris-Straight beaked. Rectirostrus, a, um-Straight-beaked. Rectiseptatus, a. um - Having straight septæ. Rectistriatus, a, um-Having straight furrows Rectistylus, a, um-Having straight stems or styles. Rectus, a, um-Straight. Recurvatus, a, um-Curved backward. Recurvirostris-Having a recurved beak. Recurvus, a, um—Turned back, bent or curved back. Reflexus, a, um-Bending backward, reflexed. Regalis, e-Regal, splendid. Regularis, e.—Regular, according to a rule, of or belonging to a bar. Regulatus, a, um—Regulated. Reliquus, a, um—Remaining. Remex-A rower, oarsman. Remibrachiatus, a, um-Paddle-armed. Remipes-Oar-footed.

walls Remotus, a, um-Removed, distant, remote. Remus-An oar. Reniformis, e-Kidney-shaped. Repandus, a, um-Bent backward. Repens-Creeping, crawling. Repertus, a. um-Discovered, hit upon. Repositus, a, um-Restored, kept, remote, distant. Reservatus, a, um-Reserved. Restrictus, a, um-Drawn back, bound[®]up. Resupinatus, a, um-Lying on one's back, bent backward. Resupinoides-Like a resupinate form. Reticularis, e-Reticulated. Reticulatus, a. um-Made like a net, net-like, reticulated. Retiferus, a, um—Net-bearing. Retiformis, e—Net-formed. Retorquatus, a, um—Turned back. Retractilis, e—Drawn back. Retrorsus, a, um-Turned backward, in reversed order. Retroversus, a, um-Turned backward, in reversed order. Retusus, a, um-Beaten back, blunt, dull. Reversus, a, um-Turned about, reversed. Revolutus, a, um-Rolled back, revolved. Rhabdocarpus, a, um-Rod-fruited or longfruited. Rhombeus, a, um-Rhomboidal. Rhombicus, a, um-Rhombic. Rhombiferus, a, um-Rhomb-bearing. Rhomboidalis, e—Rhomboidal. Rhomboides—Rhomb-like. Rhomboide us, a, um—Lozenge-shaped, rhomboid. Rhombolinearis, e-Rhomb-lined. Rhynchonelliformis, e-Like Rhynchonella. Riciniformis, e--Like a tike or tick. Ricinula-A little tick. Rictum-The mouth wide open. Rigens-Stiffened, standing upright. Rigidus, a, um-Hard, inflexible, rigid. Rimosus, a, um-Full of cracks, or fissures. Ringens--Gaping. Robusteus, a, um-Strong, of hard wood. Robustus, a, um-Strong, robust. Rostellatus, a, um-Little-beaked. Rostellum-A little beak. Rostratus, a, um-Beaked, curved at the end. Rota---A wheel. Rotadentatus, a, um--Wheel-toothed. Rotalinea—Having a round line. Rotatorius, a, um—Whorled. Rotatus, a, um-Wheel-shaped. Rotulatus, a, um--Rounded. Rotuliformis, e—Little wheel shaped. Rotuloides—Like a little wheel. Rotulus-A little wheel. Rotundatus, a, um-Rounded. Rotundifolius, a, um-Round-leaved. Rotundilobus, a, um—Round-lobed. Rotundispira—Having a round spire. Rotundus, a, um—Wheel-shaped, circular, rotund. Rubellus, a, um-Reddish.

RUB.-SER.] Ruber, bra, br Rudicula-A v Rudis, e-Rou Rugatinus, a, plaits. Rugatulus, a, Rugicosta-Ha Rugilineatus, a Rugiplicati plates. Rugistriatus, a. Rugosiusculus, wrinkles. Rugosus, a, un Rugulatus, a, t Ruguliferus, a, Ruidus, a, um Rusticellus, a, Rusticus, a, un Saccatus, a, ui a little bag. Sacculus-A lit Sagittarius, a, arrow. Sagittatus, barbed like Salamandroides Salebrosus, a, u Saliginoides-L Salisburioides Samariformis, e Sanguinolariode laria. Sarcinula-A lit Sarcululus-A 1 Sarmenticius, a twigs. Sarmentosus, a, branches. Saxifragifolius. fraga. Saxivadus, a, un Scaber, era, erui Scaberrimus, a, Scabiosus, a, um Scabriculus, a, u Scabrosus, a, um Scalariformis, e-Scalaris, e-Of steps, or a lac Scalatus, a, um-Scalenus, a, um-Scalpriformis, e Scapha—A skiff Scintilla—A spar Scissilis, e-Split Scitulus, a, um-Scobiniformis, e-Scobina—A rasp. Scolopendrites—f Scoparius-A swe Scorpionis, e-O pion. Scrinium—A case

Scriptiferus, a, ur Scrutator-A sear Sculptilis, e-For ing or graving
RAD.-RUB.

RUB.-SER.]

t barriers or

tant, remote.

ard.

hit upon. ept, remote,

k, bound up. n one's back,

ste form.

e a net, net-

ack.

kward, in re-

backward, in

blunt, dull. it, reversed. k, revolved. uited or long-

al.

bearing. 1

zenge-shaped. ned.

Rhynchonella. r tick.

en. pright. ble, rigid. ks, or fissures.

hard wood. mst. iked.

curved at the

-toothed. ine.

ed.

l-shaped. eel.

d. d-leaved. 1-lobed. nd spire. aped, circular,

ing or graving.

Ruber, bra, brum-Red, ruddy. Sculptus, a, um - Engraved, sculptured, carved. Rudicula-A wooden spoon, a spatula. Rudis, e-Rough, unwrought, unpolished. Rugatinus, a, um-Having little folds or Scutatus, a, um-Armed with a shield. Scutellatus, a, um-Armed with a little plaits. shield. Rugatulus, a, um—Having little wrinkles. Rugicosta—Having wrinkled ribs. Rugilineatus, a, um—Having wrinkled lines. Rugiplicatus, a, um-Having wrinkled plates. Rugistriatus, a, um-Having wrinkled striæ. Rugosiusculus, a, um-Covered with small wrinkles. Rugosus, a, um-Wrinkled, shriveled. Rugulatus, a, um-Having wide furrows. Ruguliferus, a, um-Wrinkle-bearing. Ruidus, a, um-Rough. Rusticellus, a, um-Somewhat rustic. Rusticus, a, um-Rural, rustic, rough. Saccatus, a, um-That is put in a bag, like a little bag. Sacculus—A little bag. Sagittarius, a, um—Of or belonging to an arrow. rittatus, a, um – Discharging arrows, barbed like an arrow. Sagittatus, Salamandroides-Like a salamander. Salebrosus, a, um-Rough, rugged, uneven. Saliginoides-Like willow wood. Salisburioides-Like Salisburia. Samariformis, e-Like elm-seed. Sanguinolariodeus, a, um-Like Sanguinolaria. Sarcinula-A little bundle. Sarcululus-A little hoe. Sarmenticius, a, um-Of or belonging to twigs. Sarmentosus, a, um-Full of twigs or little branches. Saxifragifolius, a, um-Leaved like Saxifraga. Saxivadus, a, um-Creeping over stone. Scaber, era, erum-Rough, scurfy. Scaberrimus, a, um-Very rough, scurfy. Scabiosus, a, um-Scabby, rough, scurfy. Scabriculus, a, um-Rough. Scabrosus, a, um-Rough. Scalariformis, e-Ladder-like. Scalaris, e-Of or belonging to a flight of steps, or a ladder. Scalatus, a, um-Having stairs. Scalenus, a, um-Unequal-sided, scalene. Scalpriformis, e-Lancet-shaped. Scapha-A skiff or boat. Scintilla-A spark. Scissilis, e—Split, cleft, or rent. Scitulus, a, um—Handsome, pretty, elegant. Scobiniformis, e-Rasp-like. Scolopendrites—Stone-scolopendrium. Scoparius-A sweeper. Scorpionis, e-Of or belonging to a scorpion. Scrinium-A case, chest, or box. Scriptiferus, a, um-Writing-bearing. Scrutator-A searcher, investigator. Sculptilis, e-Formed or produced by carv-

GLOSSARY.

Scutelliformis, e-Waiter-shaped. Scutigerus, a, um-Shield-bearing. Scutulatus, a, um-Lozenge-shaped, checkered. Scyphulus-A small cup. Scyphus—A cup, a goblet. Secalinus, a, um--Like small grain. Secans-A cutter. Secretus, a, um-Severed, separated, secreted. Sectifrons-Having a divided front. Sectoralis, e-Like a sector, or cutter. Secundus, a, um-Following. Securiformis, e-Ax or hatchet shaped. Securis-An ax or hatchet. Segmentatus, a, um - Ornamented with strips, trimmed, made of pieces. Selaginoides-Like Selago. Selago-A plant. Selectus, a, um—Culled, selected, chosen. Selentus—Having a crescent tail. Selluliformis, e—Like a little seat or stool. Semicarinatus, a, um-Half-keeled. Semicircularis, e-Half-circular. Semicostatus, a, um-Half-ribbed. Semicylindricus, a, um-Half-cylindrical. Semiellipticus, a, um-Half-elliptical. Semifasciatus, a, um - Half-bundled or banded. Semina-Seed. Seminosus, a, um-Full of seeds. Semiorbiculatus, a, um-Half-orbicular. Semiplicatus, a, um-Half-plaited. Semipunctatus, a, um-Half-dotted. Semiradiatus, a, um-Half-rayed. Semiradicatus, a, um-Half-rooted. Semireductus, a, um-Half bent back. Semireticulatus, a, um—Half-reticulated. Semirotundus, a, um—Half-round, semicircular. Semistriatus, a, um-Half-striated. Senarius, a, um-Consisting of six. Senectus, a, um-Aged, very old. Senex-Old, aged. Sentosus, a, um- Full of thorns, thorny. Separatus, a, um—Separated. Septatus, a, um—Divided with partitions or septa. Septemnotatus, a, um—Seven-marked. Septentrionalis, e—Northern. Septoris, e-Having seven mouths. Septus, a, um - Inclosed, enveloped, surrounded. Sepultus, a, um-Buried in deep sleep, slumbering. Seriatus, a, um-In series. Sericeus, a, um-Silken. Serotinus, a, um—Backward, late. Serpens—Creeping, crawling. Serpillifolius, a, um—Thyme-leaved. Serpuloides—Like Serpula. Serpuloideus, a, um-Snake-like or Serpul like. Serratulus-A small saw.

Spathatus, a, um-Spatula-shaped. Spatiosus, a, um-Ample, of great extent, spacious. Spatulatus, a, um-Blade-shaped, spatulate. Speciosus, a, um-Handsome, beautiful, splendid. Spectabilis, e – Visible, admirable, re-markable. Sphæricus, a, um-Of or belonging to a ball, spherical. Sphærion-A little ball or pill. Sphærodactylus-Spherical toed or fingered. Sphæroidalis, e-Spheroidal. Spheroidalis, e—Spheroidal. Spherolatus, a, um—A widened sphere. Sphenophylloides—Like Sphenophyllum. Sphenopteroides—Like Sphenopteris. Spicatus, a, um—Pointed, spiked. Spiculatus, a, um-Having little points. Spiculus, a, um-Pointed. Spinalatus, a, um—Spine-winged. Spiniferus, a, um—Thorn-bearing, thorny, spiny. Spinigerus, a. um-Thorn-bearing, thorny, / spiny. Spinobrachiatus, a, um-Having spines on the arms. Spinoclavatus, a, um—Club-spined. Spinoporus—Having spines and pores. Spinosulus, a, um—Somewhat thorny. Spinosus, a, um—Full of thorns, thorny, prickly. Spinotentaculatus, a, um-Having spinefeelers. Spinulicosta—Having spines and ribs. Spinulicerus, a, um—Spine-bearing. Spinulosus, a, um—Full of little thorns. Spinula—A little thorn. Spiralis, e-Spiral. Spiratus, a, um—Spiral. Spiriferoides—Like Spirifera. Spironema—Having spiral threads or lines. Spirorbis—Spire-whorl. Spissiseptus, a, um-Having crowded or numerous septa. Spissus, a, um-Thick, crowded, compact, dense. Splendens-Splendid, bright. Splendidus, a. um—Bright, shining. Spondyliformis, e—Shaped like Spondylus. Spondylus-A vertebra, spondyle. Spongiaxis-Sponge-axis. Spongilla-A little sponge. Sponsus, a, um—Promised, betrothed. Spurius a, um—Illegitimate. Squalodens-A kind of fish-tooth. Squamifer, era, erum-Scale bearing. Squamiformis, e-Scale-like. Squamosus, a, um-Covered with scales. scaly. Squamula—A little scale. Stabilis, e-Firm, stable, durable. Stachyoides-Like Stachys. Stamineus, a. um-Full of threads, thready. Stella-A star. Stellaris, e—Of or belonging to a star, starry. Stellatimsulcatus, a, um—Star-furrowed. Stellatus, a, um—Covered with stars, starred. Stellifer, era, erum-Star-bearing, starry. Stellifolius, a, um-Star-leaved.

STE.-SUB.] Stelliformis, e Stenocephalus Stenopus-Ha Stigmatus, a, Stigmosus, a. branded. Stillativus, a, Stipatus, a, u rounded, c Stoloniferus, a or water-sl Stragulus, a, u Stramineus, a. Strenuus, a, u Striatellus, a, Striatiformis, e species Striatocostatus Striatolineatus Striatomargina margin. Striatopora-E Striatulus, a. having sma Striatura-Bei fluting. Striatopora-H Striatus, a, um Strictus, a, umtogether. Strigatus, a, grooved, flu Strigillatus, a, Strigosus, a, un Striobrachiatus arms. Striolatus, a, u Strix-A furro Strophium-A Strophomenoid Styliola-A tru Stylus-A point Subabbreviatus viated Subaculeatus, a Subæqualis, e-Subæquatus, a, Subæquilaterus sided. Subalatus, a, ut Subangularis, e Subangulatus, a Subarcuatus, a, arcuate. Subattenuatus. out or attent Subcæspitosus, a Subcancellatus, Subcarbonarins Subcardiiformis Subcarinatus, a, Subcavus, a, t hollowed out Subcentralis, e-Subcircularis, e-Subclavatus, a, u Subcompressus, Subconcavus, a,

Subconicus, a, u

Serratus, a, um—Saw-shaped, serrated. Serrula—A small saw. Servila – A small saw. Servilatus, a, um—Like a little saw. Servilis, e—Of or belonging to a slave, paltry Sesquiplicatus, a, um-Once and a half plaited. Setaceus, a, um—Hairy. Setiferus, a, um—Bristle-bearing, having coarse hair. Setigerus, a, um-Bristle-bearing, having coarse hair. Sexarmatus, a. um-Six-armed. Sexlobatus, a, um-Six-lobed. Sexplicatus, a, um-Six-plaited. Sexradiatus, a, um-Six-rayed. Sextans-A sixth part. Sicula—A dagger, sickle, or scythe. Sidereus, a, um—Of or belonging to the stars, starry. Sigaretoides—Like Sigaretus. Sigillarioides—Like Sigillaria. Sigillatus, a, um-Adorned with little images or figures. Sigillum—A sign, mark. Sigmoides—Like the Greek letter Sigma. Sigmoideus, a, um-Like the Greek letter Sigma. Signatus, a, um—Marked, designated. Silicula—A little pod. Siliqua—A pod. Siliquoideus, a, um—Like a pod. Similior—Similar. Similior—Similar. Similis, e—Like, resembling, similar. Simplex—Simple, plain. Simplicitas—Simpleness, simplicity. Simulans-Imitating, copying. Simulator-A copier, imitator. Simulatrix-A transformer. Singularis, e—Alone, solitary, singular. Singularitas — Singleness, being alone or single. Sinistrorsus, a, um-Toward the left side. Sinuatus, a, um-Hollowed out, excavated, having depressions. Sinuosus, a, um-Full of bendings, curves, or folds, sinuous. Sirpus-A rush, bulrush. Smilacifolius, a, um-Smilax-leaved. Sobrina-A cousin. Socialis, e-Of or belonging to companionship, social. Solarioides — Like Solarium. Soleniformis, e — Solen-shaped. Solenoides — Like Solen. Solidirostris-A solid beak. Solidissimus, a, um-Very firm or solid. Solidulus, a, um-Solid. Solidus, a, um-Firm, compact, solid. Solitarius, a, um-Lonely, solitary. Solus, a, um-Alone, single, sole. Solutus, a, um-Separated, loosened. Sordidus, a, um-Small, sordid, paltry. Sororcula-A little sister. Sparsus, a, um—Scattered, separated, dis-persed. Sparsipora-Having few pores. Spartarius, a, um-Of or belonging to a broom.

650

SER.-STE.

STE.-SUB.]

ped. great extent.

ed, spatulate. beautiful. e,

mirable, re-

ging to a ball,

ed or fingered.

ed sphere. nophyllum. opteris. ked. tle points.

ged. aring, thorny,

aring, thorny,

ing spines on

pined. nd pores. t thorny. orns, thorny,

laving spine-

and ribs. aring. ttle thorns.

reads or lines.

z crowded or

ded, compact,

hining. ike Spondylus. dyle.

etrothed. tooth.

bearing.

d with scales,

able.

reads, thready.

o a star, starry. ar-furrowed. h stars, starred. aring, starry. ed.

Stelliformis, e-Star-shaped. Stenocephalus-Having a narrow head. Stenopus—Having a narrow foot. Stigmatus, a, um—Branded. Stigmosus, a, um-Full of brand-marks, branded. Stillativus, a, um-Dropping. Stipatus, a, um—Crowded together, sur-rounded, compressed. Stoloniferus, a, um—Bearing a useless sucker or water-shoot. Stragulus, a, um-Covered. Stramineus, a, um-Made of straw. Strenuus, a, um-Vigorous, strenuous. Striatellus, a, um-Finely channeled. Striatiformis, e-Shaped like Striatus, another species Striatocostatus, a, um-Striæ-ribbed. Striatolineatus, a. um-Striæ-lined. Striatomarginatus, a, um-Having a striated margin. Striatopora—Having striæ and pores. Striatulus, a, um—Somewhat striated, or having small striæ. Striatura-Being channeled or fluted, a fluting. Striatopora-Having striated pores. Striatus, a, um—Furrowed, striated. Strictus, a, um—Drawn tight, bound, pressed together. Strigatus, a, um grooved, fluted. um-Furrowed, channeled, Strigillatus, a, um-Furrowed, fluted. Strigosus, a, um—Lean, thin, meager. Striobrachiatus, a, um—Having grooved arms. Striolatus, a, um—Very minutely striated. Strix—A furrow, channel, groove. Strophium—A twisted girdle, a band. Strophomenoides-Like Strophomena. Styliola-A truncated column. Stylus-A pointed instrument, stake, or pale. Subabbreviatus, a, um-Somewhat abbreviated Subaculeatus, a, um—Somewhat prickly. Subæqualis, e—Subequal. Subæquatus, a, um-Somewhat equal. Subæquilaterus, a, um-Somewhat equalsided. Subalatus, a, um-Somewhat winged. Subangularis, e-Somewhat angular. Subangulatus, a, um—Somewhat angulated. Subarcuatus, a, um—Somewhat curved or arcuate. Subattenuatus, a, um-Somewhat drawn out or attenuated. Subcæspitosus, a, um-Somewhat cæspitose. Subcancellatus, a, um-Subcancellated. Subcarbonarius-Below the coal. Subcardiiformis, e-Somewhat heart-shaped. Subcarinatus, a, um-Somewhat keeled. Subcavus, a, um—Somewhat excavated, hollowed out. Subcentralis, e-Subcentral. Subcircularis, e-Subcircular. Subclavatus, a, um-Somewhat club-shaped. Subcompressus, a, um-Subcompressed. Subconcavus, a, um-Subconcave. Subconicus, a, um-Subconical.

GLOSSARY.

Subconoideus, a, um-Somewhat conoidal. Subconstrictus, a, um-Subconstricted. Subcordiiformis, e-Somewhat heart-shaped. Subcoronatus, a, um-Somewhat adorned. Subcompulentus, a, um-Somewhat corpulent.

Subcrassus, a, um-Somewhat thick.

- Subcrenulatus, a, um-Somewhat crenulated.
- Subcuneatus, a, um-Somewhat wedgeshaped.
- Subcuspidatus, a, um-Somewhat pointed. Subcylindricus, a, um-Somewhat cylindrical
- Subcymbiformis, e-Somewhat boat-shaped. Subdecussatus, a, um-Somewhat arranged in pairs that cross each other.
- Subdemissus, a, um-Somewhat hanging down.

Subdepressus, a, um—Somewhat depressed. Subelegans—Somewhat elegant.

Subellipticus, a, um-Subelliptical.

- Subemarginatus, a, um-Slightly emarginated Subfalcatus, a, um - Somewhat scythe-
- shaped, subfalcate.
- Subfurcatus, a, um-Somewhat forked.
- Subfusiformis, e - Somewhat spindleshaped.

Subgracilis, e-Somewhat slender.

- Subhorridus, a, um-Somewhat rough.

Subimbricatus, a, um-Somewhat imbricated.

Subimpressus, a, um—Somewhat engraved. Sublævis, e—Nearly smooth.

Sublamellosus, a, um-Somewhat in thin plates.

Sublineatus, a, um-Somewhat striated.

Subliratus, a, um-Somewhat lined.

Sublunatus, a, um-Somewhat lunate.

Submarginatus, a, um-Somewhat mar-

gined. Submucronatus, a. um-Somewhat sharppointed.

Submutans-Somewhat changing.

Subnasutus, a, um-Somewhat nasute.

Subnervosus, a, m-Somewhat veiny.

Subnodosus, a, um-Somewhat knotty or nodose.

Suborbicularis, e-Somewhat orbicular or orb-shaped:

Suborbiculatus, a. um—Somewhat orbicular. Subovalis, e—Suboval.

Subovatus, a, um-Subovate.

Suboviformis, e-Somewhat egg-shaped.

Subpapillosus, a, um-Somewhat papillose. Subpapyraceus, a, um-Somewhat like Papyrus, the paper-reed. Subplanus, a, um—Somewhat flat.

Subplicatus, a, um—Somewhat plaited. Subpulchellus, a, um—Somewhat handsome. Subquadrans—Somewhat squared.

- Subquadratus, a, um-Somewhat squared.
- Subramosus, a, um-Somewhat ramose.

Subramulosus, a, um-Somewhat branchy.

- Subrectus, a, um-Somewhat straight. Subretiformis, e-Somewhat net-shaped, or
 - net-like.

Surgens-Rising.

Subrigidus, a. um-Somewhat rigid. Subrotundatus, a, um-Somewhat rounded. Subrugosus, a, um-Somewhat wrinkled. Subscalaris, e-Somewhat ladder-shaped. Subscitulus, a, um - Somewhat handsome.

Subsiduus, a, um-Sinking down, settling. Subsinuatus, a, um-Somewhat sinuated. Subsinuosus, a, um-Somewhat sinuous. Subspatulatus, a, um-Somewhat spatulashaped.

Subsphericus, a, um-Subspherical. Subspinosus, a, um-Somewhat spiny. Subspinulosus, a, um-Somewhat covered with small spines.

Substellatus, a, um-Somewhat starred. Substriatellus, a, um-Somewhat finely striated.

Subsulcatus, a, um-Somewhat furrowed. Subtæniatus, a, um-Somewhat banded. Subtentus, a. um-Extended underneath, bent.

Subtextilis, e-Somewhat like net-work. Subtextus, a, um-Woven under, affixed. Subtilis, e-Fine, thin, slender, delicate. Subtilitus, a, um-Fine, thin. Subtilstriatus, a, um—Finely striated. Subtortilis, e—Somewhat twisted. Subtortuosus, a, um—Somewhat tortuous. Subtrigona—Somewhat three-angled. Subtrigonalis, e-Somewhat three-angled,

subtrigonal. Subtruncatus, a, um-Somewhat shortened. Subtubulatus, a, um—Somewhat pipe or or tube formed.

Subtumidus, a, um-Somewhat tumid. Subturbinatus, a, um - Somewhat top-

shaped. Subulatus, a, um-Awl-shaped.

Subumbonatus, a, um-Somewhat protuberant.

Subumbrosus, a, um-Somewhat umbrellalike.

Subundatus, a, um-Somewhat waved. Subundiferus, a, um Somewhat wavebearing.

Subvadus, a, um-Somewhat creeping.

Subvaricosus, a, um-Subvaricose.

Subventricosus, a, um-Subventricose.

Subvesicularis, e-Subvesicular.

Succinctus, a, um-Girded, contracted, succinct.

Succulens—Succulent, sappy. Sulcatinus, a, um—Small-furrowed.

Sulcatus, a, um-Furrowed.

Sulciferus, a, um-Furrow-bearing. Sulcomarginatus, a, um-Having the mar-

gin furrowed. Sulcoplicatus, a, um-Grooved along the

middle of the plications. Superbus, a, um-Superior, excellent, su-

perb. Superlatus, a, um-Extravagent, excessive,

exaggerated.

Supracingulatus, a, um-Encircled or girdled in the upper part.

Supraplanus, a, um-Flat above.

Symmetricus, a, um-Symmetrical. Tabulatus, a. um-Floored, tabulated. Tæniopteroides-Like Tæniopteris. Tæniopteroideus, a, um-Like Tæniopterís. Tantillus, a, um-So little, such a little thing. Tapetiformis, e-Formed like tapestry. Tardus, a, um-Slow, sluggish. Taxinus, a, um-Like the yew-tree. Tectorius, a, um-Of or belonging to a cover, rough cast. Tegulatus, a, um-Tiled, thatched. Tegulum-A covering, thatch. Telliniformis, e-Like Tellina. Telum-A dart, spear, or javelin. Temerarius, a, um-Accidental, casual. Tenax-Holding fast, griping, tenacious. Tenellus, a, um-Somewhat delicate, young. Tener, era, erum-Delicate, tender, young. Teneris, e-Delicate. Tenerrimus, a, um-Very tender, very delicate. Tenerus, a, um-Tender, delicate. Tentaculatus, a, um-Having feelers Tenuiannulatus, a, um-Having slight annulations. Tenuibrachiatus, a, um-Slender-armed. Tenuicarinatus, a, um-Finely keeled. Tenuiceps-Having a slender head. Tenuicinctus, a, um-Finely girded. Tenuicornis, e-Slender-horned. Tenuicostatus, a, um-Fine-ribbed. Tenuicosta—Having fine ribs or costa. Tenuicristatus, a, um-Slender-peaked. Tenuidactylus, a, um—Slenger-fingered. Tenuidens—Having slender teeth. Tenuidiscus-Having a thin-disk. Tenuifilum-Fine thread. Tenuifolius, a, um-slender-leaved, nar-row-leaved. Tenuilamellatus, a, um-Having thin plates. Tenuilineatus, a, um-Fine-lined. Tenuiliratus, a, um-Fine-lined. Tenuimarginatus, a, um—Thin-margined. Tenuimuralis, e—Thin-walled. Tenuinervis, e - Thin-veined. slendernerved. Tenuiradiatus, a, um—Slender-rayed. Tenuiradius—Having slender rays. Tenuiramosus, a, um - Having slender branches.

Tenuis, e—Thin, fine, slender, narrow. Tenuisculptus, a, um—Finely engraved. Tenuiseptus, a, um—Having thin septa.

Tenuissimus, a, um-Very thin or slender.

Tenuistriatus, a, um-Fine-lined.

Terebra-A borer, an auger. Terebralis, e-Like an auger.

Terebriformis, e-Shaped like Terebra, or

like an auger. Teres-Rounded, well turned, smooth, pol-

ished.

Terretiformis, e-Of a long, round shape. Terminalis, e-Terminal.

Tersus, a, um-Neat, wiped off, nice. Tessellatus, a, um-Checkered, tessellated.

Testudinarius. toise shell. Tetragonocepha head.

Tetragonopthal Tetragonum-Tetraptyx-Ha Tetricus, a, um Textiligerus, a, Textilis, e-We

Textus, a, um-Thærodactylus, Thallyformis, e like.

Tholus-A rotu Tiariformis, e-

ban. Torquis-A nec Tortalinea-Tw Tortuosus, a, m

tortuous. Tortus, a, um-Transiens-Tra Transitionis, e-Translatus, a,

ported. Transsectus, a, Transversalis, e Transversus, a, wider than 1

Triangularis, etriangular.

Triangulatus, a, Triarthrus-Ha Tribulis-One o Tribulosus, a, ur Tricarinatus, a, Tricenarius, a, u

Trichoideus, a, Trichomanoides maiden-hair

Tricingulatus, a, Tricornis, e—Th Tricostatus, a, u

Tricuspidatus, a Tridactvlites-H

Tridactylus, a, u

Tridens - Havi

prongs. Tridentiferus, a,

prongs. Tridigitatus, a, t

Trifoliatus, a, un Trifolius, a, um-Trigonalis, e-Tr

Trigonolepis-H Trigonostomus, a

mouth.

Trigonus, a, um-Trilineatus, a, ut Triliratus. a, um Trilix-Triple-tw Trilobatus, a, um Trilobus, a, um-Trilocularis, e-7 Timervis, e-Thi Trinodus, a, um-

Trinucleus-Hav Tripinnatus, a, u

SUB.-TES.

SUB.-TES.

rical.

bulated. teris. ke Tæniop-

uch a little

tapestry.

-tree. onging to a

:hed.

in. l, casual. tenacious. licate, young. ender, young.

ier, very del-

ate. feelers. ng slight an-

der-armed. y keeled. head. irded. ed. bbed. or costæ. r-peaked. sr-fingered. eeth. disk. r-leaved, narng thin plates. ined.

in-margined. i. ned, slender-

r-rayed. rays. aving slender

, narrow. engraved. thin septa. hin or slender. ned.

ke Terebra, or

1, smooth, pol-

ound shape.

off, nice. ed, tessellated. TES.-UMB.]

Testudinarius, a, um-Arched like a tortoise shell. Tetragonocephalus-Having a quadrangular head. Tetragonopthalmus-Having square eyes. Tetragonum-A quadrangle Tetraptyx-Having four folds. Tetricus, a. um-Forbidding, stern. Textiligerus, a, um—Web-bearing. Textilis, e—Woven, plaited, textile. Textus, a, um-Woven, fabricated. Thærodactylus, a. um-Hinge-toed. Thallyformis, e-Shaped like Thallus, frondlike. Tholus-A rotunda or eupola. Tiariformis, e-Shaped like a tiara or turban. Torquis—A necklace, wreath, or ring. Tortalinea—Twisted line. Tortuosus, a, m-Full of turns or crooks. tortnons Tortus, a, um-Twisted, distorted. Transiens-Transient. Transitionis, e-A passing over. Translatus, a. um - Carried over, transported. Transsectus, a, um—Cut across. Transversalis, e—Transverse, crosswise. Transversus, a, um-Transverse, crosswise, wider than long. Triangularis, e-Of or belonging to a triangle. triangular. Triangulatus, a, um—Triangulated. Triarthrus—Having three joints. Tribulis-One of the same tribe. Tribulosus, a, um-Full of thorns or thistles. Tricarinatus, a, um-Three-keeled. Tricenarius, a, um-Of or containing thirty. Trichoideus, a, um-Hair-like. Trichomanoides-Like Trichomanes, the maiden-hair fern. Tricingulatus, a, um—Three-banded. Tricornis, e—Three-horned. Tricostatus, a. um-Three-ribbed. Tricuspidatus, a, um-Three-pointed. Tridactylites—Having three fingers. Tridactylus, a, um—Three fingered. Tridens— Having three teeth, tines, or prongs. Tridentiferus, a, um-Bearing three teeth prongs. Tridigitatus, a, um—Three-fingered. Trifoliatus, a, um—Three-leaved. Trifolius, a, um—Three-leaved. Trigonalis, e—Trigonal. Trigonalis, e—Trigonal. Trigonolepis-Having triangular scales. Trigonostomus, a, um-Having a triangular mouth. Trigonus, a, um-Trigonal. Trilineatus, a, um-Three-lined. Triliratus, a, um-Three-lined. Trilix-Triple-twilled. Trilobatus, a, um-Three-lobed. Trilobas, a, um—Three-lobed. Trilocularis, e—Three-lobed. Trilocularis, e—Three-veined. Trinodus, a, um-Having three knots. Trinucleus-Having three kernels. Tripinnatus, a, um-Three-winged.

Triplicatellus, a, um-Having three plications in one fold. Triplicatus, a, um-Three-plaited. Triplicatus, a, um—Three-lined. Tripunctatus, a, um—Three-dotted. Triquetrus, a, um—Three-cornered, triangular. Triradiatus, a, um-Three-rayed. Triserialis, e--In three series Triserratus, a, um-Three-notched. Trisinuatus, a, um-Three-furrowed. Trisulcatus, a, um—Three-furrowed. Trisutura—Having three sutures. Trituberculatus, a, um-Having three tubercles. Trivolvis, e-Three-whorled. Trochiformis, e-Shaped like Trochus. Trochiscus-A small, round ball, a pill. Tropidophorus, a. um-Keel-bearing. Trudiferus, a, um-Pike-bearing. Truncatulus, a, um—Somewhat truncated. Truncatus, a, um—Truncated, cut short. Tuber—A hump, bump, or protuberance. Tuberculatus, a, um—Tuberculated, covered with tubercles. Tuberculosus, a, um-Full of tubercles. Tuberosus, a, um-Full of hamps or protuberances. Tubiformis, e-Pipe, tube, or trumpetformed. Tubiporoides-Like Tubipora. Tubularis, e-Hollow like a pipe. Tubulatus, a, um-Formed like a pipe or tube. Tubulostriatus, a. um-Having tube-like striæ. Tubulosus, a, um-Abounding in tubes. Tubulus-A small pipe or tube. Tumidifrons-Swelling front. Tumidosus, a, um-High-swelling. Tumidulus, a, um-Swollen, tumid. Tumidus, a, um-Swollen, tumid. Tumulosus, a, um-Full of hills, hilly. Tumulus-A mound. Tunicatus, a, um-Coated, covered with skin or peel. Turbidus, a, um-Confused, disordered turbid. Turbinatus, a, um-Turbinate, cone-shaped. Turbiniformis, e-Top-shaped. Turgidus, a, um-Swollen, inflated, turgid. Turricula-A little tower, a turret. Turritella-A little tower Turritiformis, e-Tower-like. Turritus, a, um-Fortified with towers. Tutus, a, um—Safe, secure, examined. Typicalis, e—Typical. Typus—The type. Tyrans-A tyrant. Uber-A teat, pap, or udder. Umbella-A parasol, umbrella Umbelliferus, a, um-Umbrella-bearing. Umbilicatus, s, um-Made like an umbil-

icus. Umbonatus, a, um—Having a shield, embossed.

Umbraculum - A shade, umbrella.

Umbrosus, a, um-Shady, umbrageous.

hooks or tenters Uncus, a, um—Hook-curved, barbed. Undans—Waving. Undatus, a, um—Wavy. Undosus, a, um-Full of waves, billowy Undulatus, a, um—Diversified as with waves, undulated. Undulostriatus, a, um—Having wavy striæ. Undulosus, a, um—Fullof undulations, wavy. Unguiculus, a, um-Having claw-like prorugged. Unguifer, era, erum-Claw-bearing. able. Unguiformis, e-Claw-shaped. Ungula-A claw, talon, hoof. Ungulatus, a, um—Having claws or hoofs. Unguloideus, a, um—Hoof-like or claw-like. Uniangulatus, a, um-One-angled. Unicarinatus, a, um-One-keeled. Unicornis, e-One-horned. Unicostatus, a, um-One-ribbed. Unicus, a, um—One and no more, single, sole. Uniformis, e—Having only one shape, uniform. Unilargus, a, um-One large, of one size. Unilobatus, a, um—One-lobed. Unioniformis, e—Like Unio. Unionoides—Like Unio. Uniserialis, e-Having a single row or series. Unispinus—Having one spine. Unisulcatus, a, um—Having one furrow. Unitus, a, um-United. journey. Uræus, a, um-Of or belonging to the tail. Urniformis, e-Urn-shaped. Urophyllus, a, um-Sharp-leaved. Utriculus-A little matrix, a bud or hull. Vadosus, a, um—Full of shadows. Vagans—Wandering, vagrant. Valens—Vigorous. Validus, a, um-Strong, powerful. Vallorus, a, um—Intrenched. Valvatiformis, e—Like folding doors, or like Valvata. Valvulus—A pod, like the shell of a bean. Varians—Varying, varied. Virgo-A maid. Variabilis, e-Changeable, variable. Varicus, a, um-Straddling. Varicosus, a, um-Having threads or lines enlarged, varicose. Varicostatus, a, um—Variably ribbed. Variolatus, a, um—Variable width or distances apart. Variolosus, a. um—Full of changes. Variopora—Having different pores. Varistriatus, a, um—Having variable striæ. Varius, a, um—Diverse, manifold, different, various. Varus, a, um - Bent, stretched or grown apart. Vascularius, a, um-Vascular, consisting of small vessels. Vasiformis, e-Vase-shaped. Vastator-A desolator, ravager. Vaticinus, a, um—Prophetical. Vellicatus, a, um—Vellicated, pinched. Velox—Swift, fleet, fitted for motion. Velotinus, a, um—Velvety. Velum—A sail, awning, curtain, veil. Venatus, a, um—Veined.

Venosus, a, um-Full of veins, veiny. Ventralis, e-Ventral. Ventricosus, a, um-Bulging out, ventricose. Venulosus, a, um-Full of small veins. Venustulus, a, um-Lovely, charming. Venustus, a, um--Lovely, beautitul, graceful. Verbenifolius, a, um-Leaved like Verbena. Vermicularis, e-Worm-shaped. Vermiculus—A little worm, grub. Verrucosus, a, um—Full of warts, rough, Versiformis, e-Changing its form, change-Vertebralis, e-Somewhat like vertebræ. Vertebratus, a, um—Articulated, jointed, vertebrated, like a.backbone. Verticalis, e—Vertical. Verticillatus, a, um—Whorled. Verticillus—The whorl of a spindle. Verus, a, um--True, real, genuine. Vesicularis, e-Vesicular. Vesiculatus, a, um-Vesicled. Vesiculosus, a, um-Full of blisters or vesicles, vesículous. Vesperalis, e-Belonging to the evening. Vestitus, a, um-Covered, clothed, adorned. Veterator-One who has grown old. Vetulus, a, um-Old. Vetustis, a, um—Old, ancient. Vexabilis, e—Disturbed, vexed, troublesome. Viaticus, a, um—Of or belonging to a Viator-A wayfarer, traveler. Viator—A waynarer, traveler. Vicinus, a, um—Near, neighboring, kindred. Victus, a, um—Conquered, vanquished. Vigilans—Watchful, vigilant. Villosus, a, um—Hairy, shaggy, rough. Viminalis, e—Bearing twigs for plaiting. Vinctus, a, um—Bounded, fettered, girded. Vinculatus, a, um-Bound. Vindex-A defender. Vinosus, a, um—Full of wine. Viola—The violet. Virgatus, a, um-Made of twigs, twig-like. Virgosus, a, um-Full of twigs. Virgulatus, a, um-Striped, like a small rod. Virguncula-A little maid. Vittatus, a, um—Bound with a fillet, banded. Volans—Flying. Volutus, a, um-Rolled, turned around, whorled. Vomer-A plowshare. Vomerium-A plowshare. Vorax-Ravenous, voracious. Vorticellatus, a, um-Whorled. Vulgatus, a, um-General, usual, common. Xiphias-A sword-fish. Xylobioides-Like Xylobius. Yoldiiformis, e-Like Yoldia. Zaphrentiformis, e-Shaped like Zaphrentis. Ziczac-Slanting in straight lines from side

to side, having sharp turns. Zonatus, a, um—Zoned, belted. Zonulatus, a, um—Small-girdled. Zygopus—With joined feet. In addition t placing America f, for fei

ACAMBONA, f Acanthaspis, f Acantherpeste Acanthocladia, Acanthoclema, Acanthodes, m Acanthograptu Acantholepis, Acantholoma Acanthophyton Acanthotelson, Acervularia, f Acheloma, n Acidaspis, f Aclis . Aclisina, f Acondylacanth Acrocrinus, m Acroculia . Acrogenia, f Acrolepis, f Acrophyllum, r Acrothele, f Acrotreta, J Actinoceras, n Actinocrinus, m Actinodesma, n Actinopteria, f Actinotrypa, Adiphlebia, f Ægilops Aethophlebia, f Agaricia Agaricocrinus, Agassichthys Agassizocrinus, Agassizodus, m Agelacrinus, m Aglaspis, f. Agnostus, m Agraulus, m Alethopteris, f Allagecrinus, m Allocrinus, m. Allocystites, m Alloprosallocrin Allorisma, n Alveolites, m Amacanthus, m. Amblypterus, m

654

Uncinatus, a, um-Barbed, furnished with

UNC.-ZYG.

s, veiny.

but, ventricose. nall veins. charming. utiul, graceful. | like Verbena. ed. grub. warts, rough.

form, change-

te vertebræ. lated, jointed, ne.

d. pindle. nuine.

listers or vesi-

the evening. othed, adorned. wn old.

nt. ed,troublesome. elonging to a

oring, kindred. vanquished.

gy, rough. for plaiting. ettered, girded.

ie.

wigs, twig-like.

igs. ike a small rod.

a fillet, banded.

urned around,

s. led. usual, common.

8.

lia.

llike Zaphrentis. lines from side rns. lted. rdled.

INDEX OF GENERA.

In addition to alphabetically indexing all the Palæozoic genera in this work, and placing in italics those which have been used but do not belong to North America, the gender of each genus is designated as follows: m, for masculine; f, for feminine; n, for neuter.

PAGE.	PAGE.	PAGE.
ACAMBONA, f	Amboccelia, f	Anthracosia, f
Acanthaspis, f	Ambonychia, f	Antliodus, m
Acantherpestes, m	Ammonites 432	Aparchites m
Acanthocladia f 201	Amnigenia (461	Apedodus m 587
Acanthocleme n 901	Ampheristocrinus m 993	Anhlebia (108
Acanthodes m 588	Ampyleepee m 579	A picevatitos m 994
Acanthographic m 170	Amphihamura m 619	Applocystices, m
Acantholonia (500	Amphicalla (Arabellites, m
Acantholepis, J	Amphicena, J	Arachnocrinus, m
Acantholoma	Amphiaesma 401	Arachnophyllum, n 172
Acanthophyton, n 104	Amphigenia, J	Araucarites, m 106
Acanthotelson, $n = 525$	Amphion, $m = 527$	Arca
Acervularia, f	Amphipeltis, f	Archæobelus, m 618
Acheloma, n 617	Amphoracrinus, m 223	Archæocaris, f 529
Acidaspis, $f \ldots \ldots 526$	Amplexopora, f 291	Archæocidaris, f. 224
Aclis	Amplexus, m	Archæocrinus, m
Aclisina, f	Ampullaria	Archæopteris, f 106
Acondylacanthus, m. 586	Ampyx, m	Archegogryllus, m 575
Acrocrinus, m	Amygdalocystites, m 223	Archwocyathellus, m 154
Acroculia	Anaclitacanthus, m	Archæocvathus, m 154
Acrogenia, f	Anarthrocanna, f	Archæoscolex, m
Acrolepis / 587	Anastrophia f	Archimedes m 292
Acrophyllum n 170	Anating f 461	Archimedinora 902
Acrothele (999	Anagyga f 994	Archimylacria (575
Acrotrate f 929	Anovrogrinus m 999	Architerbne n 570
Actinoperes p 421	Anoimitoe m 105	Archindus, n
Actinoprinus m 916	Anadina 500	Archinus, m
Actinocrinus, m	Angenna	Arctinurus
Actinoarsma, n	Angellum, n 402	Arenicolites, m
Actinopteria, J	Anisodexis, m 618	Arethusina 530
Actinotrypa, f	Anisophyllum, n 172	Arges, m
Adiphlebia, f 575	Anisotrypa, f 292	Arionellus, m 530
Agilops	Annularia, f 105	Aristophycus 106
Aethophlebia, f 575	Anodontopsis, f 462	Aristozoe, f
Agaricia 170	Anomocare	Arthracantha, f
Agaricocrinus, m	Anomalocrinus, m 223	Arthraria, f 107
Agassichthys	Anomalocystites, m. 224	Arthroclema, n
Agassizocrinus, m	Anomalodonta, f	Arthrolycosa, f 570
Agassizodus, m	Anomaloides	Arthronema, n
Agelacrinus, m	Anomia	Arthrophycus, n 107
Aglaspis f	Anomites	Arthropora f
Agnostus m 526	Anomphalus m 396	Arthrostigma n 107
Agranina m 597	Anopolenus m 598	Arthrostylne m 903
Alecto 901	Antheepidelle (159	Artinia 107
Alathoritaria (104	Anthalithes m 108	Arnshigens m 590
Allegeorieus, J 104	Authorithes, m. 100	Asaphiscus, m
Allagedrinus, m	Anthophyllum, n 172	Asapholdichnus, m
Allocrinus, m	Anthracerpes, m	Asaphus, m
Allocystites, m	Anthracomartus, m. 570	Ascoceras, n
Alloprosallocrinus, m 222	Anthracomya, f 462	Ascodictyon, n
Allorisma, n 459	Anthraconectes, m 528	Asolanus 107
Alveolites, m	Anthracopalæmon, m. 529	Aspidella, f
Amacanthus, m	Anthracoptera, f 463	Aspidichthys, m
Amblypterus, m	Anthracopupa, f	Aspidocrinus, m
,		655
		000

656

INDEX OF GENERA.

[ASP.-CHI.

CHI.-DEL.]

Р

			CHIDEL.
4a DAGE	PACE		
PAGE.	PAGE.	PAGE.	
Aspidodus, m	Beinertia, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot 109$	Callotrypa, f	(Thing days
Aspidopora, f	Belemnocrinus, m	Calophullum n 175	Chiroaus, m.
Asplenites m 107	Belemnospongia f 155	Calonodus m 500	Chirolepis, f
Adamte f A02	Deliminospongia, j 100	Calopoulus, m	Chirurus
Astoric, J	Definurus, m	Carymene , <i>J</i>	Chirospongia f
Astartella, f 463	Bellerophon, m	Calyptograptus, m 175	Chirothorium
Asteracanthus, m	Berenicea, f	Camarella , <i>f</i>	Chiter Chiter
Asterias	Bergeria 109	Camarium n 338	$Chiton, m \ldots \ldots$
Asterocarnus m 107	Bayrichia f 594	Comarcaorea n 429	Chitonodus, m
Asterogrammus 000	Deyrichang (Camaroceras, <i>n</i>	Chloephycus .
Asterocrimus	Bevrichona, J	Camarocladia, $f = 156$	Cholaster f
Asterophycus, $n \dots 107$	Billingsia	Camarocrinus, $m $	Cholodus, J.
Asterophyllites, $m = 107$	Billingsia	Camarophoria, f 338	Chorodus, m
Asteropteris, f 108	Blastoidocrinus, m	Cameratheca f 389	Chomatodus, m.
Asteroptychius m 588	Blastonbyous n 100	Campanulites 920	Chondrites, m
Asterostona m EQU	Diastophycus, 16 100	Compandades	Chonetes, m
Asteriosteus, m	Blattina, /	ampopnyllum, n = 1.176	Chonophyllum m
Astræa	Blothrophyllum, $n = 174$	Candona , f	Chonostogitos
Astreeophyllum, $n \dots 172$	Blumenbachium 155	Caninia	Christegites, m
Astræospongia, f 154	Bolboporites. m	Canistocrinus	Cnrestotes, f
Astrios	Bolosaurus m 618	Cannapora $f = 176$	Cimitaria, f
Astrocerium n 179	Bornia f 1/10	Canada m 200	Cladodus, m
Actuoconio a 151	Dothia, J	<i>Capatas</i> , <i>m</i> · · · · · · · · · 599	Cladograptus m
Astrocoma, n 154	bounriolepis, J	Carabocribus, m 230	Cladopore f
Astrocrinites	Bothrodendron, m 109	Carbonarca, $f \ldots \ldots 468$	Clathroomlin
Astropolithon, m 108	Botryllopora, f 294	Carcharopsis, $f \dots 589$	Clathran (1
Astylocrinus	Brachiocrinus, m	Cardinia, f	Clathropora, f
Astylosnongia f 154	Brachiospongia f 155	Cardiocarpon n 111	Cleodictya, f.
Atactonora f 902	Brachudootog m 610	Cardiola f	Clepsydrops, f
Atactopola, 7	Brachydectes, m	Cardioia, J 409	Clidophorus m
Atactoporena, J 293	Brachymerus	Cardiomorpha, $f = 1.5 \times 10^{-10}$	Cliogrinus m
Alaxocrinus	Brachyphyllum, $n \cdot \cdot \cdot \cdot 109$	Cardiopsis, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot 470$	Climashtichait
Ateleocystites, m	Brachyprion	Cardiopteris, f 112	Chimachtichnites, m
Atelestocrinus m 226	Bronomiartia 535	Cardium n 470	Ulimacograptus, m
Athyris f 994	Brontong m 525	Carinarongia f 200	Climaxodus, m
Atops f 599	Bruchmannia 100	Carmaropsis, J	Clinopistha, f
Atops, J	Bruckmannia 109	$Carinopora, f \dots 296$	Clioderma
Atrypa, <i>j</i>	Bucanella, f	Carpolithes, $m \cdot \cdot \cdot \cdot \cdot \cdot 112$	Clisionhallan
Aulacodus	Bucania, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot 398$	Caryocrinus, m 231	Cliscophynum, n
Aulacophyllum, n	Bucanophyllum, $n \ldots 174$	Carvocustites	Onsospira, f
Aulocopina f 154	Rulimella 300	Caryophullia 176	Clonograptus, m
Aulophyllum a 179	Palimonpha f 200	Cargophynica	Clonopora, f
Aulopara (Bunnorpha, J	Casuarinites	Closterocrinus, m
Autopora, J	Bumastus	Catenipora	Clymenia
Aulosteges, m	Bunodella, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot 536$	Catillocrinus, $m \ldots 231$	Cnemidium
Avicula, $f \ldots \ldots 463$	Bursacrinus, $m \ldots 229$	Caulerpites, m	Commutum, n
Aviculopecten, m 465	Buscopora, f	Caulopteris, f 113	Coccoerinus, m
Aviculopinna f 468	Brysonteria f 468	Cuunopora f 156	Coccosteus, m
Arinana 179	Bythograptus m 174	Callularrian n 112	Cochliodus, m
Aminana	Dythograptus, m	Centrioxylon, $n \sim 113$	Cocytinus, m
Axinus 468	Bythotrephis, f 109	Centrocrinus	Codaster m
Axophyllum, n	Bythiacanthus, $m = 589$	Centronella, f	Codonitos
	Bythopora, $f \ldots 295$	Cephalaspis, f 589	Codomites, m
BACTRITES, m		Ceramella, f.,, 296	Codonochilus, n 4
Bactropora, f	Cacabocrinus : 990	Ceramonora f 206	Coelacanthus, m
Baiera f 108	Calemiter m 110	Commonoralla f 207	Colliocrinus, m
Bailialla f	Calamooladuo m 110	Constantion in 1 201	Cœlocaulis, f
Dahomilia f	Culumoculus, m 110	Ceraterpton, $n \dots $	Cœloconus m
Dakevellia, J 468	Calamodrendron, $n \cdot \cdot \cdot 110$	Geratiocaris , <i>J</i>	Colocrinus
Balanocrinus	Calamophycus, n 110	Ceratocephala	Colonning
Baphetes, m 618	Calamopora	Ceratodus, m	Contespira, f
Barrandia, f	Calamostachys m 110	Ceremens m	Countes, $m \ldots \ldots 1$
Rarrandia 532	Calancecia f 174	Coriogripus m 231	Cœnostroma, n 1
Barrania an 000	Calapteria, J	Certocrinus, <i>m</i> · · · · · · · 251	Coleolus, m.
Darycrinus, m	$Galatnium, n \dots 155$	Cerionites, $m \cdot \cdot \cdot \cdot \cdot \cdot \cdot 150$	Coleophyllum m
Baryphyllum, n 174	Calathocrinus	Ceriopora , f 297	Coleoprion
Batacanthus, $m \dots 588$	Calaurops, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot 400$	Chænocardia, $f \cdot \cdot \cdot \cdot \cdot \cdot 470$	Collectron, m
Bathychilodus, m 588	Calcarina, f 155	Chænomva , f 470	Cohertosaurus, $m \dots 6$
Bathynotus, m 582	Calceocrinus, m 930	Chainodictyon a 297	Colosteus, m 6
Bathynroling m 599	Calcoola f 175	Chariceanbalus m 592	Colpocaris, f
Dathyurenus, m	Calcientera d	Charlocepharus, m	Colpoceras, n
Bathyuriscus, m	Calcisphæra, f 155	Charionella	Columnaria , 4
Bathyurus, m	Callipteridium, n 111	Cheliphlebia, f 575	Columnanan, J 1
Batocrinus, m	Callipteris, $f \ldots \ldots 111$	Chemnitzia , <i>f</i> 400	Commopora, f 1
Batospongia, f 154	Callocystites, m	Chetetes, m	Comarocystites, m 2
Batostoma n. 904	Callographia m 175	Chilonyx m 619	Combophyllum, n 1
Batostomalla f	Cullonoma m	Chiloperalla f 907	Compsacanthus, n 5
Datostomena, J 294	Gallonema, #	Chiloporella, J	Compassion m
Beatricea, J 155	Callopora, f 295	Chilotrypa, <i>f</i>	Compsoerings
Bechera, f 108	Calloporella, f 296	Chirocrinus	Conchinelity, m 2
N St. Asta			\sim one mean contres, $m \cdot \cdot \cdot \cdot 5$

CHI.-DEL.]

HI.

₹E. 75

. 297 . 470 . 470 . 297 . 538 . 339 . 575 . 400

. 400 . 176 . 619 . 297 . 297 . 231

INDEX OF GENERA.

Y.

	PAGE.		PAGE.		PAGE.
Chirodus, m	589	Conchiopsis	. 592	Cyathophycus, n.	158
Chirolepis, $f \cdot \cdot \cdot$	589	Conchodus, m	. 592	Cvathophyllum, n .	181
Chirurus	538	Conchopeltis, f.	. 400	Cyathopora	182
Chirospongia, f	156	Conilites	. 432	Cyathospongia, f. h	. 158
Chirotherium, n	619	Conocardium, n	. 472	Cybele	. 540
Chiton, m	400	Conocephalites,	. 539	Cyclaster	. 267 237.
Chitonodus, m	590	Conocephalus	. 539	Cycloconcha, f.	. 474
Chloephycus	113	Conoceras, n	. 432	Cyclocy stoides, m	237
Cholaster, f	231	Conocoryphe, f.	. 539	Cyclograptus, m	182
Cholodus, m	590	Conocrinus	. 234	Cyclolites, m.	183
Chomatodus, m.	590	Conophyllum	. 180	Cyclonema, n.	. 400
Chondrites, m	114	Conopterium, n.	. 157	Cyclopora, f	
Chonetes, m	339	Conostichus, m	. 114	Cycloporella, f.	299
Chonophyllum, n.	177	Conotubularia	. 432	Cyclopteris, f.	. 115
Chonostegites, m.	177	Constellaria	. 180	Cyclora, f	401
Chrestotes, f	575	Conularia, f	. 390	Cyclostigma, n	. 116
Cimitaria, $f \ldots$	472	Conulites	. 432	Cyclostoma	. 401 *
Cladodus, $m \cdot \cdot \cdot \cdot$	590	Copodus, m	. 592	Cylindroccelia, f	158
Cladograptus, m	178	Cordaianthus, m	. 114	Cyclus	541
Cladopora, f	178	Cordaicarpus, m	. 114	Cymatodus, m	. 594
Clathroccelia, f	389	Cordaistrobus, m	. 114	Cymoglossa, f	. 116
Clathropora, f	297	Cordaites, m	. 114	Cyphaspis, f	541
Cleodictya, f	157	Cordylocrinus, m.	. 234	Cypricardella, f.	474
Clepsydrops, f	619	Cornulites, m.	. 517	Cypricardia, f	475
Clidophorus, m.	470	Coronocrinus, m	. 234	Cypricardinia, f	475
Cliocrinus, m.	231	Coronura	. 540	Cypricardites, m	476
Climachtichnites, m	538	Corycephalus	. 540	Cyrtacanthus, m	594
Climacograptus, m	178	Coscinella, f	. 298	Cyrtia, f.	349
Climaxodus, m	591	$Coscinium, n \dots$. 298	Cyrtina, f	349
Clinopistha, f	472	Coscinopora.	: 157	Cyrtoceras, n	432
Clioderma	389	Coscinotrypa, f.	. 298	Cyrtocerina, f	436
Clisiophyllum, n .	179	Cotyledonocrinus, m .	. 234	Curtodonta	477
Clisospira, f	400	Crania, f.	. 341	Cyrtolites, m	401
Clonograptus, m	179	Craspedophyllum, n .	. 180	Cyrtonella, f.	402
Clonopora, f	298	Crateripora	. 298	Cystiphorolites, m	183
Closterocrinus, m.	232	Cremacrinus	. 234	Cystiphyllum, n	183
Clymenia	432	Crematopteris, f	. 115	Cystocrinus, m.	237
Cnemidium, n	157	Crenipecten, m.	. 473	Cystodictva, f	299
Coccocrinus, m	232	Crepicephalus, m	. 540	Cystopora, f.	300
Coccosteus, m	591	Crepidophyllum, n.	. 180	Cystostylus, m	. 184
Cochliodus, m	·· · 591	Crepipora, f	. 299	Cythere, f	541
Cocytinus, m	619	Cricotus, m	. 620	Cythereila, f.	541
Codaster, m	232	Crinocystites, m	. 234	Cytherellina, f.	. 541
Codonites, m	233	Crinosoma	. 234	Cytherina, f	541
Codonochilus, n	400	$Crisina, f \ldots \ldots$. 299	Cytherodon, m	477
Cœlacanthus, m	592	Crisinella, $f \ldots \ldots$. 299	Cytheropsis, f	541
Coeliocrinus, m	233	Cromyocrinus, m	. 234	Cytocrinus, m	237
Cœlocaulis, f	298	Crumenæcrinites	. 234	- , ,	14
Cœloconus, m	. 298	$Cruziana, f \ldots$. 115		2 · *
Cælocrinus, m	· · 233	Cryphæus	. 540	DACTYLODUS, m	594
Cœlospira, f	340	Crpytoblastus	. 234	Dactylophycus, n	116
Counites, $m \ldots \ldots$	179	Cryptoceras	. 432	Dadoxylon, n	116
Cœnostroma, n	157	Cryptolithus	. 540	Dæmonocrinites	. 237
Coleolus, m.	. 389	$Cryptonella, f \ldots$. 342	Dalmania	542
Coleophyllum, n.	. 179	$Cryptopora, f \ldots$. 299	Dalmanites, m	542
Coleoprion, m	. 390	Cryptozoon, n	. 157	Danæites, m	116
Collettosaurus, m.	. 620	Ctenacanthus, m	. 593	Dania, f	184
Colosteus, m	. 620	Ctenocrinus, m.	. 234	Dawsonella, f	. 402
Colpocaris, f	. 539	Ctenodonta	. 473	Dawsonja, f	184
Colpoceras, n.	, 432	Ctenodus, m	. 593	Decadactylocrinites .	237
Columnaria, f	. 179	Ctenopetalus, m	. 594	Decudocrinus	. 237
Columnopora, f	. 180	Ctenoptychius, m.	. 594	Dechenia, f	. 116
Comarocystites, m	. 233	Cuoullæa	. 473	Dekayella, f	. 184
Combophyllum, n	. 180	Cuneamya, f	. 473	Dekayia, f	. 184
Compsacanthus, n	. 592	Cupellæcrinus	. 235	Deltacrinus, m	. 237
Compsaster, m	. 234	Cupulocrinus, m	. 235	Deltodopsis, f	. 595
Compsocrinus, m.	. 234	Cyathaxonia, f.	180	Deltodus, m	. 595
Conchicolites, m	. 517	Cyathocrinus, m	. 235	Delthyris	. 343

658

INDEX OF GENERA.

Contraction of the second second

[DEL.-FUS.

....

GAL .-- LEP.]

	×		
	PAGE	10 T	PAGE.
Delter trabing m	FOF	Delicheamhala	545
Deitoptychius, m		Delichemeterug m	545
Dendrerpeton, n	620	Dolichometopus, m	545
Dendrocrinus, m · ·	238	Donchopterus, m	. 040
Dendrograptus, m .	184	Donacicrinites	. 240
Dendrophycus, n	. 117	Dorycrinus, m.	. 240
Dendropora, $f \cdot \cdot \cdot$	185	Drepanacanthus, m	. 596
Dentalina, f	158	Drepanodus , m	. 518
Dentalium, n	402	Duncanella, f	. 187
Desmiodus, m	595	Dyscritus, m	. 576
Desmiophyllum, n .	117	Dystactella, f	. 478
Deviobia, f	478	Dystactophycus, n	. 117
Diadectes m	620	Dystactospongia, f	. 158
Diamesonora f	300	-)	
Dicellocenhalus m	543	EATONIA, f.	. 345
Digellomage	343	Eccyliomphalus m	. 402
Dick carinus	930	Fahinogenia f	545
Dichomontais	195	Fahinocustites m	241
Dichograpius	100	Echinodisons m	241
Dienotrypa, J	300	Echinomeninita m	941
Dicraniscus	343	Echinoencritices, m	546
Dicranograptus, m	180	Echinoghathus, m	941
Dicranophyllum, n .	117	Echinus	040
Dicranopora, $f \cdot \cdot \cdot$	300	Ectenocrinus, m	. 242
Dicranurus	544	Ectenodesma, n	. 4/8
Dictyocrinus, m	240	Ectenodictyon, f	. 159
Dictyolites	117	Ectocynodon, m	. 621
Dictyonema, n	185	Ectosteorachis, m	. 596
Dictyophyton, n	158	Edaphosaurus, m	. 621
Dictyopteris, f	117	Edestus, m	. 597
Dictyostroma, n	158	Edmondia, f	. 478
Didymograntus m	185	Edrioaster, m	. 242
Didymonhlens f	576	Edriocrinus, m	. 242
Didymonhyllum n	117	Edriospongia, f	. 159
Dioconcurs f	576	Fichwaldia f	. 345
Dieconeura, /	943	Filitions m	573
Dignomia, J.	010	Elinaminate	242
Dimetrodon, <i>m</i> · · ·	· · 020	Flagmonhyllum	187
Dinichtnys, m · · ·	090	Elasthorogrinus m	949
Dinobolus, m	343	Eleutherocrinus, m	246
Dionide, f	544	Elkania, J	· 040
Dipeltis, m	544	Ellipsocephalus, m.	. 040
Diphyphyllum, n	186	Elliptocephala, f.	. 040
Diplaspis, $f \cdot \cdot \cdot \cdot$	596	Elonichthys	. 597
Diplazites	117	Elymella, f	. 480
Dipleura	544	Elymocaris, $f \cdot \cdot \cdot \cdot$. 546
Diplichnites, m	544	Embolamus, $m \cdot \cdot \cdot \cdot$. 547
Diplocaulus, m	621	Embolophorus, m	· 621
Diploceras, n	436	Emmonsia, $f \cdot \cdot \cdot \cdot$. 187
Diploclema, n	300	Empedias, m	. 621
Diplodus m	596	Empedocles, $m \cdot \cdot \cdot \cdot$. 621
Diplograptus m	186	Enallopora. f	. 300
Diplonhullum	187	Encenus, m	. 576
Diplopore f	300	Encrinurus, m	. 547
Diplostorium n	117	Endocerss n	. 436
Diplostegium, "	544	Endolobus	. 437
Diplostylus, m		Endothura n	159
Diplotneca, J.	091	Endomyra, "	547
Diplotrypa, J	10/	Endymon	\$547
Dipterocaris, $f \cdot \cdot \cdot$	540	Endymionia, J	547
Dipterus, m	596	Enoploura, J · · · ·	100
Discina, $f \cdot \cdot \cdot \cdot$	344	Entolium, n · · · · ·	. 480
Discites, m	436	Eocidaris, f	. 242
Discolites	402	Eccystites, m	· 242
Discophycus, n	117	Eodon, m	. 480
Discophyllum, n	187	Eophyton, $n \cdot \cdot \cdot \cdot$. 118
Discosorus. m	436	Eopteria, f	. 480
Discotrypa, f.	300	Eosaurus, m	. 621
Distacodus m	518	Eoscorpius, m	. 570
Dithyrocaria f		Eospongia, f.	. 159
Dolahra f	478	Eotrochus, m	. 403
Dolatocrinus m	240	Eotrophonia	. 518
Donatocrinus, m · · ·			

			PAGE.
Eozoon, $n \cdot \cdot \cdot$	•		. 159
Ephemerites, m	•	• •	. 576
Epicordylus, m .		• •	. 621
Equisetites, m .	•	• •	. 118
Equisetum	•	• •	. 118
Eremopteris, J.	•	• •	• 118
Fridophyllum n	•	•••	187
Eridopora f			. 301
Erismacanthus, n	n		. 597
Erisocrinus, m .			. 243
Eryops, $f \cdot \cdot \cdot$		• •	. 622
Eschara, $f \cdot \cdot \cdot$	•	• •	. 301
Escharopora, J.	•	• •	· 301
Estheria, J.	n	• •	. 159
Etoblattina, f			. 576
Eucalyptocrinus,	m		. 243
Euchasma, n			. 480
Euchondria, f .	·	•	. 480
Eucladocrinus, m	•	• •	. 244
Eugaster, m	•	• •	. 244
Eulima	•	•	9403
Eumicrotia	:	: :	. 480
Eunema. n			. 403
Eunemacanthus,	m		. 597
Eunicites, m			. 518
Euomphalus, m		•	403
Eupachycrinus, 1	n	•	. 245
Euphoberia, f .	•	•	· · 5/3
Euproops, J · ·	•	•	301
Eurylenis f	:		597
Eurypterella, f.			548
Eurypterus, m.			548
Eurythorax, m .			622
Eusarcus, m		•	549
Euspilopora, f .	•	•	301
Euspirocrinus, m	• •	•	246
Eustnenopteron,	m	•	480
Evectinopora f	:		301
Exochorhunchus .			480
FABERIA, f	•	•	549
Favastrea	٠	•	187
Favicella, f	•	•	187
Favistella f	•	•	188
Favosites, m		:	188
Favositopora			189
Fenestella, f .		•	302
Fenestralia, f .			305
Fenestrapora, f	•	•	305
Ficoidites	•	•	118
Functies	•	• 1	10, 109
Fissodus, <i>m</i>	•	•	305
Flabellaria .	:	:	118
Flustra, f			306
Forbesiocrinus,	m		246
Fordilla, f			480
Fucoides	•	٠	118
Fungispongia, f	•		100
Fusispira, J	•	•	160
Fugue	•	•	. 404
*	•		

Gemperconthus
Gampsacantinus, m.
Gaurocrinus m
Genentomum m
Genemouring, n
Gennæocrimus, m
Genopteryx, f
Geoporites
Gerablattina, f.
Geralinurg f
Gerapomana
Gerapompus, m
Gerarus, m
Geraphrynus, m
Gerephemera, f
Geroneura f
Generallia f
Gioggenth
Gisacanthus, m
Glauconome, $f \ldots$
Glossites, m
Glossoceras, n.
Glossograptus
Glossotrupa d
Glossotrypa, J
Glycerites, m
Glymmatacanthus, m .
Glyptaster m
Glyptocardia f
Gluptocatula, J
Glyptocrinus, m
Glyptocystites, m
Glyptodendron, n .
Glyptodesma, n
Glyptolenia f
Gluntotruma
Gigptotrypa
Gnathorniza, f
Gomphoceras, n
Gomphocystites m
Goniesteroidoarinus
Goniatitos m
$Gomatiles, m \ldots$
Gonioceras, n
Gonivonlia
oroniocusita
Goniophora f
Goniophora, f
Goniophora, f
Goniophora, f
Goniophora, f Goniopteris Goniotrypa, f Gordia
Goniophora, f Goniophora, f Goniotrypa, f Gordia Gorgonia, f
Goniophora, f Goniopteris Goniotrypa, f Gordia Gorgonia, f Gorgenia, f
Goniophora, f Goniophora, f Goniopteris Goniotrypa, f Gordia Gorgonia, f Gosselettia, f
Goniophora, f Goniophora, f
Goniophora, f Goniophora, f Goniopteris Goniotrypa, f Gordia Gorgonia, f Gosselettia, f Grammysia, f Granatocrinus, m
Goniophora, f Goniophora, f Goniopteris Gordia Gorgonia, f Gosselettia, f Grammysia, f Granatocrinus, m Graphiocrinus, m
Goniophora, f Goniophora, f
Goniophora, f Goniophora, f Goniopteris Goniotrypa, f Gordia Gorgonia, f Gorgonia, f Grammysia, f Granatocrinus, m Graphocrinus, m Graptodictya, f Graptoditya, f
Goniophora, f Goniophora, f Goniophora, f Goniotrypa, f Gordia Gordia Gorgonia, f Gosselettia, f Granatocrinus, m Granatocrinus, m Grapholictya, f Graptolictya, f Graptolictya, m
Goniophora, f Goniophora, f Goniopteris Goniotrypa, f Gordia Gorgonia, f Gosselettia, f Grammysia, f Granatocrinus, m Graphiocrinus, m Graptodictya, f Graptolithus, m Graptolithus, m
Goniophora, f Goniophora, f Goniopteris Goniotrypa, f Gordia Gorgonia, f Gorgonia, f Granmysia, f Granatocrinus, m Graphocrinus, m Graptolictya, f Graptolithus, m Graptolithus, m Gruphorhynchus Gullelmites, m
Goniophora, f Goniophora, f Goniophora, f Goniotrypa, f Gordia Gorgonia, f Gosselettia, f Grammysia, f Granatocrinus, m Grapholictya, f Graptolictya, f Graptolithus, m Graptolithus, m Grupphorhynchus Gullelmites, m Gypidula, f
Goniophora, f Goniophora, f Goniopteris Goniopteris Gordia Gorgonia, f Gorgonia, f Grammysia, f Grammysia, f Granatocrinus, m Grapholictius, m Graptolithus, m Graptolithus, m Graptolithus, m Gruphorhynchus Gulielmites, m Gypidula, f Gyracanthus, m
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia Gorgonia, f Gorgonia, f Grannysia, f Grannysia, f Granatocrinus, m Graptolictya, f Graptolithus, m Graptolithus, m Gruphorhynchus Gypidula, f Gypidula, f Gyracanthus, m Gyrichnites, m
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia Gordia Gorgonia, f Gosselettia, f Grammysia, f Granatocrinus, m Grapholictya, f Graptolictya, f Graptolithus, m Graptolithus, m Gruppohihus, m Gyploula, f Gypracanthus, m Gyraconthus, m Gyrichnites, m Gyrichnites, m
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia Gorgonia, f Gosselettia, f Granatocrinus, m Graptoictya, f Graptolictya, f Graptolithus, m Graptolithus, m Gruphorhynchus Gypidula, f Gypidula, f Gyracanthus, m Gyrichnites, m Gyroceras, n
Goniophora, f Goniophora, f Goniophora, f Gordia Gordia Gordia Gordia Gosselettia, f Grammysia, f Granatocrinus, m Graptodictya, f Graptolithus, m Graptolithus, m Gruptolithus, m Gypidula, f Gypiacanthus, m Gypichnites, m Gyricentes, m Gyricentes, m Gyricentes, m Gyricentes, m
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia Gorgonia, f Gorgonia, f Granatocrinus, m Graphocrinus, m Graphodictya, f Graptolithus, m Graptolithus, m Gruphorhynchus Gulielmites, m Gypidula, f Gypidula, f Gypidula, f Gypicents, m Hadrophyllum, n Hadrophyllum, n
Goniophora, f Goniophora, f Goniophora, f Gordia Gordia Gorgonia, f Gosselettia, f Grammysia, f Granatocrinus, m Graptodictya, f Graptolithus, m Graptolithus, m Graptolithus, m Gypidula, f Gypidula, f Gyracanthus, m Gyrichnites, m
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia Gorgonia, f Gosselettia, f Granatocrinus, m Graptoictya, f Graptolictya, f Graptolictya, f Graptolictya, f Graptolictya, m Graptolictya, m Graptolictya, m Graptolictya, m Graptolictya, m Gyphorhynchus Gulielmites, m Gypidula, f Gypidula, f Gyracanthus, m Gyricchnites, m Hadrophyllum, n Halia, f Halonia, f
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia Gordia Gordia Gosselettia, f Grammysia, f Granatocrinus, m Graptodictya, f Graptolithus, m Graptolithus, m Graptolithus, m Gypidula, f Gypidula, f Gyracanthus, m Gyrichnites, m Gyrich
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia Gorgonia, f Gosselettia, f Granatocrinus, m Graptoictya, f Graptolictya, f Graptolictya, f Graptolictya, f Graptolictya, m Graptolictya, m Graptolictya, m Graptolictya, m Graptolictya, m Gyphorhynchus Gulielmites, m Gypidula, f Gypidula, f Gyracanthus, m Gyricchnites, m Hadrophyllum, n Halia, f Halonia, f Halysites, m Halysites, m Halysites, m
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia 1119 Gorgonia, f Gosselettia, f Granatocrinus, m Graptodictya, f Graptodictya, f Graptolithus, m Graptolithus, m Graptolithus, m Gyphorhynchus Gulielmites, m Gypidula, f Gypidula, f Gyracanthus, m Gyrichnites, m Hadrophyllum, n Hadrophyllum, n Halonia, f Halonia, f Halpophelbium, n Haplocrinus, m Haplocrinus, m
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia Gorgonia, f Gosselettia, f Granatocrinus, m Graptolictya, f Graptolictya, f Graptolictya, f Graptolictya, f Graptolictya, m Graptolictya, m Graptolictya, m Graptolictya, m Graptolictya, m Graptolictya, m Graptolictya, m Gyphorhynchus Gulielmites, m Gypidula, f Gypidula, f Gyracanthus, m Gyricchnites, m Hadrophyllum, n Halia, f Halonia, f Haplocrinus, m Haplophebium, n Haplotichnus, m
Goniophora, f Goniophora, f Goniophora, f Goniophora, f Gordia

GAL.-LEP.]

s.

 $\begin{smallmatrix} \mathbf{s} & \mathbf{9} & \mathbf{6} & \mathbf{1} & \mathbf{8} & \mathbf{8} & \mathbf{8} & \mathbf{2} & \mathbf{7} & \mathbf{1} & \mathbf{7} & \mathbf{3} & \mathbf{2} & \mathbf{1} & \mathbf{1} & \mathbf{1} & \mathbf{7} & \mathbf{9} & \mathbf{6} & \mathbf{3} & \mathbf{3} & \mathbf{0} & \mathbf{1} & \mathbf{4} & \mathbf{1} & \mathbf{3} & \mathbf{16} & \mathbf{0} & \mathbf{3} & \mathbf{7} & \mathbf{7}$

INDEX OF GENERA.

PAGE.	PAGE.	PAGE.
Galium	Harpacodus, $m \cdot \cdot \cdot \cdot \cdot 598$	Ichthyocrinus, m 256
Gampsacanthus, $m \cdot \cdot \cdot 598$	Harpes, $m \ldots \ldots 549$	Ichthyorachis, $f \ldots 310$
Gaurocrinus, m	Harpides, $m \cdot \cdot \cdot \cdot \cdot \cdot 549$	Icosidactylocrinites 256
Genentomum, $n \cdot \cdot \cdot \cdot 577$	Harttia, $f \dots $	Idiophyllum, $n \dots 120$
Generatory f 577	Haussmannia	$\begin{array}{c} \text{Idiotrypa, } f \dots & \dots & \dots & \dots \\ \text{Uiapia } f \dots & \dots & \dots & \dots & \dots \\ \text{Idiotrypa } f \dots & \dots & \dots & \dots \\ \text{Idiotrypa } f \dots & \dots & \dots & \dots \\ \text{Idiotrypa } f \dots & \dots & \dots & \dots \\ \text{Idiotrypa } f \dots & \dots & \dots & \dots \\ \text{Idiotrypa } f \dots & \dots & \dots & \dots \\ \text{Idiotrypa } f \dots & \dots & \dots & \dots \\ \text{Idiotrypa } f \dots & \dots & \dots & \dots \\ \text{Idiotrypa } f \dots & \dots \\ \ & \dots & \dots & \dots \\ \ & \dots & \dots$
Geoporites 180	Helicotoma f 405	
Gerablatting f 577	Heliodus m 500	Illeenue m
Geralinura, f	Heliolites m 191	Inachus 406
Gerapompus, m 577	Heliophycus, n	Inocaulis, m 193
Gerarus, <i>m</i>	Heliophyllum, $n \dots 192$	Inoceramus
Geraphrynus, $m \cdot \cdot \cdot \cdot 571$	Helminthoidichnites, m 518	Intrapora, $f \ldots \ldots 310$
Gerephemera, $f \dots 577$	Helodectes, m 622	Intricaria, f
Geroneura, $f \dots 577$	Helodus, m 599	Iocrinus, m
Gervillia, $f \ldots \ldots 481$	Helopora, $f \cdot \ldots \cdot 308$	Iphidea, f 346
Gisacanthus, $m \dots 598$	Hemeristia, $f \dots 578$	Ischadites
Glossitos m (49)	Hemicosmites, $m \cdot \ldots 252$	Ischyrinia, $f \dots 483$
Glossoceras n 437	Hemicrypturus	Isocaraia
$Glossograptus m \dots 189$	Heminronites 346	
Glossotrypa, f	Hemitrypa, f , \dots , 309	Isotelus n 559
Glycerites, m 518	Hernodia. f	Isotrypa, f
Glymmatacanthus, $m \cdot .598$	Heterocrinus, m	1500 9 pa, 9
Glyptaster, $m \ldots 247$	Heterocystites, m	JANASSA , f 600
Glyptocardia, $f \cdot \cdot \cdot \cdot \cdot \cdot 481$	Heterodictya, f	,,,
Glyptocrinus, $m \cdot \cdot \cdot \cdot 247$	Heterophrentis, f 193	KNORRIA, f
Glyptocystites, $m \dots 248$	Heterospongia, $f . . \bullet_{.}$. 160	Koninckia, $f \ldots \ldots 346$
Glyptodendron, $n \cdot \cdot \cdot 119$	Heteroschisma, $n \cdot $	Kutorgina, $f \ldots \ldots 347$
Glyptodesma, $n \dots 481$	Heterotrypa (. 193	T
Chuptotepis, J	Hindella, $f \dots 346$	LABECHIA, $f \dots $
Gnathorpiza f 508	Hinnarionur 246	Lambdodus, m 600
Gomphoceras, n	Hippodophycus n 120	Lamenterogrinus m 257
Gomphocystites, m	Hipponicharion, m	Lasiocladia f 160
Goniasteroidocrinus, m. 249	Hippothoa 309	Leaja, f
Goniatites, $m \ldots 438$	Holocystites, m	Lecanocrinus, m
Gonioceras, $n \ldots 441$	Holometopus, $m \cdot \cdot \cdot \cdot 550$	Lecracanthus, $m \cdot \cdot \cdot \cdot 600$
Goniocælia	Holopea, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot 405$	Lecythiocrinus
Goniophora, $f \ldots 481$	Holopella, $f \ldots 406$	Leda 484
Goniopterus f	Homographics, $m \cdot \cdot \cdot \cdot 599$	Lepadocrinus, $m \dots 257$
Gordia	Homalonotus m 550	Leperalia, J
Gorgonia, f,	Homocrinus, m	Lepidechinus m 958
Gosselettia, f 482	Homothetus, m 578	Lepidesthes, f
Grammysia, $f \ldots 482$	Homotrypa, f	Lepidilla, f , \dots , 553
Granatocrinus, m 250	Homotrypella f 310	Lepiditta, f
Graphiocrinus, $m \cdot \cdot \cdot 251$	Hornerá, f 310	Lepidocidaris, f 258
Graptodictya, $f \ldots 307$	Hortholus 442	Lepidocoleus, m
Graptolithus, m 19	Houghtonia 193	Lepidocystis, $m \ldots 121$
Gryphorhynchus 483	Huronia, $f \ldots \ldots 442$	Lepidodendron, $n \dots 121$
Gymidule f 246	Hypochinus, $m \dots 255$	Lepidodiscus
Gyracanthus m 508	Hybocrinus m	Lepidonites, m
Gyrichnites, m	Hybocystites m' 255	Lepidophiolos, <i>m</i> · · · · 122
Gyroceras, n	Hydnoceras,	Lepidostrobus m 123
3	Hydreionocrinus, m 256	Lepidoxylon, n , \dots , 124
HADROCRINUS, m 252	Hylerpeton, $n \ldots 622$	Lepocrinites
Hadrophyllum, n 191	Hylonomus, $m \cdot \cdot \cdot \cdot \cdot 622$	Leptacanthus 600
Haimeophyllum, n 191	Hymenophyllites, m 120	Leptæna, $f \cdot \ldots \cdot \cdot \cdot \cdot \cdot 347$
Halma, f	Hyphasma, n , $?$ 622	Leptobolus, $m \cdot \cdot \cdot \cdot \cdot \cdot 348$
Halveitag	Hyolithellus, m	Leptocelia, $f \dots 348$
Halueiominue 950	Humanthominites 391	Leptodesma, $n \dots 484$
Hanloerinus	Hyperinioerinues	Leptodomus, J 485
Haplophlebium n 577	Hystrispongia f 160	Leptonitus, m 100
Haplotichnus, m 578		Leptophractus m
Harlania, f	ICHNOPHYCUS, n	Leptopora, f 194
Harmodites	Ichthyacanthus, m 622	Leptopterion, n 161

65**9**

ć

660

INDEX OF GENERA.

[LEP.-OPH.

14

PAGE	1
Leptotrypa, f ,	Macro
Lescuropteris, $f \cdot \cdot \cdot \cdot 1/24$	Macro
Lesleva, $f \cdot $	Macro
Libellula, f	Macro
Lichas, m	Madr.
Lichenalia, $f \cdot \cdot \cdot \cdot \cdot \cdot 311$	Malo
Lichenocrinus, m 258	3 Maria
Lichenotrypa, $f. \ldots 312$	2 Marra
Licrophycus, $n \dots 12^{5}$) Mars
$Lima, f. \ldots 480$	3 Marti
$Limaria, f \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot 194$	Math
Limoptera, $f \ldots 486$	Mattl
Lindstromia, $f \cdot \cdot \cdot \cdot 194$	Mazo
Lingula, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot 349$) Meco
Lingulelasma, $n \dots 351$	Meek
Lingulella, $f \cdot \cdot \cdot \cdot \cdot \cdot 352$	Meek
Lingulepis, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot 352$	Mega
Lingulops, $f \cdot $	Mega
Linipora	i Mega
Linnarssonia, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot 352$	Mega
Lioclema, $n \dots \dots \dots \dots \dots$	Maga
Liodis, m	Maga
Liognathus, m	Mega
Liopteria, $f \dots 489$	7 More
Liorhynchus, n	Moga
Liostracus, m	Mega
Lasgocaris.	1 Melia
Lisgodus, m	1 Melo
Listracanthus, <i>m</i>	8 Melo
Lithediatum 12	5 Meno
Lithomyloorig n 570	9 Meri
Lathomyacris, n	6 Meri
Tithostrotion n	4 Meri
Littowing 406-48	6 Meso
Lituites m 44	2 Meao
Localipora, f , \ldots , 312	2 Meso
Loftusia, f 16	1 Mesp
Loganellus, m 55	5 Meta
Lonchocephalus, m 55	5 Meto
Lonchopteris, f	5 Mian
Lonsdalia, $f \ldots 19$	4 Mich
Lophodus 60	1 Micr
Lophophyllum, $n \dots 19$	4 Micr
Lophospira, f 40	8 Micr
Loxonema, $n \cdot \cdot \cdot \cdot \cdot \cdot 40$	6 Micr
$Lucina, f \dots 48$	6 Micro
Lumbriconereites, $m = 51$	8 Micr
Lunatipora, $f. \ldots 19$	5 Mille
Lunulicardium, $n \dots 48$	6 Mulo
Lunulites 16	1 Mod
Lycopodiolithes	5 Mod
Lycopodites, $m \cdot \cdot \cdot \cdot \cdot 12$	5 Mod
Lyellia, $f \dots \dots 19$	J Mole
Lyonsia 48	/ Mon
Lyriocrinus, $m \cdot \cdot \cdot \cdot \cdot 20$	1 Mon
Lyriodictya, J	7 Mon
Lyriopecten, $m \dots 48$	7 Mon
Lyrodesma, n 40	9 Mon
Lyropora, J.	a Mon
Lysocystites, m	3 Mon
Lysorophus, m	Mon
MACHERACANTHUS m. 60	1 Mur
Machairodus 51	9 Mya
Machurea f	8 Mye
Macrocheilus, n 40	8 Myc
Macrochilina, f 40	9 Myla
sector of the sector ship of the	

	1	PAGE.	
Macrofon, m		. 487	My
Macropetalichthys, m		. 601	My
Macrostachya f		. 126	My
Macrostylogrinug w	÷.	259	My
Macrostylocrinus, m		105	M
Maarepora	٠	. 190	my
Malocystites, m.	•	. 259	
Mariacrinus, m		. 259	Na
Marracanthus, m		. 601	Na
Marsupiocrinus, m.		. 260	Na
Martinia f		. 352	Na
Mathoria f		488	Ne
Matthenia, f	•	309	Ne
Matthevia, J	•	571	Na
$Mazonia, f \cdot \cdot \cdot \cdot$	•	. 0/1	Ive
Mecolepis, $f \rightarrow \cdots \rightarrow \cdots$	•	. 602	Ne
Meekella, f.		. 353	Ne
Meekopora, f.		. 312	Ne
Megalaspis, f		. 555	Ne
Monalograntug m		195	Ne
Megalograpius, m.	•	199	No
Megalomus, m · · ·	•	. 400	No
Megalopteris, f	•	. 120	INC
Megambonia, f		. 488	Ne
Meganteris		. 353	Ne
Meganhyton n		. 126	Ne
Magantena		489	Ne
Megapiera	•	161	No
Megastroma, n.	•	. 101	37:
Megathentomum, n .		. 579	NI
Megistocrinus, m		. 260	N1
Melia		. 443	Ni
Moloarinus m		. 261	No
Melocifica, no	•	961	No
Meionites, m	•	- 201 EEG	N
Menocephalus, m.		. 550	INC
Merista, f		. 353	NO
Meristella, f		. 353	N1
Maristing f		. 354	NI
Monodmodus m		602	NI
Mesoumouus, m · · ·	•	556	N
Me ^o nacis, $f \cdot \cdot \cdot$	•	. 000	NT.
Mesothyra, f		. 000	INI
Mespilocrinus, m		.261	N
Metarmosaurus, m .		. 623	N
Metontoma f		. 409	N
Metoptoma, j.	-	579	N
Miamia, /	•	106	1.
Michelinia, f	٠	. 190	
Microceras, n.		: 410	
Microevelus, m		. 196	0
Microdiscus, m		. 557	0
Migradoma f		. 410	00
Microcoma, J	•	480	0
Microaon	•	161	in
Microspongia, J.	•	. 101	P No
Millepora	٠	. 190	0
Mitoclema, n		. 313	0
Modiola f.		. 489	0
Modiolongia f		. 489	0
Modioropsis, J		. 401	1 OI
Modiomorpha, J	•	101	0
Mœllerina, f		. 101	
Molgophis, $m \ldots$. 623	0
Monocraterion, n		. 519	0
Monographus m		. 196	0
Monomoralla		354	0
Monomerena, J	•	409	0
Monopteria, J	•	. 402	
Monotis, $f \cdot \cdot \cdot \cdot$	•	. 492	0
Monotrupa		. 196	0
Monotrypella, f.		. 196	0
Montiaulinora f		197	0
Monticulipora, J	•	410	lő
Murchisonia, J.	•	409	10
Myalina, $f \ldots$. 492	10
Myelodactylus, m.		. 261	0
Mycterops, f.		. 602	0
Mulaoria		. 579	0
mynacting, no	•		1 0

				P	AGE.
Ayrianites, m					. 519
Ayrtillocrinus,	m		•	•	. 261
Aytilarca, f.					. 493
Iytilops , f.				•	. 494
Aytilus, m				•	. 494
Vaiadites		•	•	•	. 494
Vatica	•	•	•	•	. 413
Naticopsis, f .			•	•	413
Nautilus, m.	·	•	•	•	• 443
Nebulipora, f .	•	•	•	•	. 198
Necymylacris,	n	•	•	•	. 579
Nelimenia		•	•	•	. 445
Nemagraptus, 7	n	•	•	•	. 198
Nemapodia, f .	·	٠	•	•	. 519
Nemataxis, m .	•	•	·	·	. 313
Nematophycus, n	ι.	•		•	. 127
Nematophyllur	n,	n	•	·	. 127
Nematopora, f	1	*	•	·	. 313
Nematoxylon,	n	·	•	•	127
Nephropteris.	·	•	•	•	510
Nereidavus, m		•	•	•	510
Nereites, m.		•	•	•	· 019
Neriopteris, J.	٠.	y)	•	·	107
Neuropteris, J	ċ	•	•	•	· 127 919
Nicholsonella,	<i>!</i> •	•	•	•	510
Nileus, m		٠	•	·	. 001
Nipterocrinus,	m	•	•	•	. 202
Nodosinella, J	· ·	•	•	•	190
Nœggerathia, J	·	•		•	. 129
Nothodon, m.	·	•		·	. 025
Nothozoe	•	•	•		969
Nucleocrifius.	n	•	,	•	355
Nucleospira, j	•	•	•	·	494
Nucula, j. · ·	•	•	•	•	495
Nuculatia, j .	÷	Ċ		÷	496
Naillinora	•				. 161
Nuttainia		Ċ	÷	÷	557
Nyassa f					. 496
Nyctopora, f.	÷				. 198
rijetopera, j					
OBOLELLA, f .					. 355
Obolellina					. 355
Obolus, m					. 355
Odontocephalus					. 557
Odontochile .					. 557
Odontopteris, <i>j</i>	٠.	•		·	. 129
Odontotrypa, j	ſ.		•	٠	. 313
Oenites, m .	•			٠	. 519
Oestocephalus,	m	ι.			· 023
Ogygia, $f \ldots$	·	•	•	·	. 00/
Oldhamia, f .		•	•	•	. 198
Olenellus, m.		4	•	•	. 001
Olenoides , m .		•	•		- 007
Olenus, m	•	•	•	•	. 000
Oligocarpia, J.	•	•	•	•	963
Oligoporus, m	•	•	•	•	963
Olivanites	•	•	•	•	. 200
Omphalatrach	,		<i>n</i> .	•	413
Omphaiotroch	uß	, '	10 .	•	198
Omphyma, J.	•	•	•	•	602
Onchus	•	•	•	·	. 445
Onvohestor	•	•	•		264
Onvehoerinus		2 ·			. 264
Onvchodus m		•••			. 602
Onbiacodon, m	a .				. 624
- Particouolity in					

Ophileta, f. Opisthoptera. . Oracanthus, m Orbicula Orbiculoidea, f. Orbitulites . Ormathichnus, m Ormoceras, n. Ormoxylon, nOrnithichnites, m. . Orodus, m. Orthacanthus, m Orthis, f. . . Orthisina, f. . Orthoceras, n. Orthodesma, n . Orthogoniopteris, fOrthonema, n Orthonota, f. Orthonotella, f. Orthonychia. Orthopleurodus, m. Orthopora, f. Orthostoma, n Ortonia Oryctoblattina, f. Oryctocephalus, m Ostrea PACHYCRINUS, m Pachydictya, f . Pachylocrinus . . Palæacis, f . . Palæacmæa, f. Palæanatina, f Palæarca. Palæaspis, f Palæaster, m. Palæasterina, f. Palæchinus, m . Palæobatis, m Palæocampa, f Palæocardia, f Palæocaris, f. Palæoconcha, f. Palæochorda, f. Palæocoma, f Palæocrinus, m . Palæocrusia, f. Palæocyclus, m. Palæocystites, m Palæomanon, f. Palæoneilo, f. Palæoniscus, m . . Palæopalæmon, m Palæophycus, n Palæophyllum, n Palæopinna, f Palæopteris Palæosolen, m Palæospongia, f Palceotrochis . . Palæotrochus, m Palæoxyris, f . .

Ø

OPH.—POS.]

OPH.—POS.]

静

ê

INDEX OF GENERA.

PAGE.	PAGE.	PAGE.
Ophileta f 413	Paleschara f 313	Phyllodictya f 315
Opisthoptera 497	Palmacites 131	Phyllograptus m
Orgenthus $m = 603$	Papanka f 500	Phyllopore f 315
Orhimila 958	Pananaga 500	Dhullonomin a 215
Orbiculaidea f	Pantulua	Phylloptonia f 192
Orbitulitas	$\begin{array}{c} \text{Fallylus, } u \\ \text{Dealise} \end{array} $	Displayer and the second secon
Orouulles	Paona, $f \dots $	Physetocrinus, m · · · · 209
Ormathichbus, $m \cdot \cdot \cdot \cdot \cdot 414$	Paracardium, $n = 1.500$	Physonemus, m 606
Ormoceras, $n \ldots 445$	Paracyclas, $f \dots $	Physophycus, n
Ormoxylon, $n = 130$	Paradoxides, $m \cdot \cdot \cdot \cdot \cdot 559$	Physospongia, $f \sim 163$
Ornithichnites, m 624	Pararca, $f \ldots \ldots \ldots 500$	Phytolithus 133
Orodus, $m \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot 603$	Pariotichus, $m \cdot \cdot \cdot \cdot \cdot \cdot \cdot 624$	Phytopsis, $f \ldots \ldots 134$
Orthacanthus, $m \cdot \cdot \cdot \cdot \cdot 604$	Parioxys, m 624	Pileopsis 415
Orthis, $f \ldots \ldots 356$	Parisocrinus	Pileotrypa, $f \dots 315$
Orthisina, $f \dots 360$	Paromylacris, $n \dots 580$	Piliolites
Orthoceras, n	Pasceolus. m	Piloceras. n
Orthodesma, n 497	Patella, f	Pinacotrypa, f
Orthogoniopteris f 130	Pattersonia f 163	Pinne f 502
Orthonema n 414	Peconteris f 131	Pinnatonora 315
Orthonote f 407	Pecten 501	Pinnonnia 509
Orthonotalla f 408	Polion m 694	Dinnularia f 124
Onthomachia 414	Poltodug and 605	Disconinus 920
Orthonychia.	Petrodus, m	Pisocrinus, m 209
Orthopieurodus, $m \cdot \cdot \cdot \cdot 604$	Pettura	Placunopsis, $f \dots 502$
$Orthopora, f \dots $	Pemphigaspis, $f = 560$	Plangtichnus, $m \cdot \cdot \cdot \cdot 580$
$Orthostoma, n \dots 414$	Pentacrinites	Planolites
Ortonia	$Pentagonia, f \dots \dots 360$	<i>Planorbis</i> 415
Oryctoblattina, $f \dots 579$	Pentagonites	Plasmopora, $f \ldots 200$
Oryctocephalus , $m \cdot \cdot \cdot 558$	Pentamerella, $f \ldots 360$	Platephemera, $f \ldots 580$
Ostrea 498	Pentamerus, $m \ldots 361$	Playceras, n 415
•	Pentremites, $m \ldots 267$	Platycrinus, $m \dots 270$
PACHYCRINUS, m 265	Peplorhina, f	Platycystites, m
Pachydictva, f	Pereichocrinus	Platvodus, m 606
Pachylocrinus	Periplectrodus, m 605	Platimotus
Pachuphullum	Peripristis m 605	Platyschisma n
Pachyphyllum n 198	Pernachactae 501	Platysomus m 607
Pachyphynum, π · · · · · 100 Pachypora f 100	Pernopecten m 501	Platvetome n 418
Pachypora, f	Percence f 100	Distustuophia 269
Palmonia f	Petelichang 459	Platystrophia
Palaeacis, J 101	$\begin{array}{c} \text{retainchings, } m \cdot \cdot \cdot \cdot \cdot \cdot 452 \\ \text{Details due } \end{array}$	Plasmopora, J 200
Palæacmæa, J 414	Petalodus, $m \cdot $	Plectambonites
Palæanatina, $f \cdot \cdot \cdot \cdot \cdot 498$	Petalorhynchus, $n \cdot \cdot \cdot 606$	Plectostylus 418
Palæarca 498	Petalotrypa, $f \dots 314$	Plethomytilus, $m \cdot \cdot \cdot \cdot 503$
Palæaspis, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot 604$	Petigopora, $f \cdot \cdot \cdot \cdot \cdot \cdot 314$	Pleuracanthus, $m \cdot \cdot \cdot \cdot 607$
Palæaster, $m \ldots 266$	Petrablattina, $f \dots 580$	Pleurocystites, $m \ldots 272$
Palæasterina, $f \dots 266$	Petraia, f 199	Pleurodictyum, $n \dots 200$
Palæchinus, $m \cdot \cdot \cdot \cdot \cdot \cdot 266$	Petraster, <i>m</i>	Pleuronotus, $m \ldots 419$
Palæobatis, $m \ldots 604$	Petrodus, $m \ldots \ldots 606$	Pleurophorus, m 503
Paleocampa, $f \ldots 573$	Phacelopora, $f \ldots 314$	Pleuroptyx, f 625
Palæocardia, f 498	Phacops, f	Pleurorhynchus 504
Palæocaris, f	Phænopora, f	Pleurotomaria, f 419
Palæoconcha, f 498	Phæthonides, m 560	Plicatula
Palæochorda, f	Phaneropleuron, n	Plumuling f 134
Palæocoma f	Phanerotinus m. 415	Plumulites m
Palmoerinus m 267	$\begin{array}{cccc} Physical f & 202 \\ \end{array}$	Pricescenthus m 607
Palmoarusia f 550	Phophodus m 606	Poosilodna m 607
Palmoenelue m 100	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Policabora f 571
Delesseretites	Phillipsia, J	Poliochera, J
$\mathbf{Faleocystites}, m \cdot \cdot \cdot \cdot 207$	Philipsastrea, J	Polycronues 455
Palæomanon, J 101	Philocrinus	Polyallasma 200
$Palæonello, f \cdot \cdot \cdot \cdot \cdot \cdot 499$	Phlegethontia, $f = 1.624$	Polyernus, $m \dots 580$
Palæoniscus, $m \cdot \cdot \cdot \cdot \cdot \cdot 604$	Pholadella, $f = \dots = 502$	Polygnathus, $m \dots 520$
Palæopalæmon, $m = 559$	Pholadomya 502	Polyphemopsis, $f \cdot \cdot \cdot \cdot \cdot 423$
Palæophycus, n 130	Pholidocidaris, m 269	Polypora, $f \ldots \ldots 315$
Palæophyllum, n 199	Pholidops, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot 362$	Polyporites, m 134
Palæopinna, f 499	Phractopora, $f \cdot \cdot \cdot \cdot \cdot 315$	Polyrhizodus, m 607
Palcopteris	Phragmoceras, n 452	Polyspora
Palæosolen, m 500	Phragmodictya, f 163	Porambonites, m
Palæospongia, f 162	Phragmolites 415	Porcellia, f
Palcotrochis	Phragmostoma n 415	Porites
Palæotrochus, m	Phthanocoris, f	Porocrinus, m
Palzozuris f. 131	Phthonia f 502	Posidonia f
	40:	
	43	

661

80

,1

662

INDEX OF GENERA.

[POS.-SOL.

ŧ

	PAGE.	PA	GE.		PAGE
Posidonomya f	504	Ptuchocripus	276	Saccammina f	164
Poteriorinus m	004	Ptychodoama n	508	Saccarinus, j	070
Proceedium	210 E04	Ptychoresma, n	000	Saccocrinus, m	218
Præcardium, n	004	Ptychonema, n	504	Saccospongia, / "	104
rasopora, j	201	Ptychoparia, J	004	Særichnites, m	• • 453
Prestwichia	561	Prychophyllum , n	201	Sagenaria,	138
Primitia, $f \ldots$		Ptychopteria, f	508	Sagenella, f	321
Prioniodus, m	520	Ptyctodus, $m \dots \dots \dots$	610	Salterella. f	520
Prionotus	201	Ptyonius, $m \ldots \ldots \ldots $	625	Salteria,	566
Prisconaia. f	504	Ptyonodus, m	610	Sandalodus, m	612
Prismopora, f	317	Pugiunculus.	392	Sanguinolaria, f	. 509
Pristicladodus, m	608	Pupa f	424	Sanguinolites, m	509
Pristodus m	608	Pyenomye f	509	Sao	566
Productolle f	369	Pyanomya, j	276	Saportega f	198
Productina, <i>j</i> · · · ·	002	Propostulus, m	000	Saportaa, j	100
Productus, <i>m</i> · · · ·	505	Propostyrus, <i>m</i>	202	Sarcinala, J	· · 200
Proetus, $m \cdot \cdot \cdot \cdot \cdot$	001	Pygopterus, $m \cdot \cdot \cdot \cdot 011-0$	020	Sauripieris,	· · 012
Promacrus, m	504	Pygorhynchus, n	211	Sauropleura, f	625
Promylacris , $n \cdot \cdot \cdot$	580	Pyrenomœus, m ,	509	Sauropus, m	· · 625
Propteticus, m · · ·	581		- 1	Scævogyra, $f \cdot \cdot \cdot$	425
Prorynchus, n	504	Quenstedtia,	202	Scalaripora, f	\$21
Proscorpius,	571			Scalites, m.	425
Protargea f	201	RAMIPORA, f	320	Scaphiocrinus, m.	279
Protaster m	276	Ranicens	625	Scenella, f	392
Protastering	276	Ranhistoma n	494	Scenellopora f	399
Prothunia f	504	Destritos m	202	Scentrophy f	022
Protingens, J	004	Des Calle f	169	Sceptropora, J	970
Froticanites, <i>m</i>	002	Raunella, J	100	Schlashlaster .	· · 0/0
Protoblechnum, n .	134	Receptaculites, m	103	Schizoblastus, m	281
Protocaris, f	563	Remopleurides, m	565	Schizobolus, m .	370
Protocrisina , $f \cdot \cdot \cdot$	317	Rensselæria , $f \cdot \cdot \cdot \cdot \cdot$	366	Schizocrania, f	371
Protocyathus, m	163	Reptaria, f.	320	Schizocrinus, m	281
Protograptus, m	201	Retepora, f	320	Schizodus, m	510
Protolimulus, m	563	Reteporina, f	320	Schizodiscus, m	566
Protomys f	505	Retiocrinus m	277	Schizopteris	138
Protoscolar m	520	Retiograntus m	202	Schenaster m	281
Protospongia f	162	Potiolitos m	202	Schutzia f	130
Protospongia, /	195	Retiontes, m	202	Schutzta, J	107
Protostigma, J	100	Retzia, J	104	Scollaborna, n	· · 420
Prototaxites, m	130	Rhabdaria, J	104	Scontnus, m	020
Prototypus, m	563	Rhabdichnites,	566	Scolopendrites, m	. 7. 139
Proutella, $f \ldots$	318	Rhabdocarpus, m	136	Scyphia,	164
Psammodus, m	608	Rhachiopteris , f	137	Scyphocrinus, m	281
Psaronius, m	135	Rhachitomus, m	625	Scytalocrinus,	281
Psephodus, m	610	Rhachura, f	566	Sedgwickia, f	511
Pseudocrania, f	366	Rhacophyllum, n	137	Selaginites, m.	139
Pseudomonotis, f	505	Rhadinichthys, m	611	Selenoides.	164
Pseudoneconter s f	135	Rhinidictya f	320	Selenopora f	322
Pandophorus m	494	Phinipore f	321	Semicoscinium n	392
Prilophorus, m	190	Dhinoconic f	566	Sentenore f	999
Pshophyton, n	130	Rhinocaris, J.	000	Septopora, j	022
Pterichthys, m	610	Rhizodus, m	011	Serpula, J	021
Pterinea, $f \cdot \cdot \cdot \cdot$	· · 505	Knizograptus, m	202	Serpuntes, m	· · 021
Pterinopecten, m	507	Rhizolithes,	138	Shumardia, f	000
Pterocephalia, f	564	Rhizomopteris, f	138	Sicarius,	612
Pteronautilus, m	453	Rhizomorpha, $f \cdot \cdot \cdot \cdot$	138	Sidemina,	453
Pteronitella, f	507	Rhodocrinus, m	277	Sigillaria, f	139
Pteronites. m	507	Rhombodictyon, n	164	Sigillarioides, m	141
Pteropora.	318	Rhombopora, f	321	Sigillariostrobus, m	141
Pterotheca f	392	Rhonalonaria f	321	Siphonia.	164
Pterotogrinug m	276	Rhynchodus m	611	Siphonocrinus m	281
Ptomucoting m	564	Phynchonolla f	367	Sinhonotrete f	371
Dialogamous, 77	190	Phamahoming	370	Skenidium a	971
Tutocarpus, m	130	Rhynchospira,	970	Swithin f	3/1
Futionella,	318	Rhynchotreta, f	370	Smuna, J	203
Pulodictya, f	318	Knynobolus,	370	Solenocaris, f	007
Ptilograptus, m	201	Ribeiria, f.	566	Solarium,	42 5
Ptilonaster,	276	Rinodus,	612	Solemya,	512
Ptilophyton.	136	Romingeria, f	203	Solen, m	512
Ptilopora, f	319	Rotalia, f	164	Soleniscus. m	425
Ptiloporella f	. 319	Rotella, f	425	Solenocaris.	566
Ptiloporine f	310	Rotularia	138	Solenochilus n	453
Ptilotrypa	200	Resichnites m	566	Solenomya f	. 519
Displaypa, J	020	Description and a second second	199	Solononlourne f	567
rtychaspis, J	004	Rusophycus, n	199	solenopieura, J · · ·	007

SOL.-UNG.]

Solenopsis, f .
Solenoula, f
Sorocladus, m
Spathella, f
Spathiocaris f
Spatiopora f
Sphærevogbug
Sphærezonnus, m
Spharocoryphe, J
Spharocrinus,
Sphærocystites, m
Sphærolites, m
Sphagodus,
Sphenacodon, m.
Sphenolium, n
Sphenophyllum, n
Sphenopteris, f
Sphenopterium.
Sphenothallus m
Sphenotus m
Spheropezium m
Sphragionura f
Spirangium .
Spirifore f
Spiniforing
Spiriterina, J.
Spirigera,
Spirodomus, m
Spirophyton, n
Spirorbis, m
Spirula,
Spongia,
Sporangites, m
Sporocystis, m
Squamaster.
Stanbalante
Dui DUVIONIAPIG 7
Staurocephaliter
Staurocephalites, m Staurographics, m
Staurocephalites, m Staurograptus, m .
Staurograptus, m Staurograptus, m Steganocrinus, m
Staurocephalites, m Staurograptus, m Steganocrinus, m Stellipora, f
Staurograptus, m Staurograptus, m Steganocrinus, m Stellipora, f Stemmatocrinus, m
Staurocephälites, m Staurograptus, m Steganocrinus, m Stellipora, f Stemmatocrinus, m
Staurographiles, m Staurographiles, m Steganocrinus, m Stellipora, f Stemmatocrinus, m Stemmatodus, m Stemmatopteris, f
Staurograptus, m Staurograptus, m Steganocrinus, m Stellipora, f Stemmatocrinus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m
Staurograptus, m Staurograptus, m Steganocrinus, m Stellipora, f Stemmatocrinus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m
Staurograptus, m Staurograptus, m Staurograptus, m Steganocrinus, m Stellipora, f Stemmatocrinus, m Stemmatopteris, f Stemacanthus, m Stenaster, m Stenocrinus,
Staurographiers, f Staurographiers, m Staurographier, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemacanthus, m Stenacanthus, m Stenacarthus, m Stenacarthus, f
Staurographilites, m Staurographilites, m Staurographilites, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stematopteris, f Stenacanthus, m Stenaster, m Stenocrinus, Stenopora, f Stenopterodus, m
Staurograptus, m Staurograptus, m Staurograptus, m Steganocrinus, m Stellipora, f Stemmatocrinus, m Stemmatopteris, f Stenacanthus, m Stenacarthus, m Stenocrinus, Stenopora, f Stenopterodus, m Stenopterodus, m
Staurographilites, m Staurographilites, m Staurographilites, m Steganocrinus, m Stellipora, f Stemmatocrinus, m Stemmatopteris, f Stenacanthus, m Stenaster, m Stenopora, f Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenopterodus, m
Staurograptus, m Staurograptus, m Staurograptus, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenacter, m Stenopora, f Stenopora, f Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenotheca, f
Staurographilites, m Staurographilites, m Staurographilites, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stematopteris, f Stenacanthus, m Stenaster, m Stenopra, f Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenopterodus, m
Staurographilites, m Staurographilites, m Staurographilites, m Steganocrinus, m Steflipora, f Stemmatopteris, f Stemmatopteris, f Stenacanthus, m Stenacanthus, m Stenopora, f Stenopora, n Stenopterodus, m Stenoschisma, n Stenotheca, f Stephanocrinus, m Stereocrinus, m Stereocrinus, m
Staurographiles, m Staurographiles, m Staurographiles, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenacanthus, m Stenopterious, m Stenopterodus, m Stenopterodus, m Stenochisma, n Stenotheca, f Steropterodus, m Sterocrinus, m Sterocrinus, m Sterocrinus, m
Staurographiers, f Staurographiers, f Staurographiers, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenacanthus, m Stenopora, f Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenotheca, f Sterobergia, f Sterobergia, f Stictopora, f
Staurographilites, m Staurographilites, m Staurographilites, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenaster, m Stenopra, f Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenobeca, f Stephanocrinus, m Sterobergia, f Stictopora, f Stictoporella, f
Staurograptus, m Staurograptus, m Staurograptus, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenaster, m Stenopora, f Stenopora, f Stenopterodus, m Stenoschisma, n Stenotheca, f Stephanocrinus, m Stereocrinus, m Stereocrinus, m Stereocrinus, m Stereocrinus, m Stereocrinus, m Stereocrinus, m Stereocrinus, m Stereocrinus, m Stereocrinus, m
Staurographies, m Staurographies, m Staurographies, m Steganocrinus, m Stellipora, f Stemmatous, m Stemmatous, m Stemmatous, m Stematopteris, f Stenacanthus, m Stenacanthus, m Stenopora, f Stenopora, f Stenopterodus, m Stenobeca, f Stenobeca, f Sterobergia, f Stictopora, f Stictopora, f Stictopora, f Stictoprypa, Stigmaria, f
Staurographiers, f Staurographiers, f Staurographiers, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenacanthus, m Stenopora, f Stenopora, f Stenopterodus, m Stenopora, f Sterobergia, f Sterobergia, f Stictoporal, f Stigmario, f
Staurographilites, m Staurographilites, m Staurographilites, m Steganocrinus, m Steflipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenaster, m Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenobeca, f Stephanocrinus, m Sternbergia, f Stictopora, f Stictopora, f Stictoprogeneration Stictoprogeneration Stictoprogeneration Stictoprogeneration Stictoporal, f Stictoporal, f
Staurographilies, m Staurographilies, m Staurographilies, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenaster, m Stenopora, f Stenopora, f Stenopterodus, m Stenotheca, f Stephanocrinus, m Sterobergia, f Sterobergia, f Stictopora, f Stictoporella, f Stictotypa, Stigmaria, f Stigmarioides, m Stematopora, f
Staurograptiles, m Staurograptiles, m Staurograptiles, m Steganocrinus, m Steflipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenaster, m Stenopora, f Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenotheca, f Stenotheca, f Sterobergia, f Sterobergia, f Stictopora, f Stictopora, f Stigmaria f Stigmarioides, m Stomatopora, f Staparollus, m
Staurographies, m Staurographies, m Staurographies, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatodus, m Stematopteris, f Stenacanthus, m Stenopora, f Stenopora, f Stenopterodus, m Stenopora, f Sterobergia, f Sterobergia, f Stictoporal, f Stictoporal, f Stictopora, f Stigmarioides, m Stomatopora, f Straparollina, f Straparollus, m
Staurographilies, m Staurographilies, m Staurographilies, m Steganocrinus, m Steflipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenaster, m Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenoberodus, m Stenobeca, f Stephanocrinus, m Sterobergia, f Stictopora, f Straparollina, f Straparollus, m Streblopteria, f
Staurographilites, m Staurographilites, m Staurographilites, m Steganocrinus, m Steflipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenaster, m Stenopora, f Stenopora, f Stenopora, f Stenoblerodus, m Stenoblerodus, m Stenoblerodus, m Sterobergia, f Stictopora, f Stictopora, f Stictopora, f Stictopora, f Stictopora, f Stictopora, f Stictopora, f Straparollina, f Straparollus, m Streblopteria, f Streblopteria, f
Staphylopteris, f Staurocephalites, m Staurograptus, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenacanthus, m Stenacanthus, m Stenopora, f Stenopterodus, m Stenopterodus, m Stenobeca, f Stenotheca, f Sternbergia, f Stictopora, f Stictopora, f Stictopora, f Stigmaria, f Stigmarioides, m Staparollina, f Straparollus, m Streblopteria, f Streblotrypa, f Strephocheus, m
Staphylopteris, f Staurocephalites, m Staurograptus, m Steganocrinus, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatodus, m Stemmatodus, m Stenacanthus, m Stenacanthus, m Stenopora, f Stenopterodus, m Stenopterodus, m Stenobterodus, m Stenobteca, f Sterobergia, f Stictoporal, f Stictoporal, f Stictoporal, f Stictopora, f Stigmarioides, m Stomatopora, f Straparollina, f Strephodes, m Strephodes, m
Staurographilites, m Staurographilites, m Staurographilites, m Steganocrinus, m Steflipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenaster, m Stenopterodus, m Stenopterodus, m Stenopterodus, m Stenoberodus, m Stenoberodus, m Stenoberodus, m Sterobergia, f Stictopora, f Straparollina, f Straparollus, m Strephochetus, m Strephodes, m Strephodes, m Strephodes, m
Staphylopteris, f Staurocephalites, m Staurograptus, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenaster, m Stenaster, m Stenopora, f Stenopora, f Stenopterodus, m Stenobeca, f Sterobergia, f Stictopora, f Straparollina, m Straparollina, m Streblopteria, f Streblopteria, f Strephodes, m Streptelasma, n Streptelasma, n
Staphylopteris, f Staurocephalites, m Staurograptus, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatodus, m Stemmatopteris, f Stenacanthus, m Stenacanthus, m Stenacanthus, m Stenopora, f Stenopterodus, m Stenopterodus, m Stenobeca, f Steobheca, f Stecobregia, f Stictopora, f Stictopora, f Stictopora, f Stictopora, f Stictopora, f Stigmaria, f Straparollina, m Strephochetus, m Strephochetus, m Strephochetus, m Strephoches, Stephasia, n Strephoches, m Streptaxis, m
Staphylopteris, f Staurocephalites, m Staurograptus, m Steganocrinus, m Steganocrinus, m Stellipora, f Stemmatodus, m Stemmatodus, m Stemmatodus, m Stemmatodus, m Stemmatodus, m Stenacanthus, m Stenacanthus, m Stenopora, f Stenopora, f Stenopterodus, m Stenobteca, f Sterobergia, f Stictoporalla, f Stictoporalla, f Stictopora, f Stigmarioides, m Stomatopora, f Straparollina, f Straparollus, m Strephochetus, m Strephochetus, m Strephochetus, m Streptalas, m Streptalas, m Strephochetus, m Streptalas, m Streptalas, m Streptoceras, n Streptoceras, n Streptoceras, n

SOL.-UNG.]

INDEX OF GENERA.



P

PAGE.	PAGE.		PAGE.
Solonopsis f 519	Stroptogolon m 165	The Histian a	207
Solenopsis, J	Streptosolen, m · · · · 100	I naussigma, n	. 321
Solenoula, $f \ldots \ldots \ldots \ldots \ldots 141$	Streptospongia, f 165	Thampiscus, m ⁴ ,	. 327
Sorocladus m 141	Strigtopore f - 205	Thempodiature f	188
Speetly lle f	Striatopora, J	mainfourciya, j	100
Spatnena, $j = \dots = 0.013$	Stricklandia,	Thamnograptus, m	. 207
Spathiocaris, $f \ldots 567$	Stricklandinia, f 379	Thamnopora, f	. 328
Spationora f 323	Strigilling 612	Themnotrypu f	298
Spheropola, J		Thanhotrypa, j	. 020
Sphærexochus, $m = 507$	Strobhocystites, m 283	Theca, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot$. 393
Sphærocoryphe, $f =, 567$	Strobilospongia,	Thecia, f	. 207 -
Spherocrinus - 282	Strobilue 146	Thecosterites m	907
Sahumaanatitaa	Strought in the second se	Theostegites, m	. 201
Sphærocystites, m	Stromatocerium, n 165	Inenar opus, <i>m</i>	. 626
Sphærolites, m	Stromatopora, f 165	Theropleura, f	. 626
Sphagodus 521	Strombodes m 905	Thorseodus m	613
Sphangaadan	Stronbolcos, m	Thoracourds, m	. 010
Sphenacodon, $m \cdot $	Strophalosia, J	Inrinacodus, m	. 613
Sphenolium, $n \ldots 513$	Strophites, $m \ldots 427$	Thyrsidium, $n \ldots \ldots$. 626
Sphenophyllum $n = 141$	Strophodonta f 379	Thysenocrinus m	286
Sphonoptonia (14)	Strophonoch 6	Thy sanocindus, m	- 200
sphenopteris, J 142	strophomena, J 381	Titanophasma, f	. 981
Sphenopterium, 164	Strophonella, f	Tomodus, m	. 613
Sphenothallus m 143	Strophostylus m 427	Trachomatichnus m	454
Sphonotus m 519	Strophostyrus, m	Trachomaticinus, m.	. 101
ophenotus, <i>m</i>	Strotoermus, m	rachydomia, n	. 428
Spheropezium, $n \ldots 626$	Strotopora, f	Trachypora, f	. 207
Sphragiopora, f	Stylastrea, f	Trachyum n	166
Spirangium n 144	Stulifon 407	Thomas an atom	400
Spirangium, $n \cdot \cdot \cdot \cdot \cdot \cdot 144$	$Siyiijer, \ldots 421$	Tremanotus , $m \cdot \cdot \cdot \cdot$. 428
Spirifera, $f \dots $	Styliola, $f \ldots \ldots 392$	Tremataster, m	. 286
Spiriferina, f	Stylonurus m 568	Trematella f	328
Spirigera 377	Subretenore f 296	Tromatic f	905
	Subretepora, J	Trematis, J	. 380
Spirodomus, $m \cdot \cdot \cdot \cdot \cdot 514$	Subulites, $m \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot 427$	Trematoceras, n	454
Spirophyton, n 144	Sulcopora, f	Trematocrinus.	. 287
Spirorbis m 521	Symphylurus m 568	Trematodiacua	455
Spinolo Maria AFA	Symphyturus, m	Trematouiscus, m	. 400
Spirula, 404	Synoathocrinus, m	Trematopora, <i>f</i>	. 328
Spongia, \ldots \ldots \ldots 165	Synocladia, $f \dots 326$	Trematospira , f	. 385
Sporangites, m	Syntrielasma, n	Treptichnus m	581
Sporocystia m 144	Syringoorinus m 285	Triagning	. 001
Sporocysus, m	Syringoerinus, <i>m</i>	Trucrinus,	. 201
Squamaster,	Syringodendron, $n \dots 146$	Triarthrella, f	. 568
Staphylopteris, $f \ldots 144$	Syringolites, $m \cdot \ldots \cdot 205$	Triarthrus, m	. 568
Staurocephalites, m	Suringophyllum 166	Trichinlus m	573
Staurograptus m 202	Syringopore f 206	Thickense iter	147
Staurograpius, m 200	Syringopora, J 200	Trichomanites, m	. 14/
Steganocrinus, $m \cdot \ldots \cdot 282$	Syringostroma, $n \dots 166$	Trichophycus, $n \cdot \cdot \cdot$. 147
Stellipora , f 203	Syringoth vris, $f \dots 384$	Trichospongia, f	. 166
Stemmatocrinus m 282	Syringoxylon n 146	Tricologrinus m	987
Stemmetodus m 619	offingoal fion, it is in 110	This and a second secon	147
Stemmatouus, m · · · · · 012		1 rigonocarpum, n	. 14/
Stemmatopteris, J 144	TENIASTER, m	Trigonodus, m	. 613
Stenacanthus, $m \ldots 612$	Tæniodictva, f	Trigonotreta, f	. 386
Stenaster m 282	Teniodus m 612	Trimorollo	286
Stanominus 000	Territordus, m	Trimerena, J	. 300
Stenocrinus,	Tæniophyllum, $n \ldots 146$	Trimerorhachis, f	. 626
Stenopora, $f \cdot \cdot \cdot \cdot \cdot \cdot \cdot 203$	Tæniopora, $f \ldots 327$	Trimerus,	. 568
Stenopterodus, m 612	Tæniopteris, f	Trinucleus m	568
Stenoschisma n 977	Talarogrinus m 995	Triphylloptonia f	149
Stonothese f	$\mathbf{Tataroermus}, m \cdot \cdot \cdot 200$	Triphynopteris, J	. 140
Stenotneca, J	Tanaodus, $m \cdot $	$\mathbf{Triplesia}, f \dots$. 387
Stephanocrinus, m 283	Taonurus, $m \cdot \cdot \cdot \cdot \cdot \cdot \cdot 146$	Trochita, f	. 428
Stereocrinus, m	Taxocrinus m 285	Trochoceres n	455
Sternhorgia f 145	Tuabnoarinua m 905	The shalltes	. 100
Ottobergia, J	1	rochontes, m	. 400
Suctopora, f	Technophorus, $m =$	Trochonema, n	. 428
Stictoporella, f	Teleiocrinus, m	Trochophyllum, n	. 207
Stictotrupa 325	Telephus m 568	Trochus	498
Stigmonia f 145		<i>Trockus</i> ,	. 120
Sugmaria, J 140	<i>Teuna</i> ,	Troostocrinus , <i>m</i>	. 287
Stigmarioides, $m \cdot \cdot \cdot \cdot 145$	Tellinomya, $f \ldots 514$	Tropidoleptus , m	. 387
Stomatopora, f	Tellinopsis, f	Tropidopora f	329
Stranarolling f 498	Tempochilus m 454	Trublidium	490
Straparollus 120		ryonalum, n	. 429
Suraparonus, m 426	Tentaculites, m	Tuberculopora,	. 329
Streblopteria, $f \dots 514$	Terataspis, f	Tubipora, f	. 207
Streblotrypa, f	Teratichnus, m 454	Tuditanus m	626
Strephochetus	Torobratula f 004	Turke	. 020
Strephoenetus, m 160	Terebratula, J	1 urbo, m	. 429
Strephodes,	Tereoratulites,	Turbonilla,	. 429
Streptaxis, m	Termes, m	Turrilepas. m	. 569
Streptelasma, n 204	Tetradium n 208	Territella f	490
Strontogorga at 454	Totragraptus	runnena, j · · · · ·	. 420
Streptoceras, n 404	10 magraphus, m 206		
Strobilepis, f 468	Textularia, 166	ULODENDRON, n	. 148
Streptorhynchus, $n \dots 378$	Thaleops, $f \ldots \ldots \ldots \ldots 568$	Ungulina.	. 515

INDEX OF GENERA.

UNI.-ZYG.

11144						
				*	1	PAGE.
Unio,	 Р/	515 329	Vitulina, f PAGEVitulina, f Xolkmannia, m 148Xystrodus, m	:	:	· 614 · 614
Unitrypa, Uphantænia, f	 	166	WAICHIA, f			. 516
VALVULINA, f · · · Vanuxemia, f · · · Vasocrinus, m · · ·		. 515 . 287	Waldheimia, f			· 208 · 430
Vaticinodus, <i>an</i>	:	. 516 . 613	XENOCRINUS, m 287 Zatrachys, n 287 Zeacrinus, m 581 Zittelella, f 581	•		. 288
Vermipora, f Vertumnia, f <i>Vesicularia</i> , f		. 207 . 516 . 208	Xenoneura, f			. 430 . 388

FIRS

As THIS work was ical and palæontologic has been urged that bringing about correct

This criticism may mispronounced, and a of these.

Words ending in c Orthoc'eras, Cyrtoc'era Monticulip'ora, Leptoj have the i long and Favosi'tes, Litui'tes, T accent on the penult, We say Ath'yris, Cari as'pis, and Syringoth'y

I have seen no real rocks as set forth in th be some who apply the to the Devonian. It s some use it for that rea

VEG

THERE have been v work.

- BYTHOTREPHIS pergracili Trans. Roy. Soc. Can Taconic.
- Cruziana carleyi, James, 11 Nat. Hist., vol. 7, p. nized.
- DACTYLOIDES bulbosus, Ha N. Y. St. Mus. Nat. 1 scure markings supp marine algæ, graptoli spongoid substance. DICRANOPHYLLUM. Type LEPIDODENDRON cliftonen
- Bull. G. S. A., vol. 2, murrayanum, Dawson, 1 vol. 2, p. 532, Coal Me

664



FIRST APPENDIX, 1892.

As THIS work was intended for the use of beginners in the pursuit of geological and paleontological information, as well as for the most advanced students, it has been urged that I should have accented the technical words, with a view of bringing about correct and uniform pronunciation.

This criticism may be well taken, but there are only a few words commonly mispronounced, and a few examples will suffice to correct the pronunciation of most of these.

Words ending in ceras, crinus, pora, and lepis are accented on the antepenult, as Orthoc'eras, Cyrtoc'eras, Gomphoc'eras, Actinoc'rinus, Xenoc'rinus, Platyc'rinus, Monticulip'ora, Leptop'ora, Chirol'epis, Bothriol'epis, etc. Words ending in ites have the i long and the accent on the penult, as Cypricardi'tes, Dalmani'tes, Favosi'tes, Litui'tes, Trocholi'tes, etc. Words ending in nema, mena, etc., have the accent on the penult, as Cyclone'ma, Loxone'ma, Strophome'na, Calyme'ne, etc. We say Ath'yris, Cari'na, Cerat'odus, Cœlentera'ta, Epithe'ca, Onych'odus, Palæas'pis, and Syringoth'yris.

I have seen no reason to change the established nomenclature of the Groups of rocks as set forth in the geological part of this work, notwithstanding there may be some who apply the word Cambrian to rocks indiscriminately from the Taconic to the Devonian. It seems to be a word that is easily pasted over ignorance, and some use it for that reason.

VEGETABLE KINGDOM.

THERE have been very few fossil plants described since the publication of this work.

- BYTHOTREPHIS pergracilis, Dawson, 1889, Trans. Roy. Soc. Can., vol. 7, p. 54, Up. Taconic.
- Cruziana carleyi, James, 1885, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 155. Not recognized.
- DACTYLOIDES bulbosus, Hall, 1886, 39th Rer. N. Y. St. Mus. Nat. Hist., p. 160. Ob-scure markings supposed to represent marine algae, graptolites, or traces of a spongoid substance.

Bull. G. S. A., vol. 2, p. 53 murrayanum, Dawson, 1891, circle³. S. A., vol. 2, p. 532, Coal Meas.

Nematophyllum was preoccupied by McCoy for a genus of corals in 1851, and hence sould not be used again by Fontaine & White as a generic name. I now propose for Nematophyllum of Fontaine & White in Permian or Upper Carboniferous Flora of West Virginia and S. W. Pennsylvania, p. 35, the generic name Nematophyllites with N. angustus, Fon-taine & White as the type.

- RUSOPHYCUS, from its etymology, should be spelled Rhysophycus.
 - acadicum, Dawson, 1861 (Rusichnites acadicus), Can. Nat. and Geol., vol. 1, p. 363, and Acad. Geol., p. 410, Coal Meas.

- carbonarium, Dawson, 1868 (Rusichnites carbonarius), Acad. Geol., p. 257, Carboniferous.
- clintonense, Dawson, 1890 (Rusichnites clintonensis), Quar. Jour. Geol. Soc., vol. 46, p. 598, Clinton Gr.
- grenvillense, Dawson, 1890 (Rusichnites grenvillensis), Quar. Jour. Geol. Soc., vol. 46, p. 598, Up. Taconic.
- SPHENOPHYLLUM vetustum, Newberry, 1889, Jour. Cin. Soc. Nat. Hist., vol. 12, p. 55, Up. Held. Gr.

SPHENOPTERIS salisburyi, Lesquereux, 1887,

SPH.-ACT.

Franklin Soc. Rep. on R. I., p. 69, Coal Meas.

- SPIRAXIS, Newberry, 1884, Ann. N. Y. Acad. Sci., vol. 3, p. 217. An elongated spiral cast, supposed to represent a fucoid. Type S. major. Another species, S. randalli, is also described. Both from the Chemung Gr.
- TRIGONOCARPUM ambiguum, Lesquereux, 1890, Dict. of Foss. Pa., vol. 3, p. 1213, Coal Meas.
- VOLKMANNIA brevistachys, Lesquereux, 1890, Dict. of Foss. Pa., vol. 3, p. 1253, Coal Meas.

TANIMAL KINGDOM.

PROTOZOA.

SUBKINGDOM PROTOZOA.

THE animals of this Subkingdom are supposed to have consisted of protoplasm, in a cell or cells, capable of secreting an outer wall, but without hardened tissues or alimentary organs. I arrange the paleozoic sponges in this Subkingdom and in the Class Porifera, because I see no reason to suppose such forms as Pattersonia, Dystactospongia, Archæocyathus, Strephochetus, etc., were any more highly developed than Rhizopoda. It may be part of the Class has shown such variation and development as to point to a higher organization, which is in accordance with all intelligent views of evolution, but I see no evidence to warrant raising the Class to the rank of a Subkingdom in the animal scale, as some have done. In any view presented by those who claim that the Porifera occupy a place between Protozoa and Cælenterata, I discover no ground for raising it to the rank of a Subkingdom, if any regular grade is to be maintained, in the classification of animals.

ERRATA.-For family "Leptonitide," on page 153, read "Family Leptomitidæ.-Leptomitus," and strike "Leptomitus" from those enumerated under "Family Affinity Uncertain." On page 161 change the specific names under Palaacis to the feminine gender.

ACANTHODICTYA, Hinde, 1889, Trans. Roy. Soc. Can., vol. 7, p. 47. [Ety. *akantha*, a spine; *dictuon*, net.] Subcylindrical, skeletal mesh-work of longitudinal and transverse spicular strands or fibres; longitudinal strands composed of somewhat loosely arranged facicles of elon-gated overlapping spineles, and the spicules of the slender transverse fibres are, as a rule, disposed in a single series. From the outer surface of the sponge, numerous spicular rays project outward at right angles. Anchored, probably, by a basal prolongation of the longitudinal strands. Some of the elongated longitudinal spicules are cruciform, and their transverse rays form the cross fibres. The general structure resembles Cyathospongia, but is characterized/ by the presence of the projecting surface rays. Type A. hispida, described in the same place, from Upper Taconic rocks.

- Actinodictya placenta, Hall, 1892, 9th Ann. Rep. State Geologist, p. 59, Chemung Gr. Not entitled to recognition for want of illustration.
- ACTINOSTROMA fenestratum, Nicholson, 1889, Monog. Brit. Stromatoporoids, p. 146, and A. tyrrelli, 1891, Ann. and Mag. Nat. Hist., vol. 7, p. 317, Devonian. Biopella, Wallace, 1878, Am. Jour. Sci., vol.
 - 115. p. 369. [Ety. bios, life; palla, a ba Founded upon very imperfect an ertain material from the geodes kuk Group, with the state-"there is uncertainty as to of mei uction of species." and yet B. the

CID.-LAS.]

keokuk, B. grandis mani, B. hæcklei, 1 B. palmata are nai acterless descripti tion. CIDAROSPONGIA, Gurl

- Foss. Bull., No. 2 spherical bodies, v base, full hemisp which, along the divided into twel regular in size and half the distance the center of the c come obsolete, lea depressed, central diameter is about body. The top o tured by two wellings, which are si and at the margi cular area. Durin becomes elevated, portion becomes from the flattened of the dome. Th somewhat irregul centric lines of gro low the dome, are Type C. ella. De
- place, from the Co CRYPTOZOON steeli, Bra Bull. Am. Mus. N Calciferous Gr.
- Cryptodictya alleni, Hal State Geologist, p. entitled to recognit tration.

CUCUMULITES, Gurley, 1 Bull., No. 2, p. 2 thin, punctate, elc which is slightly ing; being closed larger extremity an with a well-defin opening at the sma face ornamented l merous pointed ele which along the ce shell become arrai rows, breaking up a lar in crossing the and toward the sma



FIG. 1195. — Cyclo-spongia discus. Lower side.

CYCLOSPONGIA, S. A. M Sheets 17th Rep. p. 5. [Ety. kuklos

C. tuberculatus. D

CID.-LAS.]

1

)r

10

e.

nd

ıll

to

W

ıd

ay

ni-

er

æ-

ro

la.

er

ın.

Ъr.

of 89,

46.

ag.

rol.

я

ect

des

iteto

B.

keokuk, B. grandis, B. wortheni, B. woodmani, B. hæcklei, B. hyatti, B. alicei, and B. palmata are named, with almost characterless descriptions, without illustration.

- CIDAROSPONGIA, Gurley, 1884, New Carb. Foss. Bull., No. 2, p. 4. Round hemi-spherical bodies, with flattened irregular base, full hemispherical top or dome. which, along the margin, is distinctly divided into twelve lobes, being quite regular in size and extending fully onehalf the distance from the margin to the center of the dome, where they become obsolete, leaving a smooth, slightly depressed, central, circular area, whose diameter is about one-half that of the body. The top of the dome is punctured by two well-defined circular openings, which are situated close together, and at the margin of the smooth circular area. During growth the dome becomes elevated, and a lower or basal portion becomes developed, extending from the flattened base to the margin of the dome. This lower portion is somewhat irregularly marked by concentric lines of growth. The sides, below the dome, are moderately straight. Type C. ella. Described at the same place, from the Coal Meas.
- CRYPTOZOON steeli, Brainard & Seely, 1890. Bull. Am. Mus. Nat. Hist., vol. 3, p. 6, Calciferous Gr.
- Cryptodictya alleni, Hall, 1892, 9th Ann. Rep. State Geologist, p. 60, Chemung Gr. Not entitled to recognition for want of illustration.
- CUCUMULITES, Gurley, 1884, New Carb. Foss. Bull., No. 2, p. 2. Body consisting of a thin, punctate, elongate, tubular shell, which is slightly arcuate and expanding; being closed and rounded at the larger extremity and somewhat pointed, with a well-defined terminal or oral opening at the smaller extremity. Surface ornamented by more or less numerous pointed elevations or tubercules, which along the central portion of the shell become arranged in longitudinal rows, breaking up and becoming irregular in crossing the larger rounded end and toward the smaller extremity. Type O. tuberculatus. Described at the same

place with C. tricarinatus from the Warsaw Group.

Saw Cyathophycus siluriana, Tames. Too poorly defined to be recognized.

CYATHOSPONGIA quebecensis, Dawson & Hinde, 1889, Trans. Cyclo-Roy. Soc. Can., vol.

7, p. 44, Up. Taconic. CYCLOSPONGIA, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Indiana, p. 5. [Ety. kuklos, a circle; spongia,

sponge.] Sponge, circular, button-shaped or discoid, and consisting of numerous thin, calcareous laminæ, having a concentric structure and filled with minute canals or interstices. The structure has some resemblance to that of Strephochetus richmondense, but the laminæ are much thinner, and the interlaminar spaces are

much less marked. and no vertical tubes have been found within them. That was a free sponge; this one is supposed to have been attached to some other object. Type C. discus. Described in the same Fig. 1196. - Cyclo-



place, from the Upper Helderberg Gr.

spongia discus. Upper side.

- Dictyophyton amalthea, D. halli, D. randalli, D. sceptrum, D. scitum, D. tomaculum, D. vascellum, Hall, 1892, 9th Rep. State Geologist, N. Y., pp. 56 to 58, Chemung Gr. Such descriptions, without illus-trations, are not entitled to recognition.
- HALICHONDRITES, Dawson, 1889, Trans. Roy. Soc. Can., vol. 7, p. 52. Oval or irreg-ular masses of small simple spicules, imbedded in patches of pyrite, and, without any definite arrangement or root, spicules may indicate the presence of a halichondroid sponge. In the best preserved specimens the spicules appear to be biacerate and more slender and pointed than in Lasiothrix, and they seem to be in two series, inclined at a very oblique angle to each other. In some specimens elongated spaces, with well-defined margins, are covered with thin films of pyrites, which may have resulted from the replacement or incrustation of a mass of minute spicules, of which traces remain in some places. He observed that sponges having originally much keratose or other dense animal matter, would naturally aggregate in and around themselves a greater quantity of pyrite than those of a more purely siliceous character. Type H. confusus. Named at the same place, from the Upper Taconic.
- Hyalostelia metissica, Hinde, 1889, Trans. Roy. Soc. Can., vol. 7, p. 49, Up. Ta-conic. Founded upon a confused mass of supposed spicules.
- LASIOTHEIX, Hinde, 1889, Trans. Roy. Soc. Can., vol. 7, p. 50: [Ety. lasios, shaggy; thrix, hair.] Sponge small, depressed oval in outline, the outer surface cov-ered by a layer of longitudinally arranged, apparently simple, acerate spicules; beneath this is another layer of spicules disposed transversely. From the base of the sponge several simple elongated spicules extend. Type L. curvicostata. Described in the same place, from the Upper Taconic. L. curvicostata. flabellata is also described.



1195. ig. 1195. — Cyclo-spongia discus. Lower side.

CŒLENTERATA.

- PALEACIS cavernosa, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 4, Waverly Gr.
- PROTOSPONGIA coronata, P. cyathiformis, P. delicatula, P. mononema, P. polynema, and P. tetranema, Dawson & Hinde, 1889, Trans. Roy. Soc. Can., vol., 7, pp.
- 37 to 43, Up. Taconic. Ptychostylus, Gurley, 1884. The name was preoccupied by Gabb in 1865.
- RECEPTACULITES elrodi, S. A. Miller, 1892, Advance Sheets of 18th Rep. Geo. Sur. Ind., p. 3, Up. Held. Gr.

- Rhombodictyon globosus, James. Too poorly defined to be recognized.
- Spirocyathus, Hinde. Synonym for Archæocyathus.
- Stephanella sancta, Hinde, 1891, Lond. Geo. Mag., vol. 8, p. 22. Radiating lines of pyrites supposed to represent spicules. No generic or specific characters.
- Stromatopora ludlowensis and S. tubularis, James. Too poorly defined to warrant any recognition.

SYRINGOSTROMA. Type S. densum.

SUBKINGDOM CŒLENTERATA.

THE Order Rugosa has been called Tetracoralla, because the septa are said to be some multiple of four; and the Tabulata, Hexacoralla, because the septa are said to be a multiple of six. The internal cavity of a Graptolite, so far as I have been able to discover, is divided longitudinally into three or four departments, which is altogether different from the structure of the living Hydrozoa, where the interior part of the body consists of a single undivided cavity. It may be the Order Graptolida should be raised to the rank of a Class, because it is so different in composition and structure from the living Hydrozoa.

ERRATA.—On page 168, insert "Family Calceolide.—Calceola," and remove "Baryphyllum" to the "Cyclolitidæ." On page 169, for "Family Helioporidæ" read "Family Heliolitidæ." On page 177, strike out "Chonophyllum validum." In the eleventh line from the top of page 189, read "F. alpenensis" for "F. dumosus." In the sixth line from the bottom of page 194, read "1669" for "1869." In the first line on top of page 196, read "Description" for "Descrides." In the third and seventh lines from the top of page 199, read "Hamilton" for "Chemung." In the fifteenth and sixteenth lines from the bottom of page 201, read "Edwards & Haime, 1850," for "Lonsdale, 1839, Sil. Syst., p. 691, and E. & H." For the word "lamella," in the definition of Zaphrentis, on page 208, read "septa," and add Clifford as an author of the genus with Rafinesque. On page 209, under Z. elliptica, read "Pal., No. 8," instead of Pal., No. 6."



FIG. 1197.-Amplexus blairi.

ACTINOCYSTIS variabilis, Whiteaves, 1892, Cont. to Can. Pal., p. 271, Devonian. Alveolites roemeri refer to Cladopora.

AMPLEXUS blairi, A. bicostatus, A. corniculum, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 8. The blairi and corniculum from the Chouteau limestone and bicostatus from the Burlington Group.

cinctutus, S. A. Miller, 1892, 18th Rep. Geo. Sur. Ind., p. 5, Niagara Group.

coralloides, probably, not an American species.

CHETETES ponderosus, Rominger, 1892, Am.

- Geol., vol. 10, p. 61, Up. Held. Gr. Cœnograprus, Hall, 1868, 20th Rep. N. Y. Mus. Nat. Hist., pp. 210, 211, 251. [Ety. koinos, living together; grapho, I write.] Polypary compound, developed bilaterally from the initial point; cellules on one side of slender branches, which are developed on one or two sides of a long slender axis or rachis, the free extremities of which are likewise celluliferous. Not branching dichotomously. Type C. divergens.
 - divergens, Hall, 1859 (Graptolithus diver-gens), Pal. N. Y., vol. 3, p. 509, Hud. Riv. Gr.
 - gracilis, Hall, 1847 (Graptolithus gracilis), Pal. N. Y., vol. 1, p. 274, Utica Slate.

surcularis, Hall, 18 Mus. Nat. Hist., p COLUMNARIA disjuncta, to Can. Pal., p. 269 Crepidophyllum is a s ophyllum, and th should be referred CYATHOPHYLLUM athal 1891, Cont. to Can Devonian. C. petra sense, 1892, pp. 264 C. juvene, refer to Heli C. panicum refer to Dip CYSTELASMA, S. A. M Sheets 17th Rep. (



FIG. 1198.-Cy lanesvillense. -Cystelasma Summit and side views.

lique plates, irregu give to the interior unequal size and in septa or regular tak sicular. Type C. lan in the same place fr CYSTIPHYLLUM greenii, Advance Sheets 18 Ind., p. 4, Up. Held DAWSONIA are small, con and each has a mi summit. They have connection with any DICTYONEMA pertenue a Færste, 1887, Bull vol. 2, p. 107, Niagar DIPHYPHYLLUM panicun (Cyathophyllum pan Penin. Mich., p. 90, DIPLOTRYPA westoni, U palæontology of Can Riv. Gr.

Graptolithus alatus, G. G. logani, G. octobi Loganograptus. G. gracilis refer to Cœno Hadrophyllum aplatun 2d Ann. Rep. Geo. Coal Meas.



FIG. 1199.-Leptopora gorbyi.

HELIOPHYLLUM juvene, (Cyathophyllum juve p. 101, Ham. Gr. parvulum, Whiteaves, 1

Pal., p. 203, Devoniar

COL.-ZAP.]

Mus. Nat. Hist., p. 210, Utica Slate. Columnaria disjuncta, Whiteaves, 1892, Cont.

to Can. Pal., p. 269, Devonian. Crepidophyllum is a synonym for Crasped-

ophyllum, and the species under it should be referred to Craspedophyllum. CYATHOPHYLLUM athabascense, Whiteaves, 1891, Cont. to Can. Pal., vol. 1, p. 202, Devonian. C. petraoides and C. waska-sense, 1892, pp. 264 and 265, Devonian.

C. juvene, refer to Heliophyllum juvene. C. panicum refer to Diphyphyllum panicum.

CYSTELASMA, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 12,



P

d

e

n

а.

ζ.

v.

.]

rn re

ıg

i-

8.

C.

(T)

d.

3),

Ety. kustis, a cavity; elasma, lamellae.] Corallum simple, irregularly turbinate or cylindrical, consisting of an outer wall, transversely

FIG. 1198.-Cystelasma wrinkled or conlanesvillense. Summit stricted, which is and side views. connected by ob-

- lique plates, irregularly disposed, that give to the interior cystose chambers of unequal size and irregular shape. No septa or regular tabulæ. Structure vesicular. Type C. lanesvillense, described in the same place from the Warsaw Gr.
- CYSTIPHYLLUM greenii, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 4, Up. Held. Gr.
- DAWSONIA are small, conical or bell-shaped, and each has a minute spine at the summit. They have not been found in connection with any Graptolite.
- DICTYONEMA pertenue and D. scalariforme, Færste, 1887, Bull. Denison Univ., vol. 2, p. 107, Niagara Gr.
- DIPHYPHYLLUM panicum, Winchell, 1866, (Cyathophyllum panicum,) Rep. Low. Penin. Mich., p. 90, Ham. Gr.
- DIPLOTRYPA westoni, Ulrich, 1889, Micro-palæontology of Can., pt. 2, p. 30, Hud. Riv. Gr.
- Graptolithus alatus, G. crucifer, G. headi, G. logani, G. octobrachiatus refer to Loganograptus. G. divergens and G. gracilis refer to Coenograptus.
 - Hadrophyllum aplatum, Cummins, 1891, 2d Ann. Rep. Geo. Sur. Texas, p. 552, Coal Meas.





FIG. 1199.-Leptopora gorbyi. Summit views.

- juvene, Rominger, HELIOPHYLLUM 1876, (Cyathophyllum juvene,) Foss. Corals. p. 101, Ham. Gr.
 - parvulum, Whiteaves, 1891, Cont. to Can. Pal., p. 203, Devonian.

Surcularis, Hall, 1868, 20th Rep. N. Y. | LEPTOPORA gorbyi, S. A. Miller, 1891, Ad-Mus. Nat. Hist., p. 210, Utica Slate. | vance Sheets 17th Rep. Geo. Sur. Ind., p. 6, Chouteau limestone.

LOGANOGRAPTUS, Hall, 1868, 20th Rep. N.Y. St. Mus. Nat. Hist., pp. 207 and 251.

[Ety. proper name; grapho, I write.] Polypary compound,

growing bilaterally from the

initial point, and consisting of four, eight or more simple stipes numerously divided



1200 - near the base and below the Leptopora commencement of the cells; gorbyi sal view.

Ba- furnished with a corneous central disc. Type L. headi. To this genus, is also referred the species described as Graptolithus alatus, G. crucifer, G. logani and G. octobrachiatus.

MICROCYCLUS blairi, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 7, Chouteau

limestone.

MONOTRYPELLA CONfluens, Foerste, 1887, Bull. Denison Univ., vol. Fig. 1201. 2, p. 172, Niag. ara Gr.



- Microcyclus blairi.

unjiga, Whiteaves, 1891, Cont. to Can. Pal., vol. 1, p. 214, Devonian.

- Monticulipora clintonensis, crustulata, cleavelandi, milfordensis and nicholsoni, James, 1888, Jour. Cin. Soc. Nat. Hist., vol. 11, pp. 15 to 36, Hud. Riv. Gr. Some of these are synonyms for species described under other genera, by Ulrich. Others are not defined so as to be recognized. Whether or not any of them will stand is a question. M. falesi and ohioensis by the same party, 1884, same Journal, vol. 3, p. 137, Hud. Riv. Gr. Not recognized.
 - M. molesta, Nicholson, seems to be a synonym for M. mammulata.
- parasitica, var. plana, Ulrich, 1889, Micropalæontology of Canada, pt. 2, p. 29, Hud. Riv. Gr.
- OLDHAMIA antiqua was described in 1844, in Jour. Geo. Soc. Dublin, vol. 3, p. 60.
- PACHYPHYLLUM devoniense, Edwards & Haime, 1851, Polyp. Foss. Terr. Pal., p. 397, Devonian.
- PRASOPORA parmula, Foerste, 1807, Bull. Denison Univ., vol. 2, p. 170, Niagara Group.
- Stenopora ohioensis, Foerste, 1887, Bull. Den-ison Univ., vol. 2, p. 85, Coal Meas. STRIATOPORA gorbyi, S. A. Miller, 1892, Ad-
- vance Sheets 18th Rep. Geo. Sur. Ind. p. 7, Niagara Gr.
- ZAPHRENTIS calyculus, Z. chouteauensis, Z. declinis, Z. exigua, Z. tantilla, and Z. tenella, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., pp. 10, 11, and 12. All from the Chouteau limestone except Z. declinis, which is from the Keokuk Gr.

SUBKINGDOM ECHINODERMATA.

CLASS CRINOIDEA.

THE only systematic classification of crinoids into families, so far as learning has extended, is based upon the number and arrangement of the plates in the calyces. See "The Structure, Classification, and Arrangement of American Palæozoic Crinoids into Families," 16th Rep. Geo. Sur., Indiana, p. 302. The number of basal plates is first in importance. There are no rudimentary basals. Second in importance is the presence or absence of subradials. Third, the presence or absence of regular interradials. Fourth, the structure of the azygous side. Families having only two basal plates are confined to the Subcarboniferous and Carboniferous. Those having three basals extend from the Lower Silurian to the Subcarboniferous. Those having four basals extend from the Lower Silurian to the Devonian. And those having five basals extend from the earliest crinoids throughout Palæozoic time.

GENERA HAVING TWO BASALS.

FAMILY ACROCRINIDÆ.—Acrocrinus. FAMILY DICHOCRINIDÆ.—Dichocrinus, Cotyledonocrinus, Talarocrinus. FAMILY PTEROTOCRINIDÆ.—Pterotocrinus.

GENERA HAVING THREE BASALS, NO SUBRADIALS, REGULAR INTER-RADIALS.

FAMILY ACTINOCRINIDÆ. — Actinocrinus, Agaricocrinus, Alloprosallocrinus, Amphoracrinus, Batocrinus, Blairocrinus, Cylicocrinus, Dorycrinus, Eretmocrinus, Gennæocrinus, Megistocrinus, Physetocrinus, Saccocrinus, Steganocrinus, Strotocrinus, Teleiocrinus.

FAMILY ARTHRACANTHIDE. —Arthracantha.

FAMILY DOLATOCRINIDÆ.—Allocrinus, Dolatocrinus, Hadrocrinus, Stereocrinus. FAMILY PLATYCRINIDÆ.—Coccocrinus, Cordylocrinus, Eucladocrinus, Macrostylocrinus, Marsupiocrinus, Platycrinus.

GENERA HAVING THREE BASALS, SUBRADIALS, NO REGULAR INTER-RADIALS.

FAMILY AMPHERISTOCRINIDÆ.—Ampheristocrinus, Closterocrinus. FAMILY ICHTHYOCRINIDÆ.—Ichthyocrinus, Lecanocrinus, Mespilocrinus.

GENERA HAVING THREE BASALS, SUBRADIALS, AND REGULAR INTER-RADIALS.

FAMILY TAXOCRINIDÆ.—Forbesocrinus, Onychocrinus, Taxocrinus.

GENERA HAVING ' RADIALS. THI FINITY WITH 1

> FAMILY CALCEOC FAMILY SYNBATH FAMILY ZOPHOCR

GENERA HAVING F

FAMILY EUCALYP FAMILY MELOCRI FAMILY XENOCRI

GENERA HAVING H

FAMILY AGASSIZC FAMILY CYATHOO bocrinus, Cya FAMILY DENDROC FAMILY ERISOCRI FAMILY EUPACHY FAMILY MEROCRI FAMILY POTERIOO rinus, Gonioci rinus, Vasocri

GENERA HAVING

FAMILY GLYPTAS sanocrinus. FAMILY GAUROCR FAMILY RHODOCI Rhaphanocrin

GENERA HAVING FI

FAMILY CLEIOCRI FAMILY GLYPTOCI rinus, Siphone

GENERA HAVING]

FAMILY ANOMALO FAMILY BELEMNOG FAMILY CATILLOC FAMILY GAZACRIN FAMILY HAPLOCRI

670

GENERA HAVING THREE BASALS, NO SUBRADIALS, NO REGULAR INTER-RADIALS. THE FAMILIES ARE ANOMALOUS AND HAVE NO NEAR AF-FINITY WITH EACH OTHER.

FAMILY CALCEOCRINID.E.—Calceocrinus, Deltacrinus, Halysiocrinus. FAMILY SYNBATHOCRINID.E.—Synbathocrinus. FAMILY ZOPHOCRINID.E.—Zophocrinus.

GENERA HAVING FOUR BASALS, NO SUBRADIALS, REGULAR INTERRADIALS.

FAMILY EUCALYPTOCRINIDÆ.—Callicrinus, Eucalyptocrinus, Hypanthocrinus. FAMILY MELOCRINIDÆ.—Compsocrinus, Mariacrinus, Melocrinus, Technocrinus. FAMILY XENOCRINIDÆ.—Xenocrinus.

GENERA HAVING FIVE BASALS, FIVE SUBRADIALS, NO REGULAR INTER-RADIALS.

FAMILY AGASSIZOCRINIDÆ.—Agassizocrinus.

ng

he æ-

el

nd

ni

ır

ıb

he

gh-

us.

ret-

ga-

us.

108

FAMILY CYATHOCRINIDÆ.—Abrotocrinus, Arachnocrinus, Bursacrinus, Carabocrinus, Cyathocrinus, Graphiocrinus, Palæocrinus.

FAMILY DENDROCRINIDÆ. –Dendrocrinus, Ottawacrinus.

FAMILY ERISOCRINIDÆ.—Erisocrinus, Menocrinus, Stemmatocrinus.

FAMILY EUPACHYCRINIDÆ.—Æsiocrinus, Delocrinus, Eupachycrinus, Ulocrinus. FAMILY MEROCRINIDÆ.—Merocrinus.

FAMILY POTERIOCRINID.E.—Atelestocrinus, Barycrinus, Cœliocrinus, Euspirocrinus, Goniocrinus, Homocrinus, Hydreionocrinus, Poteriocrinus, Scaphiocrinus, Vasocrinus, Zeacrinus.

GENERA HAVING FIVE BASALS, FIVE SUBRADIALS, REGULAR INTER-RADIALS.

FAMILY GLYPTASTERIDÆ. — Cyphocrinus, Glyptaster, Lampterocrinus, Thysanocrinus.

FAMILY GAUROCRINIDÆ.—Gaurocrinus, Retiocrinus.

FAMILY RHODOCRINIDÆ. — Archæocrinus, Goniasteroidocrinus, Lyriocrinus, Rhaphanocrinus, Rhodocrinus.

GENERA HAVING FIVE BASALS, NO SUBRADIALS, REGULAR INTERRADIALS.

FAMILY CLEIOCRINIDÆ.—Cleiocrinus.

FAMILY GLYPTOCRINIDE. — Cupulocrinus, Glyptocrinus, Pycnocrinus, Schizocrinus, Siphonocrinus.

GENERA HAVING FIVE BASALS, NO SUBRADIALS, NO REGULAR INTER-RADIALS.

FAMILY ANOMALOCRINIDÆ.—Anomalocrinus.

FAMILY BELEMNOCRINIDÆ.—Belemnocrinus.

FAMILY CATILLOCRINIDÆ.—Catillocrinus.

FAMILY GAZACRINIDÆ.—Gazacrinus.

FAMILY HAPLOCRINIDÆ.—Allagecrinus, Haplocrinus.

[ABR. -ÆSI.

FAMILY HETEROCRINIDE.-Ectenocrinus, Heterocrinus, Iocrinus, Ohiocrinus. FAMILY HYBOCRINIDE.—Hybocrinus.

FAMILY MISSOURICRINID.E. - Missouricrinus.

GENERA BELONGING TO ANOMALOUS FAMILIE

FAMILY PISOCRINIDÆ. - Pisocrinus. This family has five basals, followed by three plates, that are both radial and subradial in position.

FAMILY EDRIOCRINIDE.—Edriocrinus. The base is solid in this family, and is followed by five radials.

FAMILY CAMAROCRINIDE.—Camarocrinus. Distinct from all other families. FAMILY ANCYROCRINID.E. - Ancyrocrinus. Distinct from all other families.

GENERA UNCERTAIN AS TO FAMILY AFFINITY.

Aspidocrinus, Brachiocrinus, Coronocrinus, Cystocrinus, Nipterocrinus, Pachycrinus, and the fossil described by Hall as Myrtillocrinus americanus.

ORDER CYSTOIDEA.

FAMILY STRIBALOCYSTIDE. -Stribalocystites.

ABROTOCRINUS, Miller & Gurley, 1890, Desc. New Gen. and Spec. Echinodermata,

p. 30, and 16th Rep. Geo. Sur. Ind., p. 350. [Ety. abrotos, immortal; krinon, lily.] Calyx bowl-shaped, depressed below; basals 5, occupying a shallow concavity; subradials 5, as high as wide; first radials pentagonal, wider than high, truncated horizontally the entire width of the plates, sutures gaping; brachial or second radials constricted in the middle and bearing upon the upper sloping sides the free arms; arms bifurcate frequently and bear pinnules; no regular interradials. First azygous plate in line with the first radials, horizontally truncated above and having a gaping suture ; second plate constricted in the middle, and followed by a single series of plates. Type A. cy-mosus, which is described at the same place, from the Keokuk Gr. ACTINOCRINUS blairi and A.

brittsi, S. A. Miller, 1892, Adv. Sheets

18th Rep.

Geo. Sur.

Ind., pp. 35,

FIG. 1202.-Abrotocrinus cymosus

36, Burlington Gr., and A. chouteauensis, p. 18, from the Chouteau limestone, and A. fossatus, p. 40, from the Burlington Gr.





chouteauensis. Azygous view.



FIG. 1203. - Actinocrinus FIG. 1204. - Actinocrinus chouteauensis. Summit view.

grandis, Miller & Gurley, 1890, Desc. New Gen. and Spec. Echinodermata, p. 25, and 16 th Rep. Geo. Sur. Ind., p. 346, Keokuk Gr. nodosus, S. A. Miller, 1891, Bull. No. 4, Geo. Sur.

FIG. 1205. - Actinocrinus chouteauensis. Basal Mo., p. 33, Burview. lington Gr.

puteatus, Rowley & Hare, 1891, Kansas City Scientist, vol. 5, p. 101, Burlington Gr.

- sedaliensis, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 16, Burlington Gr. senarius, Hall, 1860, Supp. Geo. Rep. Iowa,
- p. 25, syn. for Physetocrinus ornatus.
- ÆSIOCRINUS, Miller & Gurley, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 14. [Ety. aisios, auspicious, coming at good time;



krinon, lily.] Colu-bowl-shaped, plate Basals five, formin tened or concav large, four hexago and curving upwa the calyx. First above; one or mo ray supporting str of a single series bearing pinnules. radials. An azyg radials. An azyge upon a subradial, l dials, and is follow connect with the p long, composed of bearing numerous on the sides of th magnificus, describ from the Up. Coal described at the basilicus was desc Gen. and Spec. Ec from the Up. Coal were republished in Indiana, pp. 337, 33



FIG. 1206 - A lykinsi, Butts, 1891, Kai vol. 5, p. 144, Coal M

672

AET.-AGA.]

SI.

by

is

yc-

811-

ne-

the

nus

1m-

Å

90,

en.

chi-

p. ith sur. 346, Milnll. Bur. lur-

> 1888 ton

nce

16,

w8.

our.

Sty. me;

s.

krinon, lily.] Column pentagonal, calyx AETHOCYSTITES, S. A. Miller, 1892, Advance bowl-shaped, plates smooth or granular. Sheets 18th Rep. Geo. Sur. Ind., p. 9. Basals five, forming a pentagonal, flattened or concave disc. Subradials large, four hexagonal, one heptagonal. and curving upward half the height of the calyx. First radials 5, truncated above; one or more brachials in each ray supporting strong arms, composed of a single series of plates; arms 10, bearing pinnules. No regular inter-An azygous interradial rests radials. upon a subradial, between two first radials, and is followed by two plates that connect with the proboscis. Proboscis long, composed of four series of plates bearing numerous transverse fissures on the sides of the plates. Type Æ. magnificus, described at the same place, from the Up. Coal Meas. Æ. harii was described at the same time, and Æ. basilicus was described in Desc. New Gen. and Spec. Echinodermata, p. 53, from the Up. Coal Meas. All of which were republished in 16th Rep. Geo. Sur. Indiana, pp. 337, 338, and 369.



FIG. 1206.-Æsioerinus magnificus lykinsi, Butts, 1891, Kansas City Scientist, vol. 5, p. 144, Coal Meas.

Sheets 18th Rep. Geo. Sur. Ind., p. 9. Ety. aethes,



FIG. 1207. Aethocystites sculptus.

plates, they form an obconical cup, commencing from a small column. In the second range there are five elongated plates.

The third range consists of five much shorter plates. The plates are ornamented with wrinkles, and bear tubular ridges radiating from a central point, in the middle range, which follow the longitudinal sutures or center of the first and third ranges, and have porous connection with the interior of the body. The plates do not possess pores after the manner of *Holocystites* or Caryocrinus, and no pores have been determined, except as above stated. Type A. sculptus. Described at the same place, from the Niagara Gr.

AGANASTER, Miller & Gurley, 1890, Desc. New Gen. and



FIG. 1208.—Aganaster gregarius. Dorsal side.

Spec. Echinodermata, 57, republished in 16th Rep. Geo. Sur. Ind., p. 372. [Ety. agan, very Cirmuch; aster, star.] cular disc with five long,

narrow rays. Dorsal side covered with small polygonal plates, not inter-

unusual; kus-

tis, bladder.]

This genus consists of the

bodies of elon-

gated, subel-

liptical Cystoidea of un-

determined

family affinity.

Probably they

do not belong to any defined family. There are only three

ranges of

plates. In the

first range

there are three

AGA.-BAR.

rupted by the presence of the rays, thus showing the disc has a greater depth than the rays have. Rays narrow, convex, spine-bearing, and com-posed of plates ar-

FIG. 1209. - Aganaster gregarius. Dorsal gregarius. side of arm, mag. AGARICOCRINUS blairi nified.

ranged opposite each other. Ventral side has a deep central disc and ten oral plates. Type A. gre-garius. Described by Meek and Worthen as Protaster

and A. sampsoni, S.

A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., pp. 20 and 21, Chouteau limestone, and A. chouteauensis and A. germanus, pp. 42 and 43, Chouteau limestone.

- dissimilis, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 55, Keokuk Gr. And also at the same time and place, from the same Group, A. gorbyi and A. indianensis.
- decornis, Rowley & Hare, 1891, Kansas City Scientist, vol. 5, p. 117, Burlington Gr.
- splendens, Miller & Gurley, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 18, republished in 17th Rep. Geo. Sur. Ind., p. 55, Keokuk Gr.

AGELACRINUS blairi, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 12, Keokuk Gr.

ALLOCRINUS benedicti. S. A. Miller, 1891, 17th Rep. Geo. Sur. Ind., p. 37, Niagara Gr.

FIG. 1210. — Allocri-nus benedicti. Basal view.

ALLOPROSALLOCRINUS gurleyi, S. A. Miller, 1891, 17th Rep. Geo. Sur. Ind., p. 58, Keokuk Gr.





FIG. 1211 — Alloprosallocrinus gurleyi. Basal and side views.

- ARACHNECRINUS canadensis, Whiteaves, 1891, Cont. to Can. Pal., p. 208, Devonian.
- ARCHÆOCIDARIS legrandensis, Miller & Gurley, 1890, Desc. New Gen. and Spec. Echinodermata, p. 59, Kinderhook Gr. ATELEOCYSTITES, Billings, is probably a good genus, and not a synonym for Anomalocystites. In that case, Ateleocystites huxleyi would be the type, and the

genus may include A. balanoides, which does not seem to belong to Hall's genus Anomalocystites.

BARYCRINUS blairi and B. boonvillensis, S. A. Miller, Bull. No. 4, Geo. Sur. Mo., p. 25, Keokuk Gr.



FIG. 1212.—Barycrinus princeps.

latus, Hall, 1861, (Cyathocrinus latus,) Proc. Bost. Soc. Nat. Hist., p. 292, Burlington Gr.

princeps, Miller and Gurley, 1890, Desc. New Gen. and Spec. Echinodermata, p. 52, Keokuk Gr.



FIG. 1213.-Barycrinus princeps. Azygous view.

stellifer, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 46, Keokuk Gr.



BATOCRINUS agnatus, crawfordsvillensis,



FIG. 1214.-Batocrinus icosidactylus.

> gurleyi, and sweeti kuk Gr., B. davisi kia Gr., and the ot lington Gr.

cantonensis, B. face B. jucundus, B. 1 inus, B. poculum, M and Gurley, 1890, D New Gen. and S Echinodermata, pp. 20, 34 to 36, B. jucun and B. marinus v published in the J Cin. Soc. Nat. Hist., 13, pp. 19 and 20, all were republished the 16th Rep. Geo. 1 Ind.,, pp. 340, 341, 353, and 354. B. ulum is from the l derhook Gr., the oth from the Keokuk G calvini, Rowley, 1890, 1 Geol. vol. 5, p. 146, F lington Gr.

brittsi and B. compa 1892, Advance She Sur. Ind., pp. 32 and



FIG. 1216.-Blairocrinus arro mit viev

and B. decrepitus, 1 and B. blairi, p. 39, Bt divalis, S. A. Miller

BAT.-CAL.]

BATOCRINUS agnatus, B. boonvillensis, B. crawfordsvillensis, B. decoris, B. gorbyi,

B. gurleyi, B. mediocris, B. pulchellus, B. spergenensis, B. venustus, S. A. Miller, 17th Rep. Geo. Sur. Ind., pp. 53, 60 to 68. All from the Keokuk Gr. except B. decoris and B. spergenensis, which are from the Warsaw Gr.

bulbosus, B. davisi, B. gurleyi, B. inflatus, B. rotadentatus, B. sweeti, and B. abscissus, Rowley and Hare, 1891, Kansas City Scientist, vol. 5. pp. 102 and 114 to 117. B. abscissus,

FIG. 1214.-Batocrinus icosidactylus.

gurleyi, and sweeti are from the Keokuk Gr., B. davisi from the Kaskaskia Gr., and the others from the Burlington Gr.

cantonensis, B. facetus, B. jucundus, B. marinus, B. poculum, Miller and Gurley, 1890, Desc. New Gen. and Spec. Echinodermata, pp. 19, 20, 34 to 36, B. jucundus and B. marinus were published in the Jour. Cin. Soc. Nat. Hist., vol. 13, pp. 19 and 20, and all were republished in the 16th Rep. Geo. Sur. Ind.,, pp. 340, 341, 352, 353, and 354. B. poc-ulum is from the Kinderhook Gr., the others from the Keokuk Gr.

FIG. 1215. -- Batocrinus irregcalvini, Rowley, 1890, Am. ularis. Geol. vol. 5, p. 146, Burlington Gr.

brittsi and B. comparilis, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., pp. 32 and 33, Burlington Gr.



FIG. 1216.-Blairocrinus arrosus. Basal and summit views.

and B. decrepitus, p. 34, Keokuk Gr., and B. blairi, p. 39, Burlington Gr. divalis, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 22, Keokuk Gr., and at same place republished B. icosidactylus and B. irregularis.

- BELEMNOCRINUS sampsoni, S. A. Miller, 1890, Bull. No. 4, Geo. Sur. Mo., p. 26, Burlington Gr.
- BLAIROCRINUS, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 69. [Ety. proper name; krinon, lily,] Calyx low, saucer-shaped, but not depressed at the base. Surface deeply sculptured and bears radial ridges, though the interradial ridges are not sunken; vault elevated above the arm openings, more or less convex above, with a short subcentral proboscis, having an opening on top, surrounded by numerous small plates. Basals, 3, forming a flat hexagonal disc; primary radials, 3 x 5;



FIG. 1217.-Blairocrinus trijugis. Basal, summit, and side views.

secondary radials, 1 x 10, axillary; tertiary radials, 1 x 20; regular interradials, one large plate resting upon the first radials, followed by one or two ranges of two plates each, and these by two elongated plates that connect with the plates of the vault. First azygous plate in line with the first radials, followed by ranges of two plates until they connect with the plates of the vault. Type B. trijugis, de-scribed at the same time and place from the Chouteau limestone.

- arrosus and B. bullatus, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 41, Chouteau limestone.
- CALCEOCRINUS should be corrected, p. 230, ninth line from the top, so as to read "three" instead of "four" anchylosed plates.
 - indianensis, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 35. Niagara Gr.
- CALLICRINUS, D'Orbigny, 1850, Prodrome Pal. Stratigraphique, 1, p. 45. [Ety. kallos, beautiful; krinon, lily.] Body oblong, cylindrical; calyx cup-shaped, base excavated for the insertion of the column. Basals4, unequal, cuneate; no subradials; radials 3 x 5; first one hexagonal, transverse, arcuate below ; second one short, quadrangular; third, pentagonal, axil-lary; secondary radials, $2 \ge 10$, the second axillary and supporting the arms, which are composed of a double series of plates bearing pinnules; first interradial large, decagonal, bearing two elongated plates in the second series, like Eucalyptocrinus; vault and proboscis as in Eucalyptocrinus; surface

vance p. 46,

)esc. jata.

tus,)

Bur

AR

ich

1118

sis.

Io.,

view

deeply sculptured or bearing a more or less developed spine on each radial and interradial plate. Type C. costatus. acanthinus, Ringueberg, 1890, Ann. N.Y. Acad. Sci., vol. 5, p. 302, Niagara Gr. beachleri, Wachsmuth & Springer, 1892, Am. Geol., vol 10, p. 140. Not defined so as to be recognized.

676



FIG. 1218.—Caryocrinus indianensis. Side and summit views.

- CARYOCRINUS indianensis, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur.
- Ind., p. 19, Niagara Gr. CLIOCRINUS, p. 231, is, probably, incorrectly defined. See my remarks, p. 323, 16th Rep. Geo. Sur. Ind.
- CODASTER gracillimus and C. grandis, Rowley and Hare, 1891, Kansas City Scientist, p. 99, Burlington Gr.
- CODONITES inopinatus, Rowley and Hare, 1891, Kansas City Scientist, pp. 100

and 118, Burlington Gr. CYATHOCRINUS benedicti, C. gurleyi, C. labyrinthicus, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo.

Sur. Ind., pp. 47

Niagara Gr. and

the other two

species from the Keokuk Gr. boonvillensis, and C. sampsoni, S. A. Miller, 1891, Bull. No. 4, Geo. Sur. Mo., p. 29, Keokuk Gr.

gorbyi, S. A. Mil-ler, 1892, Advance Sheets 18th Rep.

Geo. Sur. Ind., p. 44, Keokuk Gr. inflexus, see Delo-

crinus inflexus.

latus, see Barycri-



FIG. 1219.—Cyathocrinus gurleyi.

nus latus. multibrachiatus var squamosus, Hall, 1872, in a note to photographic plate No. 5, sometimes distributed with Desc. New Spec. Crin. from the Carb. rocks of the Miss. Valley, Keokuk Gr.

opimus, Miller and Gurley, 1890, Desc.

CAR.-CYP.

New Gen. and Spec. Echinodermata, p. 28, and 16th Rep. Geo. Sur. Ind., p. 348, Keokuk Gr.



FIG. 1220.—Cylicocrinus canaliculatus.

CYLICOCRINUS, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 31 [Ety. kulix, ikos, a cup ; krinon, a lily.] Calyx urn-shaped; truncated below. Basals 3, expanded; primary radials, 3 x 5, -the first one very large; second one, small, quadrangular; third, small, pentagonal; secondary radials 2 or more; arms 10. Regular interradials consist of one large plate followed by very small ones between the arm-bases that connect with the vault-plates; first azygous plate in line with the first radials, followed by three plates in the second and in the third ranges, which are connected with smaller plates that connect with the vault. The vault is convex and covered with minute plates. except the ambulacral grooves, which are open and have serrated edges as if protected by some kind of cilia. The primary radials resemble those in some species of Batocrinus; the azygous area resembles Saccocrinus; the vault is different from that in all other known genera of crinoids. Type Cylicocrinus canaliculatus, described at the same place from the Niagara Gr.



FIG. 1221—Cyphocrinus gorbyi. Basal and sum-mit views.

CYPHOCRINUS, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 50. [Ety. kuphos, bowed down; krinon, lily.] Calyx obconoidal or obpyramidal as high as the first interradials, then rapidly expands and curves downward until the periphery and ambulacral orifices are directed below a horizontal line. Basals 5, forming a pentagonal disc; sub-radials 5, hexagonal, except one which is truncated by the first azygous plate; it is heptagonal; primary radials 3×5 ; 3 of the first ones heptagonal, DEL.-DOR.]

and the other two radials quadrangula agonal, and bear of



res she sid FIG. 1222. - Cyphoeri- it

ing rad rad

firs

Side sec nus gorbyi. view of calyx. pla

plates in succeeding unite with the plates secondary radials pr plate large, truncat is followed by thre each succeeding ran with the plates of th vex and covered with merous plane, con plates; a large spin the center of the y orifice, without any the azygous side o ocrinus gorbyi, desc. place from the Niaga

DELOCRINUS, Miller and Cin. Soc. Nat. Hist. 16th Rep. Geo. Sur. delos, manifest; kri basin shaped; arms a double series of in column round; surfa lous; plates thick; | a concavity and form interior; subradials below the middle, reg the upper part term angle; first radials truncated above and second radial on th gaping suture, but in a straight crenated 1 one outer angle of other, having a furro



FIG. 1223.—Delocrinus h

as to form a toothed h second plate articula hinge, in the middle p there is a socket for t

DEL.-DOR.]

and the other two Hexagonal; second radials quadrangular; third radials pentagonal, ^eand bear on the upper slop-



ing sides secondary radials; regular interradials numerous; the first one large and resting between the short upper sloping sides of the first radials;

FIG. 1222. – Cyphoeri- it is followed, in the nus gorbyl. Side second range, by two view of calyx. plates, and by three

plates in succeeding ranges until they unite with the plates of the vault; intersecondary radials present; first azygous plate large, truncates a subradial, and is followed by three or four plates in each succeeding range, until they unite with the plates of the vault; vault convex and covered with more or less numerous plane, convex, or spinous plates; a large spinous plate occupies the center of the vault, and the anal orifice, without any prominence, is on the azygous side of it. Type Cyphocrinus gorbyi, described at the same place from the Niagara Gr.

DELOCRINUS, Miller and Gurley, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 9, and 16th Rep. Geo. Sur. Ind., p. 333. [Ety. delos, manifest; krinon, lily.] Calyx basin shaped; arms broad, composed of a double series of interlocking plates; column round; surface smooth or granulous; plates thick; basals 5, occupying a concavity and forming a cone in the interior; subradials 5, large, inflexed below the middle, regularly arched, and the upper part terminating in an acute angle; first radials wider than high, truncated above and separated from the second radial on the outer face by a gaping suture, but immediately within, a straight crenated ridge extends from one outer angle of the plates to the other, having a furrow on each side so



FIG. 1223.-Delocrinus hemisphericus.

as to form a toothed hinge on which the second plate articulates; behind this hinge, in the middle part of each plate, there is a socket for the reception of a tooth-like projection; second radials or brachials produced externally in a strong spine; no regular interradials; one azygous interradial resting on a subradial and followed by another piece above the top of the calyx. Type D. hemisphericus.

- craigi, Worthen, 1875, (Eupachycrinus craigi,) Geo. Sur. Ill., vol 6, p. 527, Coal Meas.
- fayettensis, Worthen, 1873, (Eupachycrinus fayettensis,) Worthen, Geo. Sur. Ill., vol. 5, p. 565, Up. Coal Meas.
- hemisphericus, Shumard, 1858, (Poteriocrinus hemisphericus,) Trans. St. Louis Acad. Sci., vol. 1, p. 221, and 16th Rep. Geo. Sur. Ind., p. 335, Up. Coal Meas.
- inflexus, Geinitz, 1866, (Cyathocrinus inflexus,) Carb. und Dyas, in Neb., p. 62, and White's Cont. to Pal., No. 6, p. 128, Up. Coal Meas.
- missouriensis, Miller and Gurley, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 14. Up. Coal Meas.
- DENDROCRINUS nodobrachiatus, Ringueberg, 1890, Ann. N. Y. Acad. Sci., vol. 5, p. 303, Niagara Gr.
- DICHOCRINUS blairi, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 36, Keokuk Gr.

cinctus, Miller & Gurley, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 21, and 16th Rep. Geo. Sur. Ind.,



FIG. 1224.—Dichocrinus cinctus. Two of the views are magnified.

- p. 342, Kinderhook or Waverly Gr.
- humbergi, S. A. Miller, 1891, Bull. No. 4, Geo. Sur. Mo., p. 26, and Advance Sheets 17th Rep. Geo. Sur. Ind., p. 36, Keokuk Gr.
- parvulus, S. A. Miller, 1891, Bull. No. 4, Geo. Sur. Mo., p. 27, Keokuk Gr.
- ulrichi, Miller & Gurley, 1890, Desc. New Gen. and Spec. Echinodermata, p. 48, and 16th Rep. Geo. Sur. Ind., p. 366, Keokuk Gr.
- DOLATOCRINUS has only three basals, as shown by a specimen belonging to Mr. Gurley.
- DORYCRINUS amœnus, and D. confragosus, S. A. Miller, 1890, Bull. No. 4, Geo. Sur. Mo., p. 34, Burlington Gr.
 - elegans, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 17, Burlington Gr.

ata, nd.,

nce

31

ly.

OW.

als

ond

nall.

or

CYP

ials by ases first rathe nich that t is ites. nich is if The ome area ; is

own

nus

ame

5

um-

ince

. 50. non, idal hen vard ori-

orintal onal

gous

mal.

inflatus, Rowley & Hare, 1891, Kansas City Scientist, p. 114, Burlington Gr. ECHINODISCUS sampsoni, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 76, Keokuk Gr.

EUPACHYCRINUS craigi. See Delocrinus craigi.

fayettensis. See Delocrinus fayettensis. hemisphericus. See Delocrinus hemisphericus.



FIG. 1225.—Echinodiscus sampsoni.

EOCIDARIS blairi, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 73, Keokuk Gr.





FIG. 1226.—Eocidaris blairi.

FIG. 1227. — Eocidaris blairi. Showing spines.

ERETMOCRINUS lyonanus, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 59, Keokuk Gr.

Ind., p. 59, Keokuk Gr. prægravis, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 37, Keokuk Gr.

Erisocrinus inflexus. See Delocrinus inflexus.



FIG. 1228.-Eretmocrinus lyonanus. Side and basal views.

EUCALYPTOCRINUS ellipticus, E. elrodi, E. gorbyi, E. subglobosus, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., pp. 37 to 40, Niagara Gr. muralis, Ringueberg, 1890, Ann. N. Y. Acad. Sci., vol. 5, p. 305, Niagara Gr. lindahli, Wachsmuth & Springer, 1892, Am. Geol., vol. 10, p. 139. Not defined so as to be recognized.

FIG 1229.-Eupachycrinus harii.

harii, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 71, Up. Coal Meas.

- Coal Meas. magister, Miller & Gurley, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 4, and 16th Rep. Geo. Sur. Ind., pp. 328, 371, Up. Coal Meas.
- sphæralis, Miller & Gurley, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 5, and 16th Rep. Geo. Sur. Ind., p. 329, Up. Coal Meas.





FIG. 1230.—Eupachycrinus tumulosus. Azygous and basal views.

tumulosus, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 70, Kaskaskia Gr.

FORBESOCRINUS elegantulus, S. A. Miller, 1891, Bull. No. 4, Geo. Sur. Mo., p. 40, Keokuk Gr.

speciosus, Miller & Gurley, 1890, Desc. New Gen. and Spec. Echinodermata,



FIG. 1231.-Forbesocrinus speciosus.

p. 27, and 16th Rep. Geo. Sur. Ind., p. 347, Keokuk Gr. spinifer instead of "spiniger."



GAZACRINUS S. A. M 18th Rep. Geo.



FIG. 1232.-Gazacrinus

natus radials $2 \ge 10$; single series of plate in each radial area; vault sustained by a specialized frame - work, with ambu- FIG connecting the orifice. Type Described at the Niagara Gr. 'GLYPTASTER lockport Ann. N. Y. Aca Niagara Gr. GONIASTEROIDOCRINU Keokuk Gr. It vance Sheets 17t p. 51, and sever: are corrected. GONIOCRINUS, Miller New Gen. and p. 32, and 16th 351. [Ety. gonie lily.] Calyx sma convex or angula tending beyond



F16. 1234.—Goniasteroid ing the pen

> radials five, abou basals; first radi long, and suppoconcave upper

GAZ.-GRA.]

FOR

nus

mi-

heets

Up.

Jour.

and

371,

Jour.

and Up.

ygous

vance

p. 70,

filler,

p. 40,

Desc.

mata.

GAZACRINUS S. A. Miller, 1892, Adv. Sheets 18th Rep. Geo. Sur. Ind., p. 49. [Ety.]



gaza, treasury; krimon, lily.] Calyx obconoidal; b as a ls 5, o n e truncated b y the azygous plate; primary radials, 3 x 5;

FIG. 1232.—Gazacrinus inornatus.

radials 2×10 ; arms composed of a single series of flattened plates, one plate in each

radial area; vault sustained by a specialized frame - work,



secondary

with ambu- FIG. 1233.—Gazacrinus inorlacral canals

connecting the arms with a central orifice. Type *Gazacrinus inornatus*. Described at the same place, from the Niagara Gr.

- GLVPTASTER lockportensis, Ringueberg, 1890, Ann. N. Y. Acad. Sci., vol. 5, p. 304, Niagara Gr.
- GONIASTEROIDOCRINUS tuberosus is from the Keokuk Gr. It is re-defined in the Advance Sheets 17th Rep. Geo. Sur. Ind., p. 51, and several errors respecting it are corrected.
- GONIOCRINUS, Miller & Gurley, 1890, Desc. New Gen. and Spec. Echinodermata, p. 32, and 16th Rep. Geo. Sur. Ind., p. 351. [Ety. gonia, an angle; krinon, a lily.] Calyx small, basin-shaped; plates convex or angular. Basals 5, small, extending beyond the column. Sub-



FIG. 1234.—Goniasteroidocrinus tuberosus. Showing the pendulous arms.

radials five, about the same size as the basals; first radials larger, wider than long, and supporting on the slightly concave upper faces, a little shorter than the width of the plates, the brachials; brachials 3 in each ray, flanged at the sides; arms resembling Scaph-

iocrinus; no regular interradials; azygous interradials. consisting of a series of plates, the first one like a first radial, and resting upon the upper truncated face of a subradial. which is followed by plates very



much like FIG. 1235.—Goniocrinus sculpthe brach-tilis. Natural size and magials, which nified.

form a convex, arm-like appendage that curves in toward the proboscis at or above the base



also exists on the right side of the area resting between the upper sloping sides of two subradials and the under sloping side of a first radial, and the azygous plate which truncates a subradial. Column pentag-

of the free

arms. A small

azygous plate

FIG. 1286.-Goniocrinus sculp- onal, bearing tills. Left side view and azy- cirrhi, and gous side. Both magnified a composed of httle.

thicker and thinner plates; canal pentagonal. Type G. sculptilis, which is described at the same place, from the Waverly or Kinderhook Gr.

- GRANATOCRINUS aplatus, G. concinnulus, G. excavatus, G. exiguus, G. pyriformis, Rowley & Hare, 1891, Kansas City Scientist, vol. 5, pp. 99, 100, 117, 118, Burlington Gr.
- GRAPHIOCRINUS must be restored, as described by De Koninck & Lehon, and the redefinition of Wachsmuth & Springer wholly set aside. The generic formula is as follows: Basals 5; radials 2 x 5; anal 1; arms 10; none bifurcate. There is not a shadow of reason or evidence for supposing De Koninck and Lehon were mistaken in their diagnosis.

679

Ind.,

HOLOCYSTITES adipatus, H. benedicti, H.



colletti, H. commodus, H. gorbvi, H. indianensis, H. ornatissimus, H. papulosus, H. parvulus, H. parvus, H. scitulus, H. spangleri, H. subovatus, H. wykoffi, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., pp. 13

FIG. 1237. — Holocystites subovatus. Summit.

to 18, Niagara Gr.

- amplus, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 8, Niagara Gr.
- HYDRIONOCRINUS pentagonus, Miller & Gurley, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 17. and 16th Rep. Geo. Sur. Ind., p. 339, Up. Coal Meas.



。FIG. 1238.—Hydrionocrinus pentagonus.

- Hyptiocrinus typus, Wachsmuth & Springer, 1892, Am. Geo., vol. 10, p. 138. Not defined so as to be recognized.
- ICHTHYOCRINUS conoideus, Ringueberg, 1890, Ann. N. Y. Acad. Sci., vol. 5, p. 305, Niagara Gr.
- greenii, S. A. Miller, 1892, 18th Rep. Geo. Sur. Ind., p. 52, Keokuk Gr.
- Idiocrinus elongatus and I. ventricosus, Wachsmuth & Springer, 1892, Am. Geo., vol. 10, p. 135. Not defined so as to be recognized.
- LECANOCRINUS tennesseensis, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 41, Niagara Gr.
- MARIACRINUS aureatus, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 34. Niagara Gr.
- Ind., p. 34, Niagara Gr. granulosus, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 35, Niagara Gr.
- MELOCRINUS æqualis, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 48, Niagara Gr.
- oblongus, M. parous, Wachsmuth & Springer, 1892, Am. Geo., vol. 10, p. 143. Not defined so as to be recognized.
- MELONITES was preoccupied when Owen & Norwood used it, and Meek & Worthen proposed instead of it Melonechinus.
- MENOCRINUS has five basals, and does not have any near affinity with Platycrinus, nor belong to the same family.
- MISSOURICRINUS, S. A. Miller, 1890, Bull. No. 4, Geo. Sur. Mo., p. 31. [Ety.

[HOL.-PEN.

proper name; krinon, lily.] Calyx obconoidal or basin shaped; plates smooth or granulous; basals 5, forming a small cup; no subradials; no regular interradials; primary radials 1×5 , wider than high, and separated from the brachials by an external gaping suture; brachials axillary, except in the ray





FIG. 1239.-Missouricrinus admonitus.

opposite the azygous side; arms resembling those in Scaphiocrinus; first azygous interradial rests between two primary radials and truncates a basal plate; column pentagonal. Type M. admonitus, which was described at the same time, from the Burlington Gr.

MYELODACTYLUS gorbyi, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 72, Niagara Gr.

NIPTEROCRINUS has five basals.



FIG. 1240.—Onychaster asper.

- ONYCHASTER asper, O. confragosus, O. demissus, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. 1pd., p. 74, Keokuk Gr.
- ONYCHOCRINUS cantonensis, Miller & Gurley, 1890, Desc. New Gen. and Spec. Echinodermata, p. 41, and 16th Rep. Geo. Sur. Ind., p. 358, Keokuk Gr.
 - ulrichi, Miller & Gurley, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 17, and 16th Rep. Geo. Sur. Ind., p. 339, Keokuk Gr.



FIG. 1241.-Onychaster demissus.

- norwoodi, Meek & Worthen should be restored, as it is not a synonym for O. exculptus.
- OTTAWACRINUS, p. 265, first line at top of page read subradial instead of "basal." PALEOCYSTITES, p. 267, is described in Dec-
- ade 3. PENTREMITES basilaris and P. broadheadi

PIS.-SCA.]

are described on and P. hemisph gemmiformis, p. P. sampsoni, p. 5 p. 154, of vol. 4, Sci. P. cherokeu Troost, and as Ro catus in 1852, it v call the same sp the Geo. Sur. Iov laterniformis, see formis.

PISOCRINUS benedicti, S. A. Miller, 1891



FIG. 1242. — Pisocrinu benedicti. Side and basal views.

pyriformis was desc PLATYCRINUS absenti P. allophyllus, P. annosus, P. brittsi, P. ollicula, from the Chouteau limestone; P. acclivus, P. bati-F. ola, P. blairi, P. broadheadi, P. carchesium, P. concinnus, P. go cidentalis, P. pul P. sampsoni, P. sul lington Gr.; and H illis, P. boonviller from the Keokuk (Sur. Mo., pp. 8

- 1890. alabamensis, S. A. M Sheets 17th Rep. (Kaskaskia Gr.
- altidorsatus, P. corl ginatus, P. pisun from the Burling villensis, P. insoler teau limestone; 1891, Kansas City 98, 113.
- caducus, S. A. Mil Sheets 18th Rep. (Keokuk Gr., and at teauensis and P. col teau limestone.
- POTEBIOCRINUS agnatus boon villensis, P. Miller, 1891, Advan Geo. Sur. Ind., pp. Group.
- arcanus, P. cantonensi ensis, P. graniline P. verus, from the E nista, P. legrander spartarius, from the Miller and Gurley, 1 Nat. Hist., vol. 13, p

680

r

i

are described on p. 159, and P. clavatus and P. hemisphericus, on p. 157; P. gemmiformis, p. 553; P. nodosus, p. 155; P. sampsoni, p. 551; and P. spinosus, p. 154, of vol. 4, Trans. St. Louis Acad. Sci. P. cherokeus was not defined by Troost, and as Roemer described P. sulcatus in 1852, it was too late for Hall to call the same species P. cherokeus in the Geo. Sur. Iowa, in 1858.

laterniformis, see Troostocrinus laterniformis.

PISOCRINUS benedicti, P. campana, P. gorbyi, S. A. Miller, 1891, Advance Sheets 17th



Advance Sheets 17th Rep. Geo. Sur. Ind., pp. 28 to 32, Niagara Gr. P. gemmiformis is rede-

FIG. 1242. – Pisocrinus benedicti. Side and basal views.

cussed. pyriformis was described in 1884.

PLATYCRINUS absentivus, P. æquiternus,

P. allophyllus, P. annosus, P. brittsi, P. ollicula, from the Chouteau lime-



stone; P. acclivus, P. bati- FIG. 1243. – Pisocrinus ola, P. blairi, gorbyi. Summit and P. broadheadi, blades. P. carchesium,

P. concinnus, P. gorbyi, P. lautus, P. occidentalis, P. pulcellus, P. rotundus, P. sampsoni, P. sulcatus, from the Burlington Gr.; and P. æternalis, P. amabilis, P. boonvillensis, P. pentagonus, from the Keokuk Gr., Bull. No. 4, Geo. Sur. Mo., pp. 8 to 23, S. A. Miller, 1890.

- alabamensis, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 50, Kaskaskia Gr.
- altidorsatus, P. corbuliformis, P. marginatus, P. pisum, P. planobasalis, from the Burlington Gr.; P. curryvillensis, P. insolens, from the Chouteau limestone; Rowley & Hare, 1891, Kansas City Scientist, pp. 97, 98, 113.
- caducus, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 13, Keokuk Gr., and at same place P. chouteauensis and P. colletti from the Chouteau limestone.
- POTERIOCRINUS agnatus, P. amœnus, P. boon villensis, P. coryphæus, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., pp. 42 to 45, Keokuk Group.
 - arcanus, P. cantonensis, P. crawfordsvillensis, P. granilineus, P. subramosus, P. verus, from the Keokuk Gr.; P. genista, P. legrandensis, P. scopæ, P. spartarius, from the Kinderhook Gr.;
 Miller and Gurley, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, pp. 23, 24, and Desc.

- New Gen. and Spec. Echinodermata, pp. 29, 37 to 40, 49, republished, 16th Rep. Geo. Sur. Ind., pp. 343, 344, 348, 355 to 358, 365.
- brittsi, S. A. Miller, 1890, Bull. No. 4, Geo. Sur. Mo., p. 30, Keokuk Gr.
- meekanus refer to Cyathocrinus meekanus, Chouteau limestone.
- waltersi, Rowley and Hare, 1891, Kansas City Scientist, p. 101, Burlington Gr.
- Protaster gregarius, see Aganaster gregarius. RHODOCRINUS benedicti, S. A. Miller, 1892,
 - Advance Sheets 18th Rep. Geo. Sur. Ind., p. 15, Keokuk Gr.
 - cælatus, R. sculptus, Miller and Gurley, 1890, Desc. New. Gen. and Spec. Echinodermata, pp. 42, 43, and 16th Rep.



FIG. 1244.—Saccocrinus howardi. Side, azygous, and summit views.

Geo. Sur. Ind., pp. 359, 360, Kinderhook Gr.

nanus is from the Kinderhook Gr.

- parvus, S. A. Miller, 1891, Bull. No. 4, Geo. Sur. Mo., p. 39, Keokuk Gr.
- SACCOCRINUS benedicti and S. howardi, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., pp. 29 and 30, Niagara Gr.
 - gorbyï, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 57, Niagara Gr.
- SCAPHIOCRINUS bellus, S. bonoensis, S. disparilis, S. granuliferus, S. graphicus, S.

lacunosus, S. manus, S. præmorsus, S. repertus, Miller & Gurley, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 24, and Desc. New Gen. and Spec. Echinodermata, pp. 29, 45 to 52, republished in 16th Rep. Geo. Sur. Ind., pp. 345, 349, 362 to 367, Keokuk Gr.

boonvillensis, P. constrictus, S. A. Miller, 1891, Bull. No. 4, Geo. Sur. Mo., pp. 37, 38, Keokuk Gr.

gorbyi, S. porrectus, S. sampsoni, S. A. Mil-

ler, 1891, Advance FIG. 1245.—Scaphi-Sheets 17th Rep. ocrinus gorbyi.

Geo. Sur. Ind., pp. 42, 46; S. sampsoni from the Chouteau limestone, the others from the Keokuk Gr.



lyoni, and S. maniformis, S. A. Miller, 1892, Advance Sheets Geo. Sur. Ind. p. 45, Keokuk



Gr. SCHŒNASTER legrandensis, and Miller Gurley, 1890, Desc. New Gen. and Spec. Echinodermata, p 56, and 16th

Rep. Geo.

Schœnaster le-1246. grandensis.

Sur. Ind., p. 371, Kinderhook Gr. STEGANOCRINUS benedicti, S. A. Miller, 1892. Advance Sheets 18th Rep. Geo. Sur. Ind., p. 27, Keokuk Gr.



FIG. 1247.—Schœnaster legrandensis. Part of ven-tral side magnified 6½ diameters.

STEPHANOCRINUS elongatus, S. hammelli, S. obpyramidalis, S. A. Miller, 1891, 17th Rep. Geo. Sur. Ind., pp. 22 to 26, Niagara Gr. S. osgoodensis is redescribed and the genus is discussed at

the same place. cornetti, S. A. Miller, 1892, Advance



FIG. 1248.—Steganocrinus benedicti.

Sheets 18th Rep. Geo. Sur. Ind., p. 12, Niagara Gr.

STRIBALOCYSTITES, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., [Ety. stribalos, close pressed, p. 20. thick, in allusion to the thick tumid plates; kustis, bladder.] Body rudely

SCH.-ULO.

subovate or subelliptical, and covered by about five series of tumid plates.





FIG. 1249.—Stribalocystites gorbyl. Side, summit, and basal views.

Basals 4, unequal; second series of plates 6, unequal; fourth and fifth

series irregular and covering the summit; no arms; orifice arms; near the summit



on the azygous Fig. 1250. -- Stribalo side, and another on the left mean on the left near

- the summit, both being above the third range of plates; sometimes there is a central orifice. Type S. tumidus, which is described at the same place, from the Niagara Gr.
- gorbyi, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 11, Niagara Gr.
- SYNBATHOCRINUS blairi, S. A. Miller, 1891, Bull. No. 4, Geo. Sur. Mo , p. 32, Keokuk Gr.
- wachsmuthi, Meek & Worthen, 1869, wachsmuthi, Meek & Worthell, 1809, Proc. Acad. Nat. Sci., p. 67, and Geo. Sur. Ill., vol. 5, p. 437, Burlington Gr. TAXOCRINUS spinifer, Hall, 1861, Proc. Bost. Soc. Nat. Hist., p. 318,

Burlington Gr.

subovatus, Miller & Gurley, 1890, Desc. New Gen. and Spec. Echinodermata, p. 26, and 16th Rep. Geo. Sur. Ind., p. 347, Keökuk Gr.

TECHNOCRINUS spinulosus is the type of the FIG. 1251 L-axo cgenus.

- TROOSTOCRINUS laterniformis, Owen & Shumard, 1850 (Pentremites laterniformis), Jour. Acad. Nat. Sci. 2d ser., vol. 2, p. 66. Kaskaskia Gr.
 - nitidulus, Miller & Gurley, 1890, Desc. New Gen. and Spec. Echinodermata, p. 58, and 16th Rep. Geo. Sur. Ind., p. 373, St. Louis Gr.
- St. Louis Gr. wachsmuthi, Gurley, 1884, New Carb. Foss. Bull. No. 2, p. 1, Warsaw Gr. ULOCRINUS, Miller & Gurley, 1890, Jour.
 - Cin. Soc. Nat. Hist., vol. 13, p. 6, and 16th Rep. Geo. Sur. Ind., p. 330. [Ety. oulos, solid, substantial; krinon, lily.] Calyx globular or pyramidal, large, plates more or less convex, smooth or granular. Basals 5, forming a pentagonal disc or low cup; columnar opening pentagonal; subradials 5, very large; first radials large, pentagonal, upper face projects over the interior of the calyx so as to make a broad articu-

ZEA.-ZOP.]

lating face for the regular interradials azygous plate place part of the calyx,



FIG. 1252.—

rests upon its upper the calyx, and proje the top of the first round. Type U. bu the same place, fron Meas. U. kansasens at the same place, fro ZEACRINUS commaticus.



FIG. 1253 -- Ulocri

The paper entitled "I the Iowa Geological Surve has never been published. entitled to recognition. 1 not generally distributed a of any of the organisms. w contains, would be absolut the organism intended to stract of the descriptions Illinois. A very selfish ex publication, which was ne shown on page 95 of this v publications, and they will never having appeared wit than the names in a priva mocrinus; A. ovatus, A. mul narius var. spiniferus, A. the tenuiradiatus, sometimes re erodus, sometimes referred t times referred to Strotocrini to Telei crinus; A. lagena, A. tuta var. attenuata, sometime quens, A. locellus, A. doris, calyculus, P; nodobrachiatus æqualis in Geo. Sur. Ill., vo Heterocidaris keokuk, and H bricatus, and Protaster (?) bar

682

ZEA.-ZOP.]

9.

d

8

it.

of

h

1 e

he

re

18.

;e

ets

ra

)1,

39,

30.

ir.

st.

18,

k

8C.

ec.

26.

eo. 47,

3118

the

511-

is).

, p.

SSC.

173.

rb.

mr.

md

Ety.

ly.]

rge,

1 01

tag-

)en-

ery nal

r of iculating face for the first brachial; no regular interradials. A quadrangular azygous plate placed obliquely forms part of the calyx, and a small plate



FIG. 1252.-Ulocrinus buttsi.

rests upon its upper angle at the top of the calyx, and projects slightly above the top of the first radials; column round. Type U. buttsi, described at the same place, from the Upper Coal Meas. U. kansasensis is also described at the same place, from the same rocks. ZEACRINUS commaticus, Z. pocillum, S. A.



FIG. 1253 -- Ulocrinus kansasensis.

Miller, 1891, Bull. No. 4, Geo. Sur. Mo., pp. 28, 36, Keokuk Gr.

dubius, Miller & Gurley, 1890, Desc. New Gen. and Spec. Echinodermata, p. 44, and 16th Rep. Geo. Sur. Ind.,

p. 361, Keokuk Gr. faggi, Rowley & Hare, 1891, Kansas City Scientist, p. 103, Burlington Gr.

ZOPHOCRINUS, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 32. [Ety. zophos, dark, obscure; krinon, lily.] Body ovate or pear shaped, and covered by two circles of plates and the vault. Basals or first circle of plates 3, forming an obconoidal cup, higher than wide; two of the plates are of equal size, and quadranr: the other is larger and pen-

gular; the other is larger and pen-



FIG. 1254.-Zophocrinus howardi. Side and summit views.

tagonal; second circle of plates 4, 3 pentagonal and 1 quadangular; they are horizontally truncated on top, and bear a circle of numerous pinnules surrounding a convex vault. Seven plates constitute the test of the calyx. It possessed a column with a small columnar canal. Type Z. howardi, described at the same place, from the Niagara Gr.

The paper entitled "Descriptions of New Species of Crinoidea, from investigations of the Iowa Geological Survey, Preliminary Notice, by James Hall," dated February 25, 1861, has never been published, as required by the laws of nomenclature, and is not, therefore, entitled to recognition. It is a private pamphlet, that was never kept for sale, and was not generally distributed among those conversant with the subject, and contains no figures of any of the organisms, which, with such meagre and imperfect descriptions as the text contains, would be absolutely necessary to enable an expert palæontologist to determine the organism intended to be named. Hall says, on page 10, that he published the abstract of the descriptions to get ahead of the publications of the Geological Survey of Illinois. A very selfish excuse for such poor work, and it does not add any vitality to the publication, which was never entitled to recognition under the laws of nomenclature, as shown on page 95 of this work. One genus and two species have been redefined in valid publications, and they will stand as of the date of the redefinition. The following names, never having appeared with valid definitions should be stricken out, as of no more value than the names in a private catalogue: Actinocrinus carica, sometimes referred to Eretmocrinus; A. ovatus, A. multibrachiatus var. echinatus, A. lucina, A. thetis, A. thoas. A. quaternarius var. spiniferus, A. themis; A. remibrachiatus, sometimes referred to Eretmocrinus; A. tenuiradiatus, sometimes referred to Strotocrinus or Teleiocrinus; A. eryx, A. (Calathocrinus) erodus, sometimes referred to Strotocrinus or Teleiocrinus; A. (Calathocrinus) insculptus, sometimes referred to Strotocrinus or Teleiocrinus; A. (Calathocrinus) althea, sometimes referred to Telei crimus; A. lagena, A. thalia; A. matuta, sometimes referred to Eretmocrimus; A. ma tuta var. attenuata, sometimes referred to Eretmocrinus; A. (?) tenuidicus, A. securis, A. infrequens, A. locellu, A. doris, Platycrinus olla (name preoccupied), P. regalis, P. glyptus, P. calyculus, P; nodobrachiotus (name preoccupied), P. parvinodus, P. eminulus, P. aqualis (P. aqualis in Geo. Sur. Ill., vol. 5, p. 456), Symbathoorinus papillatus, Rhodoorinus wachsmuthi, Heterocidaris keokuk, and H. lavispinus. All of the above, including Lepidechinus, L. imbricatus, and Protaster (?) barrisi, which have been since defined, in proper publications, are

BRYOZOA.

ART.-NEM.

printed in the above named private pamphlet, on about nine pages. In other words, thirty-eight new species and two new genera are defined on about nine pages, without a single figure of any kind, and without mentioning a locality from which any of them came, or informing any one of the age of the rocks further than to write "Burlington limestone.

Wachsmuth (who has probably seen some of the so-called types) has condemned, as synonyms of other species, the above named Actinocrinus multibrachia us var. echinatus, A. thetis, A. thoas, A. quat marius var. spiniferus, A. themis, A. eryx, A. lagena, A. securis, A. locellus, A. doris, Platycrinus olla, P. glyptus, P. calyculus, P. nodobrachiatus, and Synbathocrinus papillatus.

Had I been able to see a copy of the pamphlet, none of the names would have appeared as valid in the first edition of this work; but none of my correspondents had ever seen one, and I borrowed most of the names from references made to them by Meek & Wachsmuth. More recently Wm. F. E. Gurley, of Danville, Illinois, has been able to obtain a copy of all except the last page of the pamphlet, and I have been allowed to examine it, with the above result.

SUBKINGDOM MOLLUSCOIDA.

CLASS BRYOZOA.

Some genera were by accident placed in two families in this Class. Correct by striking Peronopora out of the Batostomellidæ; Eridopora, Lichenotrypa, Sagenella, and Selenopora from the Ceramoporidæ; Coscinella, Reptaria, and Semiopora from the Fenestellidæ; Anisotrypa from the Rhabdomesontidæ; Heliotrypa from the Stictoporidæ; Criscinella from the Thamniscidæ; Acanthoclema, Amplexopora, Atactopora, Bactropora, Chilotrypa, Nemataxis, and Tropidopora from the Trematoporidæ. Strike out the family Labechiidæ because it belongs, probably, to the Protozoa. Place Semiopora with the Ptylodictyonidæ; Sagenella and Reptaria with the Tubuliporidæ.

The bryozoum is sometimes called coencecium (koinos, common; oikos, house) or polyzoarium, especially when Polyzoa is used for the Class instead of Bryozoa. Gymnolæmata, in the last line on page 289, is from, gumnos, naked ; laimos, the throat.

- ARTHROCLEMA armatum, A. cornutum and Arthrostylus conjunctus and A. ob-liquus, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 12, pp. 193 and 194 and pp. 189 and 190, Trenton Gr.
- Ceramopora concentrica and C. whitei, James, 1888, Jour. Cin. Soc. Nat. Hist., vol. 11, p. 38. Not recognized.
- CHAINODICTYON, at the top of p. 297, is from
- chaino, gaping; and dictuon, net. DIASTOPORINA, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 12, p. 177. [Ety. diminutive of Diastopora.] Zoarium bifoliate, flabellate; zoœcia tubular, prostrate, not entirely immersed; apertures constricted, oblique, the anterior side not elevated; interspaces, striated. Type D. flabellata, described, at the same time, from the Trenton Gr. He also described at the same time from the Trenton Gr., Enallopora mundula under the name of Mitoclema mundulum. He gives his reasons for not using the ge-

neric name Enallopora in vol. 8, Geo. Sur. Ill. p. 683.

- DEYMOTRYPA, Ulrich, 1890, Geo. Sur. Ill., vol. 8, p. 399. [Ety. drumos, a thicket; trupa, perforation.] Zoarium dichotomous, reverse striated; zoecia in ranges, tubular, thick walled in tangential sections, springing from a thin plate; superficial apertures angular, oval within. Type D. diffusa, Hall's Retepora diffusa, and includes Hall's Thamniscus cisseis and T. niagarensis.
- Fenestella hemitrypa, see Hemitrypa proutana.
- FISTULIPORA laxata, Ulrich, 1889, Micropalæontology of Canada, p. 37, Hud. Riv. Gr. The genus Fistulipora is referred by some authors to the Alcyonaria, because the larger pores increase by coenenchymal gemmation, a method of increase said to be unknown among Bryozoa.
 - Glyptotrypa on p. 307, read Glyptopora.

PAC.-VIN.]

HELOPORA alternata, H 1890, Jour. Cin. So p. 192, Trenton Gr NEMATOPORA conferta,] Ulrich, 1890, Jour. vol. 12, pp. 196, 197 PACHYDICTYA emaciata Foerste, 1887, Bull. 2, pp. 162 to 165, N

pumula, P. triserialis Cin. Soc. Nat. Hist., and in Micropalæc P. hexagonalis and ton Gr.

PALESCHARA quadrangul (Chetetes quadran Prov. Ont., p. 61, D

PINACOTRYPA marginat Cont. to Can. Pal.,

POLYPORA manitobensi Cont to Can. Pal.,

RHINIDICTYA exigua, 1 minima, Ulrich, 18

Nat. Hist., vol. 12, p ton Gr.

RHOMBOPORA multipora, Denison Univ., vol.

ONE valve of the s drawn vertically from t The flattened space bet the aperture in one of front of the foramen ar deltidium, but in some Crania, the valves are h in all Groups of rocks, have reached its maxin clined since the Carbon

Beecher says the m the pedicled or fixed cor mately related to the s mouth. The extreme and consequently no ur swimming species, nor g life. All Brachiopods I ulum. (Ety. pro, early semielliptical in outline, slight posterior gaping is than the brachial. The n by which characters prin the individual as to be in
PAC.-VIN.]

M.

ds, t a

m

on

88

us, ris, yn-

apver

: &

to

by lla, rom

the ora.

nat-

the

with

) or

Z08.

oat.

Geo.

vol.

upa,

s, re-

ular, ions,

ficial e D.

l in-

d T.

rout-

icro-Hud.

s re-

Alcyrease

ethod

nong

a.

2X.

- HELOPORA alternata, H. mucronata, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 12, p. 192, Trenton Gr.
- NEMATOPORA conferta, N. granosa, N. ovalis, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 12, pp. 196, 197, Trenton Gr. PACHYDICTYA emaciata, P. obesa, P. turgida,
- PACHYDICTYA emaciata, P. obesa, P. turgida, Foerste, 1887, Bull. Denison Univ., vol. 2, pp. 162 to 165, Niagara Gr.
- pumula, P. triserialis, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 12, pp. 186, 187, and in Micropalæontology, pp. 42, 43, P. hexagonalis and P. magnipora, Trenton Gr.
- PALESCHABA quadrangularis, Nicholson, 1874, (Chetetes quadrangularis,) Rep. Pal. Prov. Ont., p. 61, Devonian.
- PINACOTRYPA marginata, Whiteaves, 1892, Cont. to Can. Pal., p. 278, Devonian. POLYPORA manitobensis, Whiteaves, 1892,
- Cont to Can. Pal., p. 280, Devonian. RHINIDICTYA exigua, R. humilis and R. minima, Ulrich, 1890, Jour. Cin. Soc.
- minima, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 12, pp. 183 to 185, Trenton Gr.

RHOMBOPORA multipora, Foerste, 1887, Bull. Denison Univ., vol. 2, p. 72, Coal Meas.

- STICTOPORELLA rigida, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 12, p. 188, Trenton Gr.
- STOMATOPORA moniliformis, Whiteaves, 1891, Cont. to Can. Pal., vol. 1, p. 212, Devonian; S. tenuissima, Utica Gr. and S. turgida, Hud. Riv. Gr., Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 12, pp. 175 and 176.
- SUBRETEPORA halli and S. sublaxa, Ulrich, 1890, (Philloporina halli and P. sublaxa,) Jour. Cin. Soc. Nat. Hist., vol. 12, pp. 179 and 181, Trenton Gr. Ulrich gives his reasons for not using Subretepora in vol. 8, p. 686, Geo. Sur. Ill.
- VINELLA, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 12, p. 173. [Ety. proper name.] Zoarium attached to foreign bodies, consisting of exceedingly slender, ramifying, thread-like tubes, occasionally radiately arranged; surface faintly lined longitudinally; a row of widely separated pores along the surface of the tubes. Type V. repens, described at the same time from the Trenton Gr.

CLASS BRACHIOPODA.

ONE value of the shells in this Class is always larger than the other. A line drawn vertically from the beak to the base will divide the shell into two equal parts. The flattened space between the beaks is called the hinge area or the cardinal area; the aperture in one of the beaks is called the foramen; and the triangular plate in front of the foramen and sometimes forming part of its circumference is called the deltidium, but in some genera it does not exist. When there are no teeth, as in Crania, the values are held together by the adductor muscles. The shells are found in all Groups of rocks, from the Taconic to the most recent; but the Class seems to have reached its maximum development in the Devonian, and to have slowly declined since the Carboniferous age.

Beecher says the main characters common to the Class are, the bivalve shell, the pedicled or fixed condition, the animal composed of two pallial membranes intimately related to the shell, a visceral sac, and two arms or appendages near the mouth. The extreme range of variation does not eliminate any of these features, and consequently no univalve or multivalve forms are found, nor any strictly free swimming species, nor growths or modifications adapting the organism to a Pelagic life. All Brachiopods have a common form of embryonic shell called the protegulum. (Ety. pro, early; tegos, a covering.) The protegulum is semicircular or semielliptical in outline, with a straight or arcuate hinge-line, and no hinge area. A slight posterior gaping is produced by the pedicel valve being usually more convex than the brachial. The modifications noted are apparently due to accelerated growth, by which characters primarily nealogic become so advanced in the development of the individual as to be impressed finally upon the embryonic shell. Acrothele dichotoma refer to Acrotreta dichotoma.

Acrotreta gulielmi refer to Discinopsis guli-* elmi.

- Anoplia, Hall, 1892, Pal. N. Y., vol. 8, p. 309. Proposed as a subgeneric name with Leptaena (?) nucleolata, Hall, as the type. It is only necessary to say it has no place in nomenclature as a subgeneric name. If it is a name which deserves retention, it should be in a generic sense, and probably it should be placed in that rank.
- ATHYRIS angelica var. occidenta'is, Whiteaves, 1891, Cont. to Can. Pal., vol. 1, p. 227, Devonian.
- ashlandensis, Herrick, 1888, Bull. Denison Univ. vol. 4, p. 24, Waverly Gr.
- brittsi, and A. ottervillensis, S. A. Miller, 1892, 18th Rep. Geo. Sur. Ind., p. 60, Ham. Gr.
- ATRYPA calvini, and A. reticularis, var. niagarensis, Nettleroth, 1889, Kentucky Foss. Shells, pp. 89, 92, Niagara Gr. deflecta, Hall see Zwospirg deflects
- deflecta, Hall, see Zygospira deflecta. ellipsoidea, Nettleroth, 1889 Kentucky Foss. Shells, p. 90, Up. Held Gr. missouriensis, S. A. Miller, 1892, Advance

missouriensis, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 61, Ham Gr.

Aulosteges spondyliformis, see Strophalosia spondyliformis.

BARBOISELLA, Hall, 1892, Pal. N. Y., vol. 8, 62. [Ety. proper name.] Lingulalike shell; pedicel-valve bears a high cardinal area, appearing as a thickened triangular plate, divided by a broad pedicel-groove, and having at each basal angle a boss or condyle which served as a muscular fulcra or as a point of articulation; the interior has a subquadrate depressed area in continuation of the pedicel-groove, and from its antelateral angles diverge two linear depressions, which extend about one-fourth the length of the shell; from outside and behind the extremities of these depressions begins a pair of long, curved furrows, composed of two shorter curves, the posterior rounding over the extremities of the linear depressions; the anterior and longer curves gradually approximate, and nearly meet at about one-third the length of the shell from the anterior margin; these furrows are accompanied by low ridges along their inner margin. A low median ridge, with elevated edges, begins at the posterior umbonal impression, and continues to the center of the valve, widening near its anterior extremity; behind its termination there is a pair of indistinct muscular impressions. In the brachial valve the beak is scarcely prominent, and the muscular markings are essentially as in the opposite valve, but more sharply developed; beneath the beak there is a faint umbonal scar. The long compound lateral curves have a greater degree of curvature than in the pedicel-valve, and their posterior portion incloses a thickened area, which is continued into a low median septum that bifurcates in the middle of the valve, and has extending from the angle an intercalated ridge. Type Lingula subspatulata, Meek & Worthen.

- BILLINGSELLA, Hall, 1892, Pal. N. Y., vol. 8, 230 [Ety. proper name.] Shell Orthis-like, transverse; subquadrate or semicircular in outline: contour concavo or plano convex; surface striate pedicel-valve the more convex: cardinal area moderately high, vertical or slightly incurved; delthyrium covered by a convex plate, which may be minutely perforated at the apex; teeth well developed, but dental plates are continued along the bottom of the umbonal cavity, inclosing a small subelliptical muscular area near the apex. In the brachial valve the cardinal area is greatly inclined, making an obtuse angle with that of the opposite valve; delthvrium partly covered by a convex deltidium, which never attains the development seen in the opposite valve, and is sometimes absent. Type Orthis and is sometimes absent. Type Orthus perina, Hall. It probably includes Streptorhynchus primordiale, Whitfield, Orthusina grandæva and Orthis lau-rentina, Billings.
- CAMARELLA bernensis, and C. owatonnensis, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 328, Trenton Gr.
- minor, Walcott, 1890, 10th Ann. Rep. U. S. Geo. Sur. p. 614. Up. Taconic. CHONETES manitobensis, Whiteaves, 1892,
 - HONETES manitobensis, Whiteaves, 1892, Cont. to Can. Pal., p. 281, Devonian. subquadrata, Nettleroth, 1889, Kentucky
 - subquadrata, Nettleroth, 1889, Kentucky
 Foss. Shells, p. 67, Up. Held. Gr.
 tumida, Herrick, 1888, Bull. Denison
 Univ., vol. 3, p. 36, Waverly Gr.
- complanata, dawsoni, reversa, refer to Chonostrophia.
- CHONOPECTUS, Hall, 1892, Pal. N. Y., vol. 8, p. 312. [Ety. chonos, a cup; pektos, combed.] Shell Jike Chonetes, the cardinal margin of the pedicle-valve bearing a row of erect spines; beak compressed, leaving a flattened area or cicatrix from attachment in early growth; surface ornamented with a double series of concentric lines or wrinkles, having the appearance of the engraving on a machine-turned watchcase, and strongest on the umbonal and central part; these wrinkles are crossed by concentric growth-lines, and sometimes by finer radiating lines more or less flexuous. Casts of the pedicel-valve show the impression of a short median septum dividing two broad obcordate flabelliform muscular scars, from the outer margin of which there are radiating vascular scars; impressions of a narrow cardinal area and exceedingly small teeth also occur on

CHO.-CRA.]

the internal cast. Norwood & Pratte CHONOSTROPHIA. Hall, p. 310. [Etv. ch

turning around.] Chonetes, concave valve being sligh umbo, but becom over the pallial contour like Le tremely tenuous face covered with fasciculate striæ. the upper margin bears a row of h same structure an Chonetes. The d and appears to h pletely closed. 7 strong, and rest up valve; between median septum, en one half the length ing a subcordate outer margins of elevated. In the crural plates are bilobed cardinal p surface it ends pallial region fine substance fibrous. netes reversa, Whit genus is referred C. dawsoni, and C. hel Pal. N. Y., vol. 8,

 $\begin{array}{c} \mathbf{Fal.} \mathbf{N} \cdot \mathbf{I} \cdot, \mathbf{Vol.} \\ \mathbf{Gr.} \end{array}$

CHRISTIANA, Hall, 1892 p. 298. [Ety. prop sembling Leptæna nally elongated, som in outline; norma surface smooth or radiating lines, ci concentric plication the pedicel-valve hi ably closed by a c divergent, and fron the elevated margin muscular scars, tra most the entire ler scars inclose two In the brachial val cess is bipartite, eac grooved behind; t long and diverge elevated extremiti lower moiety of t duced on each side cular ridge, curving the sides, then our ing the anterior m each branch recu backward, parallel as far as the base cess. The interspace versely at about on from the hinge-line The four areas thus

the posterior and a

CHO.-CRA.]

'HO

in

rior

lich

um

the

the

Lin-

l. 8, hell

e or

con-

ate

inal

01

red

mi

eth

are

um-

llip

Ín

a is

tuse

lve;

rex

the

ilve,

rthis

ides

ield,

lau-

nsis,

Nat.

Rep.

892.

icky

ison

Cho-

1. 8.

ktos.

car-

)ear-

com-

i or

arly

th a

3 or

the

stch-

and

essed

ome-

'e or

licel-

hort

road

cars,

here

pres-

r on

and

ie

the internal cast. Type Chonetes fischeri, Norwood & Pratten.

CHONOSTROPHIA, Hall, 1892, Pal. N.Y., vol. 8, p. 310. [Ety. chonos, a cup; strophe, turning around.] Shell like a reversed Chonetes, concavo-convex, the pedicelvalve being slightly convex about the umbo, but becoming broadly concave over the pallial region; outline and contour like Leptana; valves extremely tenuous and compressed ; surface covered with fine, alternating or fasciculate striæ. In the pedicel-valve the upper margin of the cardinal area bears a row of hollow spines of the same structure and arrangement as in Chonetes. The delthyrium is narrow, and appears to be more or less completely closed. The teeth are quite strong, and rest upon the bottom of the valve; between them arises a low median septum, extending one-third or one half the length of the valve, dividing a subcordate muscular area, the outer margins of which are distinctly elevated. In the brachial valve the crural plates are united to form a bilobed cardinal process. On the inner surface it ends abruptly: internal pallial region finely papillose; shellsubstance fibrous, punctate. Type Cho-netes reversa, Whitfield. To the same genus is referred Chonetes complanata, C. dawsoni, and C. helderbergia, Hall, 1892, Pal. N. Y., vol. 8, p. 353, Low. Held. Gr.

CHRISTIANA, Hall, 1892, Pal. N. Y., vol. 8, p. 298. [Ety. proper name.] Shell resembling Leptæna, usually longitudinally elongated, sometimes semielliptical in outline; normally concavo-convex; surface smooth or covered with fine radiating lines, crossed by stronger concentric plications; cardinal area of the pedicel-valve high; delthyrium probably closed by a convex plate; teeth divergent, and from their bases extend the elevated margins of two linguiform muscular scars, traversing the shell almost the entire length these diductor scars inclose two elongate adductors. In the brachial valve the cardinal process is bipartite, each of the lobes being grooved behind; the crain, pating in long and divergent, terminating in lower moiety of these plates is produced on each side of an elevated muscular ridge, curving slightly inward on the sides, then outward on approaching the anterior margin of the valve, each branch recurving and passing backward, parallel to the median axis, as far as the base of the cardinal process. The interspaces are divided transversely at about one-third their length from the hinge-line, by a lower ridge. The four areas thus inclosed represent the posterior and anterior scars of the adductor muscles. Type Leptæna subquadrata, Hall.

CLITAMBONITES, Pander, 1830, Beitrage zur Geognosie des russ. Reiches, p. 70. [Ety. klitos, a sloping place; ambon, any rising; lithos, stone.] Shells with a subsemicircular marginal outline; convex or subpyramidal; hinge-line straight, and forming the greatest diameter of the shell; pedicel-valve elevated; cardinal area high, vertical, or sometimes incurved and crossed by a broad delthyrium, with a perforate deltidium; dental lamellæ strongly developed, converging and uniting in the median line ; median septum about half the length of the valve; muscular impressions obscure; cardinal area developed in the brachial valve, delthyrium filled with a callosity; dental sockets large; crural plates low; thickened transverse area in the umbonal region; surface striate; shell-substance impunctate. Type Pronites adscendens, Pander. It includes Orthisina vernuili, Eichwald, and Hemipronites americanus, Whitfield.

- CONOTRETA, Walcott, 1890, Advance Sheets Washington. Biological Soc. Etv. konos, cone; tretos, perforated.] Structure calcareo corneous. Five narrow ridges radiate from the apex toward the front, on the internal side of the dorsal or conical valve, the central one of which joins the thickened apex, which is supposed to have been perforated by a siphonal tube. In Acrotreta there is an elongated muscular scar extending from each side of the siphonal tube obliquely forward. Type C. rusti, which is described at the same place from the Trenton Gr.
- CRANIA agaricina, C. pulchella, Hall, 1892, Pal. N. Y., vol. 8, p. 180, Low. Held. Gr., and C. granosa and C. favincola at same place, Ham. Gr.
 - blairi, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 56, Chouteau limestone, and C. greenii from Up. Held. Gr.
 - columbiana, Walcott, 1888, Proc. U. S. Nat. Mus. p. 441, Up. Taconic. Not defined so as to be recognized.
 - halli, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 328, Trenton Gr.

radicans, see Strophalosia radicans.

CRANIELLA Chlert, 1888, Bull. de la Soc. d'Etudes Scientif. d'Angers, p. 37. [Ety. diminutive of Crania.] Shell somewhat irregular; outline subcircular or subquadrangular; ventral valve thin, adhering by its entire surface; dorsal valve conoidal, more or less elevated; apex subcentral, posterior; interior of the dorsal valve without a well-defined border; impressions of the adductors large, distinct, four in number, of which the posterior two are quite distant, the two subcentrals smaller, closely approximate or even confluent; from near each

of the posterior impressions starts a broad vascular sinus, strongly sinuous near its point of departure, narrowing gradually in following the contour of the valve, emitting from its marginal side dichotomizing secondary branches. Type C. meduanensis, Œhlert. It probably includes Crania hamiltonia, Hall, and C. greenii, S. A. Miller.

- ulrichi, Hall, 1892, Pal. N. Y., vol. 8, p. 181, Trenton Gr.
- CRYPTONELLA ovalis, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 76, Ham. Gr.
- traversensis, Winchell, 1866, (Terebratula traversensis,) Rep. Low. Penin. Mich., p. 95, Ham. Gr.
- Derbya, Waagen, 1884, Palæontologica Indica, Ser. 13, vol. 1, pp. 576, 591 to 607. [Ety. proper name.] This genus, according to Hall, is distinguished from Streptorhynchus by the presence of a median septum in the pedicel valve. He notes no other generic difference. Type D. regularis, Waagen. Hall refers to this genus Orthis keokuk, Hall, Orthis robusta, Hall, Hemipronites (Streptorhynchus) crassus, Meek & Hayden, and regards Hemipronites lasallensis and H. richmondi, McChesney, as synonyms for H. crassus. I consider Orthis robusta, Hall, more closely related to Hemipronites crassus, Meek, than either H. lasallensis or H. richmondi, McChesney, and if one is to be retained as a species all three should be, and in no event is either one of them congeneric with Orthis keokuk. Hence, I see no propriety in the use of the word Derbya as applied to American fossils, and as I have seen no typical specimens belonging to the genus, I express no opinion as to its value. Hall, however, describes Derbya broadheadi, D. bennetti, D. cymbula, D. affinis, and D. biloba, from the Up. Coal Meas., Pal. N. Y., vol. 8, pp. 347 to 350, and on p. 346 D. ruginosa, from the Keokuk Gr., and D. costatula from the Kaskaskia Gr. All of these may be referred to Streptorhynchus, and it is not too much to say that Meek would have classed all of them as synonyms for Streptorhynchus crassum.
- DISCINA concordensis, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 328, Trenton Gr.
- keokuk, Gurley, 1884, New Carb. Foss., p. 6, Keokuk Gr.
- sampsoni, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 80, Chouteau limestone.
- DISCINOPSIS, Matthew, 1892, Pal. N. Y., vol. 8, p. 105. [Ety. from resemblance to Discina.] Shell subcircular, depressed conical; apex excentric; apex of the pedicel-valve truncated, with a circular aperture; interior having a pair of diverging furrows from the beak, that converge toward the anterior margin, and

inclose a thickened area, which, in the subumbonal region, is apparently free and projects like a shelf, from beneath which the foramen probably opened; shell substance tenuous, apparently corneous; surface marked concentrically, and also with radiating striæ. Type Acrotreta gulielmi, Matthew.

EATONIA variabilis, Whiteaves, 1891, Cont. to Can. Pal., vol. 1, p. 233, Devonian.

- Hallina, Winchell & Schuchert, 1892, Am. Geo., vol. 9, p. 291. [Ety. proper name.] Shells small, articulate, rostrate, biconvex, semiplicate; pedicel opening bounded laterally by incomplete deltidial plates; calcified brachial supports long and much like Waldheimia. Type H. saffordi, described at the same place with nicolletti, from Trenton Gr. Neither one defined so as to be recognized.
- Koninckina americana, Swallow, may be stricken from the list as it is not a Koninckina,^{*} and is too poorly defined to be recognized.
- KUTORGINA labradorica var. swantonensis, Walcott, 1889, Proc. Nat. Mus., vol. 12, p. 36, Up. Taconic.
- LEPTENA charlottæ, Winchell & Schuchert, 1892, Am. Geo., vol. 9, p. 288, Trenton Gr., and Plectambonites gibbosus, from Galena Gr. Not defined so as to be recognized.
- minnesotensis, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci, vol. 3, p. 329, Trenton Gr., and præcosis, recedens and saxea, Hud. Riv. Gr.
- LEPT.ENISCA, Beecher, 1890, Am. Jour. Sci. and Arts, Ser. 3, vol. 40, p. 239. [Ety. diminutive of Leptæna.] Shell concavoconvex, attached to foreign objects by calcareous cementation of the ventral beak; valves articulated by teeth and sockets; dorsal valve concave; interior with broad spiral impression on each side of the median line, making a single volution; adductor impressions small; cardinal line narrow, bearing in the center two prominent, bilobed, cardinal processes, separated to admit the vertical septum in the opposite beak; ventral valve convex, area elongate, triangular; fissure covered with a pedicel sheath; cardinal muscular scar supported on or limited by two elevated famellæ; cavity of beak divided by a vertical septum, on each side of which, in the anterior half, is a small, adductor scar; shell structure punctate. Type L. concava.
- adnascens and L. tangens, Hall, 1892, Pal.
- N. Y., vol. 8, p. 352, Low. Held Gr. concava, Hall, 1857, (Leptæna concava,) 10th Rep. N. Y. St. Nat. Hist., p. 47, and Pal. N. Y., vol. 3, p. 197, Low. Held. Gr.
- LEPTELLA, Hall, 1892, Pal. N. Y., vol. 8, p. 293. [Ety. leptos, thin.] Shell small, concavo-convex, semicircular or semi-

elliptical; hinge-lin valve evenly con-moderately high, covered by a convex spicuous; brachial cave; cardinal area filled with the card is divided behind b on the cardinal ma double but less con crural plates, which highly elevated ab they are short, term inclose deep sockets tened or concave; forming a double vided by a broad m surface covered wit ating lines, which e flection. Type Lept.

LINDSTROMELLA, Hall, 1 8, p. 134. [Ety. pro with outline con characters as in Orl valve with a faint r two strong approxin ning behind a tran through the apex, a ing to meet the me rior adductor scars l ridges and the med cular scar at the po each ridge. Type Ham. Gr.

LINGULA atra, Herrick, Univ., vol. 4, p. 16, deflecta, Winchell & Sc.

Geo., vol. 9, p. 284, 0 fined so as to be rec exilis, see Lingulodisci

gannensis, Herrick, 1 Univ., vol. 4, p. 17, gorbyi, S. A. Miller, 18

18th Rep. Geo. Sur teau limestone. macconnelli, Walcott, 18

Mus., p. 441, Up. Tac defined.

meeki, Herrick, 1888, I vol. 4, p. 18, Waverl norwoodi, see Lingulop parrishi, S. A. Mill

Sheets 18th Rep. G Up. Coal Meas.

riciniformis var. galen Schuchert, 1892, Am. Galena Gr. Not d recognized.

sedaliensis, S. A. Mill Sheets 18th Rep. Ge Chouteau limestone. subspatulata, refer to Ba

lata. tighti, Herrick, 1887, B vol. 2, p. 43, Coal M triangulata, Nettleroth

Shells, p. 34, Up. He. waverlyensis, Herrick, Univ., vol. 4, p. 18, V LIN.-NEW.]

Р.

10

ee

th

1:

ly

c.

be

ıt.

n.

n-

ıg

۶Ĭ

p-

a

he

r.

g.

be

я

ed

18

2,

٢t,

)n

m

)e

n.

n

a.

ъi.

v.

0-

)V

al

ıd

e.

)n

a

ns

in

r-

16

ζ;

e.

d-

p-

ed

я

h.

DI

De

ιl.

7.

N.

11,

elliptical; hinge-line straight; pedicel- | valve evenly convex; cardinal area moderately high, delthyrium nearly covered by a convex plate; teeth inconspicuous; brachial valve slightly concave; cardinal area high, delthyrium filled with the cardinal process which is divided behind by a median groove; on the cardinal margin this process is double but less conspicuous than the crural plates, which are arched and highly elevated above the hinge-line they are short, terminate abruptly, and inclose deep sockets; visceral area flattened or concave; its anterior margin forming a double visceral area is divided by a broad median ridge, and its surface covered with five sharp radiating lines, which end at the line of de-

flection. Type Leptzna sordida, Billings. LINDSTROMELLA, Hall, 1892, Pal. N. Y., vol. 8, p. 134. [Ety. proper name.] Shells with outline contour and pedicel characters as in Orbiculoidea; brachial valve with a faint median septum and two strong approximating ridges, beginning behind a transverse line passing through the apex, and rapidly converging to meet the median septum; anterior adductor scars lying between these ridges and the median septum; a circular scar at the posterior extremity of each ridge. Type L. aspidium, p. 178, Ham. Gr.

- LINGULA atra, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 16, Waverly Gr.
 - deflecta, Winchell & Schuchert, 1892, Am. Geo., vol. 9, p. 284, Galena Gr. Not defined so as to be recognized.

exilis, see Lingulodiscina exilis.

- gannensis, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 17, Waverly Gr.
- gorbyi, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 55, Chouteau limestone.
- macconnelli, Walcott, 1888, Proc. U. S. Nat. Mus., p. 441, Up. Taconic. Not properly defined.
- meeki, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 18, Waverly Gr.
- norwoodi, see Lingulops norwoodi.
- parrishi, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 53, Up. Coal Meas.
- riciniformis var. galenensis, Winchell & Schuchert, 1892, Am. Geo., vol. 9, p. 284, Galena Gr. Not defined so as to be recognized.
- sedaliensis, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 54, Chouteau limestone.
- subspatulata, refer to Barroisella subspatulata.
- tighti, Herrick, 1887, Bull. Denison Univ., vol. 2, p. 43, Coal Meas.
- triangulata, Nettleroth, 1889, Ky. Foss. Shells, p. 34, Up. Held. Gr.
- waverlyensis, Herrick, 1888, Bull. Denison, Univ., vol. 4, p. 18, Waverly Gr.

- Winchell LINGULELASMA galenensis, x 1892, Am. Geo., vol. 9, Schuchert, p. 285, Galena Gr. Not defined so as to be recognized. Ulrich, Schuchert and others persist in using the word Lingulasma, which has no more meaning than Lasma or Linguma would have. I spelled the word Lingulelasma, as it should have been coined, supposing the misspelling was accidental; but, probably, Mr. Ulrich's spelling should be recognized, and if so, then the word should be stricken from science, as a meaningless compound, under rules on page 98.
- LINGULODISCINA, Whitfield, 1890, Bull. Am. Mus. Nat. Hist., p. 121. [Ety. Lingula and Discina.] Upper valve linguloid in character, having a terminal beak, the accretions of growth being along the lateral and basal margins; lower valve having its growth-lines nearly equal on all sides of the initial point and perforated on the cardinal side by a byssal slit as in Discina; shell structure as in Lingula and Discina. Type L. exilis, exilis, Hall, 1860, (Lingula exilis,) 13th Rep. N. Y. St. Mus. Nat. Hist., p. 77.
- Rep. N. Y. St. Mus. Nat. Hist., p. 77, and Pal. N. Y., vol. 4, p. 7, Ham. Gr. LINGULOPS granti, Hall, 1892, Pal. N. Y.,
 - vol. 8, p. 173, Niagara Gr. norwoodi, instead of Lingula norwoodi.
- MIMULUS, Barrande, 1879, Systeme Silurien du Centre de la Boheme, vol. 5, p. 109. [Ety. mimulus, a mime, an imitator.] Spirifera (?) waldronensis, Miller & Dyer, was referred to Triplesia by Hall, without a knowledge of the interior, and he now refers it to Mimulus, though the internal characters of that genus are unknown.
- MONOMERELLA egani, M. greenii, M. kingi, M. ortoni, Hall, 1892, Pal. N. Y., vol. 8, pp. 174, 175, Niagara Gr.
- NEWBERRIA, Whiteaves, 1891, Cont. to Can. Pal., vol. 1, p. 236. [Ety. proper name.] Shells elongate-ovoid, having the general contour and external aspect of Rensselæria and Amphigenia, but without the strongly radiate striate surface of the former genus. The convexity of the valves is greatest in the umbonal region, and the surface is distinctly flattened over the lateral slopes, leaving the median portion of the valves very prominent; the pedicel valve has the rostrum produced and incurved; the apex truncated by a circular foramen; deltidial plates not determined; the teeth are comparatively small, projecting forward and gently upward, free at their extremities, and supported by narrow dental plates which join the interior of the valve above the middle of its depth, and are continued forward as slender ridges upon the inner surface, which gradually merge into the shell. In the bottom of the rostral and umbonal cavity there is a broad, scarcely defined,

muscular area, from which radiate a series of vascular ridges and depressions; the strongly marked pair of adductors are situated posteriorly, just within this muscular area; lying in front of these is a single (rarely divided) elongate adductor impression which often extends forward to the center of the shell; on each side of the muscular impressions is a thickened triangular area, very narrow at its origin in the umbonal region, widening anteriorly and produced into two divergent furrows (four in all), which extend over the pallial region, in some instances almost to the anterior margin. In the brachial valve there are two short, divergent, crural plates, which are not united at their bases to form a hinge plate, as in Rensselæria; a low median ridge arises between them, passing for a short distance along the bottom of the valve. separating the obovate, narrowly flabelliform muscular scars of the adductor muscles. These scars are characterized by the strong striation of their surfaces: surface smooth, or with obscure radiating striæ; distinguished from Rensselæria, which has strong radiating striæ on the surface, and preserves two broad, strong, dental plates on the interior of the pedicel-valve, which reach nearly to the bottom of the rostral and post umbonal cavity, leaving a narrow space for the muscular area, quite unlike that of the corresponding valve of Newberria. It is from this narrow cavity, produced by the encroachment of these strong dental plates, that we have the narrow rostral casts of Rensselæria. The thickened strong hinge-plate, which supports the crura in the brachial valve of Rensselæria, does not exist in Newberria; the spoon-shaped process found in Amphigenia does not exist in Newberria. Type N. johanni. condoni, McChesney, 1867, (Rensselæria condoni,) Trans. Chi. Acad. Sci., vol.1,

- p. 36, Oriskany Gr. claypolei, Hall, 1891, Advance Sheets 10th Ann. Rep. N. Y. St. Geo., Ham. Gr.
- johanni, Hall, 1867, (Rensselæria johanni,) Pal. N. Y., vol. 4, p. 385, Up. Held. Gr.
- lævis, Meek, 1868, (Rensselæria lævis,) Trans. Chi. Acad. Sci., p. 108, Devonian.
- missouriensis, Swallow, 1891, Advance Sheets 10th Ann. Rep. N. Y. St. Geo., Ham. Gr.
- NUCLEOSPIRA indianensis, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 79, Ham. Gr.
- OBOLELLA misera and O. pretiosa, refer to the genus Linnarssonia.
- OEHLERTELLA, Hall, 1892, Pal. N. Y., vol. 8, p. 132. A proposed subgeneric name to include Discina pleurites.
- ORBICULOIDEA herzeri, Cuyahoga Shales, O. numulus, Low. Held. Gr., and

O. ovalis, Trenton Gr., Hall, 1892, Pal. N. Y., vol. 8, pp. 177, 178. ORTHIS arcuaria, Hud. Riv. Gr.; O. holstoni.

- O. loricula, O. saffordi, Trenton Gr. O. oweni, Keokuk Gr.; O. senecta, Clinton Gr., ard O. superstes, Chemung Gr., Hall, 1892, Pal. N. Y., vol. 8, pp. 340 to 342.
- benedicti, S. A. Miller, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 78, Niagara Gr.
- germana, Winchell & Schuchert, 1892. Am. Geo., vol. 9, p. 290, Galena Gr. meedsi. Trenton Gr.; proavita, Hud. Riv. Gr. Not defined so as to be recognized.
- goodwini, Nettleroth, 1889, Kentucky Foss. Shells, p. 39, Up. Held. or Ham. Gr.
- inæqualis. see Streptorhynchus inæquale. linneyi, Nettleroth, 1889, Kentucky Foss.
- Shells, p. 41, Hud. Riv. Gr. manitobensis, Whiteaves, 1892, Cont. to Can. Pal., p. 283, Devonian.
- missouriensis, Swallow, is the same de-scribed afterward as O. theimii.
- corpulenta, macrior, rogata, tersus, minnesotensis, petræ. Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3. pp. 330, 332, Trenton & Hud. Riv. Gr. The first four seem to be synonyms for O. testudinaria, but possibly they are not.
- Orthisina alberta, Walcott, 1888, Proc. U. S. Nat. Mus., p. 442, Up. Taconic. Not properly defined.
- Paterina is a generic name proposed for such shells as Kutorgina labradorica, without any distinct generic characters being pointed out. See Am. Jour. Sci. and Arts, Ser. 3, vol. 41, p. 343.
- PENTAMERELLA thusnelda, Nettleroth, 1889, Kentucky Foss. Shells, p. 51, Up. Held. Gr.
- PENTAMERUS colletti, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 77, Waterlime Gr.
 - complanatus, Nettleroth, 1889, Kentucky Foss. Shells, p. 53, Niagara Gr. decussatus, Whiteaves, 1891, Can. Record
 - Sci., p. 295, Up. Sil.
 - globulosus, Nettleroth, 1889, Kentucky Foss. Shells, p. 54, Niagara Gr.
 - knotti, Nettleroth, 1889, Kentucky Foss. Shells, p. 56, Niagara Gr.
 - uniplicatus, Nettleroth, 1889, Kentucky Foss. Shells, p. 63, Niagara Gr.
- PHOLIDOPS calceola, P. patina, Hall, 1892, Pal. N. Y., vol. 8, p. 182, Corniferous
- limestone. Polytrechia. Hall, 1892, Pal. N. Y., vol. 8, p. 239 [Ety. polus, many; toichos, the wall of a house.] Shell small, subtri-hedral in contour; hinge-line straight; pedicel-valve with a high, nearly vertical cardinal area, obliquely striated; delthyrium covered with a convex plate; dental lamellæ widely separated, descend for a distance vertically, and then bend inward to the median line,

forming with the d vault; the inner spondylium, is su median septum an septa, which mee angulation; the u vided into five chai shallow, depresse area narrow ; delth sockets widely sep narrow and nearly line; cardinal pr prominent, and at crural plates ther thickening support tum; surface stria Type P. apicalis, W the same place fi Gr.

PRODUCTELLA minneap Bull. Minn. Acad p. 332, Trenton Gr to this genus. pyxidata is from the

semiglobosa, Nettler Foss. Shells, p. 70, PRODUCTUS blairi, S. A.

Sheets 17th Rep. (Chouteau limeston

nodocostatus, P. rario villensis, Herrick, Univ., vol. 4, p. 19 pileiformis, McChesr

Foss., p. 40, Kaskas

PSEUDOCRANIA anomala nomer, that the s

streptorhynchoid, y

- RENSSELÆRIA condoni, lævis, refer to New
- RETZIA ashlandensis (Rhynchospira a
- Denison Univ., vol. circularis, R. plicata

S. A. Miller, 1892, 1 Rep. Geo. Sur. In limestone.

sobrina, Beecher & N. Y. St. Mus., p.

- RHINOBOLUS, (mispelled has shown, in Pal
 - why this genus in merella, and that i
 - with R. galtensis as fined R. davidsoni
- RHYNCHONELLA allegha Bull. No. 41, U. 8 Waverly Gr.
- belliformis, R. louisvi R. saffordi var. de ata, Nettleroth, 18 Shells, pp. 73 to 8 tenuistriata from th others from the Nia

colletti, S. A. Miller, 1

- 18th Rep. Geo. Sur Gr., and R. koke
- Waterlime Gr. lævis, R. medialis, H 1889, Trans. Am. 1

PRO.-STR.]

POL

Pal.

oni.

ir.

ecta,

ung

pp.

eets

Ni-

892

ir.

Ind.

cog

cky

ale.

088

. to

de

nin-

Jull.

330.

first

stu-

S.

Not

for

ica,

ters

Sci.

889.

Up.

Ad-

nd.,

cky

ord

cky

088.

ckv

892

'OUS

8

the

)tri-

·ht:

erti-

ed;

vex

ted.

and

ine,

01

BRACHIOPODA. 👗

forming with the deltidium a subrostral vault; the inner spoon-shaped plate, spondylium, is supported by a stout median septum and two smaller lateral septa, which meet it at the lines of angulation; the umbonal cavity is divided into five chambers; brachial valve shallow, depressed convex; cardinal area narrow; delthyrium broad; dental sockets widely separated; crural plates narrow and nearly parallel to the hingeline; cardinal process simple, linear, prominent, and at its union with the crural plates there is a subtriangular thickening supported by a median septum; surface striated; no fold or sinus. Type P. apicalis, Whitfield, described at the same place from the Calciferous Gr.

PRODUCTELLA minneapolis, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 332, Trenton Gr. It does not belong to this genus.

pyxidata is from the Kinderhook Gr.

- semiglobosa, Nettleroth, 1889. Kentucky Foss. Shells, p. 70, Up. Held. Gr. PRODUCTUS blairi, S. A. Miller, 1891, Advance
- PRODUCTUS blairi, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 79, Chouteau limestone.
- nodocostatus, P. raricostatus and P. rushvillensis, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 19 to 23, Waverly Gr. pileiformis, McChesney, 1859, New Pal.
- Foss., p. 40, Kaskaskia Gr. PSEUDOCRANIA anomala, Hall says, is a misnomer, that the shell described is a streptorhynchoid, whatever that means. RENSSELÆRIA condoni, R. johanni and R. lævis, refer to Newberria.
- RETZIA ashlandensis, Herrick, 1888, (Rhynchospira ashlandensis,) Bull.
- Denison Univ., vol. 3, p. 25, Waverly Gr. circularis, R. plicata and R. triangularis, S. A. Miller. 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 61, Chouteau limestone.
- sobrina, Beecher & Clark, 1889, Mem. N. Y. St. Mus., p. 61, Niagara Gr.
- RHINOBOLUS, (mispelled Rhynobolus,) Hall has shown, in Pal. N. Y., vol. 8, p. 44, why this genus is distinct from Trimerella, and that it should be restored with R. galtensis as the type, and he defined R. davidsoni from the Niagara Gr.
- RHYNCHONELLA alleghania, Williams 1887, Bull. No. 41, U. S. Geo. Sur., p. 87, Waverly Gr.
 - belliformis, R. louisvillensis, R. rugicosta, R. saffordi var. depressa, R. tenuistriata, Nettleroth, 1889, Kentucky Foss. Shells, pp. 73 to 82; louisvillensis and tenuistriata from the Up. Held. Gr., the others from the Niagara Gr.
 - colletti, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 57, Niagara Gr., and R. kokomoensis from the Waterlime Gr.
 - lævis, R. medialis, R. striata, Simpson, 1889, Trans. Am. Phil. Soc., pp. 443,

444; lævis from the Clinton Gr., the others from the Waverly Gr.

- minnesotensis and sancta, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 333, Trenton Gr.
- Rhynchospira ashlandensis, see Retzia ashlandensis.
- ROEMERELLA, Hall, 1892, Pal. N. Y., vol. 8, p. 137. Proposed as a subgenus to include Discina grandis.
- SKENIDIUM, (should be spelled Scenidium,) anthonense, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 333, Trenton Gr.
- SCHIZOGRANIA, helderbergia, Low. Held. Gr. S. schucherti, Hud. Riv. Gr., Hall, 1892, Pal. N. Y. vol. 8, p. 179.
- SIPHONOTRETA minnesotensis. Hall, 1892, Pal. N. Y., vol. 8, p. 177, Trenton Gr.
- SPIRIFERA byrnesi, S. davisi, S. dubia, S. foggi, S. hobbsi, S. knappana, S. macconathi, Nettleroth, 1889, Kentucky Foss. Shells, pp. 109 to 122; foggi from the Niagara Gr., the others from the Up. Held. Gr. capax is from the Kinderhook Gr., and
 - is not a synonym for S. parryana.
 - carteri was so poorly defined that it could not be recognized, and it is now claimed by some that it is the same as Syringothyris typus. The name should be dropped from the list.
 - deltoideus, S. tenuispinatus, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 27, Waverly Gr.
 - disjuncta var. occidentalis, Whiteaves, 1891, Cont. to Can. Pal., vol. 1, p. 222, Devonian.
 - subventricosa, McChesney, 1860, New Pal. Foss., p. 44, 1865, pl. 1, fig. 4, Coal Meas.
 - texta, see Syringothyris texta.
- winchelli, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 46, Waverly Gr. SPIRIFERINA depressa, Herrick, 1888, Bull.
- SPIRIFERINA depressa, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 47, Waverly Gr.
- STREPTORHYNCHUS inæquale, Hall, 1858, (Orthis inæqualis,) Geo. Iowa, p. 490, Kinderhook Gr.
 - subsulcatum, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 335, Trenton Gr.; desideratum, (Orthothetes desideratus), Hall, 1892, Pal. N.Y., vol. 8, p. 345, Waverly Gr., and S. ulrichi, p. 351, Kaskaskia Gr.
- STRICKLANDINIA louisvillensis, Nettleroth, 1889, Kentucky Foss. Shells, p. 65, Niagara Gr.
- subquadrata, Herrick. Not properly defined.
- STRINGOCEPHALUS burtoni, Defrance, 1827, Dict. des Sci. Naturelles, vol. 51, p. 102, and 1891, Cont. to Can. Pal., vol. 1, p. 235, Devonian.
- STROPHALOSIA keokuk, Beecher, 1890, Am. Jour. Sci. and Arts, Ser. 3, vol. 40, p. 244, Keokuk Gr.
 - radicans, Winchell, 1866, (Crania radicans,) Rep. Low. Penin. Mich., p. 92, Ham. Gr.

O

rockfordensis, Hall, 1892, Pal. N. Y., vol. 8, p. 353, Up. Devonian.

- scintilla, Beecher, 1890, Am. Jour. Sci. and Arts, Ser. 3, vol. 40, p. 243, Chouteau limestone.
- spondyliformis, White & St. John, 1868, (Aulosteges spondyliformis), Trans. Chi.
- Acad. Sci., p. 118, Coal Meas. STROPHEODONTA, instead of Strophodonta. [Ety. stropheus, the socket in which the door moves; odous, tooth.]
- Whiteaves, STROPHOMENA acanthoptera, 1891, Can. Record Sci., p. 294, Up. Sil.
- conradi, S. winchelli, Hall, 1892, Pal. N.Y., vol. 8, p. 344, Trenton Gr.
- emaciata, scofieldi, septata, Winchell & Schuchert, 1892, Am. Geo., vol. 9, pp. 285, 287, Trenton Gr., and planodorsata, Hud. Riv. Gr. Not properly defined.
- halli, inquassa, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 334, Trenton Gr.
- SYRINGOTHYRIS randalli, Simpson, 1889, Trans. Am. Phil. Soc., p. 441, Chemung Gr.
- texta, Hall, 1857, (Spirifer textus), 10th Rep. N. Y. St. Mus. Nat. Hist., p. 169, Waverly Gr.

STR.-HYO.

vance Sheets 17th Rep. Geo. Sur. Ind., p. 77, Keokuk Gr.

- inconstans, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 24, Waverly Gr. inornata is from the Coal Meas., and de-
- scribed on p. 48. occidentalis, S. A. Miller, 1892, 18th Rep. Geo. Sur. Ind., p. 59, Chouteau limestone.
- traversensis, see Cryptonella traversensis.
- helena, Nettleroth, 1889, Foss. Shells, p. 137, Ni-TREMATOSPIRA Kentucky agara Gr.
- TRIPLESIA, or Triplasia as it should be spelled, can not be changed into Triplecia as suggested by Hall in 1892, Pal. N. Y., vol. 8, p. 269. In that event Dicraniscus would have priority. But Triplasius among the insects does not interfere with Triplasia among the fossil brachiopods.
- ZYGOSPIRA aquila, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 335, Trenton Gr.
- deflecta, Hall, 1847, (Atrypa deflecta), Pal. N. Y., vol. 1, p. 140, Trenton Gr. kentuckiensis, Nettleroth, 1889, Kentucky
- Foss. Shells, p. 137, Hud. Riv. Gr. uphami, Winchell & Schuchert, 1892,
- Am. Geo., vol. 9, p. 291, Galena Gr.

SUBKINGDOM MOLLUSCA.

CLASS PTEROPODA.

- COLEOLOIDES, Walcott, 1889, Proc. U. S. Nat. Mus., vol. 12, p 37. [Ety. Coleolus, a genus; oides, like.] Shell slender, elongate, cylindrical, straight or slightly converted to the straight or slightly curved, apparently thin ; surface marked by very fine, slightly oblique, longitudinal striæ. Type C. typicalis, described at the same place from the Up. Taconic. A poor definition without illustration.
- CONULARIA, above the septum, is often broken off, and it has been suggested that it may have fallen off during the life of the animal; hence the shell is sometimes called deciduous, from decido, I fall off.
- gracilis, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 48, pl. 8, fig. 2; vol. 3, pl. 6, fig. 13, Waverly Gr. The name was preocupied by Hall in 1847. As the species appears to be distinct from

all others, I now propose the specific name herricki. The species will then be called C. herricki, after Prof. C. L. Herrick.

- intertexta, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 63, Keokuk Gr.
- salinensis, Whiteaves, 1891, Cont. to Can.
- Pal., vol. 1, p. 244, Devonian.
 sampsoni, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 80, Chouteau limestone.
- HyoLITHES lanceolatus, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur.
 - Ind., p. 63, Chouteau limestone. similis, Walcott, 1889, Proc. U. S. Nat. Mus., vol. 12, p. 38, Up. Taconic. Not illustrated.
 - terranovicu^{*}, Walcott, 1889, Proc. U. S. Nat. Mus. vol. 12, p. 37, Up. Taconic. Not illustrated.

THE better author ticatory apparatus or o ribbon, is called the od is round or entire, the when the aperture po siphon, or forming a t spira, the shell is call margin of the apertur mouth), or peritreme, outer lip from the fi arating it from the columella is solid, it shells are sometimes co aragonite and an oute is a horny epidermis w much more readily dis casts of Murchisonia a Silurian strata, and oth

The new genus H should be referred to th

- ACLISINA bellilineata, S 17th Rep. Geo. Sur teau limestone.
- swallovana, on p. 395, and a half diameter
- BELLEROPHON gorbyi, S. Rep. Geo. Sur. Ind.,
- incomptus, B. nodocc sis, B. rugopleurus Gurley, 1884, New No. 2, pp. 8 to 11, Co subcordiformis, Herri
- son Univ., vol. 2, erous.
- CALLONEMA clarki, Net tucky Foss. Shells, p CARINAROPSIS deleta and
- 1892, Bull. Minn. Ac p. 335, Trenton Gr.
- CONCHOPELTIS obtusa, S Minn. Acad. Nat. Trenton Gr.
- DENTALIUM granvillens Bull. Denison Univ verly Gr.
- Eccyliomphalus perkin Bull. Am. Mus. Nat Calciferous Gr.
 - triangulus, Whitfield Mus. Nat. Hist., vo ous Gr.

TEREBRATULA gorbyi, S. A. Miller, 1891, Ad-

GASTROPODA.

ACL.-FLE.]

YO.

ıd., son de-

ep. ne-

sis 89.

Ni-

be

np-

Pal. ent

But

not

08

ull.

:35,

al.

:ky

392,

ific

len

L.

nce

63,

an.

nce

80,

92

ur.

lat.

Not

lat.

Not

CLASS GASTROPODA.

THE better authors use Gastropoda, and I prefer it to Gasteropoda. The masticatory apparatus or chitinous band, bearing minute teeth and forming a rasp-like ribbon, is called the odontophore, (odous, tooth; phero, I carry.) When the aperture is round or entire, the shell is called holostomatous, (holos, whole; stoma, mouth;) but when the aperture possesses a notch, more or less prolonged, for the respiratory siphon, or forming a trough-like extension for the skirt of the mantle, as in Fusispira, the shell is called siphonostomatous, (siphon, a tube; stoma, mouth.) The margin of the aperture is sometimes called the peristome, (peri, around; stoma, mouth), or peritreme, (peri, around; trema, an opening.) The notch separating the outer lip from the first whorl is called the posterior canal, and the notch sep-When the arating it from the end of the columella is the anterior canal. columella is solid, it is called imperforate; and when hollow, perforated. The shells are sometimes composed of aragonite; at other times there is an inner layer of aragonite and an outer layer of calcite; and, especially in the younger shells, there is a horny epidermis which may disappear with age. It is said that aragonite is much more readily displaced in fossilization than calcite, which may account for the casts of Murchisonia associated with the shells of Cyclonema, in the same Lower Silurian strata, and other like phenomena in other genera and species of shells.

The new genus Helenia is supposed to belong to the Dentalidæ; Fusispira should be referred to the Subulitide; Metoptoma and Paleacmea to the Patellide.

- ACLISINA bellilineata, S. A. Miller, 1891, (17th Rep. Geo. Sur. Ind., p. 85, Chouteau limestone.
 - swallovana, on p. 395, is magnified three and a half diameters.
- BELLEROPHON gorbyi, S. A. Miller, 1891, 17th Rep. Geo. Sur. Ind., p. 84, Hud. Riv. Gr. incomptus, B. nodocostatus, B. ourayensis, B. rugopleurus, B. tenuilineatus, Gurley, 1884, New. Carb. Foss. Bull. No. 2, pp. 8 to 11, Coal Meas. subcordiformis, Herrick, 1887, Bull. Deni
 - son Univ., vol. 2, p. 18, Subcarbonifero118.
- CALLONEMA clarki, Nettleroth, 1889, Kentucky Foss. Shells, p. 175, Up. Held. Gr. CARINAROPSIS deleta and phalera, Sardeson,
- 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 335, Trenton Gr.
- CONCHOPELTIS obtusa, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 336, Trenton Gr.
- 1888, **DENTALIUM** granvillense, Herrick, Bull. Denison Univ., vol. 3, p. 92, Waverly Gr.
- ECCYLIOMPHALUS perkinsi, Whitfield, 1890, Bull. Am. Mus. Nat. Hist., vol. 3, p. 30, Calciferous Gr.
- triangulus, Whitfield, 1890, Bull. Am. Mus. Nat. Hist., vol. 3, p. 29, Calciferous Gr.

- EUOMPHALUS comes, Hall, syn. for Eccyliomphalus laxus.
 - flexistriatus and E. maskusi, Whiteaves, 1891, Cont. to Can. Pal., vol. 1, pp. 242, 243, Devonian.

manitobensis, Whiteaves, 1890, Trans. Roy. Soc. Can., vol. 8, p. 100, Devonian. sampsoni, Nettleroth, 1889, Kentucky Foss. Shells, p. 182, Up. Held. Gr.

- FLEMINGIA, DeKoninck, 1881, Annales du Musee Royal D'Histoire Naturelle de Belgique, tome 6, p. 93. [Ety. proper name.] Shell conical, spire acute, spiral whorls nearly flat externally; circumference more or less angular; aperture often depressed, and angular at the outer margin; peristome not contin-uous, external border oblique, slender, and sharp; columella slender, slightly twisted over, and giving place to the formation of an umbilical fossette more or less large and imperforate; shell thin; surface smooth or covered with irregular striæ, obliquely crossed with more distant lines. Type F. prisca. This groups is nearly related to Extra This genus is nearly related to Eotrochus.
 - carbonaria, Meek & Worthen, 1866, (Trochita (?) carbonaria), Proc. Acad. Nat. Sci., p. 270, Kaskaskia Gr. This species is figured and described by DeKoninck as

a Flemingia, and yet it much resembles an Eotrochus.

- (?) stultus, Herrick, 1888, Bull. Denison Univ., vol 4, p. 45, Waverly Gr. This species may belong to Eotrochus.
- FUSISPIRA (?) spicula, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 336, Trenton Gr.
- HELENIA, Walcott, 1889, Proc. U. S. Nat. Mus., vol. 12, p. 39. [Ety. proper name.] Shell an elongate, narrow, flattened,
- curved tube; transverse section and aperture elliptical; surface marked by concentric, imbricating transverse, lines of growth. Type H. bella, which is described at the same place from the Up. Taconic, without illustration.
- HELICOTOMA similis, Whitfield, 1890, Bull. Am. Mus. Nat. Hist., vol. 3. p. 31, Calciferous Gr.

HOLOPEA cassina is from the Calciferous Gr. hubbardi, S. A. Mil-ler, 1892, Advance



hubbardi.

FIG.

Sheets 18th Rep. Geo. Sur. Ind., p. 64, 1255.-Holopea Hud. Riv. Gr. perundosa, Sardeson,

- 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 336, Trenton Gr.
- LEPETOPSIS parrishi, Gurley, 1884, New Carb. Fors. p. 7, Up. Coal Meas.
- MACLUREA manitobensis, Whiteaves, 1889, Trans. Roy. Soc. Can., p. 75, Trenton Gr.
- Macrochilus carinatum, see Macrochilina carinata.
- MACROCHILINA blairi, S. A. Miller, 1891, 17th Rep. Geo. Sur. Ind., p. 84, Chouteau limestone.
- carinatum, Nettleroth. The name was preoccupied. See M. Nettlerothana.
- nettlerothana, n. sp. Proposed instead of M. carinatum of Nettleroth, in Kentucky Foss. Shells, p. 180, Up. Held. Gr., which name was preoccupied.
- METOPTOMA. Type M. pileus. explanata, Sardeson, 1892, Bull. Minn-Acad. Nat. Sci., vol. 3, p. 336, Tren. ton Gr.
- MURCHISONIA archiacana and M. dowlingi, Whiteaves, 1892, Cont. to Can. Pal., p. 315, Devonian.
- hammelli, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 65, Hud. Riv. Gr.
- obelisca is from the Calciferous Gr.

NATICOPSIS remex is from the Coal Meas.

- PALEACMEA cingulata, Whiteaves, 1892,
- Cont. to Can. Pal., p. 311, Devonian. PLATYCERAS boonvillense, S. A. Miller, Advance Sheets 17th Rep. Geo. Sur. Ind. p. 82, Keokuk Gr.
- compressum, Nettleroth, 1889, Kentucky, Foss. Shells, p. 162, Up. Held. Gr.

- cyrtolites is from the Burlington Group. milleri, Nettleroth, 1889, Kentucky Foss. Shells, p. 165, Up. Held. Gr.
- missouriense, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 82, Burlington Gr.
- nasutum, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 82, Chouteau limestone.
- pettisense, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 81, Burlington Gr.
- romingeri, Walcott, 1888, Proc. U. S. Nat. Mus., p. 442, Up. Taconic. Not illustrated.
- PLATYSTOMA broadheadi, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 86, Chouteau limestone.
- PLEUROTOMARIA arabella, Nettleroth. The name was preoccupied. See P. nettlerothana.
- clivosa, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 337, Trenton Gr. fficilis, Whitfield, 1890, Bull. Am.
- difficilis, Whitfield, 1890, Bull. Am. Mus. Nat. Hist., vol. 3, p. 33, Calciferous Gr.
- goniostoma, Whiteaves, 1890, Trans. Roy. Soc Can., vol. 8, p. 99, Devonian. harii, S. A. Miller, 1891, Advance Sheets
- 17th Rep. Geo. Sur. Ind., p. 83, Up. Coal Meas.
- infrancolosa, Whiteaves, 1892, Cont. to Can. Pal., p. 313, Devonian. nettlerothana, n. sp. Proposed instead of P. arabella, of Nettleroth, in Kentucky Foss. Shells, p. 171, which name was preoccupied, Up. Held. Gr.
- proctori, Nettleroth, 1889, Kentucky Foss. Shells, p. 173, Up. Held. Gr. sedaliensis, S. A. Miller, 1891, 17th Rep.
- Geo. Sur Ind., p. 83, Chouteau limestone.
- strigillata, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 86, Waverly Gr.
- PORCELLIA manifoldensis, Whiteaves, 1892, Cont. to Can. Pal., p. 318, Devonian. RAPHISTOMA tyrrelli, Whiteaves, 1892, Cont.
- to Can Pal., p. 314, Devonian. STRAPAROLLUS blairi, S. A. Miller, 1891, Ad-
- vance Sheets 17th Rep. Geo. Sur. Ind., p. 86, Chouteau limestone.
- SUBULITES was described by Emmons, 1842, Geo. Sur. 2d Dist. N. Y., p. 392.
- benedicti, S. A. Miller, 1891, 17th Rep. Geo. Sur. Ind., p. 84, Niagara Gr.
- TRYBLIDIUM conicum is from the Chazy Gr. exsertum, validum, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 337, Trenton Gr.
 - indianense, S. A. Miller, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 85, Hud. Riv. Gr.
 - madisonense, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 64, Hud. Riv. Gr.

THE living animals tion to conclude that a not warrant the presum elliptical, lunate, T-shap expand to the aperture, to the aperture. The either by an emarginat always indicate it; for of the shell it may cros and for this reason it h than calcite; but the fa tion does not indicate su

- ACTINOCERAS hindii, Whi Roy. Soc. Can., vol. ian.
- ASCOCERAS indianense, Bost. Soc. Nat. Hist. agara Gr.
- APSIDOCERAS, Hyatt, 188 Nat. Hist., vol. 22, 1 the felloe of a wh
 - Loosely coiled, sn tuberculated gyrocer tened abdomens. 7 tion are triangular, t the internal apex of phons near the ve loidal. The sutures lobes, saddles at the l lobes on the sides a there is frequently
 - tubercles on each of of the whorls; they and the abdomen is or fluted along the magnificum.
- insigne, Whiteaves, 18 Can., p. 82, Trenton magnificum, Billings,
- magnificum,) Rep. o
- Can., p. 807, Hud. R Asymptoceras newloni, see loni.
- CYRTOCERAS boycii is fro dardanum and fosteri pl. 16 in 20th Rep. 1
 - Hist. hertzeri, refer to Hexan
 - howardi, Niagara Gr., Hud. Riv. Gr., S. A Sheets 18th Rep. p. 69.
 - indianense, S. A. Mill

CEPHALOPODA.

ACT.-EPH.

RY.

up.)88. nce 82.

ace 82, ace

81,

at.

us

91.

ur.

'he tle-

ad.

m.

er-

Dy.

ets

Jp.

to

ad

en-

ne

88.

ep.

ne-

on

92,

nt.

۱d.

d.,

42,

эp.

Jr.

111.

37,

ets

1d.

ice

64,

CLASS CEPHALOPODA.

THE living animals of this Class are carnivorous, but it is too strong a presumption to conclude that all fossil Cephalopoda were carnivorous. The evidence does not warrant the presumption. The mouth of the shell or aperture may be round, elliptical, lunate, T-shaped, or of almost any other form, and the shell may gradually expand to the aperture, be contracted behind the aperture, or more or less contracted to the aperture. The ventral side may be indicated by the shape of the aperture, either by an emargination or a sinus, but the position of the siphuncle does not always indicate it; for in Orthoceras the siphuncle may be central, or in the growth of the shell it may cross the central line. The external shell is generally destroyed and for this reason it has been supposed to have been composed of aragonite rather than calcite; but the fact that the shell often appears as if run together in fossilization does not indicate such a distinction.

- ACTINOCERAS hindii, Whiteaves, 1890, Trans. Roy. Soc. Can., vol. 8, p. 101, Devonian.
- ASCOCERAS indianeuse, Newell, 1888, Proc. Bost. Soc. Nat. Hist., vol. 23, p. 484, Niagara Gr.
- Apsidoceras, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 289. [Ety. apsis, the felloe of a wheel; keras, horn.] Loosely coiled, smooth, costated, or tuberculated gyroceran shells, with flattened abdomens. The whorls in section are triangular, the dorsum forming the internal apex of the outline; siphons near the venter and nummu-loidal. The sutures have broad ventral lobes, saddles at the lateral angles, broad lobes on the sides and dorsal saddles; there is frequently a line of heavy tubercles on each of the lateral angles of the whorls; they are all large shells. and the abdomen is frequently hollow or fluted along the center. Type A. magnificum.
 - insigne, Whiteaves, 1889, Trans. Roy. Soc.
 - Can., p. 82, Trenton Gr. magnificum, Billings, 1857, (Gyroceras magnificum,) Rep. of Progr. Geo. Sur. Can., p. 807, Hud. Riv. Gr.
- Asymptoceras newloni, see Solenochilus newloni.
- CYRTOCERAS boycii is from the Chazy Gr. dardanum and fosteri are illustrated on pl. 16 in 20th Rep. N. Y. St. Mus. Nat. Hist.
 - hertzeri, refer to Hexamoceras hertzeri.
- howardi, Niagara Gr., and C. thompsoni, Hud. Riv. Gr., S. A. Miller, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 69.

indianense, S. A. Miller, 1891, Advance

Sheets 17th Rep. Geo. Sur. Ind., p. 88, Niagara Gr.

- manitobense, Whiteaves, 1889, Trans. Roy. Soc. Can., p. 80, Trenton Gr.
- nashvillense, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 87, Niagara Gr
- occidentale, Whiteaves, 1890, Trans. Roy. Soc. Can., vol. 8, p. 103, Davonian.
- saffordi, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 88, Hud. Riv. Gr.
- Discites was preoccupied in 1768 by Walch, and again used by Schlotheim in 1820, before DeHaan used it in 1825 or McCoy in 1844. Hyatt in 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 292, proposed Discitoceras for the shells included in McCoy's genus. All the species therefore under the name Discites in this work should be referred to Discitoceras.
- DOMATOCERAS, Hyatt, 1891, 2d Ann. Rep. Geo. Sur. Texas, p. 342. The generic characters can not be determined from the definition. D. umbilicatum is defined at the same place from the Coal Meas. as the type.
- ENDOCERAS crassisiphonatum, Whiteaves, 1891, Trans. Roy. Soc. Can., vol. 9, p. 79, Trenton Gr.
- ENDOLOBUS, gibbosus; Hyatt, 1891, 2dAnn. Rep. Geo. Sur. Texas, p. 353, Coal Meas.
- Hyatt, 1883, Proc. Bost. EPHIPPIOCERAS, Soc. Nat. Hist., vol. 22, p. 290. [Ety. ephippion, a saddle; keras, horn.] Gen-eric definition very obscure. Type E. ferratum, described by Cox as Nautilus ferratus; and to the same genus Nautilus divisus should be referred if the

description is such as to establish it; for the species do not properly belong to Nautilus.

- Gastrioceras compressum, see Goniatites compressus.
- GOMPHOCERAS angustum, Newell, 1888, Proc. Bost. Soc. Nat. Hist., vol. 23, p. 475, Niagara Gr.
 - clarki, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 88, St. Louis Gr.
- hertzeri, see Hexamoceras hertzeri.
- lineare, Newell, 1888, Proc. Bost. Soc. Nat.
- Hist., vol. 23, p. 473, Niagara Gr. manitobense, Whiteaves, 1890, Trans. Roy. Soc. Can., vol. 8, p. 102, Devonian. parvulum, Whiteaves, 1891, Can. Rec. of Sci., p. 298, Up. Sil.
- wabashense, Newell, 1888, Proc. Bost. Soc. Nat. Hist., vol. 23, p. 476, Niagara Gr. wabashense, Newell, 1888, Proc. Bost. Soc.
- Nat. Hist., vol. 23, p. 470, Niagara Gr. GONIATITES baylorensis, White, 1891, Bull.
- U. S. Geo. Sur. No. 77, p. 19, Permian Gr.
- brownensis, 1891, S. A. Miller, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 90, Waverly Gr.
- compressus, Hyatt, 1891, (Gastrioceras compressum,) 2d ALn. Rep. Geo. Sur. Texas, p. 355, Coal Meas. gorbyi. S. A. Miller, 1891, Advance Sheets
- 17th Rep. Geo. Sur. Ind., p. 90, Chouteau limestone.
- greenii, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 76, Knobstone Gr.
- indianensis, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 90, Waverly Gr.
- leviculus, Miller & Faber, 1892, Jour. Cin. Soc. Nat. Hist., vol. 14, p. 167, St. Louis Gr.
- limatus, Miller & Faber, 1892, Jour. Cin. Soc. Nat. Hist., vol. 14, p. 166, St. Louis Gr.
- missouriensis, Miller & Faber, 1892, Jour. Cin. Soc. Nat. Hist., vol. 14, p. 164, Up. Coal Meas.
- occidentalis, Miller & Faber, 1892, Jour. Cin. Soc. Nat. Hist., vol. 14, p. 166, Coal Meas.
- sciotoensis, Miller & Faber, 1892, Jour. Cin. Soc. Nat. Hist., vol. 14, p. 165, Waverly Gr.
- GONIOCERAS lambi, Whiteaves, 1891, Trans. Roy. Soc. Can., vol. 9, p. 86, Trenton Gr.
- GYROCERAS canadense, G. filicinctum, G. submammillatum, Whiteaves, 1890, Trans. Roy. Soc. Can., vol. 8, pp. 106, 107, Devonian.
- magnificum, refer to Apsidoceras magnificum.
- HEXAMOCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 278. [Ety. hex, six; meros, part; keras, horn.] This genus is distinguished from Gomphoceras only by the aperture. In Gomphoceras there

is only one lateral branch on each side of a longer median aperture, which gives the mouth a T-shape; in Hexamoceras there are three branches on each side of the median aperture, increasing in length toward the summit. Type H. panderi.

cacabiforme, Newell, 1888. Proc. Bost. Soc. Nat. Hist., vol. 23, p. 481, Niagara Gr.

- delphicolum, Newell, 1888, Proc. Bost. Soc. Nat. Hist., vol. 23, p. 479, Niagara Gr.
- hertzeri, Hall & Whitfield, 1875, (Cyrtoceras hertzeri,) Ohio Pal., vol. 2, p. 150, Niagara Gr.
- HOMALOCERAS, Whiteaves, 1890, Trans. Roy. Soc. Can., vol. 8, p. 104. [Ety. homalos, level; keras, horn.] Shell consisting of a slender tube, which is broadly and strongly arcuate, curved in the same plane, and much flattened laterally, its venter or outer border being very narrow, truncated, and depressed in the center; sutural line consisting of two very narrow saddles, with an equally narrow sinus between them on the venter, a broadly concave sinus or lobe on each of the sides, and a rather narrow saddle on the dorsum; siphuncle cylindrical, exogastric, and placed near the venter or outer and convex margin; body-chamber long, occupying about one-third of the entire length. Type H. planatum, which is described at the same place from the Devonian.
- LITUITES eatoni, L. eatoni var. cassinensis, L. internistriatus, L. seelyi, are from the Calciferous.
 - magnificus, refer to Apsidoceras magnificum.
- MEDLICOTTIA, Wasgen, 1879, Pal. Indica, Ser. 13, pp. 39, 83. [Ety. proper name.] Shell discoid and volutions deeply embracing; lobes divided by single linguiform marginal saddles, or trifoliate or divided saddles; ventral lobes deep and undivided; the first pair of saddles are narrow, long, and the margins cut by several lobes and saddles growing progressively longer internally; numerous auxiliary lobes are generated from the marginal divisions in the outlines of the first pair of saddles, and from the division of large magnosellarian saddles near the umbilicus. Type M. primis.
 - copei, White, 1889, Am. Nat., vol. 23, p. 117, and Bull. U. S. Geo. Sur., No. 77, Permian Gr.
- METACOCERAS Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 268. Nautiloid
- shells, with a wide umbilicus perfo-rated in the middle; volutions subquadrangular, bearing nodes on the dorsolateral sides, slightly embracing; siphuncle eccentric on the dorsal side. Type M. sangamonense.
- cavatiforme, M. dubium, M. hayi, M. inconspicuum, M. walcotti, Hyatt, 1891,

2d Ann. Rep. Geo to 340, Coal Meas. planorbiforme, Meel Proc. Acad. Nat. S Geo. Sur. Ill., vol. planorbiformis,) U

NAU.-SOL.]



FIG. 1256.—Metacoce

- sangamonense, Meek Nautilus sangamo Nat. Sci. Phil., p. Ill., vol. 2, p. 386, U
- NAUTILUS bisulcatus, Denison Univ., v verly Gr.
- forbesanus, refer to I anum.

kelloggi is from the C parallelus is Beecher's planorb formis, see Me

forme. quadrangularis, McCh quadrangulus. It

the genus Tainocer T. quadrangulum.

sangamonensis, see M monense.

toddi, S. A. Miller, 18 18th Rep. Geo. Su Coal Meas.

ONCOCERAS gibbosum, whiteavesi magnum, Whiteaves,

Soc. Can., p. 79, Tre whiteavesi, n. sp. Tre posed instead of O

eaves, in Trans. Ro p. 80, which name w

ORTHOCERAS brainerdi erous. canadense, Whiteaves,

canadense,) Trans. I 9, p. 85, Trenton Gr.

colletti, Up. Coal. Mea Niagara Gr., and O. Gr., S. A. Miller, 189 18th Rep. Geo. Sur.

harii, S. A. Miller, 189 17th Rep. Geo. Sur Coal Meas.

NAU.-SOL.]

1 side gives ceras side ng in be H.

t. Soc. a Gr. Bost. , Ni-

vrtoe-). 150,

Roy. malos. ing of r and same lv. its 7 narn the f two ually venbe on arrow cylinr the rgin :

ensis. m the

mag-

about

Type

at the

idica. ame. v emnguite or deep ddles is cut

owing merfrom tlines from arian эе M.

23, p. D. 77,

, Soc. tiloid perfoquadorso-;; siside.

I. in-1891, CEPHALOPODA.

2d Ann. Rep. Geo. Sur. Texas, pp. 334 to 340, Coal Meas.

planorbiforme, Meek & Worthen, 1860, Proc. Acad. Nat. Sci. Phil., p. 469, and Geo. Sur. Ill., vol. 2, p. 386, (Nautilus planorbiformis,) Upper Coal Meas.



FIG. 1256.—Metacoceras cavatiforme.

- sangamonense, Meek & Worthen, 1860, Nautilus sangamonensis,) Proc. Acad. Nat. Sci. Phil., p. 470, and Geo. Sur. Ill., vol. 2, p. 386, Up. Coal Meas.
- NAUTILUS bisulcatus, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 20, Waverly Gr.
- forbesanus, refer to Temnochilus forbesanum.
- kelloggi is from the Calciferous.
- parallelus is Beecher's species.
- planorbiformis, see Metacoceras planorbiforme.
- quadrangularis, McChesney, should be quadrangulus. It is now referred to the genus Tainoceras, and is therefore T. quadrangulum.
- sangamonensis, see Metacoceras sangamonense.
- toddi, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 72, Up. Coal Meas.
- ONCOCERAS gibbosum, Whiteaves, see O. whiteavesi
 - magnum, Whiteaves, 1889, Trans. Roy. Soc. Can., p. 79, Trenton (?) Gr.
 - whiteavesi, n. sp. Trenton (?) Gr. Pro-posed instead of O. gibbosum, Whiteaves, in Trans. Roy. Soc. Can., 1889,
- p. 80, which name was preoccupied. ORTHOCERAS brainerdi is from the Calciferous.
 - canadense, Whiteaves, 1891, (Sactoceras canadense,) Trans. Roy. Soc. Can., vol. 9, p. 85, Trenton Gr.
 - colletti, Up. Coal. Meas., O. franklinense, Niagara Gr., and O. gorbyi, Hud. Riv. Gr., S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., pp. 65 to 68. harii, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 77 Un
 - 17th Rep. Geo. Sur. Ind., p. 87, Up. Coal Meas.

С

- obstructum, Newell, 1888, Proc. Bost. Soc. Nat. Hist., vol. 23, p. 467, Niagara Gr.
- selkirkense, Whiteaves, 1891, Trans. Roy. Soc. Can., vol. 9, p. 82, Trenton Gr. semiplanatum, Whiteaves, 1891, Trans.
- Roy. Soc. Can., vol. 9, p. 81, Trenton Gr.
- tyrrelli, Whiteaves, 1890, Trans. Roy. Soc.
- Can., vol. 8, p. 100, Devonian. winnepegense, Whiteaves, 1891, Trans. Roy. Soc. Can., vol. 9, p. 82, Trenton Gr.
- Phacoceras, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 292. [Ety. phakos, a lentil; keras, horn.] The characters ascribed to it do not distinguish it from Discitoceras. Type P. oxystomum. In 1891 the same author described P dumbli from the Coal Meas. in 2d Ann. Rep. Geo. Sur. Texas, p. 347. PHRAGMOCERAS missouriense, S. A. Miller,
- 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 89, Chouteau limestone.
- POPANOCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 337. [Ety. popanon, a round, flat cake; keras, horn.] Volutions involute, compressed and costate, or marked by furrows; the lobes and saddles are numerous and club-shaped; the ventral lobes are divided by prominent narrow, siphonal saddles, carrying small funnel lobes. Three or more pairs of lobes are divided by marginal saddles, either single or double, the terminations of the lobes being either bifid or trifid. Type P. kinganum. walcotti, White, 1889, Am. Nat., vol. 23,
 - p. 117, and Bull. U. S. Geo. Sur., No. 77, p. 21, Permian Gr.
- Potenice McCoy, 1854, British Pal. Foss. p. 321. [Ety. poterion, a cup; keras, horn.] Shell short, fusiform; sec-tion circular, mouth contracted; septa simple; siphon subcentral, moniliform; distinguished from Gomphoceras and allied genera by having an en-tire and simple aperture. Type P. ellipticum.
 - apertum and P. nobile, Whiteaves, 1889, Trans. Roy. Soc. Can., vol. 8, pp. 77, 78, Trenton (?) Gr.
 - gracile, Whiteaves, 1891, Trans. Roy. Soc. Can. vol, 9, p. 87, Trenton Gr. missopriense, S. A. Miller, 1892, Advance
 - Sheets 18th Rep. Geo. Sur. Ind., p. 70, Chouteau limestone.
- Ptychites cumminsi, see Waagenoceras cumminsi.
- Sactoceras canadense, see Orthoceras canadense
- Solenochnus blairi, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 75, Chouteau limestone.
- newloni, Hyat, 1891, (Asymptoceras newloni,) 2d Ann. Rep. Geo. Sur. Texas, p. 346, Coal Meas.
- rockfordense, S. A. Müller, 1891, Advance

697

MET.

- STREPTODISCUS, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 71.
 [Ety. streptos, twisted; diskos, quoit.] Proposed instead of Trematodiscus of Meek & Worthen, which was preoccupied. Type S. stygialis.
 - indianensis, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 71, Keokuk Gr.
- ohioensis, Miller & Faber, (Trematodiscus ohioensis,) 1892, Jour. Cin. Soc. Nat. Hist., vol. 14, p. 168, Waverly Gr.
- TEMNOCHILUS conchiferum T. crassum, and T. depressum, Hyatt, 1891, 2d Ann. Rep. Geo. Sur. Texas, pp. 329 to 333, Coal Meas.
 - forbesanum instead of Nautilus forbesanus, on p. 444.
- TETRAGONOCERAS, Whiteaves, 1890, Trans. Roy. Soc. Can., vol. 8, p. 105. [Ety. tetra, four; gonia, angle; keras, horn.] Shell subspiral, recurved, coiled loosely on the same plane, making a lax volution toward the apex, but nearly straight anteriorly; transverse section quadrangular; siphuncle cylindrical, exogastric, marginal, and placed in the

middle of the venter. Type T. gracile, which is described at the same place from the Devonian.

STR.-TAL

- Trematodiscus, see Streptodiscus.
- TROCHOČEBAS maccharlesi, Whiteaves, 1889, Trans. Roy. Soc. Can., p. 81, Trenton (?) Gr.
- WAAGENOCERAS, Gemmellaro, 1888, Gior. Sci. Nat. Ed. Econ., vol. 19, p. 11. [Ety. proper name; keras, horn.] Shell discoid; volutions embracing and bearing transverse constrictions; septa numerous and complex. Type W. stachei. cumminsi, White, 1889, Am. Nat., vol.23.
 - p. 117, and Bull. U. S. Geo. Sur., No. 77, p. 20 Permian Gr.
- TAINOGRAS, Hyatt, 1883. Proc. Bost. Soc. Nat. Hist., vol. 22, p. 269. [Ety. tainia, a head-band; keras, horn.] Whorls discoidal; section quadrate; two lateral rows of tubercles, and two rows on the outer side in the later stages of growth; siphon above the center; sutures have ventral, lateral, and dorsal lobes, but no apnular lobes. Type T. quadrangulum. It is very much like Metacoceras, if not a synonym.

cavatum, Hyatt, 1891, 2d Ann. Rep. Geo. Sur. Texas, p. 341, Coal Meas.



.040

THIS Class has gradually improved in the Geological ages, and is now in the maximum of its development. The lobes of the animal are right and left, and unite along the dorsal or hinge-line of the shell, and extend laterally in the form of mantles to the pallial line. The depth of the pallial sinus indicates the size of the siphonal muscles. The shell opens along the ventral side. The external hinge ligament consists of horny fibres that are found preserved, sometimes, almost as well as the shell, in Lower Silurian rocks. Some shells have an internal ligament or cartilage between the hinges of the two valves, located in pits or cartilage furrows on the faces of the hinge. The anterior adductor is in front of the mouth, and the posterior adductor behind the umbo, near the termination of the intestine. Sometimes scars are left by the pedal muscles used for projecting and retracting the foot. When there are no teeth or crenulations on the hinge, the shell is edentulous. The teeth beneath the umbo are the cardinal teeth, and those anterior or posterior to the umbo are lateral teeth. Some shells are composed of aragonite, others of calcite, and others have an outer layer of calcite and an inner one of aragonite, and generally there is an epidermis or outer horny coating. The outer calcite layer is secreted at the margin of the mantle or circumference of the shell and is prismatic, while the inner layers of aragonite are secreted in the form of laminæ by the sides of the mantle.

The families Unionidæ and Ostreidæ, I think, are not palæozoic. Anthracosia, Prisconaia, and Cardinia might be referred to the Cardiniidæ; Clinopistha and Solenomya to the Solenomyidæ. ALL.-GON.]

ALLORISMA CONVEXUM rick, 1888, Bull. I pp. 72, 74, and A. cnyahoga, vo verly Gr. ANODONTOPSIS affinis, V

to Can. Pal., p. 30 Arca ornata, Herrick,

Univ., vol. 3, p. 83 AVICULA *circulus*, refe culus.

obioensis, Herrick, ensis,) Bull. Deni 36, Coal Meas. recta, Herrick, 1888.

vol. 4, p. 115, Way subspatulata, Herric

Univ., vol. 4, p. 3 AVICULOPECTEN COOP and A. perelong Bull. Denison Un

verly Gr. scalaris and sorer, Denison Univ., vo

Meas. sculptilis, S. A. Mi Sheets 17th Rep.

Coal Meas. Carbonarca occidentalis.

cidentalis. CARDIOPSIS tenuicosta Cont. to Can. Pal.

CLIDOPHORUS consuetu Rep. Geo. Sur.

lena Gr. Сыморіятна striata, N

tucky Foss. Shells,



FIG. 1257.—Clionychia rho auterior views of a ca

CLIONYCHIA, Ulrich, vol. 10, p. 97. [onyx, a claw.] Ambonychia by tl ating plications oi of a byssal openi end, the less cen muscular scars, an distinct hinge-teet chia lamellosa, E A. erecta, A. atten A. undata, and

\$204

ALL.-GON.]

- ALLORISMA convexum and A. cooperi, Herrick, 1888, Bull. Denison Univ., vol. 3, pp. 72, 74, and A. consanguinatum, A. cuyahoga, vol. 4, pp. 28, 29, Waverly Gr.
- ANODONTOPSIS affinis, Whiteaves, 1892, Cont. to Can. Pal., p. 303, Devonian.
- Arca ornata, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 83, Waverly Gr.
- AVICULA circulus, refer to Pernopecten circulus.
- obioensis, Herrick, 1887, (Gervillia ohioensis,) Bull. Denison Univ., vol. 2, p. 36, Coal Meas.
- recta, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 115, Waverly Gr.
- subspatulata, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 30, Waverly Gr.
- AVICULOPECTEN cooperi, A. granvillensis, and A. perelongatus, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 50, Waverly Gr.
- scalaris and sorer, Herrick, 1887, Bull. Denison Univ., vol. 2, pp. 26, 27, Coal Meas.
- sculptilis, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 92, Coal Meas.
- Carbonarca occidentalis, refer to Edmondia occidentalis.
- CARDIOPSIS tenuicostata, Whiteaves, 1892, Cont. to Can. Pal., p. 307, Devonian. CLIDOPHORUS consultus, Ulrich, 1892, 19th
- Rep. Geo. Sur. Minn., p. 223, Galena Gr.
- CLINOPISTHA striata, Nettleroth, 1889, Kentucky Foss. Shells, p. 200, Up. Held. Gr.



FIG. 1257.-Clionychia rhomboidea. Lateral and auterior views of a cast of a right valve.

CLIONYCHIA, Ulrich, 1892, Am. Geo., vol. 10, p. 97. [Ety. kleio, I close; onyx, a claw.] Distinguished from Ambonychia by the absence of radiating plications or striæ, the absence of a byssal opening in the anterior end, the less central position of the muscular scars, and by the absence of distinct hinge-teeth. Type Ambonychia lamellosa, Hall, and including A. erecta, A. attenuata, A. mytiloides, A. undata, and A. amygdalina, and also C. rhomboidea, described at the same place from the Trenton Gr.

- CONOCARDIUM alternistriatum, Herrick, 1888. Bull. Denison Univ., vol. 4, p. 42, Waverly Gr.
- elrodi, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 95, Niagara Gr.
- exiguum and C. parvulum S. A. Miller. 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 94, Ham. Gr. indianense, S. A. Miller, 1891, Advance
- Sheets 17th Rep. Geo. Sur. Ind., p. 94, Keokuk Gr.
- CRENIPECTEN foerstii, Herrick, 1887, Bull. Denison Univ., vol. 2, p. 28, Coal Meas.
 - senilis and C. subcardiformis, Herrick, 1888, Bull. Denison Univ., vol. 3, pp. 53, 54, Waverly Gr.
- CYPRICARDELLA gorbyi, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 92, Keokuk Gr. producta, Whiteaves 1892, Cont. to Can.
 - Pal., p. 309, Devonian.
- CYPRICARDINIA scitula, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 38, Waverly Gr.
- CYPRICARDITES halli, Nettleroth, 1889, Ken-tucky Foss. Shells, p. 206, Hud. Riv. Gr.
 - ngulata, C. germanus, C. glabellus, C. nanus, C. obtusiformis, C. sardesoni, cingulata, C. C. tenellus, Ulrich, 1892, 19th Rep. Geo. Sur. Minn., pp. 231 to 239, Trenton Gr.
 - hindi and C. sterlingensis refer to Whitella hindi and Whitella sterlingensis.
 - luculentus, minnes tensis, triangularis, vicinus, Sardeson, 1892, Bull. Minn. Acad. Nat. Sci., vol. 3, p. 338, Trenton and Hud. Riv. Gr.
 - modestus, C. oviformis, C. terminalis, Ulrich, 1892, Am. Geo., vol. 10, pp. 98 to 100, Trenton Gr.
- Cyrtodonta hindi, see Whitella hindi. huronensis, see Cypricardites huronensis. Dolabra sterlingensis, see Whitella sterlingensis.
- occidentalis, Swallow, 1860, EDMONDIA Cardinia occidentalis,) Trans. St. Louis Acad. Sci., vol. 1, p. 655, Choutean limestone.
 - sulcifera, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 30, Waverly Gr.
 - Entolium attenuatum, Herrick, see Pernopecten attenuatus.
- Gervillia obioensis, see Avicula obioensis. GLOSSITES manitobensis, Whiteaves, 1892. Cont. to Can. Pal., p. 310, Devonian.
- GLYPTODESMA cancellatum, Nettleroth,
- 1889, Kentucky Foss. Shells, p. 227, Up. Held. Gr.
- GONIDON, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 84. [Ety. gonia, an angle: odous, tooth.) Shell equivalve, very inequilateral, gibbous, not gap-ing; resembling Palæoneild but the hinge is continuous, slightly Rexed be-

TAL.

racile. place

1889. Tren-Gior.

[Etv. ll disearing a nuol. 23. r., No.

t. Soc. tainia. Vhorls lateral ws on zes of enter; d dor-Type much 7m. . Geo.

n the t, and orm of of the hinge ost as ament irrows nd the Somee foot. e teeth : umbo others here is e marinner itle. acosia. a and

LAMELLIBRANCHIATA.

neath the beaks, without true teeth (?); but the hinge margin of both valves zigzagged by sharp incisions, into which corresponding projections of the opposite valve fit closely; the series of denticulations thus formed is continuous, but the size of the excisions diminishes before and behind the beaks; posterior adductor scar nearly terminal. Type G. ohioensis, which is described at the same place from the Waverly Gr.

- GRAMMYSIA blairi, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 93, Chouteau limestone.

 - b) 55, Chouceau minestone.
 c) annelica, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 35, Waverly Gr.
 herricki, n. sp. Proposed instead of G.
 ovata, Herrick, in Bull. Denison Univ., vol. 4, p. 35, pl. 3, fig. 12, Up. Subcarboniferous.

ovata, Herrick, was preoccupied, see G. herricki.



FIG. 1258.—Ischyrodonta truncata a, Outline view of a left valve; lops waverlyensis. b, internal view of same; c, d, and e, three views of a cast. MODIOLOPSIS alata, M. angus-

ISCHYRODONTA, Ulrich, 1890, Am. Geo., vol. 6, p. 173. [Ety. ischyros, strong; odous, tooth.] Short or elongated, thick bivalve shells, having small subterminal beaks, with the hinge straight or slightly arcuate and extended posteriorly; hinge-plate wide and strong, without posterior lateral teeth, but with a strong cardinal tooth in the left valve, and two nearly as strong in the right; just in front of them a pair of subcircular, large and deep anterior muscular impressions, and between these and the teeth another very small pair; posterior scar large, but faintly marked, ovate, situated in the postero-cardinal region; pallialline simple; ligament probably internal ; in casts the beaks are prominent,

compressed, with a sulcus extending toward the basal margin. Type I. truncata, which with I. elongata is described at the same place from the Hud. Riv. Gr.

- ovalis, Ulrich, 1892, 19th Rep. Geo. Sur.
 Minn., p. 242, Hud. Riv. Gr.
 LIOPTERIA halli, L. nasuta, L. newberryi, and L. ortoni, Herrick, 1888, Bull. Denison Univ., vol. 3, pp. 60, 61, and vol. 4, pp. 29, 114, Waverly Gr., except the last, which is from the Keokuk Gr.
- LEPTODESMA scutella, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 59, Waverly Gr.

LIMOPTERA, the type is L. macroptera.

- LYRIOPECTEN nodocostatus, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 32, Waverly Gr.
- MACRODON newarkensis, M. striatocostatus, Herrick, 1888, Bull. Denison Univ., vol. 4, pp. 36, 37, and M. triangularis, vol. 3, p. 74, Waverly Gr. pygmæus, Whiteaves, 1892,

Cont. to Can. Pal., p. 299, Devonian.

MATHERIA rugosa, Ulrich, 1892, 19th Rep. Geo. Sur. Minn., p. 241, Trenton Gr.

MEGALODON, Sowerby, 1827, Genera of Recent and Foss. 1827. Shells. [Ety. megas, large; odous, tooth.] Shell oblong, smooth or keeled; ligament external; hinge teeth 1x2, thick; one posterior lateral tooth; anterior adductor impression deep, with a raised margin and a small pedal scar behind it; beaks subspiral. Type M. cucullatus.

subovatus. Whiteaves, 1890, Trans. Roy. Soc. Can., vol. 8, p. 97, Devonian.

Modiola waverlyensis, see Mytilops waverlyensis.

tata, M. milleri, M. parva, M. simulatrix, M. subparallela, Ulrich, 1890, Am. Geo., vol. 5, pp. 274 to 283, Hud. Riv. Gr.; and M. oviformis, from the Trenton Gr.; and M. oblonga, M. pulchella, and M. subtruncata, from the Utica Slate.

- charlestownensis, Nettleroth, 1889, Ken-tucky Foss. Shells, p. 218, Up. Held. Gr.
- concava, M. similis, Ulrich, 1892, 19th Rep. Geo. Sur. Minn., pp. 225, 227, Trenton Gr., and M. subelliptica, p. 226, Galena Gr.
- dychei, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 77, Hud. Riv. Gr.
- MODIOMORPHA attenuata, Whiteaves, 1890, Trans. Roy. Soc. Can., vol. 8, p. 96, Devonian, M. compressa, M. tumida, and

MYA.-SCH.]

p. 296, Devonian. Monotis is not an genus.

MYALINA trigonalis, W to Can. Pal., p. 294

- MYTILARCA inflata, W
 - to Can. Pal. p. 293 MYTILOPS waverlyens
 - (Modiola waverlye
 - Univ., vol. 3, p. 63. NUCULA herzeri, Net tucky Foss. Shells

Gr. manitobensis, Whit

1892, Cont. to Can. p. 301, Devonian.

- NUCULANA similis, ar spatulata, Herrick, Bull. Denison Univ 3, p. 79, Waverly (ORECARDIA, Herrick,
- Bull. Denison Univ
- 4, p. 41. [Ety. oproduced at a fit se kardia, heart.] She equilateral, inequi ventricose, strongly vated beak, which in apex; hinge-line posteriorly, furnish ridge or cartilage r separated from the area which is ele less arched under marked with radia ornata, which, with scribed at the same verly Gr.
- ORTHODESMA minneso Ulrich, 1892, 19th R pp. 228, 229, Trento
- ORTHONOTA corrugata, Trans. Roy. Soc. Ca vonian.
- Ostrea patercula, Winch of Whitfield, is fro New Jersey, which was mixed with V ton fossils.
- PALÆONEILO consimilis, Herrick, 1888, Bu
- vol. 4, pp/ 43, 44, W Panenka is a Polish or nifying the same a a little girl. It is

ing to the rules of should be discarded

grandis, Whiteaves, 1 p. 402, Corniferous

PARACYCLAS elongata,

Nettleroth, 1889, Ke pp. 210, 212, Up. H

PERNOPECTEN attenuat (Entolium attenuat Univ., vol. 2, p. 24, circulus, Shumard, culus,) Geo. Rep. M

limestone.

MYA.-SCH.]

genus.

MYTILOPS

Gr.

NUCULA herzeri,

verly Gr.

vonian.

ton fossils.

limestone.

should be discarded.

p. 402, Corniferous Gr.

pp. 210, 212, Up. Held. Gr.

ORTHODESMA

p. 296, Devonian.

Monotis is not an American palæozoic

MYALINA trigonalis, Whiteaves, 1892, Cont. to Can. Pal., p. 294, Devonian.

MYTILARCA inflata, Whiteaves, 1892, Cont.

waverlyensis, Herrick,

(Modiola waverlyensis,) Bull. Denison

Univ., vol. 3, p. 63, Waverly Gr. ULA herzeri, Nettleroth, 1889, Ken-

tucky Foss. Shells, p. 221, Up. Held.

ventricose, strongly curved, acute, ele-

vated beak, which inclines forward at the apex; hinge-line extended, produced posteriorly, furnished with a thickened

ridge or cartilage plate; the beaks are

separated from the hinge by a pseudo-

area which is elevated, and more or

less arched under the beak; surface marked with radiating lines. Type O.

ornata, which, with O. cornuta, is de-

scribed at the same place from the Wa-

Ulrich, 1892, 19th Rep. Geo. Sur. Minn., pp. 228, 229, Trenton Gr.

ORTHONOTA corrugata, Whiteaves, 1890, Trans. Roy. Soc. Can., vol. 8, p. 98, De-

Ostrea patercula, Winchell, in the opinion of Whitfield, is from the Cretaceous of

PALÆONEILO consimilis, P. curta, P. ignota,

vol. 4, pp. 43, 44, Waverly Gr. Panenka is a Polish or Bohemian word, sig-

New Jersey, which by some accident

was mixed with Waverly or Burling-

Herrick, 1888, Bull. Denison Univ.,

nifying the same as the Latin puella.

a little girl. It is not formed accord-

ing to the rules of nomenclature, and

Nettleroth, 1889, Kentucky Foss. Shells,

(Entolium attenuatum,) Bull. Denison

culus,) Geo. Rep. Mo., p. 206, Chouteau

Univ., vol. 2, p. 24, Waverly Gr. circulus, Shumard, 1885, (Avicula cir-

grandis, Whiteaves, 1891, Can. Rec. Sci.,

PARACYCLAS elongata, and P. octerionii,

PERNOPECTEN attenuatus, Herrick, 1887,

minnesotense, O. safførdi,

to Can. Pal. p. 293, Devonian.

manitobensis, Whiteaves,

NUCULANA similis, and N.

1892, Cont. to Can. Pal., p. 301, Devonian.

spatulata, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 79, Waverly Gr. ORÆCARDIA, Herrick, 1888,

Bull. Denison Univ., vol.

4, p. 41. [Ety. oraios,

produced at a fit season;

kardia, heart.] Shell in-

equilateral, inequivalve,

1888.

tend Type ata is n the

-MOD

. Sur.

errvi. Bull , and ex-

Keo-Bull

Wa-

1888. , Watatus,

Jniv., ilaris, y Gr. 1892. . 299,

1892 Ainn.,

1827, Foss. large; ll obpeled : hinge e posan-

8car spiral. 1890.

ession

nargin

1., vol. Myti-

ingusparva. Ilrich. o 283, , from ;a, M.

from Ken-Held.

19th , 227, p. 226,

lvance p. 77, 1890.

)6, Dea, and M. parvula, 1892, Cont. to Can. Pal., | PLETHOCARDIA, Ulrich, 1892, 19th Rep. Geo. Sur. Minn., p. 243. [Ety. pletho, to be full; kardia, heart.] Shell thin, oblique, tumid, with the margins closed; beaks large, prominent, spirally enrolled, and curving forward; narrow, deep escutcheon posterior to the beaks; bifid cardinal tooth projects forward and downward; single lateral tooth at the posterior extremity of the hinge-line; anterior muscular scar deep at the antero-dorsal angle, margined by a curved ridge extending from the under side of the cardinal tooth. Type P.



FIG. 1259 -- Plethocardia umbonata.

umbonata, from the Trenton Gr., described at the same place. P. sub-erecta is also described from the Galena Gr.

- POSIDONOMYA fragilis, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 39, Waverly Gr.
- PROMACRUS missouriensis, Swallow, 1860, (Solen (?) missouviensis,) Trans.St.Louis Acad. Sci., vol. 1, p. 655, Chouteau limestone. It is not a Sanguinolites. limestone.
 - nasutus, Meek, 1871, (Sanguinolites nasutus,) Am. Jour. Conch., vol. Chouteau limestone.
 - truncatus, Herrick, 1888, Bull. Denison
- Univ., vol. 3, p. 60, Waverly Gr. PTERINEA lobata, Whiteaves, 1892, Cont. to Can. Pal., p. 292, Devonian.
- PTERINOPECTEN ashlandensis, and P. cari niferus, Herrick, 1888, Bull. Denison Univ. vol. 3, p. 58, and vol. 4, p. 33, Waverly Gr.
 - sedaliensis, S. A. Miller, 1891, Advance Sheets 17th Rep. Geo. Sur. Ind., p. 93, Chouteau limestone.
- PTERONITES obliquus, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 58, Waverly Gr.
- PTYCHOPTERIA æquivalvis, Whiteaves, 1891, Cont. to Can. Pal., vol. 1, p. 239, Devonian.
- mesocostalis, Williams, 1887, Bull. U. S. Geo. Sur., No. 41, p. 35, Portage Gr. obsoleta, Simpson, 1889, Trans. Am. Phil. Soc., p. 448, Chemung Gr.
- SANGUINOLITES missouriensis and S. nesutus refer to Promacrus.
- senilis, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 66, Waverly Gr.
- SCHIZODUS affinis, Herrick, 1887, Bull. Denison Univ., vol. 2. p. 41, Coal Meas.

harii, S. A. Miller, 1891, Advance Sheets

newarkensis,

S. palæon-eiliformis,

Herrick 1888, Bull. Denison Univ., vol. 3, pp. 64, 96, and S. pro-

longatus,

vol. 4, p. 36,

Waverly

Gr., and S.

17th Rep. Geo. Sur. Ind., p. 91, Up. Coal Meas. harlanensis, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 117, Berea Grit.

702

FIG. 1260 .-- Technophorus divaricatus. Left valve nat-ural size and magnified 3 diameters

spellmani, and S. subcircularis, 1887, vol. 2, pp. 36, 41, 42, Coal Meas. wheeleri, Swallow, 1862 (Cypricardia (?)

wheeleri,) is in Trans, St. Louis Acad. Sci., vol. 2, p. 96.

- SOLENOMYA cuyahogensis, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 115, Waverly Gr., and S. meekana, and S. subradiata, 1887, vol. 2, p. 30, Coal Meas.
- SPATHELLA subelliptica, Whit-eaves, 1892, Cont. to Can. Pal., p. 298, Devonian.
- STREBLOPTERIA gracilis, S. media, S. squamosa, Herrick, 1888, Bull. Denison Univ., vol. 3, pp. 56, 57, Waverly Gr.
- TECHNOPHORDS extendatus, Ulrich, 1892, 19th Rep. Geo. Sur. Minn. p. 222, Trenton Gr., and T. divaricatus, T. filistriatus, T. subacutus, Am. Geo., vol. 10, pp. 101 and 102, Trenton Gr.
- TELLINOMYA diminuens, and T. cuneata, Simpson, 1889, Trans. Am. Phil. Soc., p. 453, Clinton Gr.
 - compressa T. nitida, T. planodorsata, T. subrotunda, Ulrich, 1892, 19th Rep. Geo. Sur. Minn., pp. 215 to 219, Trenton Gr.; T. intermedia, p. 218, Galena Gr.; and T. recurva and T. similis, pp. 220, 221, Hud. Riv. Gr.; and T. longa, Am. Geo., vol. 10, p. 103, Black Riv. Gr.
- candens, lepida, Sardeson, 1892, Bull. Minn., Acad. Nat. Sci., vol. 3, p. 339, Trenton Gr.
- WHITELLA, Ulrich, 1891, Am. Geo., vol. 6, p. 176. [Ety. proper name.] Shell large, thin, obliquely quadrangular or suboval, equivalve, inequilateral, more or less ventricose, closed all around; beaks prominent, incurved; cardinal line straight or slightly convex, the edges inflected to form a sharply defined esinflected to form a sharply defined es-

cutcheon extending beyond the beaks nearly to the anterior extremity of the shell; area finely striated longitudinally; hinge-line straight, one-half or

two-thirds the length of the shell, with four or five oblique teeth in front of the beaks; ligament probably external and internal; two simple adductor impres-sions, posterior one faint, pallial-line entire; surface concentrically lined. Type W. obliquata, described at the same place from the Hud. Riv. Gr.; and W. compressa and W. scofieldi, from the Trenton Gr.

- concentrica, Ulrich, 1892, 19th Rep. Geo. Sur. Minn., p. 247, Trenton Gr.; W. præcipta, p. 246, Galena Gr.; and W. sulcodorsata, p. 248, Hud. Riv. Gr. hindi, Billings, 1862, (Cyrtodonta hindi,)
- Pal. Foss., vol. 1, p. 151, Hud. Riv. Gr. sterlingensis, Meek & Worthen, 1866,
- (Dolabra sterlingensis,) Proc. Acad. Nat. Sci., p. 260, and Geo. Sur. Ill., vol. 2, p. 339, Hud. Riv. Gr.



and part of the muscular impressions.

[SOL.-WHI.

THE Tubicola are and the paleozoic for composed of calcite, apex or on one side.

SUBK

chitonous or horny, it belong to the mastica

ARABELLITES aciculati James, 1884, Jour. vol. 7, p. 148, Hud CORNULITES sublavis, Cont. to Can. Pal vonian.

POLYGNATHUS wilsoni Cin. Soc. Nat. Hist Riv. Gr. PRIONIODUS dychei, Ja

Soc. Nat. Hist., v Riv. Gr. SABELLARITES, Dawson

ments or somites (som by a membrane. Th rine objects by the an exserted and retracted traca (entomos, cut in aquatic, covered with more pieces, in some shell, which completel In other genera the a armor ; the branchiæ the limbs are jointed undergo a regular m amounts to a species valves united on the by an adductor musc spots, or tubercle. M

THE integument (

ARA.-SPI.]

ARA.-SPI.]

ANNELIDA.

SUBKINGDOM ARTICULATA.

CLASS ANNELIDA.

THE Tubicola are invested in tubes to which they are not muscularly attached, and the paleozoic forms show no muscular scars. The tubes seem to have been composed of calcite, and are generally found attached to some other object at the apex or on one side. The jaws of the Conodonts are minute, glossy black, and chitonous or horny, instead of being composed of calcite. Most of them, probably, belong to the masticatory apparatus of Crustaceans.

- ARABELLITES aciculatus, and A. hindei, James, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 148, Hud. Riv. Gr.
- CORNULITES sublevis, Whiteaves, 1891, Cont. to Can. Pal., vol. 1, p. 210, Devonian.
- POLYGNATHUS wilsoni, James, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 148, Hud. Riv. Gr.
- PRIONIODUS dychei, James, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 147, Hud. Riv. Gr.

SABELLARITES, Dawson, 1890, Quar. Jour.

Geo. Soc., vol. 46, p. 605. [Ety. Sabellaria, a genus; *ites*, from *lithos*, stone.] Elongated tubes composed of grains of sand and calcareous organic fragments associated with carbonaceous, flocculent matter, indicating a horny or membranous sheath. Type S. trentonensis, which is described at the same place from the Trenton Gr., with S. phosphaticus from the Up. Taconic.

SPIRORBIS is generally more or less elevated in the last whorl, and the aperture is always turned up.

CLASS CRUSTACEA.

....

THE integument of the Crustacea (crusta, a crust,) is called chitonous; the segments or somites (soma, body,) are arranged longitudinally, and united transversely by a membrane. The Cirripedia (cirrus, a curl; pes, foot,) are attached to submarine objects by the anterior end or metamorphosed head. The articulated cirri are exserted and retracted from an opening at the posterior extremity. The Entomostraca (entomos, cut into; ostrakon, a shell,) have been defined as follows: Animals aquatic, covered with a shell or carapace of a horny consistency, formed of one or more pieces, in some genera resembling a cuirass or buckler, and in others a bivalve shell, which completely or in great part envelops the body and limbs of the animal. In other genera the animal is inverted with a multivalve carapace, like jointed-plate armor; the branchiæ are attached either to the feet or to the organs of mastication; the limbs are jointed and more or less setiferous. The animals, for the most part, undergo a regular moulting or change of shell as they grow; in some cases this amounts to a species of transformation. The Ostracoda (ostrakon, a shell,) have the valves united on the back by a membrane or ligament, and the valves are closed by an adductor muscle, the place of attachment being indicated by a pit, group of spots, or tubercle. Many genera have been recently described, some of them, appar-

WH1.

f the idinf or with f the and presl-line ined. the Gr.; ieldi, Geo. : W.

W.

ndi.)

'. Gr.

1866, Acad. . Ill.,

of a vs of itnge

CRUSTACEA.

[ACA.-BAR,

ently, not ranking higher than species. The central part of the cephalic shield of the Trilobita (treis, three; lobos, a lobe,) is called the glabella; the grooves at the sides of it are called axal furrows, the one at the rear the neck furrow; the fixed cheeks are on each side of the glabella, and separated from the free cheeks by the facial suture, though the facial suture is absent in Trinucleus and some other genera ; the central part of the thorax is the axis, and the side lobes are the pleure; the dividing line is the axal furrow; the segments of the pygidium are anchylosed. The Xiphosura (xiphos, a sword; oura, a tail,) have a broad, convex buckler, compound, subcentral eyes, and ocelli in front; the mouth has a small labrum and six pairs of appendages; the telson, or terminal segment, is ensiform.

ACANTHOTELSON magister, Packard, 1886, Mem. Nat. Acad. Sci., vol. 3, p. 127, Carboniferous.

ACIDASPIS ortoni, Foerste, 1887, Bull. Denison Univ., vol. 2, p. 90, Niagara Gr. perarmata, Whiteaves, 1891, Can. Rec.

Sci., p. 300, Up. Sil. ÆCHIMINA, Jones & Holl, 1869, Ann. and

- Mag. Nat. Hist., Ser. 4, vol. 3, p. 217. [Ety. aichme, a sharp point.] Valves thick, straight at the hinge, rounded at the ends, convex at the ventral border, and outdrawn at the surface into a broad-based and sharp-pointed hollow cone, which either involves all the surface or rises from the postero-dorsal or centro-dorsal region. Type *E*_cuspidata.
- abnormis, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 183, Niagara Gr., and Æ. marginata, p. 184, from the Ham. Gr.
- AGNOSTUS desideratus, Walcott, 1889, Proc. U. S. Nat. Mus., vol. 12, p. 39, Up. Taconic.

latus, see Bollia lata.

- AGRAULOS redpathi, Walcott, 1890, 10th Ann. Rep. U. S. Geo. Sur., p. 654, Up. Taconic.
- AMPYX americanus, Safford & Vogdes, Proc. Acad. Nat. Sci., Trenton Gr.
- ANOMALOCARIS, Whiteaves, 1892, Can. Rec. Sci., vol. 5, p. 205. [Ety. anomalos, unlike; karis, shrimp.] A phyllocarid crustacean; body from 9 to 13 segments, exclusive of the caudal segment, each bearing a pair of slender, narrowly elongated and acutely pointed, simple and probably branchial appendages of the nature of uropods or footgills; posterior terminal segment margined with three pairs of caudal spines, one terminal, the other two lateral. Type A. canadensis, described at the same place from rocks of uncertain age, probably Up. Taconic.
- APARCHITES concinnus, Jones, 1858, (Cytheropsis concinna,) Ann. & Mag. Nat. Hist., Ser. 3, vol. 1, p. 249, Black Riv. Gr.
- inornatus, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 182, Up. Held. Gr., and A. oblongus, p. 137, Hud. Riv. Gr. mitis, Jones, 1891, Cont. to Can. Micro-Pal., p. 91, Devonian; and A. mundu-

lus and A. tyrrelli, p. 62, from the Chazy Gr.

- ARISTOZOE canadensis, Whitfield, 1890, Ann. N. Y. Acad. Sci., p. 505, Trenton Gr.
- ASAPHUS has a lip-plate, labrum, or hypostoma, (hupo, under; stoma, mouth;) that'is wide and deeply forked behind. The jointed limbs and branchial filaments shown in the illustration of the Oxford specimen in the Jour. of the Cin. Soc. of Nat. Hist., as well as the description of them, are largely imaginary, as the specimen does not show the characters.
- ATOPS reticulata, Walcott, 1890, (Conocoryphe reticulata,) 10th Ann. Hep. U. S. Geo. Sur., p. 649, Up. Taconic. AVALONIA, Walcott, 1890, 10th Ann. Rep.
- U. S. Geo. Sur., p. 646. Type A. man-uelensis, described at the same place from the Up. Taconic.
- BAIRDIA, McCoy, 1846, Synop. Foss. Ire-land, p. 164. [Ety. proper name.] Carapace varying from a broadly triangular to a narrow elongate subtriangular form, with extremities more or less acute; surface smooth and setiferous or finely punctate; no central tubercle; lucid spots well marked; margins thin and trenchant; when closed the edges of the right valve lie within those of the left; interior of the marginal borders, except on the dorsal edge, cased with a narrow lamelliform plate, as in Cypris, except that a slight fold or notch is frequently apparent at the angles of the hinge-line; the dorsal edge of the right valve is quite simple, and, in the closed carapace, underlies the dorsal edge of the left valve, which is larger and overlapping; ventral margin incurved. Type B. curta.
- anticostiensis, Jones, 1890, Quar. Jour. Geo. Soc., vol. 46, p. 548, Hud. Riv. Gr. cestriensis, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 210, Kaskaskia Gr.; and B. leguminoides, p. 197, Ham. Gr.
- BARYCHILINA, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 198. [Ety. barus, heavy, thick; cheilos, a lip.] Carapace small, subrhomboidal or ovate; valves thick, unequal, the right the larger, overlapping the left except in the pos-

BAT.-BOL.]

terior half of th dorsal side; the this portion of and resemble a edges of both va all around, that much the heavie narrow or round face striate. Ty which, with B. p and B. pulchella same place from Ham. Gr.

BATHYURELLUS, Whit Mus. Nat. Hist. Taconic or Calcif BATHYURISCUS daws

Proc. U. S. Na Taconic. Bathyurus seelyi, refe

seelyi.

BEECHERELLA, Ulricl Geo., vol. 8, p. 198 name.) Carapac gate, boat-shap moderately conv less inequivalve gin varying from to strongly conve: times flattened, v defined carina or valves, giving the lar shape in cros

other cases the d convex; antero-do acuminate, often into a long spine; est on the right times absent on terior extremity rounded; ventral or straightened in

- hingement simple of right valve th in the central par the left valve. Ty described at the from the Low. He B. cristata, B. ang cula, B. ovata, B. subtumida var. in
- same rocks. BEYRICHIA ciliata, ref ciliata.
 - clavigera and B. clav Jones, 1891, Cont. Chazy Gr.; and Trenton Gr.; an strictispiralis, p. 7 clarkei, 1890, Qua vol. 46, p. 17, Low diffisa, p. 546, A1 halli, p. 15, Wata hamiltonensis, p. B. kalmodini, p. B. subquadrata, p.

duryi, refer to Cteno lyoni, Ulrich, 1890, Hist., vol. 13, p -BAR,

BAT.-BOL.]

eld of t the fixed y the nera; ne di-The

comd six

the Ann.

dr. → hyith ;) hind.

filaf the the the

agin-

v the

noc-Rep. c. Rep. nan-

place

Ireme.] ' tririane or iferitral red : 7hen) lie the orsal orm ight it at orsal ple, rlies hich itral our. Gr. Soc. skia 197,

> Soc. rus, bace lves ger, pos

CRUSTACEA.

terior half of the more or less convex dorsal side; the edges of the valves in this portion of the back are smooth, and resemble a pair of thick lips; edges of both valves thick and smooth all around, that of the right valve much the heavier; a sharply defined, narrow or rounded umbilical pit; surface striate. Type B. punctostriata, which, with B. punctostriata var. curta and B. pulchella, are described at the same place from the Up. Held. or Ham. Gr.

- BATHYURELLUS, Whitfield, 1890. Bull. Am. Mus. Nat. Hist., vol. 3, p. 38, Up. Taconic or Calciferous.
- BATHYURISCUS dawsoni, Walcott, 1888, Proc. U. S. Nat. Mus., p. 446, Up. Taconic.
- Bathyurus seelyi, refer to Bolbocephalus seelyi.

BEECHERELLA, Ulrich, 1891, Am. Geo., vol. 8, p. 198. [Ety. proper name.) Carapace small, elongate, boat-shaped to ovate, moderately convex, more or less inequivalve; dorsal margin varying from nearly straight to strongly convex; back sometimes flattened, with a sharply defined carina on one or both valves, giving them a triangular shape in cross sections; in other cases the dorsal slope is convex; antero-dorsal extremity

- acuminate, often drawn out into a long spine; spine strong est on the right valve, sometimes absent on the left; posterior extremity acuminate or rounded; ventral edge convex or straightened in the middle; hingement simple, dorsal edge of right valve thickened, and in the central part overlapping the left valve. Type B. carinata, described at the same place, from the Low, Held. Gr., with
 - B. cristata, B. angulata, B. navicula, B. ovata, B. subtumida, and B. subtumida var. intermedia, from the same rocks.
- BEYRICHIA ciliata, refer to Ctenobolbina ciliata.
 - clavigera and B. clavigera var. clavifracta, Jones, 1891, Cont. to Micro-Pal., p. 65, Chazy Gr.; and B. quadrifida, p. 66, Trenton Gr.; and B. tuberculata var. strictispiralis, p. 77, Up. Sil. Also B. clarkei, 1890, Quar. Jour. Geo. Soc., vol. 46, p. 17, Low. Held. Gr.; and B. diffisa, p. 546, Anticosti Gr.; and B. halli, p. 15, Waterlime Gr.; and B. hamiltonensis, p. 19, Ham. Gr.; and B. kalmodini, p. 538, Ham. Gr., and B. subquadrata, p. 537, Corniferous Gr.

lyoni, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 190, Up. Held. or Ham. Gr.; also B. tricollina, Ham. Gr.; and B. radiata var. cestriensis and B. simulatrix, pp. 204, 205, Kaskaskia Gr. richardsoni, refer to Depranella richardsoni.

symmetrica, refer to Bollia symmetrica.

- tuberculata, Kleden, 1834, (Battus tuberculatus,) Verst. d. Mark Brandenburg, p. 115, Up. Sil.
- BOLBOCEPHALUS, Whitfield, 1890, Bull. Am. Mus. Nat. Hist., vol. 3, p. 36. [Ety. bolbos, bulb; kephale, head.] Head large, semicircular, including the movable cheeks; glabella proportionally large, bulbous or subspherical, expanded in front of the eyes, and marked by a single, very indistinct furrow near the posterior; fixed cheeks narrow; eyes large, semicircular, elevated; lateral limbs narrow from front posteriorly; frontal limb linear; facial



described at the same place, FIG. 1262.—Beecherella carinata. Right valve, interior and from the Low. Held. Gr., with dorsal views of same. Magnified 20 diameters.

- suture cutting the posterior margin within the genal angle behind, and passing closely around the glabellar lobe in front; movable cheeks triangular, marginal, spined; pygidium semicircular, lobed, and transversely furrowed. Type B. seelyi.
- seelyi, Whitfield, 1886, (Bathyurus seelyi,) Bull. Am. Mus. Nat. Hist., vol. 1, p. 339, Calciferous Gr.
- truncatus, Whitfield, 1890, Bull. Am. Mus. Nat. Hist., vol. 3, p. 37, Calciferous Gr.
- BOLLIA. Jones & Holl, 1886, Ann. and Mag. Nat. Hist., ser. 5, vol. 17, p. 360. [Ety. proper name.] Valves oblong, with rounded and nearly equal ends; straight on the back, more or less outcurved on the ventral edge; surface punctate and bearing a lobular elevation on each side

of a median bay-like sulcus, constituting two irregular, obliquely transverse lobes, which converge downward and meet near the middle of the ventral region by a low, narrow, bent isthmus, sinuous in the adult, but more or less simply curved in the young state. The dorsal portions of this horseshoe lobe project outward; there is a strong semilunar ridge at each end of the valve, parallel with the marginal border, which has a slight outer rim. Type B. uniflexa.

- bilobata, Jones, 1890, Quar. Jour. Geo. Soc., vol. 46, p. 540, Corniferous Gr.; and B. hindei, p. 540, Ham. Gr.; and
- B. semilunata, p. 548, Hud. Riv. Gr. granifera, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist, vol. 13, p. 205, St. Louis Gr.; and B. obesa, p. 189, Up. Held. or Ham. Gr.; B. persulcata and B. pumila, pp. 116, 117, Hud. Riv. Gr.
- lata, Vanuxem, 1842, (Agnostus latus,) Geo. Rep. N. Y., p. 80, and Pal. N. Y., vol. 2, p. 301, Clinton Gr.
- symmetrica, Hall, 1852, (Beyrichia symmetrica,) Pal. N. Y., vol. 2, p. 317, Niagara Gr.
- ungula, Claypole, 1889, Am. Geo., vol. 4, p. 338, Marcellus limestone.
- BRONTEUS senescens, Hall, 1892, 8th Ann. R-p. St. Geo. N. Y., Chemung Gr.
- BYTHOCYPRIS, Brady, 1880, Rep. Ostracoda of the Challenger, p. 45. [Ety. buthos, the depth of the sea; Cypris, a genus.] Carapace smooth, more or less reniform; left valve much larger than the right, which it overlaps both on the dorsal and ventral margins.
- devonica, B. indianensis, B. punctulata, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 196, Up. Held. or Ham. Gr.
- lindstromi and B. obtusa, Jones, 1890, Quar. Jour. Geo. Soc., vol. 46, p. 548, Anticosti Gr.
- CALYMENE has a subquadrate hypostoma, with two short spines posteriorly; the surface, when well preserved, is granular or tubercular.

multicosta is from the Chazy Gr.

- vogdesi, Foerste, 1887, Bull. Denison Univ., vol. 2, p. 95, Niagara Gr.
- CARCINOSOMA, Claypole, 1890, Am. Geo., vol. 6, p. 400. [Ety. karkinos, a crab; soma, the body.] Proposed instead of Eurysoma, on p. 259. Body ovate, narrower in front, abruptly tapering behind into a cylindrical abdomen ending in a spiniform tail; head shield entire, roundly triangular, bluntly pointed in front; thoracic segments 6 or more, ending on each side in a backwardly directed point; abdominal segments 4, subquadrate; beyond these is a sharply triangular spine; appendages consist of 5 pairs of organs, the first 4 of which taper rapidly to a point and are furnished with spinous pro-

cesses; the swimming feet are thicker and longer than the others, and consist of three segments. Type C. newlini, described at the same time on p. 260, from the Waterline Gr.

CERATIOCARIS had numerous body rings, posterior to the bivalve carapace, carrying lamellar appendages, behind which there was a pointed telson and two lateral spines.

Concoryphe is a synonym for Atops.

- CTENOBOLBINA, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 108. [Ety. ktenos, comb; bolbos, bulb.] Carapace small, elongate, suboval, strongly convex; the posterior two-fifths more or less bulbous or subglobular, and separated from the remainder by a deep, narrow sulcus, extending in a gentle curve from the dorsal margin more than half the distance across the valves toward the postero-ventral border; the anterior three-fifths often with another oblique but less impressed sulcus; valves equal, dorsal margin straight, hinge simple, ventral edge thick, and the true contact margins generally with a row of small spines on each side; in a lateral view both are concealed by a frill or flattened border, usually mistaken for the true contact edges; surface generally granulous. Type C. ciliata.
 - alata, C. bispinosa, C. ciliata var. curta, C. ciliata var. emaciata, tumida, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, pp. 108 to 111, Hud. Riv. Gr.; and C. antespinosa, C. informis, C. minima, C. papillosa, pp. 186 to 188, Up. Held. or Ham. Gr.; and C. punctata, p. 186, from the Niagara Gr.
 - ciliata, Emmons, 1855, (Beyrichia ciliata,)
- Am. Geo., p. 219, Hud. Riv. Gr.
 duryi, S. A. Miller, 1874, (Beyrichia duryi,) Cin. Quar. Jour. Sci., vol. 1, p. 232, Hud. Riv. Gr.
- Cyclus, DeKoninck, 1841, Mem. Acad. Sci. Bruxelles, vol. 14, p. 18. [Ety. kuklos, circle.] Carapace longer than wide, somewhat hemispherical, narrow, smooth border, indented behind shield; divided down its center by a dorsal ridge, from which radiate ribs or transverse wrinkles. Type C. radialis.
- americana, Packard, 1886, Mem. Nat. Acad. Sci., vol. 3, p. 143, Coal. Meas.
- Cypridina, Edwards-Milne, 1838, Lamarck's Anim. Sans Vert., vol. 5, p. 178. [Ety. from the genus Cypris.] They have two eyes situated toward the middle of their bivalve test, and a caudal appendage at the posterior border, armed with spines disposed as the teeth of a comb. Edwards mentioned no type when founding the genus upon the living Ostracoda, but it is very evident the genus is not known in Palæozoic rocks.
 - herzeri, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 209, Keokuk Gr.

Cythere ohioensis, ensis. CYTHERELLA, Jones,

Cret., p. 28. [Ety Carapace oblong, pitted; no ter contact margins valve grooved or edge for the rec sented by the left (smaller) va flange stronger a the anterior port lucid spots rese dina.

ovatiformis, Ulrich Soc. Nat. Hist., kaskia Gr.

Cytherina phaseolus, se CYTHERELLINA, Jones

Mag. Nat. Hist., from Cytherella elongate, conver cavated internall tours. Type C. glandella, instead o

CYTHEROPSIS concinn cinnus.

ohioensis, Herrick ensis,) Bull. Der 60, Waverly Gr.

DALMANITES troosti, ops truosti,) Proc ton Gr.

DEPRANELLA, Ulrich, Nat. Hist., vol. small, high, su dorsal border st ruptly at each nearly straight or ing almost eve sickle-shaped rid with the poster and is sometime postero-dorsal k with two or mo ridges; the two the ventral edge which is describ from the Birdsey D. elongata, D. n to 121, Chazy Gr richardsoni, S. A. 1

richardsoni,) Cir 1, p. 347, Hud. R DIONIDE is from N. Ja

p. 391, and Syst. ELLIPTOCEPHALA br

(Olenellus brogg Mus., vol. 12, p. ELPE, Barrande, 1872

Supp. p. 510. T tyrrelli, Jones, 189

p. 93, Devonian. ENCRINURUS excedrer

Acad. Nat. Sci., ' thresheri, Foerste,

Univ., vol. 2, p. ENTOMIS, Jones, 1861

[CYT.-ISO.

CRUSTACEA.

CYT.-ISO.

Cythere ohioensis, see Cytheropsis ohioensis.

- CYTHERELLA, Jones, 1849, Monog. Entom. Cret., p. 28. [Ety. diminutive of Cythere.] Carapace oblong, compressed, smooth or pitted; no terminal denticulations; contact margins of the right (larger) valve grooved or rabbeted on its inner edge for the reception of a flange presented by the contact margin of the left (smaller) valve; both groove and flange stronger at the posterior than at the anterior portion of the valves. The lucid spots resemble those in Cypridina.
 - ovatiformis, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 209, Kaskaskia Gr.
- Cytherina phaseolus, see Leperditia phaseolus. CythereLLINA, Jones & Holl, 1869, Ann. and Mag. Nat. Hist., vol. 3, p. 215. [Ety. from Cytherella.] Carapace valves elongate, convex, smooth, thick, ex-cavated internally, with undulating contours. Type C. siliqua.
- glandella, instead of Cytheropsis glandella. CYTHEROPSIS concinna, see Aparchites concinnus.
 - ohioensis, Herrick, 1888, (Cyhere ohioensis,) Bull. Denison Univ., vol. 4, p. 60, Waverly Gr.
- DALMANITES troosti, Safford, 1889, (Chasmops troosti,) Proc. Acad. Nat. Sci., Trenton Gr.
- DEPRANELLA, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 117. Carapace small, high, subelliptical in outline, dorsal border straight, terminating abruptly at each end; ventral border nearly straight or gently convex, rounding almost evenly at the ends; sickle-shaped ridge runs nearly parallel with the posterior and ventral edges. and is sometimes produced beyond the postero-dorsal border; dorsal slope with two or more strong tubercles or ridges; the two valves meet equally at the ventral edge. Type D. crassinoda, which is described at the same place, from the Birdseye Gr., with D. ampla, D. elongata, D. macer, D. nitida, pp. 119 to 121, Chazy Gr.
 - richardsoni, S. A. Miller, 1874, (Beyrichia richardsoni,) Cin. Quar. Jour. Sci., vol. 1, p. 347, Hud. Riv. Gr.
- DIONIDE is from N. Jahrb. fur Miner., Hft. 4, p. 391, and Syst. Sil. Boh., p. 640.
- ELLIPTOCEPHALA broggeri, Walcott, 1889, (Olenellus broggeri,) Proc. U. S. Nat.
- Mus., vol. 12, p. 41, Up. Taconic. ELPE, Barrande, 1872, Syst. Sil. Boh., vol. 1,
- Supp. p. 510. Type E. pinguis. tyrrelli, Jones, 1891, Cont. to Micro-Pal., p. 93, Devonian.
- ENCRINURUS excedrensis, Safford, 1889, Proc. Acad. Nat. Sci., Trenton Gr.
- thresheri, Foerste, 1887, Bull. Denison Univ., vol. 2, p. 101, Niagara Gr.
- ENTOMIS, Jones, 1861, Mem. Geol. Sur. Gt.

Brit., Geol. Edinb., p. 137. Carapace ovate-oblong, bean-like; valves indented by a transverse furrow, which begins on the dorsal margin, at about one-third of its length from the anterior extremity, and reaches half-way or more across the valve; surface bearing in front of the sulcus a tubercle or spine which is sometimes wanting; anterior border not indented. Type E. tuberosa.

- madisonensis, Ülrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 107, Hud. Riv. Gr.; and E. waldronensis, p. 183, Niagara Gr
- rhomboidea, Jones, 1890, Quar. Jour. Geo. Soc., vol. 46, p. 20, Ham. Gr. aychilina, Ulrich, 1889, Micropalæon-
- EURYCHILINA, tology of Can., p. 52. [Ety. eurys, broad; cheilos, lip.] Valves somewhat semicircular or semi-elliptical; dorsal line straight; subcentral sulcus and a hode behind it; broad border, often strated; hinge simple; surface reticulate, granulous, or smooth. Type E. reticulata, which is described at the same place from the Trenton Gr., and also E. manitobensis,
 - æqualis, E. granosa, E. longula, E. obesa, E. subradiata, Ulrich, 1890, Jour. Cin. Sec. Nat. Hist., vol. 13, p. 126 to 129, Chazy and Birdseye Gr.
 - striatomarginata, S. A. Miller, (Beyrichia striatomarginata,) 1874, Cin. Quar. Jour. Sci., vol. 1, p. 233, Hud. Riv. Gr.
- Eurysoma, Clavpole, 1890, Am. Geol., vol. 6, p. 259. The na See Carcinosoma. The name was preoccupied.

newlini, see Carcinosoma newlini.

- GRIFFITHIDES, Portlock, 1843, Rep. Geol. Londonderry, p. 310. [Ety. proper name.] Distinguished from Phillipsia, which it closely resembles by the pyriform or tumid glabella and small, smooth, lunate eyes. Type G. longiceps.
 - bufo, Meek & Worthen, 1870, Proc. Acad. Nat. Sci., p. 52, and Geo. Sur. Ill., vol. 5, p. 528, Keokuk Gr.
- p. 528, Reokuk Gr. portlocki, Meek & Worthen, 1865, Proc. Acad. Nat. Sci., p. 268, and Geo. Sur. Ill., vol. 5, p. 525, Keokuk Gr. sedaliensis, Vogdes, 1888, Irans. N. Y. Acad. Sci., vol. 7, p. 276, Waverly Gr. HALLIELLA, Ulrich, 1890, Jour. Cin. Soc. Nat.

Hist., vol. 13, p. 184. [Ety. proper name.] Valves similar to Primitia, but with a larger sulcus, narrow at the dorsal edge, and widening as it extends downward posterior lobe smaller than the anterior; the latter generally divided at or near the straight dorsal edge; surface ornamented or smooth; ventral edge thick. Type H. retifera, described at the same place from the Up. Held. or Ham. Gr.

HARPIDES. Type H. hospes.

Isochilina amii, I. labellosa, I. grandis var. latimarginata, I. ottawa var. intermedia, and I. whiteavesi, Jones, 1891, Cont. to Can. Micropalæontology, pp. 68 to 78,

cker conlewon ngs, car

ind

and

Soc.

nos.

nall,

the

ulb-

rom

cus,

the

dis-

the

rior

ique

lves inge

the

th a

: in

by a

misface

a, C.

rich,

1.13,

I C.

ima, [eld.

186, ata,)

chia

1. 1,

Sci.

klos,

vide,

row. eld

orsal

ans

Nat.

178.

They

id a

erior

d as

men-

enus

it is

n in

the

s. rck's

8

CYC.

Nat.

Chazy and Trenton Gr.: and I. bellula

- and I. dawsoni, p. 92, Devonian. amiana, I. ampla, I. kentuckiensis, I. saf-fordi, I. subnodosa, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, pp. 177 to 180. Birdseve and Trenton Gr.; and I. rectangularis, p. 182, Up. Held. or Ham. Gr.
- fabacea and I. lineata, Jones. 1890, Quar. Jour, Geo. Soc., vol. 46, p. 21, Ham. Gr.
- JONESELLA, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 121. [Ety. proper name.] Carapace small, ovate, moderately convex.; valves equal, their outline and general aspect much as in Primitia, but differing in having a simple or more or less divided prominent ridge on the posterior two-thirds, more or less curved. Type J, crepiformis.
 - crassa, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 123, Trenton Gr.; J. digitata and J. pedigera, p. 122, Hud. Riv. Gr.
- crepiformis, Ulrich, 1879, Jour. Cin. Soc. Nat. Hist., vol. 2, p. 10, Hud. Riv. Gr. Karlia, Walcott, 1888, Proc. U. S. Nat. Mus., p. 444. [Ety. from the Christian name Karl, which is a violation of all rules, and should be disregarded.] Form elongate-oval, convex; head longitudinally semicircular, deeply marked by the dorsal furrows; glabella clavate, broadly expanded in front, with or without faint glabellar furrows; occipital furrow well defined; fixed cheeks subtriangular: posterior furrow broad; eye lobe small; free cheeks narrow; hypostoma with a thick. rounded anterior margin that is extended into the large lateral wings, the sides of which extend one-half way back on the oval, convex body; posterior marginal rim strong, and separated from the body by a well-defined sulcus; thorax with seven segments; axis with a central spine on each segment; pleural lobes with a broad groove; anterior lateral ends of pleuræ faceted; pygidium short, transverse, four to five segments in the axis, lateral lobes slightly grooved; surface granulose. Type K. minor, described at the same place from the Up. Taconic, and also K. stephenensis.
- Isoxys, Walcott, 1890, 10th Ann. Rep. U. S. Geo. Sur., p. 925. Carapace large; dorsal margin slightly curved; dorsal angles produced into sharp points; anterior and posterior ends alate, subequal in outline, and merging into the rounded ventral margin, without forming an angle; marginal rim narrow; valves equal; surface smooth. Type I. chilhoweana, Up. Taconic.
- KIRBYA, Jones, 1859, Trans. Tyneside Nat. Field Club, vol. 4, p. 129. [Ety. proper name.] Carapace valves compressed, thick, oblong, impressed with a subcentral pit and raised into ridges, some

concentric with the margin, associated sometimes with longitudinal wrinkles and by a reticulate ornament; valves suboblong, higher behind than before; extremities rounded, one more obliquely than the other; dorsal border straight. and its ends subacute; ventral border nearly straight in its middle third, and broadly curved at the ends; hinge simple: ventral edge of the dextral valve overlaps slightly that of the other. Subcentral pit variable. Type K nermiana

[ION.-LEP.

- lindahli, Ulrich, 1890. Jour. Cin. Soc. Nat. Hist., vol. 13, p. 207, St. Louis Gr., and K. venosa, p. 208, Kaskaskia Gr.; K. parallela, K. semimuralis, K. subquadrata, p. 192, Up. Held. or Ham. Gr. Mr. Ulrich also identifies K. oblonga and K. tricollina, Jones & Kirby, pp. 206 and 207, Kaskaskia Gr., and K. costata, McCov, p. 208, St. Louis Gr.
- walcotti, Jones, 1890, (Primitia (?) walcotti), Quar. Jour. Geo. Soc., vol. 46, p. 543, Ham. Gr.
- KLORDENIA, Jones & Holl, 1886, Ann. and Mag. Nat. Hist., ser. 5, vol. 17, p. 347. [Ety. proper name.] Carapace valves smooth, convex, impressed with two short, vertical furrows on the dorsal region, and a third smaller furrow defines a narrow semi-lune at the front end of the valve. Type K. wilkensana. Beyrichia notata and B. notata var. ventricosa, Hall, 1859, Pal. N. Y., vol. 3, pp. 379, 380, Low. Held. Gr., are referred by Jones to this genus.
- LEPERDITIA was derived from a proper name. There is generally a tubercular eye-spot near the hinge, below and behind which there is a slight inflation and a vertical groove, extending from the dorsal margin part way across the valves.
 - æquilatera, fimbriata. dorsicornis, granilirata, germana, millepunctata, inflata, mundula, sulcata, and tumida, Ulrich, 1892, Am. Geol., vol. 10, pp. 264 to 269, Birdseye, Trenton, and Hud. Riv. Grs.
 - appressa, L. cæcigena var. frankfortensis, L. linneyi, L. tumidula, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, pp. 174 to 177, Trenton Gr.; L. nicklesi, p. 200, Warsaw Gr.; L. subrotunda, p. 181, Up. Held. or Ham. Gr.
 - balthica var. primæva, L. obscura, Jones, 1891, Cont. to Micropal., p. 70, Trenton Gr.; L. balthica var. guelphica, L. hisingeri var. egena, var. fabulina, var. gibbera, L. cæca, L. phaseolus var. guelphica, L. selwyni, L. whiteavesi, pp. 80 to 89, Niagara and Guelph Gr.; L. exigua, p. 94, Devonian.
 - canadensis var. nana, syn. for L. canadensis. claypolei, Jones, 1890, Quar. Jour. Geo.
 - Soc., vol. 46, p. 25, Hud. Riv. Gr. crepiformis, see Jonesella crepiformis.
 - frontalis, Jones, 1890, Quar. Jour. Geo. Soc., vol. 46, p. 547, Anticosti Gr.

LEP-NOT.]

hisingeri, Schmidt. Sci. St. Petersbou Niagara Gr. marginata, Schmie Imp. Sci. St. Pete p. 19, Niagara G

nana, syn, for L. c. parasitica, refer to phaseolus, Hising

- Phys. Geogr., v Niagara Gr. punctulifera, see Pr
- subevlindrica. Ulr Can., p. 49, Hud LEPIDOCOLEUS scales to form the caj applied to a ba
- supported on a been suggested t of the peduncle.
- unknown. LICHAS bicornis and I
 - Am. Geol., vol. 1 first Hud. Riv. lena Gr.
- champlainensis is faberi is a synonyr time of the pub was not aware
- Foerste's species halli, Foerste, 1888
- vol. 3, p. 118, H
 - MACROCARIS, S. A. Sheets 18th Rep · [Ety. makros, long pace bivalved, u strong ligament; and ornamented striæ; they are side in front, ar at the posterior middle part the d

are subparallel :

of twelve or m

FIG. 1263.—Macrocaris g abdominal segment

very slowly tape fifth to the postab consisting of a sh with a central rid LEP.-NOT.]

- hisingeri, Schmidt, 1873, Mem. Acad. Imp. Sci. St. Petersbourg, ser. 7, vol. 31, p. N, Niagara Gr.
- marginata, Schmidt, 1873, Mem. Acad. Imp. Sci. St. Petersbourg, ser. 7, vol. 31, p. 19, Niagara Gr.
- nana, syn. for L. canadensis.
- parasitica, refer to Beyrichia parasitica.
- phaseolus, Hisinger, 1831, Antecken. Phys. Geogr., vol. 5, pp. 110 to 135, Niagara Gr.
- punctulifera, see Primitiopsis punctulifera. subcylindrica, Ulrich, 1889, Micropal. of Can., p. 49, Hud. Riv. Gr.
- LEPIDOCOLEUS scales or plates are supposed to form the capitulum, (caput, head; applied to a barnacle, from its being supported on a peduncle,) but it has been suggested that they are the scales of the peduncle, and the capitulum is unknown.
- LICHAS bicornis and L. robbinsi, Ulrich, 1890, Am. Geol., vol. 10, pp. 271 and 272, the first Hud. Riv. Gr., and second Galena Gr.
 - champlainensis is from the Chazy Gr. faberi is a synonym for L. halli. At the time of the publication of this book I
 - was not aware of the publication of Foerste's species. halli, Foerste, 1888, Bull. Denison Univ.,
 - vol. 3, p. 118, Hud. Riv. Gr.
- MACROCARIS, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 78. [Ety. makros, long; karis, shrimp.] Carapace bivalved, united dorsally with a strong ligament; valves long, narrow, and ornamented with anastomosing striæ; they are pointed on the dorsal side in front, and on the ventral side at the posterior end, while in the middle part the dorsal and ventral sides are subparallel; abdomen consisting of twelve or more segments, which



FIG. 1263.—Macrocaris gorbyi. Carapace valves, abdominal segments and postabdomen.

very slowly taper from the fourth or fifth to the postabdomen; postabdomen consisting of a short, expanding plate, with a central ridge or line of division. The genus Strigocaris is known only from the carapace valves, and the posterior ends are subtruncated from the ventral side to the dorsal side, while in this genus the posterior ends of the valves are subtruncated from the dorsal to the ventral side." Type M. gorbyi, described at the same place from the Keokuk Gr.

- MACROCYPRIS, Brady, 1867, Intellectual Ob server, vol. 12, p. 119. [Ety. makros long; Cypris, a genus.] Carapace subcylindrical or long triangular, and often Bairdia-like, generally elongate, attenuated at the extremities; valves thin, smooth, unequal, with beveled plates within the ends, more or less sinuate on the ventral margin, the right larger than the left, and overlapping dorsal hinge-line flexuous.
 - subcylindrica, Jones, 1890, Quar. Jour. Geo. Soc., vol. 46, p. 549, Anticosti, Gr.



FIG. 1264.—Mesothyra gurleyi. Postabdomen.

- MESOTHYRA gurleyi, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 77, Kinderhook Gr.
- MICRODISCUS bellimarginatus, Shaler & Foerste, 1888, Bull. Mus. Comp., p. 35, Up. Taconic.
- helena, Walcott, 1889, Proc. U. S. Nat. Mus., vol. 12, p. 40, Up. Taconic. Moorea, Jones & Kirby, 1869, Ann. and Mag.
 - Nat. Hist., ser. 4, vol. 3, p. 225. [Ety. proper name.] Carapace valves simple, thick, flattened, longer on the dorsal than the ventral margin, without any subcentral pit, and ornamented with narrow, rounded ridges, following more or less closely and completely the marginal contour. Type M. silurica.
- bicornuta, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 191, Ham. Gr.; and M. granosa, p. 206, Kaskaskia Gr. kirbvi, Jones, 1890, Quar. Jour. Geo. Soc., vol. 46. p. 542, Corniferous Gr.
- Nothozoe was described in 1872, Syst. Sil. Boh., vol. 1, Supp., p. 536. Type N. pollens.
- Octonaria, Jones, 1887, Ann. and Mag. Nat. Hist., ser. 5, vol. 19, p. 404. [Ety. octonarius, a, um, consisting of eight; an adjective.] If any regard to the

ated kles lves)re : ielv zht, der and nge tral the ype Κ. Ŕ. ti), 143, ind :47. ves

LEP.

vat. and ad. Gr. oga pp.

WO

sal de-

ont

na. ar. . 3. re-

ber lar

nd

ion

om

he

ni-

.ta.

sh.

69. rs is.

90.

)p.

p. 81,

es, on

18ar. ar.

si. r.:

is. 30.

30.

rules of nomenclatures is to be observed, such generic names must be dis regarded. The characters ascribed to the genus are, probably, like other characters, ascribed by the same author to other genera, of no more than specific value. It would not be advisable, therefore, to propose a substantive name for the adjective. Ulrich defined four species, curta, ovata, clavigera, and stigmata, in Jour. Cin. Soc. Nat. Hist., vol. 13, pp. 193 to 195; but it is only necessary to translate such names to show the absurdity. Octonaria

CRUSTACEA.

- curta, of eight short; Octonaria ovata, eight ovate, etc. But the rules of nomenclature absolutely require a substantive for a generic name. If authors, who do not know how to distinguish an adjective from a noun, would consult some one who does before publishing their new generic names, we might be spared the trouble of indexing such work.
- Ogygopsis, Walcott, 1888, Proc. U. S. Nat. Mus., p. 446. [Ety. from resemblance to Ogygia.] Distinguished from Ogygia by having a well defined ocular ridge and a narrow palpebral lobe. Type O. klotzi.
 - klotzi, instead of Ogygia klotzi.
- Olenellus broggeri, see Elliptocephala broggeri.
- OLENOIDES curticei, Walcott, 1888, Proc. U. S. Nat. Mus., p. 443, Up. Taconic. desideratus and O. ellsi, Walcott, 1890, 10th Ann. Rep. U. S. Geo. Sur., pp. 642,
- 644, Up. Taconic. PACHYDOMELLA, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 197. [Ety. pachys, thick; domus, house; ellus, diminutive. Carapace ventricose; valves thick and strong, the left much the largest, its thick edges overlapping the right valve on all sides; dorsal side strongly arched, ventral edge more nearly straight, ends subequal; a faintly impressed, subcentral umbilical pit. Type P. tumida, described at the same place from the Up. Held or Ham. Gr.
- PARADOXIDES walcotti, Shaler & Foerste, 1888, Bull. Mus. Comp. Zool., vol. 16, p. 36, Up. Taconic.
- PHACOPS has the facial sutures uniting in front and abruptly curving from the eves to the lateral margins. The hypostoma is convex and subtriangular. pulchella, Foerste, 1887, Bull. Denison Univ., vol. 2, p. 99, Niagara Gr.
- PHÆTHONIDES immaturus, P. occidentalis, P. spinosus, Herrick, 1888, Bull. Deni-son Univ., vol. 4, pp. 57 to 59, Waverly Gr.
- PHILLIPSIA has an hypostoma longitudinally convex, winged antero-laterally, and terminating in an obtuse point behind. The type of the genus is P. kellii instead of P. gemmulifera.
- bufo, refer to Griffithides bufo.

- consors, Herrick, 1888, Bull. Denison Univ., vol. 4. p. 53, Keokuk Gr.
- nodocostata, Hare, 1891, Kansas City Sci., vol. 5, p. 33, Up. Coal. Meas.
- portlocki, refer to Griffithides portlocki.
- sampsoni, Vogdes, 1888, Trans. N. Y. Acad. Sci., vol. 7, p. 246, Keokuk Gr. præcursor, Herrick, 1888, Bull. Denison Univ., vol. 3, p. 29, Waverly Gr. serraticaudata, Herrick, 1888, Bull. Deni-
- son Univ., vol. 4, p. 52, Coal Meas. shumardi, Herrick, 1887, Bull. Denison Univ., vol. 2, p. 69. Proposed instead of Proetus missouriensis of Shumard.
- trinucleata, Herrick, 1887, Bull. Denison Univ., vol. 2, p. 64, Coal. Meas.
- PLACENTULA, Jones & Holl, 1886, Ann. and Mag. Nat. Hist., ser. 5, vol. 17, p, 407. [Ety. placentula, a little cake.] Valves suborbicular, nearly semicircular on the ventral border, straight on the dorsal margin inside, but projecting with unequal and variable angles at the outer dorsal region; surface flat or slightly convex, surrounded by a raised rim, which slopes down suddenly outside the edge of the valve; this rim incloses a depressed and reticulated area, and in or near the antero dorsal region there is a small depression defined by a raised, loop-like border. Type P. excavata.
- inornata, and P. marginata, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 124, Hud. Riv. Gr.
- POLYCOPE, Sars, 1865, Översigt af Norges Marine Ostracoder.
- sublenticularis, Jones, 1890, Quar. Jour. Geo. Soc., vol. 46, p. 550, Anticosti Gr.
- PONTOCYPRIS illinoisensis, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist. vol. 13, p. 107, Hud. Riv. Gr.; and P. acuminata, p. 210; Waverly Gr.
- PRIMITIA centralis, P. perminima, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 130, Utica Slate; and P. glabra, P. impressa, P. medialis, P. milleri, P. nodosa, P. rudis, pp. 131 to 136, Hud. Riv. Gr.; and P. nitida, P. sculptilis, pp. 135, 136, Trenton Gr.; and P cestriensis, P. cestriensis var. caldwellensis, P. granimarginata, P. simulans, and P.
 - subæquata, pp. 201, 202, Kaskaskia Gr. clarkei, Jones, 1890, Quar. Jour. Geo. Soc., vol. 46, p. 535, Corniferous Gr.; P. wal-cotti, p. 543, Corniferous Gr.; P. bil-lingsi, p. 547, Clinton Gr.; P. seminulum, p. 5, Ham. Gr.; P. ulrichi, and P. whitfieldi, pp. 6, 9, Utica Slate. lativia and P. parallela. ulrich, 1889,
 - Micro-Pal. of Can., pp. 51, 52, Hud. Riv. Gr.
 - minuta, Eichwald, 1854, (Cypridina minuta,) Bull. Imp. Soc. Nat. Moscow, vol. 27, p. 99, Hud. Riv. Gr.
- mundula var. effusa, Jones, 1891, Cont. to Can. Micro Pal., p. 64, Chazy Gr.; and P. incisa, p. 64, Trenton Gr.; and P. scitula, p. 91, Devonian.
- PRIMITIOPSIS, Jones, 1887, Sil. Ostrac. Goth-

land, p. 5. [Ety. to Primitia.] Li except that the specially smooth with an internal titioned off from by a cross wall. punctulifera, Hall, tulifera,) 13th Re

Hist, p. 92, Ham PROETUS determinatu Denison Univ., vo longicaudus, Hall, s

major. minutus, Herrick, Univ., vol. 4, p. **PTYCHOPARIA** attlebor 1888, Bull. Mus p. 39, Up. Taconi metisensis, Walcott U. S. Geo. Sur., p

mucronata, Shaler & Atops trilineata.

Rusichnites, synonym R. acadicus; R. c ensis, and R. gi referred to Rusor SAO, Barrande, 1846 p. 13, and Syst. 8 Etv. mythologica trilobation mark cular; glabella pr dorsal furrows de rows, between wh

separated on the dinal furrow; f frontal border a the anterior proje the posterior bran ner to a point at t angle; the eye ar lief toward the thorax seventeen small, two articu

suta. lamottensis is from

FIG. 1265.—Schmidtella rior and exterior view terior and ventral vi eters.

SCHMIDTELLA, Ulrich 10, p. 269. [Ety. p small, rounded, n near Aparchites an valves inflated which projects and out from a line; right valve PRO.-ULR.]

land, p. 5. [Ety. from the resemblance to Primitia.] Like Primitia externally, except that the anterior end has a specially smooth area, corresponding with an internal portion which is par-titioned off from the rest of the cavity

- by a cross wall. Type P. planifrons. punctulifera, Hall, 1860, (Leperditia punc-tulifera,) 13th Rep. N. Y. St. Mus. Nat. Hist , p. 92, Ham. Gr.
- PROETUS determinatus, Foerste, 1887, Bull. Denison Univ., vol. 2, p. 91, Niagara Gr. longicaudus, Hall, synonym for Phillipsia major.
- minutus, Herrick, 1888, Bull. Denison Univ., vol. 4, p. 56, Waverly Gr.
- PTYCHOPARIA attleborensis, Shaler & Foerste, 1888, Bull. Mus. Comp. Zool., vol. 16, p. 39, Up. Taconic. metisensis, Walcott, 1890, 10th Ann. Rep.
- U. S. Geo. Sur., p. 651, Up. Taconic. mucronata, Shaler & Foerste, synonym for
- Atops trilineata.
- Rusichnites, synonym for Rusophycus and R. acadicus; R. carbonarius, R clinton-ensis, and R. grenvillensis should be referred to Rusophycus.
- SAO, Barrande, 1846, Notice preliminaire, p. 13, and Syst. Sil. Boh., vol. 1, p. 382. [Ety. mythological name.] Body ovate, trilobation marked; head subsemicircular; glabella prominent, well defined; dorsal furrows deep; three lateral furrows, between which are lobes in relief, separated on the summit by a longitudinal furrow; facial sutures cut the frontal border and arch outwardly to the anterior projections of the eyes, and the posterior branches arch in like manner to a point at the interior of the genal angle; the eye arch is prolonged in relief toward the front of the glabella; thorax seventeen segments; pygidium small, two articulations. Type S. hirsuta.

lamottensis is from the Chazy Gr.



FIG. 1265.—Schmidtella crassimarginata Inte-rior and exterior views of right valve and an-terior and ventral views, magnified 10 diameters.

SCHMIDTELLA, Ulrich, 1892, Am. Geo., vol. 10, p. 269. [Ety. proper, name.] Carapace small, rounded, moderately convex and near Aparchites among the Leperditiidæ; valves inflated in the dorsal region, which projects shoulder-like over and out from a nearly straight hingeline; right valve slightly the larger, its

ventral edge overlapping that of the left; no sulcus or tubercles. Type S. crassimarginata, described at the same place from the Birdseye limestone.

- SOLENOCARIS having been preoccupied before Meek used it, Vogdes proposed Strig-ocaris in 1889, Ann. N. Y. Acad. Sci, vol. 5, p. 34.
- SOLENOPLEURA bombifrons, Matthew, 1887, Trans. Roy. Soc. Can., vol. 4, p. 156, Up. Taconic.
 - harveyi and S. howleyi, Walcott, 1889, Proc. U. S. Nat. Mus., vol. 12, p. 45, Up. Taconic.
- STREPULA, Jones & Holl, 1886, Ann. and Mag. Nat. Hist., ser. 5, vol. 17, p. 403. [Ety. diminutive of strepa, a stirrup, from the loop-like pattern of the ridges.] Carapace valves slightly convex, suboblong, with rounded ends, or semielliptical, and bear narrow ridges that run into the slightly thickened dorsal margin; the intervening furrows form broad valleys, and a subcentral tubercle or lobular swelling is sometimes present; the chief ridge is a free supramarginal lamina, standing outward and downward, and hiding the real marginal edge in the side view; the edge of the bivalved carapace is narrow, ovate, cross-barred at the sides with ridges, some straight and parallel, some ob-liquely divergent. Type S. concentrica. lunatifera, Ulrich, 1889, Micro-Pal. of Can., p. 56. Hud. Riv. Gr.
 - sigmoidalis and S. plantaris, Jones, 1890, Quar. Jour. Geo. Soc., vol. 46, pp. 11, 540, Ham. Gr.
- Tetradella, Ulrich, 1890, Jour. Cin. Soc. Nat. Hist., vol. 13, p. 112. Carapace oblong or subquadrate, never tumid, hinge-line straight; surface depressed, a ridge follows the margin from the posterior to the antero-dorsal angle; in the inclosed space two narrow ridges traverse the valves in a vertical or oblique direction from the dorsal edge, to the posterior half of the ventral portion of the submarginal ridge, uniting with it; the union of these ridges is supposed to be the most significant character of the genus. Type T. quadrilirata, which is a straight synonym for Beyrichia regularis of Emmons. Mr. Ulrich refers to this genus Beyrichia oculifera and B. chambersi. I do not agree with him in respect to the genus, or in what he esteems the important characters.
- subquadrans, Ulrich, 1890, Jour. Cin. Soc.
- Nat. Hist., vol. 13, p. 115, Trenton Gr. TURRILEPAS canadensis, Woodward, 1889, Lond. Geo. Mag., 3d ser., vol. 6, p. 274, Utica slate.
- ULRICHIA, Jones, 1890, Quar. Jour. Geo. Soc., vol. 46, p. 543. [Ety. proper name.] In form like Primitia, except there is no sulcus across the valves, but instead a tubercle on each side of the position in which the sulcus occurs in Primitia; a

711

-PRI.

ison Sci.,

i. Υ. r. ison

eniison d of

ison and

407. lves the rsal un-

iter ntlv im, the s a

in 'e is sed,

890. 124,

ges our. Gr. 390, 07, , p. ch,

13,

Ρ. Р. ud. lis, trisis,

Gr. эc., /albilnu-

P.

Ρ. 89 ud.

miol.

nt. r. : nd

th-

very weak generic distinction. Type U. conradi, described at the same place from Thedford, Canada. confluens and U. emarginata, Ulrich, 1890,

Jour. Cin. Soc. Nat. Hist., vol. 13, p. 203, Kaskaskia Gr. Zacanthoides eatoni, Walcott. Not defined.

CLASS ARACHNIDA.

In this Class (arachne, a spider,) the body is divided into segments, some of which are provided with articulated appendages, and a pair of ganglia is developed in each somite. The integument is hardened with chitine. The segments of the head and thorax are united, generally, into a cephalothorax. Instead of antennae there are cheliceræ (chele, a claw; keras, a horn,) or mandibles (mandibulum, a jaw.) There are maxillæ (maxillæ, jaws,) carrying long jointed maxillary palpi, (palpo, I feel.)

ARCHITARBUS elongatum, Scudder, 1890, GREOPHONUS carbonarius, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 449, Coal Meas.

rotundatus, read A. rotundatum.

GERATARBUS lacoei and G. scabrum, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 448, Coal Meas.

- Mem. Bost. Soc. Nat. Hist., vol. 4, p. 454, Coal Meas. This is Fig. 1074, on page 575, over the name Archimylacris acadicum.
- KUSTARACHNE tenuipes, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 450, Coal Meas.

CLASS MYRIOPODA.

THIS Class (murios, countless; podes, feet,) has the mouth on the under side, provided with mandibles and maxillæ. The head bears a pair of antennæ,

ACANTHERPESTES inequalis, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 424, Coal Meas.

AMYNILYSPES, instead of Amynilespes.

- ARCHIULUS glomeratus, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 436, Coal Meas.
- EILETICUS æqualis, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 421, Coal Meas. EUPHOBERIA cuspidata, Scudder, 1890, Mem.
- Bost. Soc. Nat. Hist., vol. 4, p. 426, Coal Meas.

granosa is represented by Fig. 1072. hystricosa, Scudder, 1890, Mem. Bost. Soc.

Nat. Hist., vol. 4, p. 426, Coal Meas. simplex, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4. p. 426, Coal Meas.

- spinulosa, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 430, Coal Meas.
- tracta, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 433, Coal Meas. ILYODES divisa and I. elongata, Scudder,
- 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 422, Coal Meas.
- LATZELIA primordialis, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 419, Coal Meas.
- PALENARTHRUS impressus, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 422, Coal Meas.
- XYLOBIUS frustulentus, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 438, Coal Meas.

CLASS INSECTA.

THERE are six principal veins in typical wings arising from the anterior and posterior root, named as follows: The anterior vein at the margin of the wing is the marginal vein; this is followed by the mediastinal and scapular veins, that cut the anterior margin tow directed toward the t in the posterior mars

ARCHÆOSCOLEX CORNE Trans. Roy. Soc. C Devonian.

ARCHIMYLACRIS acadie Fig. 1075. Read A allelum.

paucinervis, Scudde Soc. Nat. Hist., vol

ENC.ENUS, read Eucæn the Index on p. 6

EPHEMERITES affinis, E. and E. simplex, are Some of them are

ETOBLATTINA mazona, ana. occidentalis, Scudder

Nat. Hist., vol. 4 LITHOMYLACRIS is fer angusta and L. p gustum and L. pitt pauperata, Scudder, Nat. Hist., vol. 4

SUBK

THE work by Aga (Atlas,) Tome 1-5-v The copy in the Publi ward & Sherborn, in lished the dates at w] covers about five page Acanthodes, 1833; A dus, 1838; Coccosteu: 1838; Ctenacanthus, 1837; Helodus, 1838 bilissimus; Oracanthu Hist. Nat., vol. 27, p. Pal. Foss., p. 638; Pl not described until 1 Morris & Roberts: Pt

ACANTHODES semistriate Geo. Mag., vol. 9, ian.

Acantholepis, Newberry pied by Mayer in 1 See Eczematolepis. Actinophorus, Newberry ARC.-BOT.]

XYL.

3, p.

ed.

e of

ped

the

nnæ

1W.)

0, I

890,

ł, p.

, on

cris

em Coal

oro-

ost.

loal

Soc.

ler, . 4,

em. oal

390.

p.

em.

oal

)OS

the

713

anterior margin toward the extremity of the wing; the externomedian vein is directed toward the tip of the wing, and the internomedian and anal veins terminate in the posterior margin of the wing.

- ARCHEOSCOLEX corneus, Matthew, 1889, Trans. Roy. Soc. Can., vol. 4, p. 59, Low. Devonian.
- ARCHIMYLACRIS acadica is represented by Fig. 1075. Read A. parallela for A. parallelum.
- paucinervis, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 411, Coal Meas. ENCENUS, read Eucænus on p. 576, and in
- the Index on p. 658. EPHEMERITES affinis, E. gigas, E. primordialis,
 - and E. simplex, are probably not insects. Some of them are plants.
- ETOBLATTINA mazona, instead of E. mazonana.

occidentalis, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 410, Coal Meas. LITHOMYLACRIS is feminine, and read L.

angusta and L. pittstonana for L. angustum and L. pittstonanum.

pauperata, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 409, Coal Meas.

- MYLACRIS is feminine, and read M. anthracophila, M. antiqua, M. bretonensis, M. lucifuga, M. ovalis, M. pennsylvanica, instead of anthracophilum, antiquum, bretonense, lucifugum, ovale, and pennsylvanicum.
- NECYMYLACRIS is feminine; read N. lacoana for N. lacoanum.
- PAROMYLACRIS is feminine; read P. rotunda for P. rotundum.
 - ampla, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 408, Coal Meas.
- PROMYLACRIS is feminine; read P. ovalis for P. ovale.
 - rigida and P. testudo, Scudder, 1890, Mem. Bost. Soc. Nat. Hist., vol. 4, p. 403, Coal Meas.
- TITANOPHASMA, Brongniart, 1882, Comptes rend. Acad. 95, 1228, instead of Titanophama on page 581. The Type is T. favoli.

SUBKINGDOM VERTEBRATA.

CLASS PISCES.

THE work by Agassiz, "Recherches sur les Poissons fossiles"-(Text,) Tome 1-5; (Atlas,) Tome 1-5-was published in parts from 1833 to 1844, and very irregularly. The copy in the Public Library at Cincinnati does not show when published. Woodward & Sherborn, in "A Catalogue of British Fossil Vertebrata, 1890," have published the dates at which each plate and part of the text was published. The list covers about five pages. From this list of dates I make the following corrections: Acanthodes, 1833; Acrolepis, 1834; Ceratodus, 1838; Chirolepis, 1835; Chomatodus, 1838; Coccosteus, 1842; Rep. Brit. Assoc., p. 85, Cochliodus, 1838; Ctenodus, 1838; Ctenacanthus, 1837; Ctenoptychius, 1838; Glyptolepis, 1843; Gyracanthus, 1837; Helodus, 1838; Holoptychius, 1838, Murch. Sil. Syst., p. 599, type H. nobilissimus; Oracanthus, 1837; Orodus, 1838; Paleoniscus, Blainville, 1818, Dict. Hist. Nat., vol. 27, p. 320; Physonemus, named but not described until 1855, Brit. Pal. Foss., p. 638; Platysomus, 1835; Pleuracanthus, 1837; Pecilodus, named but not described until 1855, Brit. Pal. Foss., p. 638; Psephodus was described by Morris & Roberts; Pterichthys, 1843; Pygopteris, 1834, type P. mandibularis.

- ACANTHODES semistriatus, Woodward, 1892, Geo. Mag., vol. 9, p. 3, Low. Devonian.
- Acantholepis, Newberry, 1875, was preoccu-pied by Mayer in 1861 in Hymenoptera. See Eczematolepis.

Actinophorus, Newberry, 1889, Pal. Fish N.

Am., p. 174. The name was preoccupied by Creutz in 1799. See Tegeolepis. clarkii, see Tegeolepis clarkii.

ANTLIODUS arcuatus, Newberry, 1889, Pal. Fish N. Am., p. 208, St. Louis Gr.

ASTEROPTYCHIUS elegans, Newberry, 1889, Pal. Fish N. Am., p. 176, Waverly Gr.

D

the

BOTHRIOLEPIS leidyi, Newberry, 1889, Pal. Fish N. Am., p. 111, Catskill Gr.; and B. minor, p. 112, Chemung Gr. CALLOGNATHUS, Newberry, 1889, Pal. Fish

PISCES.

- N. Am., p. 69. [Ety. kallos, beautiful; gnathos, jaw.] Small fishes, of which only the mandibles are known; these are from one to three inches in length; the posterior end of the dentary bone flat, thin, spatulate, smooth; the anterior half narrower, thicker, and ornamented; the upper edge closely set with numerous subequal, conical, obtuse, blunt-pointed teeth. Type C. regularis, described at the same place from the Huron Shale, as well as C. serratus from the Cleveland Shale.
- Carcharopsis was not defined by Agassiz, and the forms subsequently defined
- under that name belong to Dicrenodus. Cephalaspis laticeps and C. campbelltonensis, Traquair, 1890, Lond. Geo. Mag., 3d ser., vol. 7, p. 16. Not defined so as to be recognized.
- CLADODUS carinatus, Newberry, 1889, Pal. Fish N. Am., p. 103. Too poorly de-fined to warrant recognition; beside the name was preoccupied.
- kepleri, Newberry, 1889, Pal. Fish N. Am., p. 103, and C. terrelli, p. 170, and C. tumidus, p. 172, Cleveland Shale.
 CCELOSTEUS, Newberry, 1889, Pal. Fish N. Am., p. 188. [Ety. koilos, hollow; osteon, honor for the terrel lange the terrel. Fishes of large size allied to bone.] Dendrodus and Rhizodus; only a coracoid, mandible, and tooth are known. The bones consist of a thin shell of dense osseous tissue inclosing large cavities, once doubtless filled with cartilage; the coracoid is about a foot in length and an inch and a half in diameter at the middle, and the central cavity is as large, relatively, as in the long bones of birds, the shell which surrounded it being but from one-eighth to one-quarter of an inch in thickness; the dentary bone is about one foot in length, two and a half inches wide in the middle. where it is one and a quarter inches in thickness, and four inches wide at the posterior end, where it was doubtless joined to the angular and articular elements; on the outside the posterior half is excavated to form a deep sulcus for the reception of the motor muscle; on the inside the jaw is flattened and gently arched downward to the rounded lower edge; the upper side bears on the outside a subacute toothless ridge; within and below this is a wide shoulder with seven broad, shallow pits, in which were planted the rounded bases of the teeth; teeth strong, conical, straight, acute and smooth above, plicated below; complicated interior structure as in Dendrodus. Type C. ferox, described at the same place from Carboniferous rocks.

CTENACANTHUS angustus, Newberry, 1889, Pal. Fish N. Am., p. 181, Berea Grit; and C. clarkii, and C. compressus, p. 168, Cleveland Shale; and C. cylindricus, p. 202, Keokuk Gr.; and C. littoni, p. 201, St. Louis Gr.; and C. randalli, p. 105, Olean conglomerate. And he refers C. parvulus to Hoplonchus, a genus established by Davis in 1875, in Quar. Jour. Geo. Soc. Lond., with H. elegans as the type. See p. 169.

[CAL.-DIS.

- CTENODUS wagneri, Newberry, 1889, Pal. Fish N. Am., p. 172, Cleveland Shale. DICRENODUS, Romanovsky, 1853, Bull. Soc. Imp. Moscou, p. 408. This name has priority over *Carcharopsis*, which was not defined by Agassiz, nor by any ether one writi 1982, and it has priority other one until 1883, and it has priority over Pristicladodus, both of which names Woodward & Sherborn say are synonyms.
- Dinichthys, Newberry, 1873, Ohio Pal. vol. 1, p. 313. This name was preoccupied by Hitchcock, among the fishes, in 1868. See Ponerichthys.
 - corrugatus, D. curtus, D. gouldi, D. hertzeri, D. intermedius, D. minor, D. præcursor, D. terrelli, D. tuberculatus. See Ponerichthys.
- Diplodus was preoccupied in 1810, by Rafinesque, for a genus of Sparidæ, before Agassiz used the word. See Dissodus. acinaces, D. compressus, D. gracilis, D. latus,
- D. penetrans, D. problematicus. See Dissodus.
- DIPLOGNATHUS, Newberry, 1878, Ann. N. Y. Acad. Sci., vol. 1, p. 188, and Pal. Fish N. Am., p. 159. [Ety. diploos, double; gnathos, the jaw.] Dentary bones long and slender, flattened, straight, spatu-late behind, were originally covered with cartilage; anterior and exposed portions rising into points which diverge from the symphysis, giving a forked extremity to the lower jaw; conical acute teeth formed from the jaw tissue are set along the outer margin of the mandibles and on the inside of the divergent extremities beyond the symphysis; the teeth are recurved, and formed a kind of forked rake; a deep pit in each dentary bone marks the point of insertion of a powerful ligament, which bound the rami together and prevented splitting. Type D. mir-abilis, which was described at the same place from the Cleveland Shale.
- DIPTERUS flabelliformis, D. lævis, D. minutus, D. nelsoni, D. radiatus, Newberry, 1889, Pal. Fish N. Am., pp. 89 to 119, Chemung Gr.
- Dissonus n. gen. [Ety. dissos, double; odous, tooth.] Proposed for Diplodus, Agassiz, 1843, Recherches sur les Poissons Fossiles, t. 3, p. 204, which name was pre-occupied. The type is D. gibbosus, and the American species are D. acinices, D. compressus, D. gracilis, D. latus, D. penetrans.
 - problematicus, Woodward, (Diplodus prob-lematicus,) 1892, Geo., Mag., vol. 9, p. 2, Low. Devonian.

ECZ.-HOL.]

ECZEMATOLEPIS, n. g cutaneous eruptic posed for Acar 1875, Ohio Pal., name was preoce E. pustolosa, New lepis pustulosa,) p. 38, Up. Held. (Eurylepis, Newberry, 1 Sci. Phil., and Oh

- This name was p among the reptile lolepis. corrugata, E. granulai
- ata, E. minima, E. E. striolata, E. tu epis.
- GAMPHACANTHUS, n. bent; akantha, sp Heteracanthus, N Fish. N. Am., p. preoccupied. Pec inches or more in a posterior openin the summit; base a half inches wid below; shaft curv arched transversel polished enamel, denticulate, longit divide the surfac equal bands or sutures are most terminate in succ few reach the con Type G. politus.
- politus, Newberry, politus,) Pal. Fis Ham. Gr.
- GANORHYNCHUS, Traqu Mag., vol. 10, p brightness; rhynch was founded on th 11 inches long and posed to belong long. The countr and its geological known. Type G. beecheri, Newberry
- Am., p. 95, Chemi GLYPTASPIS, Newberry
 - Am., p. 157. [Et aspis, shield.] P large size, protec plates, of which t were probably 5 ir one is lance-shape its central portion gins sloped off and by the overlap o plates. The upper ried a number of la plates, of which
- ornamented, the sloped down to th unknown. Type verrucosa, Newberr Am., p. 158, Cleve GLYPTOPOMUS, Agassiz,

ECZ.-HOL.]

- [Ety. eczema, a ECZEMATOLEPIS, n. gen. cutaneous eruption; lepis, scale.] Proposed for Acantholepis, Newberry, 1875, Ohio Pal., vol. 2, p. 38, which name was preoccupied. The type is E. pustolosa, Newberry, 1875, (Acantholepis pustulosa,) Ohio Pal., vol. 2, p. 38, Up. Held. Gr.
- Eurylepis, Newberry, 1856, Proc. Acad. Nat. Sci. Phil., and Ohio Pal., vol. 1, p. 350. This name was preoccupied by Blyth, among the reptiles, in 1854. See Haplolepis.
- corrugata, E. granulata, E. insculpta, E. lineata, E. minima, E. ornatissima, E. ovoidea, E. striolata, E. tuberculata. See Haplolepis.
- (IAMPHACANTHUS, n. gen. [Ety. gamphos, bent; akantha, spine.] Proposed for Heteracanthus, Newberry, 1889, Pal. Fish. N. Am., p. 65, which name was preoccupied. Pectoral (?) spines eight inches or more in length, robust, with a posterior opening reaching to or near the summit; base compressed, one and a half inches wide, obliquely rounded below; shaft curved forward, regularly arched transversely, covered with highly polished enamel, and marked by fine denticulate, longitudinal sutures, which divide the surface into broad, nearly equal bands or flattened ridges; the sutures are most numerous below, but terminate in succession above, so that few reach the conical pointed summit. Type G. politus.
- politus, Newberry, 1889, (Heteracanthus politus,) Pal. Fish. N. Am., p. 66, Ham. Gr.
- GANORHYNCHUS, Traquair, 1873, Lond. Geo. Mag., vol. 10, p. 552. [Ety. ganos, brightness; rhynchos, beak.] This genus was founded on the fragment of a snout 1¹/₂ inches long and 3 inches wide, supposed to belong to a fish 4 or 5 feet long. The country from which it came and its geological age are wholly un-known. Type G. woodwardi.
- beecheri, Newberry, 1889, Pal. Fish N.
- Am., p. 95, Chemung Gr. GLYPTASPIS, Newberry, 1889, Pal. Fish N. Am., p. 157. [Ety. glyptos, sculptured; aspis, shield.] Placoderm fishes of large size, protected by thick bony plates, of which those of the plastron were probably 5 in number; the middle one is lance-shaped or subrhomboidal. its central portion tuberculated, its margins sloped off and smoothed or striated by the overlap of the lateral ventral plates. The upper part of the body carried a number of lanceolate or ellipsoidal plates, of which the central parts are ornamented, the margins smooth and sloped down to thin edges; other parts
- unknown. Type G. verrucosa. verrucosa, Newberry, 1889, Pal. Fish N. Am., p. 158, Cleveland Shale.
- GLYPTOPOMUS, Agassiz, 1844, Monographie des

Poissons fossiles du Vieux Gres Rouge ou Systeme Devonien des Iles Brittaniques et de Russie, p. 77. Type G. minor, of which Huxley figured and described nearly an entire specimen in 1866, in Brit. Organic Remains, dec. 12, (Mem. Geo. Sur.,) p. 4. sayrei, Newberry, 1878, Ann. N. Y. Acad.

- Sci., vol. 1, p. 189, and Pal. Fish N. Am., p. 116, Catskill Gr.
- Goniodus, Newberry, 1889, Pal. Fish N. Am., p. 67. This name was twice preoccupied, first by Agassiz in 1836, and by Dunker, in 1848, in the mollusca. See Xenodus. hertzeri, Newberry, 1889, see Xenodus hertzeri.
- GORGONICHTHYS, Claypole, 1892, Am. Geo., vol. 10, p. 1. [Ety. Gorgon, mythological name; ichthys, fish.] Founded upon the lower left mandible, which is similar to that in Ponerichthys, and the point of a premaxillary tooth, behind which there is a tooth terminating downward in two blunt processes, the larger one in front, which distinguishes it from the upper cutting blade in Ponerichthys. Type G. clarki, described at the same place from the Cleveland Shale.
- GYRACANTHUS incurvus, Traquair, 1890, Geo. Mag., vol. 7, p. 21, Low. Devonian.
 - sherwoodi, Newberry, 1889, Pal. Fish N. Am., p. 119, Catskill Gr.; and G. inornatus, p. 177., Waverly Gr.
- HAPLOLEPIS, n. gen. [Ety. haplos, simple; lepis, scale.] Proposed for Eurylepis, Newberry, 1856, Proc. Acad. Nat. Sci. Phil., and Ohio Pal., vol. 1, p. 350. Type H. tuberculata, Newberry, 1856, (Eurylepis tuberculata,) Proc. Acad. Nat. Sci., and Ohio Pal., vol. 1, p. 350, Coal Meas. The species are H. corrugata, H. granulata, H. insculpta, H. lineata, H. minima, H. ornatissima, H. ovoidea, H. striolata, H. tuberculata.
- HARPACANTHUS, Traquair, 1886, Ann. and Mag. Nat. Hist. A sickle-shaped spine, with H. fimbriatus, from Scotland, as the type. Cited by Newberry in Pal. Fish N. Am., p. 203.
- Heteracanthus, Newberry, 1889, Pal. Fish N. Am, p. 65. The name was pre-occupied in 1836 by Diesing, among the Vermes. See Gamphacanthus politus, Newberry, see Gamphacanthus
- politus. HOLONEMA, Newberry, 1889, Pal. Fish N. Am., p. 92. [Ety. holos, entire; nema, thread.] A placoderm fish of medium size, having the body inclosed in armor made up of polygonal plates, of which the external surface is en-tirely covered by radiating lines of enamel; the central plate of the plastron is coffin shaped, pointed before, broadest near the anterior end, where the sides are produced into prominent lateral angles; from this point backward it narrows to a truncated end, which is half as wide as the greatest

-DIS. 18, p.

ndritoni, dalli. l he 18, a 5, in Η. 1

Pal.

le. Soc. has was anv ority ames syn-

. vol. 1pied 1868. rtzeri,

or, D. thvs. Rafinpefore dus. latus, e Dis-

N. Y.

, Fish uble; long spatuvered posed ing a jaw; m the r marinside id the d, and deep ts the l ligagether). mirsame

nutus, , 1889, , Che-

odous, gassiz, 8 Foss prebosus, acinis, D.

s prob-9, p. 2, breadth. Other parts unknown. Type H. rugosum.

PISCES.

- rugosum, Claypole, 1883, (Pterichthys rugosa,) Proc. Am. Phil. Soc., vol. 20, p. 664, Chemung Gr.
- HOLOPTYCHIUS granulatus, H. pustulosus, H. tuberculatus, Newberry, 1889, Pal. Fish N. Am., pp. 100, 101, Chemung Gr.; and H. halli and H. radiatus, pp. 114, 115, Catskill Gr.
- JCANODUS, N. gen. [Ety. ikanos, befitting; odous, tooth.] Proposed for Tomodus, Agassiz, MSS. and St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 171, which name was preoccupied among the fishes by Trautschold, in 1879. Type I. limitaris.
 - limitaris, St. John & Worthen, 1883, (Tomodus limitaris,) Geo. Sur. Ill., vol. 7, p. 173, Up. Burlington Gr.

- JANASSA has for its type J. bituminosa. Labodus marginatus, Newberry, 1889, Pal. Fish N. Am., p. 198, St. Louis Gr. The genus Labodus was not defined by Agassiz. Davis used it in 1883, but in 1889.Woodward & Sherborn classed it as a synonym for Copodus. The species illustrated by Newberry will belong to some other genus, probably not yet defined.
- Liognathus, Newberry, 1873, Ohio Pal., vol. 1, p. 306. The name was preoccupied among the fishes by Lacepede, in 1802. See Lispognathus.

spatulatus, see Lispognathus spatulatus.

- LISPOGNATHUS, n. gen. [Ety. lispos, smooth;
 agnathos; jaw.] Proposed for Liognathus, Newberry, 1873, Onio Pal., vol. 1, p. 306, which name was preoccupied. Type L. spatulatus.
 - spatulatus, Newberry, 1873, (Liognathus spatulatus,) Ohio Pal., vol. 1. p. 306, Up. Held. Gr.
 - MAZODUS, Newberry, 1889, Pal. Fish N. Am., p. 178. [Ety. maza, a barley-cake; odous, Teeth of Elasmobranch or tooth.] Selachian fishes, often of large size, thick and massive, with an ovoid, elliptical, or angular outline; upper surface arched in both directions, smooth or finely granulated; under surface concave, coarsely pitted, and variously furrowed and lobed; sides marked by irregular, often pustulous ridges; interior similar throughout, showing irregular, vertical, calcigerous tubes or columns closely compacted into a dense, hard, and enamel-like tissue; mandibles 7 to 8 inches long, and $1\frac{1}{4}$ inches to $1\frac{1}{2}$ inches wide. Type M. kepleri.

kepleri, Newberry, 1889, Pal. Fish N. Am., p. 180, Cuyahoga Shale.

Proposed for MILLERICHTHYS, n. gen. Pterichthys, Agassiz, 1843, Poiss. Foss., vol. 2, p. 302, which name was preoccupied among the fishes by Swainson, in 1839. [Ety. the name is proposed in honor of Hugh Miller, who was really the first to fully characterize and illustrate the genus in his work on

HOL.-PHOE.

"The Old Red Sandstone."] Type M. milleri. It is doubtful whether or not this genus is represented in North America.

- Mylostoma, Newberry, 1883, Trans. N. Y. Acad. Sci., vol. 2, p. 146, and Pal. Fish N. Am., p. 161. [Ety. mulos, a grinder; stoma, mouth.] Teeth consist of strong and massive tables of bony tissue. becoming more dense and enamel-like toward the triturating surface; they apparently formed several pairs on both the upper and lower jaws: the principal plates of the lower jaw had long oval or spatulate crowns, 3 to 6 inches in length by 1 to 2 inches wide, and half an inch or more in thickness. supported by strong, vertical, spatulate bones, which projected downward and backward, terminating posteriorly in thin, rounded margins. The upper surface of the crown is raised into a more or less prominent tubercle, which is situated near the exterior margin, and slightly anterior to the middle ; another pair are triangular in outline; the dental plates of the upper jaw are tabular and consist of very dense tissue. Type M. variabile.
- terrelli, M. variabile, Newberry, 1883, Trans, N. Y. Acad. Sci., vol. 2, p. 146, and Pal. Fish N. Am., p. 164, Cleveland Shale.
- GESTOPHORUS, n. gen. Proposed for Sphe-nophorus, Newberry, 1889, Pal. Fish N. Am., p. 92, which name was pre-occupied by Schoenherr, in 1838, among the Coleoptera. [Ety. oistos, an arrow; phoros, bearing.] The clavicle is a flat-tened bone, 6 inches or more in length by 11 inches in width at the middle. narrowing to either end; the anterior margin strongly reflexed; the exterior surface is marked by many rows of relatively large arrowhead-like tubercles, closely set one behind the other, the points directed forward: other
 - parts unknown. Type O. lilleyi. lilleyi, Newberry, 1889, (Sphenophorus lilleyi,) Pal. Fish N. Am., p. 92, Chemung Gr.
- ONYCHODUS ortoni, Newberry, 1889, Pal. Fish N. Am., p. 71, Ham. Gr.
- PETALORHYNCHUS, Agassiz, MSS. only, Newberry & Worthen, 1866, Geo. Sur. Ill., vol. 2, p. 32.
- PHANEROPLEURON, Huxley, 1859, Anderson's Dura. Den., p. 67. Type P. andersoni.
- PHEBODUS politus, Newberry, 1889, Pal. Foss. N. Am., p. 173, Cleveland Shale.
- PHYLLOLEPIS, Agassiz, 1844, Poiss. Foss. Vieux Gres Rouge, etc., p. 67. [Ety. phyllon, a leaf; *lepis*, scale.] Thin, more or less elliptical scales. Type P. concentricus.
- delicatula, Newberry, 1889, Pal. Fish N. Am., p. 97, Chemung Gr.

PHY.-TRA.

PHYSONEMUS altonensi altonensis.

stellatus, Newberry Am., p. 200, St. L PONERICHTHYS, n. (wicked; ichthys, a

Dinichthys, Newb vol. 1, p. 313, an was preoccupied

Hitchcock, in 1868 corrugatus, P. curtu medius, P. minor. Fish N. Am., pp.

Shale. hertzeri, Newberry hertzeri,) Ohio P

tage Gr. præcursor, Newberr

Am., p. 51, Cornif terrelli, Newberry, 1 relli,) Ohio Pal., v

2, p. 3, Portage Gi tuberculatus, Newb

N. Am., p. 98, Ch. Pristicladodus is said

Dicrenodus, by W PRISTODUS, Agassiz, M Trans. Roy. Soc. I

- PROTODUS, Woodward Mag., vol. 9, p. 1 odous, tooth.] A Se crown consists of conical cusp, invo tine; root large,
- expanded and an pressed. Type P. same place from t Pterichthys was preo among the fishes
- ichthys. rugosus, see Holonem

RHIZODUS anceps, N Fish N. Am., p. 1

RHYNCHODUS greenei, 1 Fish N. Am., p. 5 Sphenophorus, Newberr

Am., p. 92. The n among the Coleop in 1838. See Oest STETHACANTHUS, Newb

- N. Am., p. 198. [F akantha, a spine. medium or large (rights and lefts, outline, the conical with anterior an rounded; below the posterior margin sulcus, of which t thickness, terminat and fragile edges; tly concave, about from the base risin
- tumid, shoulder; and compressed, t tilaginous condyle life the posterior by the base of the S. altonensis.

PHY.—TRA.]

- PHYSONEMUS altonensis, see Stethacanthus altonensis.
 - stellatus, Newberry, 1889, Pal. Fish N. Am., p. 200, St. Louis Gr.
- PONERICHTHYS, n. gen. [Ety. poneros, wicked; ichthys, a fish.] Proposed for Dinichthys, Newberry, 1873, Ohio Pal., vol. 1, p. 313, and vol. 2, p. 3, which was preoccupied among the fishes by Hitchcock. in 1868. Type P. terrelli.
 - Hitchcock, in 1868. Type P. terrelli. corrugatus, P. curtus, P. gouldi, P. intermedius, P. minor, Newberry, 1889, Pal. Fish N. Am., pp. 149 to 156, Cleveland Shale.
 - hertzeri, Newberry, 1873, (Dinichthys hertzeri,) Ohio Pal., vol. 1, p. 316, Portage Gr.
 - præcursor, Newberry, 1889, Pal. Fish N. Am., p. 51, Corniferous Gr.
 - terrelli, Newberry, 1873, (Dinichthys terrelli,) Ohio Pal., vol. 1, p. 313, and vol. 2, p. 3, Portage Gr.
- tuberculatus, Newberry, 1889, Pal. Foss. N. Am., p. 98, Chemung Gr.
- Pristicladodus is said to be a synonym for Dicrenodus, by Woodward & Sherborn.
 PRISTODUS, Agassiz, MSS. only, Davis, 1883, Trans. Roy. Soc. Dub., vol. 1, p. 519.
- PROTODUS, Woodward, 1892, Lond. Geo.
 Mag., vol. 9, p. 1. [Ety. protos, first;
 odous, tooth.] A Selachian tooth; dental crown consists of a single robust, solid, conical cusp, invested with gano-dentine; root large, undivided, laterally expanded and antero-posteriorly compressed. Type P. jexi, described at the same place from the Low. Devonian.
 - Pterichthys was preoccupied by Swainson among the fishes in 1839. See Millerichthys.

rugosus, see Holonema rugosum.

- RHIZODUS anceps, Newberry, 1889, Pal. Fish N. Am., p. 191, St. Louis Gr.
- RHYNCHODUS greenei, Newberry, 1889, Pal. Fish N. Am., p. 51, Ham. Gr. Sphenophorus, Newberry, 1889, Pal. Fish N.
- Sphenophorus, Newberry, 1889, Pal. Fish N. Am., p.'92. The name was preoccupied among the Coleoptera, by Schoenherr, in 1838. See Oestophorus.
- STETHACANTHUS, Newberry, 1889, Pal. Fish N. Am., p. 198. [Ety. stethos, the breast; akantha, a spine.] Pectoral spines of medium or large size, unsymmetrical, (rights and lefts,) broadly falcate in outline, the conical summit compressed, with anterior and posterior margins rounded; below the solid summit the posterior margin is opened by a deep sulcus, of which the walls, of unequal thickness, terminate posteriorly in thin and fragile edges; anterior border gently concave, about one third its length from the base rising into a strong, often tumid, shoulder; basal portion narrow and compressed, terminating in a cartilaginous condyle for articulation. In life the posterior sulcus was occupied by the base of the pectoral fin. Type S. altonensis.

- altonensis, St. John & Worthen, 1875, (Physonemus altonensis,) Geo. Sur. Ill., vol. 6, p. 454, St. Louis Gr.
- tumidus, Newberry, 1889, Pal. Fish N. Am., p. 198, Berea Grit.
- TEGEOLEFIS, n. gen. [Ety. tegeos, a roof; lepis, scale.] Proposed for Actinophorus, Newberry, 1889, Pal. Fish N. Am., p. 174, which was preoccupied among the Coleoptera, by Creutz, in 1799. Tilescaled ganoids, of medium or large size, long and slender; body cylindrical; head pointed, bony; teeth numerous, conical, acute; fins without fulcra, delicate, many-rayed; scales narrow, quadrangular, thin. Type T. clarkii.
 - rangular, thin. Type T. clarkii. clarkii, Newberry, 1889, (Actinophorus clarkii,) Pal. Fish N. Am., p. 175, Cleveland Shale.
- TITANICHTHYS, Newberry, 1889, Pal. Fish N. Am., p. 130. [Ety. mythological name; *ichthys*, a fish.] Cranium of more gigantic size than that of Ponerichthys, being about 4 feet broad at the occiput, 3 feet or more in length, triangular in outline, and marked by incised lines; supra-scapulas or supra-clavicles rhomboidal or trapezoidal in outline, from 15 to 20 inches in diameter; clavicles 2 feet in length by eight inches in breadth, turned forward and narrowed at the lower end; maudibles 2 or 3 feet in length, subcylindrical or subtriangular rods curved upward anteriorily and furrowed like a gouge. Type T. agassizi, which, with T. clarkii, is described at the same place from the Cleveland Shale.
- Tomodus, Agassiz, MSS., and St. John & Worthen, 1883, Geo. Sur. Ill., vol. 7, p. 171, was preoccupied among the fishes by Trautschold, in 1879. See Icanodus. *limitaris*, see Icanodus limitaris.
- TRACHOSTEUS, Newberry, 1889, Pal. Fish N. Am., p. 166. [Ety. trachys, rough; osteon, a bone.] Placoderm fishes inclosed in defensive armor, consisting of a number of large, but relatively thin, bony plates, of which the outer enameled surface is thickly set with high conical tubercles, that are acute, rounded, or cupped at the summit; the spaces between these tubercles are, radiately lined; under jaws consisted of cartilaginous, angular, and articular parts with dense bony dentary portions; dental bones straight, posterior end spatulate, anterior third or exposed part carries a row of slender, conical, acute teeth along its upper margin; premaxillaries subtriangular in outline, anterior face arched, and terminating below in an acute point; posterior edge horizontal, and carrying slender, pointed teeth, which matched with a portion of those of the mandible; eye orbits relatively large and round, encircled by a ring composed of four sclerotic plates, those on one side narrower than the others;

k on e M. • not lorth

J. Y

Fish

rong

HGE.

ssue, l-like they on the had to 6 wide, ness.

ulate

and y in

h is and other denbular

more

Type 1883, , and eland

Sphe-Fish prenong row; i flat-

ength ddle,

terior vs of uber-

other, other

orus Che-

Pal. only,

Sur.

nder-Pal. Shale. Foss.

Thin, be P.

Etv.

h N.

surface in part tuberculated. Type T. clarkii, which is described at the same place from the Cleveland Shale.

NEWODUS, n. gen. [Ety. *xenos*, strange; odous, tooth.] Proposed for Goniodus, Newberry, 1889, Pal. Fish. N. Am., p. 67, which was preoccupied among the fishes, by Agassiz, in 1836, and among the Mollusca by Dunker, in 1848. Teeth numerous, composing aroughened pavement, small, variable in size and form; generally subtriangular in outline, depressed, with the central portion elevated into an obtuse angular ridge of denser tissue, and having a polished surface; other portions of the crown and the lateral margins roughened by a vermicular pitted or corrugated marking; the lower surface rough and bonelike. Type X. hertzeri, which was described at the same place from the Ham. Gr.

CLASS BATRACHIA.

CERATERPETON, Huxley, 1867, Trans. Roy. Irish Acad., vol. 24, p. 354. Type C. galvani.

GLOSSARY.

ERRATA.

Altilis, e—Fattened, instead of flattened. Coriformis, e—Heart-shaped, instead of like Coris.

Craticulus, instead of Cratiulus. Eugenium, noble; instead of Euginum, fertile. Macronotus, a, um—Having a long back, instead of long known. Ornogranulus, instead of Ornigranúlus.

Vadosus, a, um—Full of shallows, instead of shadows.

INDEX OF GENERA.

ERRATA.

Eucænus, instead of Encænus. Lithomylacris, f. Mylacris, f. Necymylacris, f, Paromylacris, f. Promylacris, f. XEN.-CER.

NORTH AME

[THIS Appendix v be mailed with the b Address, S. A. Miller

THE Report of February, 1895. Th bears the date of 18 in Nomenclature," University, January first appearance in th

The plates and Geological Survey of the spring of 1892. ployment of Mr. W privilege of examinin to see them in the ha geologist, Professor & Report. Some light No. 4, p. 37, of the commenced in July, Indianapolis and read to Cincinnati, on tha issued on the 1st day Mr. E. T. J. Jordan, filled the mailing-lis Professor S. S. Gorby mail, one of which Later a box of the b tribute in September. Missouri, who was at evidence that he recei therefore, of Mr. Wa advance sheets of th 1892, are untrue.

SECOND APPENDIX

TO

NORTH AMERICAN GEOLOGY AND PALÆONTOLOGY.

OCTOBER, 1897.

[THIS Appendix will be mailed to any one on receipt of \$1.00; and hereafter it will be mailed with the bound volume, including the First Appendix, on receipt of \$5.00. Address, S. A. Miller, Court and Walnut, Cincinnati, Ohio.]

THE Report of the Geological Survey of Ohio, Vol. VII, was published in February, 1895. The title page is dated 1893. The map which faces the title-page bears the date of 1894, made by the engraver. The article on "Recent Changes in Nomenclature," by W. A. Kellerman, on page 80a, is dated "Ohio State University, January, 1895." The volume was not published in parts, but made its first appearance in the latter part of February, 1895.

The plates and manuscript on Paleontology, for the Eighteenth Report of the Geological Survey of Indiana, were completed and delivered to the State printer in the spring of 1892. Early in June of that year, Mr. Beachler, who was in the employment of Mr. Wachsmuth, asked one of the assistant State geologists for the privilege of examining the plates and manuscript, which was refused; he then tried to see them in the hands of the State printer, but again failed. This led the State geologist, Professor S. S. Gorby, to order the work printed as advance sheets of the Report. Some light is thrown upon the subject by the letter published in Bulletin No. 4, p. 37, of the Illinois State Museum of Natural History. The printing was commenced in July, but was delayed, for some reason, until August. I went to Indianapolis and read the last of the proof on the 28th of August, and took home, to Cincinnati, on that night, a copy of the work without a cover. It was to be issued on the 1st day of September, and hence bears the date "September, 1892." Mr. E. T. J. Jordan, the assistant State geologist, informed me by letter that he filled the mailing-list on the first day of September, and I was also assured by Professor S. S. Gorby that it was done on that day, and I received two copies by mail, one of which I gave to Charles L. Faber, in the first week of September. Later a box of the books was sent to me by freight, which I commenced to distribute in September. From these I sent twenty copies to R. A. Blair, at Sedalia. Missouri, who was at McClellan Springs for his health; but he has the written evidence that he received them on the 14th day of October, 1892. The statements, therefore, of Mr. Wachsmuth, in Crinoidea Camerata, pages 200 to 203, that the advance sheets of the 18th Indiana Report were not printed until October 26. 1892, are untrue.

vani.

CER

outrtion ge of

ished rown d by nark-

s de-

k, ins. ad of

INTRODUCTION.

In 1894, Vols. IV and V of the Missouri Geological Survey on Paleeontology appeared. They would not, probably, be worth mentioning were it not for the fact that every intelligent definition is taken literally from the writings of the late Professor Meek, in Paleeontology of Ohio, Paleeontology of Eastern Nebraska, Proc. Acad. Nat. Sci. Phil., or from some other deceased paleeontologist, without using quotation marks, or otherwise giving the credit to the real author.

In 1879, Mr. Ulrich figured and described, in the Jour. Cin. Soc. Nat. Hist., what he called *Tellinomya cinqulata*. In 1895, Ohio Geology, Vol. VII, page 680, he figured and described another and different fossil, for the species, and said that the hinge teeth "were misrepresented in the original description and figures." In the latter instance we have a specimen of Tellinomya pectuaculoides, and the species would have been known from the first publication, had it not been for the misrepresentations in the original description and figures. In the same Journal he figured and described what he called *Crytolites nitidulus*. In 1897, Geo. of Minn., Vol. III. page 866, he figured and described for it another fossil, and called it Crytolitina nitidula, and said: "The original description and figures are incorrect, where they differ from the present work on the species." In the latter case, we have the fragment of a cast of Crytolites carinatus, and it would have been known from the first publication, if the original description and figures had not been erroneous or fictitious. Stomatopora proutana was described and illustrated, in 1882, in the Jour. Cin. Soc. Nat. Hist., Vol. V, page 39, plate 1. In 1886, in the 14th Ann. Rep. Minn. Sur., page 59, he described, without illustration, Ropalonaria pertenuis. In 1893, Geo. Sur. Minn., Vol. III, page 117, he classed Ropalonaria pertenuis as a synonym for Stomatopara proutana; and, on page 116, plate 1, and in Jour. Cin. Soc. Nat. His., Vol. XII, page 175, he described and illustrated Stomatopora proutana under the name of Stomatopora tenuissima n. sp. These instances may indicate what reliance, if any, is to be placed on his "original description and figures." The synonymy in Ohio Geology, Vol. VII, and in Geo. Sur. Minn., Vol. III, if not appalling, is without a parallel in natural history,

Definitions of invertebrate palaeozoic fossils, without illustration, are worse than worthless. They are worthless, because no one, other than the author, can determine whether fossils collected elsewhere than at the typical locality belong to the proposed species, and no comparison can be made with them. They are obstacles because they demand attention to which they are not entitled, and therefore they are much worse than catalogue names, which are simply worthless. I have condemned them in this Appendix, and feel that even that much recognition is going too far. It would probably be better not to notice them at all. No wellconducted journal, at this day, will admit such matter to its columns.

When three or more species have been described in any genus, the genus may be divided into groups; but giving names to such groups, for the purpose of having them applied to the species, is not binomial, or consistent with any judicious system of nomenclature. There is no science in subgeneric or group names, and they should be wholly disregarded. Archæophyton newber plied to films of BYTHOGRAPTT'S laxus. (?) to belong to t Bull. Am. Mus. N He further sugge would be more a understand how taken for a Grapi mistaken for an CALLITHAMNOPSIS, W

Am. Mus. Nat. [Ety. Callithamm: opsis, resemblanc branched, branch or in whorls near joints, and comp between bifurcat cosa.

fruticosa, Hall, 18 cosa,) Can. Org.] Trenton Gr.

CHATOCLADUS, Whitf Mus. Nat. Hist., chaite, hair; klad Marine plants wi stems giving off w aments at given plumula, described from the Trenton

CHÆTOMORPHA, A livi Algæ. (?) prima, Whitfie

Mus. Nat. Hist., v Gr. It is hardly species should bel CHONDRITES, cuneatu

Pal. Foss., vol. 3, 1 cupressimus, White Sci vol. 6, p. 200

Sci., vol. 6, p. 388, gracillimus, Whitea Sci., vol. 6, p. 389,

patulus, Whiteaves, vol 6, p. 387, Low. DACTYLOPORUS, Herze

vol. 12, p. 289. [E poros, pore.] A₁ pileus and sporife

Type D. archaus, diplace from the Coa

DICTYOLITES, Penhallo Mus., vol. 16, p. 1 net; lithos, stone.] branaceous, and mous, the ultimat bifid. Midrib non Type D. fasciolus, di place with D. mari
VEGETABLE KINGDOM.

PLANTÆ.

Archwophyton newberryanum, Britton. Applied to films of graphite.

logy the

> late Proc. ising

list., 0, he

t the

i the

ecies

srepjured

III,

litina

they

frag-

first

r fic-

Jour.

Rep.

In

as a

Cin.

opora

indi-

ires."

if not

worse

, can

ng to

e ob-

refore

have

ion is

well-

s may

aving

ystem

they

- BYTHOGRAPTUS laxus, Hall, has been shown (?) to belong to the Alge by Whitfield, Bull. Am. Mus. Nat. Hist., vol. 6, p. 351. He further suggests that Bythocladus would be more appropriate. I can not understand how an Alge can be mistaken for a Graptolite, or a Graptolite mistaken for an Alge.
- CALLITHAMNOPSIS, Whitfield, 1894, Bull. Am. Mus. Nat. Hist., vol. 6, p. 354. [Ety. Callithamnion, a genus of Algæ; opsis, resemblance.] Frond articulate, branched, branches opposite in pairs, or in whorls near the upper end of the joints, and composed of single joints between bifurcations. Type C. fruticosa.
 - fruticosa, Hall, 1865, (Oldhamia fruticosa,) Can. Org. Rem. Decade 2, p. 50, Trenton Gr.
- CHÆTOCLADUS, Whitfield, 1894, Bull. Am. Mus. Nat. Hist., vol. 6, p. 356. [Ety. chaite, hair; klados, stem or branch.] Marine plants with jointed cylindrical stems giving off whorls of hair-like filaments at given distances. Type C. plumula, described from the same place from the Trenton Gr.
- CHETOMORPHA, A living genus among the Algæ.
- (?) prima, Whitfield, 1894, Bull. Am. Mus. Nat. Hist., vol. 6, p. 355, Trenton Gr. It is hardly possible that this species should belong to a living genus. CHONDRITES, cuneatus, Whiteaves, 1897,
- Pal. Foss., vol. 3, p. 140, Low. Sil. cupressimus, Whiteaves, 1896, Can. Rec.
- Sci., vol. 6, p. 388, Low. Sil. gracillimus, Whiteaves, 1896, Can. Rec.
- Sci., vol. 6, p. 389, Low. Sil. patulus, Whiteaves, 1896, Can. Rec. Sci.,
- vol 6, p. 387, Low. Sil. DACTYLOPORUS, Herzer, 1893, Am. Geol.,
- vol. 12, p. 289. [Ety. dactylos, finger; poros, pore.] A, fungus with trunk, pileus and sporiferous arrangement. Type D. archavis, described at the same place from the Coal Meas.
- DICTYOLITES, Penhallow, 1893, Proc. Nat.
 Mus., vol. 16, p. 113. [Ety. dictuon, a net; lithos, stone.] Fronds plane, membranaceous, and regularly dichotomous, the ultimate ramuli generally bifid. Midrib none, margins regular.
 Type D. fasciolus, described at the same place with D. maximus, Devonian.

- Gluptodendron catonense seems to have, been a mistake, and the name may as well be stricken out; for even if it is a Cephalopod, as has been asserted, it is too poor to retain a specific name.
- is too poor to retain a specific name. HALISERITES, Sternberg, Fronds plane, membranaceous, costate, and dichotomous throughout; ramuli more or less linear with simple terminations. Sporangia in groups lateral to the midrib.
 - chondriformis and lineatus, Penhallow, 1893, Proc. Nat. Mus., vol. 16, p. 113, Devonian.
- INCOLARIA, Herzer, 1893, Am. Geol., vol. 11, p. 365. [Ety. *incola*, an inhabitant of a place.] A fungus in fissures of bark sending forth rounded, overlapping mycelia. Type *I. securiformis*, described at the same place from the Coal Meas.
- LEPIDODENDRON corrugatum is from the Low. Cøal Meas.
- NEUROPTERIS caudata, White, 1893, Bull. No. 98, U. S. Geo. Sur., p. 87, Coal Meas.
- jenneyi, White, 1893, Bull. No. 98, U. S. Geo. Sur., p. 82, Coal Meas.
- PECOPTERIS lesquereuxi, White, 1893, Bull. No. 98, U. S. Geo. Sur., p. 65, Coal Meas.
- PRIMICORALLINA, Whitfield, 1894, Bull. Am. Mus. Nat. Hist., vol. 6, p. 357. Articulated marine plants, consisting of elongated cylindrical fronds, composed of a central longitudinal axis, which is jointed and hollow in the fossil condition, and supports whorls of jointed pinnules from each joint; pinnules decompound. Type *P. trentonensis*, described at the same place from the Trenton Gr.
- PROTOSALVINIA, Dawson, 1888, Geo. Hist. of Plants, p. 84. [Ety. protos, first; Salvinia, a genus.] Plants with rhizocarpean affinities of which the detached disks are macrospores and the cellular envelopes sporocarps. Type P. (Sporangites) huronensis, and includes Sporangites bilobatus.
- clarkei, Dawson, 1888, Geo. Hist. of plants, p. 84, Devonian.
- PSILOPHYTON, grandis, Penhallow, 1893, Proc. Nat. Mus., vol. 16, p. 113, Devonian.
- RUSOPHYCUS chesterense, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 54, Kaskaskia Gr. See R. montanense.

montanense, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 54, Burlington Gr. A singular mix-ing up of definitions occurred in printing. The definition of chesterense belongs to montanense, as may be seen by the illustrations, and that of montanense to chesterense

SPHENOPTERIS lacoei, White, 1893, Bull. No. 98, U. S. Geo. Sur., p. 65, Coal Meas. Spiraxis, Newberry, 1884. The name was preoccupied by Adams, in 1850.

SPH.-PAL.

WALCHIA imbridatula, Dawson, 1888, Geo. Hist. of Plants, p. 138, Permian.

WINGHELLINA, Herzer, 1893, Am. Geol., vol. 11, p. 285. [Ety. proper name.] Cell bundles encased by a thick periderm with an inner tissue of oblong subquadrate cells with thick walls simulating a transverse section of Carbo-niferous fossil pine. Type W. fascina, described at the same place from the Coal Meas.

ANIMAL KINGDOM. SUBKINGDOM PROTOZOA.

- Anomalospongia, Ulrich, 1893, Geo. Sur. Minn., vol 3, p. 68. This name was proposed to supersede Anomaloides. The difficulty is that it is founded upon fragments and no generic characters are determined. There is not a shadow of reason to suppose the fragments were ever siliceous. They are crystalline calcite. The material is precisely like that of crinoids and other echinoderms, found in the same layers of rocks. The fossil has no relation to sponges.
- AULOCOPELLA, Rauff, 1895, Palæontographica, vol. 43, p. 269. winnepegensis, Rauff, 1895, Palæonto
 - graphica, vol 43, p. 269, and Pal. Foss. Can., vol. 3, p. 145, Low. Sil.
- CLATHRODICTYON jewetti, Girty, 1896, 14th Rep. N. Y. St. Geol., p. 298, Low Held. Gr.
- CRYPTOZOON boreale, Dawson, 1896, Can. Rec. Sci., p. 207, Trenton Gr. lachutense, Dawson. Not defined so as to
 - be recognized.
 - occidentale, Dawson, 1896, Can. Rec. Sci., p. 207, Taconic.
- Cyathophycus siluriana, James, Syn. for Trichophycus lanosum. Cylindrocelia, Ulrich. There are no gen-
- eric characters ascribed to this name, and the proposed species are without specific characters.
- GIRVANELLA antiqua, Dawson. Not de-fined so as to be recognized, but prob-
- ably a Strephochetus. GLOBIGERINA, D'Orbigny, 1825, Foramini-feres de Vienne. There is not a shadow of probability that the species below referred to this genus belong to it. aurrita, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 411, Up. Taconic.

cambrica, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 111, Up. Taconic.
didyma, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 111, Up. Taconic.
grandis, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 111, Up. Taconic.
Heterospongia, Ulrich. This genus and the species belong to specimens of Monticulipora altered by silicification.

- Monticulipora altered by silicification.
- Hyalostelia marcellia, Clarke. Not defined so as to be recognized.
- LOFTUSIA is regarded by Waagen as an Eocene Hydrozoan in the family Sphæractinidæ.
- LYSACTINELLA. Girty, 1896, 14th Rep. N. Y. St. Geol., p. 267. [Ety. luo, 1 loose; aktin, spicule; ellus, diminutive.] Spherical to sub-spherical, sessile, with-out anchoring spicules. Spicules hexacts, pentacts, tetracts, simple or or-nate. Type L. gebhardi, described at the same place, from the Low. Held. Gr., and also L. perelegans.
- MICROSPONGIA subrotunda, James, 1891, Jour. Cin. Soc. Nat. Hist., vol. 14, p. 55, Hud. Riv. Gr.
- Mællerina, Ulrich, Syn for Calcisphæra. greenei, Ulrich, Syn. for Calcisphæra robusta.
- OBBULINA, D'Orbigny, 1845, Foraminiferes de Vienne, p. 22. There is not a shadow of probability that the species below belong to this genus.
 - ingens, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 110, Up. Taconic intermedia, Matthew, 1894, Trans. N. Y.
 - Acad. Sci., vol. 14, p. 110, Up. Taconic. ovalis, Matthew, 1894, Trans. N. Y. Acad.
- Sci., vol. 14, p. 110, Up. Taconic. PALÆOSACCUS, Hinde, 1893, Lond. Geo. Mag., 3d ser., vol. 10, p. 57. [Ety. palaios, ancient; sakkos, bag.] Cylindrical or

RAU.-TRI.

sack-like sponge rhombic meshes. described at the Quebec Gr.



Fig. 1266.-Palæaci mit and co RAUFFELLA fucoida, S



Fig. 1267.—Receptacu-lites dixonensis basal view. Nat. Hist., p. 47.

SUBKI

THAT the Montie with the Favositidae, 1 work on the subject of the family with t names by Ulrich has the structural feature have an opportunity these fossil forms.

The Bryozoon is The only mode of pro truding one of the w afterward partitioning two gems, and these branches, and the ab The fully-developed

722

RAU.-TRI.

PAL

[. Y onic Y onic Y onic. and is of tion

fined IS an umily

Rep. uo, 1tive.] withhexr ored at

1891. 14, p. hæra.

Held.

ra roiferes

adow below N. Y.

conic. N. Y. conic. Acad.

Mag., alaios. cal or sack-like sponges with thin walls of rhombic meshes. Type P. dawsoni, described at the same place from the Quebec Gr.



Fig. 1266.-Palæacis cavernosa, summit and convex side. RAUFFELLA fucçida, Sanderson, 1896, Bull.

Minn. Acad. Nat. Sci., vol. 4, p. 78, St. Peter Sandstone. RECEPTACULITES devonicus is de-

Fig. 1267.—Receptacu-lites dixonensis, basal view.

scribed and figured, in Ohio Geol., vol. 7, p. 419. dixonensis, Miller and Gurley, 1896, Bull. No.

11, Ill. St. Mus. Nat. Hist., p. 47, Galena Gr.

eatoni should be stricken out as it is only a catalogue name.

monticulatus. Hall, seems to be a synomym for R. infundi buliformis. Streptospongia, Ulrich, Syn. for

Strephochetus. SYRINGOSTROMA, barretti, Gir-ty, 1896, 14th Hep. N. Y. St. Geol., p. 296, Low. Held. Gr. Low. Held. GL. centrotum, Gir-ty, 1896, 14th Rep. N. Y. St. Fig, 1208.—Receptaculites D. 293, dixonensis, lateral view.



consimile, Girty, 1896, 14th Rep. N. Y. St. Geol., p. 297, Low. Held. Gr.

foveolatum, Girty, 1896, 14th Rep. N. Y. St. Geol., p. 295, Low Held. Gr. microporum, Girty, 1896, 14th Rep. N. Y. St. Geol., p. 296, Low. Held. Gr. TRICHOSPONGIA hystrix, Whiteaves, 1897,

Pal. Foss. Can., vol 3, p. 147, Low. Sil.

SUBKINGDOM CŒLENTERATA.

.040.

CLASS ANTHOZOA.

THAT the Monticuliporidæ are true corals, and have their nearest relationship with the Favositida, there has been no doubt among palaeontologists since the great work on the subject by Dr. Waagen, in Palæontologia Indica. The classification of the family with the Bryozoa and the vast synonymy of generic and specific names by Ulrich have made it necessary to draw upon Dr. Waagen for some of the structural features that distinguish bryozoa from corals, that the student may have an opportunity to apply the present state of learning to the investigation of these fossil forms.

The Bryozoon is an animal of rather high organization and very short-lived. The only mode of propagation is by gemmation, and this only in one way, by protruding one of the walls of the mother cell while it is yet in a young state, and afterward partitioning off the protruding part. Each one produces only one or two gems, and these only in the peripheral part of the colony or apex of the branches, and the abode is completed as soon as the gem has attained full size. The fully-developed animals do not produce gems, and the mother animal can

always be distinguished. The gemmation is restricted to the side opposite the aperture of the cell. There is free communication between the young feeding animals and the old ones for the passage of the nutritive fluid, so that more or less pores must remain open, in the walls of the single cells, by which the animals communicate with each other. The animal is only for a short time a feeder, after which it assumes a latent vitality, in which its chief function is restricted to the thickening of the walls of the lodge, and thus strengthening the stony parts of the whole colony. The size of the lodge is fixed, and can not be extended beyond the length of the animal. If tabulæ occur, they are not a sign of progressive growth of the zooid, but represent the retrograde metamorphosis to which the zooids are subject,—a shrinking of the animal occurs, and in this shrinking process the animal deposits from time to time diaphragms behind its ever-contracting body. The circumstance that the greater part of the animals of a colony is in a state of latent life, the functions of taking and digesting food being performed only by a few animals, at the top of the branches, in arborescent colonies, brings with it the other peculiarity, that all the animals of a colony are by intimate connection and communication together. This communication is brought about by numerous capillary tubes and by large openings in the walls of the lodges, by which a free communication of all the animals of a colony is established. The calcareous substance of which the walks of the cells are built is composed of very thin fibers placed vertically to the surfaces of the wall, so that in sections cutting the single cells transversely, a concentric arrangement of the fibers can never be observed. These fibers leave interstices between them at intervals, producing numerous capillary tubes, by which the walls are always pierced in great numbers. In a longitudinal section of an arborescent specimen all the cells may be seen to take their origin at an imaginary axis, and slowly ascend and bend sideways to the surface of the branch. There is no splitting of the cells, and no such distinction between the central and peripheral part of a branch as always occurs, as Nicholson says, in the Monticuliporidæ. (Struct. and Affin. Montic., page 32.)

The animal of a colony of corals is of low organization and long-lived. Propagation is by fissiparity and by different methods of gemmation. The animals never stop producing gems, but develop them at all times of life and at different levels all over the colony, which produces the small calices intermingled with the larger ones. The gemmation takes place indiscriminately on all sides. The animals are all self-feeding, and perform all their vital functions during their whole lifetime. They constantly undergo a certain process of renovation and each one deposits large masses of sclerenchyma behind itself, and thus slowly ascends within its tube, sometimes chambering off the dead and useless parts of the corallum by diaphragms or tabulæ.

In the *Monticuliporidæ*, the gemmation is generally intermural, and the young animal has no part in common with the mother animal, and appears as if it were only filling a void space between several old animals The gemmation commences with a thickening of the primary plate or primordial wall. After this thickening has been completed, the primary mural plate of the new individual to be developed begins to be formed. In the middle of the originally dark thickening, light-colored wall-substance appears, surrounded by dark lines, indicating the primary wall of the new individual. In this state no hollow for the reception of the animal exists.

The third state of a the middle of the ge of the animal. Th except that the thic of gems is more free the corallites at the in most cases, as a sclerenchyma comp tubes or any other other. The seconda ical layers of scler rings surrounding t plate is not preserv understanding the The smaller corallit development, and h inhabiting the coral produced just befor appear in very diffe as small pores, but thickenings of the p mination of that wall spines, called "spini age observable on th in the early growth more vigorous the a in the number of th the so-called "spinif never of specific im and is represented by Aut a palæontologist his specimen. Rud lipera similar to the culum, which is not into the cells, of car no organic structure found in the corallit

Fissiparity is a of rare occurrence in gemmation in longit internal space of th animal. The longit literally split in two the other.

The family Mon the sub-class Zoantha trypella, Monticulipor

pernals

ores

uni-

h it

g of

ny. the

oid,

-a

sits

ince

the

I, at

ity,

to-

by

the

alls

aces atric

i be-

valls

cent

and plit-

part

uct.

ropnals

rent

the

mals

ime.

arge

ube,

gms

ung

were

nces

ning

ored

ll of

tists.

The third state of development is reached when the light-colored wall-substance, in the middle of the gem, becomes perforated, thus forming the hollow for the reception of the animal. The gemmation is identical with that occurring in the Favositida, except that the thickenings of the primary mural plate inaugurating the formation of gems is more frequent in the Monticuliporidæ than in the Favositidæ, which causes the corallites at the surface to be of more unequal size. The primary wall appears, in most cases, as a dark line hemmed in on both sides by light-colored masses of sclerenchyma composed of oblique, symmetrically-arranged fibers without capillary tubes or any other openings through the walls to connect the animals with each other. The secondary thickenings are always composed of successive reversed conical layers of sclerenchyma, which appear, in tangential sections, as concentric rings surrounding the visceral cavities of the single corallites. When the primary plate is not preserved, these rings may surround the visceral cavity, and without understanding the state of preservation they have been called "marginal rings." The smaller corallites are young ones or gems, which have not attained their full development, and have been produced by intermural gemmation. As the animals inhabiting the corals never stop producing gems, it is only natural that the gems produced just before the whole colony ceased augmenting, in thickness or length, appear in very different states of development on the surface of the corallum, some as small pores, but otherwise similar to the mother animals, and some even only as thickenings of the primordial wall, and projecting as little spines above the upper termination of that wall. Thus, in all stages of growth, large pores, small pores, and little spines, called "spiniform corallites" by Nicholson, and as a synonym "acanthopores," age observable on the surface of the Monticuliporide. The tabulæ are usually closer in the early growth of the gems than in the more adult state, and the better fed and more vigorous the animal, the closer will be the tabulæ. The difference, therefore, in the number of the tabulæ in a given corallite is not of specific importance. As the so-called "spiniform corallites" are nothing but newly-developed gems, they are never of specific importance. Sometimes the primary wall is not well preserved, and is represented by black spots, which have also been called "spiniform corallites," Aut a paleontologist ought to be able to understand the state of the preservation of his specimen. Rudimentary septa have been observed in some species of Monticulipera similar to those existing in the *Chetetidæ*. The appearance as of an operculden, which is not uncommon in the corallites, is caused by a secondary infiltration, into the cells, of carbonate of lime, which assumes a spheroidal shape, and possesses no organic structure of any kind. No such organ as an operculum has ever been found in the corallites.

Fissiparity is a mode of growth that does not occur in the Bryozoa, but is not of rare occurrence in the *Monticuliporida*. It can be very easily distinguished from gemmation in longitudinal sections of the corallites, by the circumstance, that the internal space of the new animal forms part of the internal space of the mother animal. The longitudinal wall begins at one of the tabulæ, and the animal is literally split in two by a wall which stretches from one side of its body cavity to the other.

The family Monticuliporidæ must be removed from the sub-class Alcyonaria to the sub-class Zoantharia, and will include Dekayia (if it is a genus), Dianulites, Monotrypella, Monticulipora, Peronopora, possibly Stenopora, and some of the genera, if

ACR.-CAM.

they are valid genera, proposed by Ulrich, among the Bryozoa; viz., Atactoporella, Batostoma, Batostomella, Homotrypa, and Homotrypella. The Favositidæ will include Alveolites, Calapoecia, Chonostegites, Cladopora, Cænites, Dendropora, Favosites, Leptopora, Lunatipora, Michelinia, Nyctopora, Pachypora, Pleurodictyum, Romingeria, Sphærolites (?), Striatopora, Syringolites, Trachypora, and Vermipora.

The family Fistuliporidæ must be removed from the Bryozoa to the sub-class Alcyonaria, and will include Callopora, Callotrypa, Cælocaulis, Evactinopora, Favicella, Fistulipora, Prasopora, and Strotopora. The important distinction between the two families, Monticuliporidæ and Fistuliporidæ, is in the mode of gemmation, being intermural in the former, and coenenchymal in the latter. There is no coenenchyma in the Monticuliporidæ. The coenenchyma consists of parallel tubes, parallel to the polypites, and each coenenchymal tube possesses numerous tabulæ. It has been supposed that the Fistuliporidæ are dimorphic; that is, occupied by two different sets of animals, of which one, the siphonozooids, dwelt in the coenenchymal tubes, whilst the other, the autozooids, occupied the larger calices. In the coenenchymal gemmation a number of these coenenchymal tubes apparently unite to form together a new autozooid, so that several reduced individuals become blended together into a single perfect one. This coenenchymal gemmation occurs in the Helioporidæ, and shows the coral nature of the fossil.

- ACROPHYLLUM. The central boss is formed solely by the elevation of the successive tabulæ; and no vertical plates take part in its formation as is the case in *Clisiophyllum*. AXOPHYLLUM. Simple, turbinate, epitheca complete. Columella large, composed of numerous vertical, spirally twisted lamellæ; in longitudinal section, it appears as a cylindrical cellular mass of
 - pluriradiale, Nicholson, instead of Clisiophyllum pluriradiale.
- AMPLEXUS. The corallum is always simple, subcylindrical or cylindro-conical and more or less twisted. It is covered with an epitheca having encirling lines of growth, and accretion ridges or constrictions are more or less developed. Septa short, never reach the center. Tabulæ extend completely across the visceral chamber and occupy the central area. The fossula consists of a lateral depression of the tabulæ. Calice circular, moderately deep, with a thin margin. annulatus, Whitfield. This name was
 - annulatus, Whitfield. This name was preoccupied by Verneuil and Haime in Bull. Soc. Geol. de France, in 1850. See A. whitfieldi.
 - geniculatus, Worthen, 1890, Geo. Sur. Ill., vol. 8, p. 82, Kaskaskia Gr.
 - rockfordensis, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 53, Kinderhook Gr.
- p. 55, Kindernook Gr. whitfieldi, n. sp. This name is proposed for A. annulatus, Whitfield, 1878, Ann. Rep. Geo. Sur. Wis., p. 80, and Geo. Wis., vol. 4, p. 314, Niagara Gr., annulatus was preoccupied in 1850, by Verneuil and Haime.
- AULOPOBA trentonensis, Winchell and Schuchert, 1893, Geo. Sur. Minn., vol. 3, p. 95, Trenton Gr.

- XOPHYLLUM. Simple, turbinate, epitheca complete. Columella large, composed of numerous vertical, spirally twisted lamellæ; in longitudinal section, it appears as a cylindrical cellular mass of large size, and it pierces a central area occupied by strong, distant tabulæ, surrounded by an accessory wall. The space between this inner wall and the outer wall is occupied by dissepiments, making an exterior zone of large/vesicles. Septa extend to the center of the visceral chamber.
- Azygograptus valcotti, Lapworth, 1896, Jour. Geol., vol. 4, p. 69. Definition worthless.
- BRYOGRAFTUS, Lapworth, 1880, Ann. and Mag. Nat. Hist., vol. 5, p. 164. [Ety. bryon, moss; grapho, I write.] Type B. kjerulfi.
- lentus, Matthew, 1894, Trans. N. Y. Acad. Sci. vol. 14, p. 270, St. John Gr. multiramosus, Gurley, 1896, Jour. Geol., vol. 4, p. 64. Definition worthless.
- Bythograptus, Hall. This is an algæ (?). See Bull. Am. Mus. Nat. Hist., vol. 6, p. 357.
- CALYPTOGRAPTUS micronematodes and radiatus, Spencer, 1884, Bull. Mus. Univ. Mo., p. 29, Niagara Gr. ^e
- CAMPOPHYLLUM. The septa are not as well developed as they are in Cyathophyllum, and the tabulæ are exposed over a larger central area. The calice is deep.
 - kansasense, Miller and Gurley, 1893, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 67, Up. Coal Meas.

CAR.-DEN.

texanum, Shuman to be recognize Caryocaris oblongus 1896, Jour. Geo erous Gr. Nan scribed as Gra menclature sho Phyllopod genu scribed in Mono locarida Pal. Sc CERATOSTIGMA, Clar Geol. N. Y., p. long to the doubtful natur described, at th Ham. Gr. CHETETES carbonari Stenopora carbo clavacoideus. Se coidea. ortoni, refer to M perantiquus, Whi vol. 3, p. 238, L CHONOSTEGITES clap 1857, Pol. Foss. Up. Held. Gr. CLADOCHONUS, Mc(Hist., vol. 20, p a twig; chonos, compound, cylin ble stoutness, a form of upright late colonies ris and bifurcating the different spe communication and the young c gation of the vi former, and ext latter; and all the epitheca. with delicate a The space bety dotheca is occi dense sclerenc guished from 4 habit of growth. of branching, sl tubes, and abru cups bent in nea It frequently (umns, and sends at right angles C. tenuicollis. CLADOPORA clarkei,

N. Y. St. Geol., halli, Girty, 1896. Geol., p. 306, Lo

CLIMACOGRAPTUS, and icaulis, and oli Jour. Geol., vo worthless.

phyllophorus, Gur vol. 4., p. 77. G definition. CLISIOPHYLLUM. EI

CLISIOPHYLLUM. E marked with co tion ridges. S boss marked w

CAR.-DEN.

texanum, Shumard. Not defined so as to be recognized.

- Caryocaris oblongus and curvilatus, Gurley, 1896, Jour. Geol., vol. 4, p. 87, Calcif-erous Gr. Named as shrimps, but described as Graptolites, and such nomenclature should be thrown out. The Phyllopod genus Caryocaris is fully described in Monogr. Brit. Palæoz., Phyl-
- CERATOSTIGMA, Clarke, 1892, p. 89.
 CERATOSTIGMA, Clarke, 1894, 13th Rep. St. Geol. N. Y., p. 178. Supposed to belong to the Alcyonaria, though of doubtful nature. Type C. papillata, described et the account of the text of the second se described, at the same place, from the Ham. Gr.
- CHETETES carbonarius, Worthen, refer to Stenopora carbonaria.
 - clavacoideus. See Leptotrypa clavacoidea.
- ortoni, refer to Monticulipora ortoni. perantiquus, Whiteaves, 1897, Pal. Foss., vol. 3, p. 238, Low. Sil.
- CHONOSTEGITES clappi, Edwards and Haime. 1857, Pol. Foss. d. Terr. Pal., p. 299, Up. Held. Gr.
- CLADOCHONUS, McCoy, 1847, Ann. Nat. Hist., vol. 20, p. 14-227. [Ety. klados, a twig; chonos, a funnel.] Corallum compound, cylindrical, walls of variable stoutness, always developed in the form of upright branching and reticulate colonies rising from one corallite. and bifurcating, at various angles, in the different species; and there is free communication between the parent and the young corallites, by a prolongation of the visceral chamber of the former, and extending throughout the latter; and all are kept in union by the epitheca. Epitheca smooth, or with delicate annulations of growth. The space between it and the endotheca is occupied by more or less dense sclerenchyma. It is distinguished from Aulopora by the erect habit of growth, regular, angular mode of branching, slender, equal stem-like tubes, and abruptly dilated terminal cups bent in nearly opposite directions. It frequently encircles crinoid columns, and sends off the eregt corallites at right angles to the column. Type C. tenuicollis.
- CLADOPORA clarkei, Girty, 1896, 14th Rep. N. Y. St. Geol., p. 306, Low. Held. Gr. halli, Girty, 1896, 14th Rep. N. Y. St. Geol., p. 306, Low. Held. Gr.
- CLIMACOGRAPTUS, antiquus, kamptotheca, laticaulis, and oligotheca, Gurley, 1896, Jour. Geol., vol. 4, p. 74. Definitions worthless/
- phyllophorus, Gurley, 1896, Jour. Geol., vol. 4., p. 77. Group not given. Poor definition.
- CLISIOPHYLLUM. Epitheca complete, and marked with constrictions and accretion ridges. Surface of the central boss marked with spirally bent or

straight lamellæ which are attached to the primary septa by delicate dissepiments and pass upward to a median columellar crest on the crown of the boss. Central area formed by vertical, spirally-twisted or straight lamellæ and by vesicular tabulæ directed upward and inward. Intermediate area formed by an outward extension of the tabulæ in large, nearly horizontal vesicles. External area formed by minute vesicular tissue, vesicles arranged in oblique rows directed outward and upward.

- pluriradiale refer to Acrophyllum pluriradiale.
- CLONOGRAPTUS proximatus, Matthew, 1895, Trans. N. Y. Acad. Sci., vol. 14, p. 265, St. John Gr.

COENITES. The type is C. juniperinus.

- Constellaria varia, Ulrich, refer to Stellipora varia.
- CYATHAXONIA has primary and secondary septa, no interlocular tabulæ in the intermediate area, and the spaces are open from the superior to the inferior part of the corallum. There are a few interseptal dissepiments near the periphery.
- CYATHOPHYLLUM. The tabulæ never extend completely across the visceral chamber as they do in Zaphrentis, and the septa are symmetrically developed. regularly arranged, and are not interrupted by any well-defined fossula.

juvene, refer to Heliophyllum juvene.

- DAWSONIA monodon and tridens, Gurley, 1896, Jour. Geol., vol 4, p. 88, Calciferous Gr.
- Dekayia, I have long regarded as founded upon weathered and altered fragments of Monticulipora, but out of deference to the opinions of others have catalogued the species; but I have been unable to distinguish any specific difference between D. aspera and D. multispinosa, or between D. pelliculata, D. appressa, and D. paupera, and no two specimens are exactly alike. Many more names might be applied to these weathered and altered corals with equally as much propriety. It is not a valid genus Any species of Monticuli*pora* may present all the characters attributed to *Dekayia*. I have two or three species of Dekayia and Monticulipora on the same specimen.
- Dekayella, Ulrich, Syn. for Monticulipora. obscura, Ulrich, Syn. for Monticulipora ulrichi.
- prænuntia, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 270, Trenton Gr., refer to Monticulipora.
- robusta, Foord, refer to Monticulipora robusta.
- DENDROGRAPTUS arundinaceus, Hall, 1847, (Graptolithus arundinaceus,) Pal. N.Y., vol. 1, pl. 74, Utica Slate.
 - unilateralis, Gurley, 1896, Jour. Geol., vol. 4, p. 84. Definition worthless.

ella, lude eptophæ-

class

ella.

two

AM.

eing yma el to been rent ibes, zmal

ther

into

and

heca

losed

isted

t apss of area ulæ. The l the ents, vesier of 1896. ition and [Ety

Υ. n Gr. ieol., (?).

pe B.

phylover ice is

Bull. p. 67,

8. ol. 6,

d ra-Univ. well

- Desmograptus devonicus and macrodictyum, Gurley, 1896, Jour. Geo., vol. 4, p. 83. Not properly defined.
- DIANULITES, Eichwald, 1829, Zool., special vol. 1, p. 180, and fully defined by Dybowsky, 1877, Chætetid. d. ostbalt. Silurform., p. 14. Type D. petropolitana, which was subsequently made the type of Diplotrypa.
 - discoidea, Ulrich, 1893 (Mesotrypa dis-coidea), Geo. Sur. Minn., vol. 3, p. 260, Galena Gr.
- dubia, Ulrich, 1890 (Diplotrypa (?) dubia), Geo. Sur. Ill., vol. 8, p. 459, Hud. Riv. Gr.
- limitaris, Ulrich, 1893 (Diplotrypa limitaris), Geo. Sur. Minn., vol. 3, p. 286, Galena Gr.
- neglecta, Ulrich, 1893 (Diplotrypa neglecta), Geo. Sur. Minn., vol. 3, p. 287, Galena Gr.
- patella, Ulrich, 1890 (Diplotrypa patella), Geo. Sur. Ill., vol. 8, p. 458, Hud. Riv. Gr.
- quebecensis, Ami., 1892 (Diplotrypa quebecensis), Can. Record Sci., p. 101, Quebec Gr.
- rotunda, Ulrich, 1893 (Mesotrypa rotunda), Geo. Sur. Minn., vol. 3, p. 262, Galena Gr.
- selkirkensis, Whiteaves, 1897 (Mesotrypa selkirkensis), Pal. Foss., vol. 3, p. 162, Low. Sil.
- Dicellograptusgurleyi and polythecatus, Gurley, 1896, Jour. Geol. vol. 4, p. 70. Definitions worthless.
- DICRANOGRAPTUS arkansasensis and parvangulus, Gurley, 1892, Geo. Rep. Ark., p. 416. Group not given.
- diapason, Gurley, 1896, Jour. Geol., vol. 4, p. 73. Definition worthless.
- DICTYONEMA actinotum, Gurley, 1896, Jour. Geol., vol. 4, p. 82. Definition worthless
 - blairi, Gurley, 1896, Jour. Geol., vol. 4, p. 82, Chouteau limestone. Although the definition is worthlesss, I know the form, and it has not the slightest resemblance to Dictyonema or any other Graptolite. It consists of a granular carbonaceous mineral that has replaced more or less a Bryozoan.
- crassum, Girty, 1896, 14th Rep. N. Y. St. Geol., p. 288, Low. Held. Gr
- Dichograptus remotus, Gurley, 1896, Jour. Geol., vol. 4, p. 64. Definition worthless.
- DIDYMOGRAPTUS bipunctatus, Gurley, 1896, Jour. Geol., vol. 4, p. 65, Calciferous Gr. convexus, Gurley, 1896, Jour. Geol., vol.
 - 4, p. 67. Group not given. Probably not an geminus, Hisinger.
- American species. perflexus, Gurley, 1896, Jour. Geol., vol.
- 4, p. 66. Definition worthless. sagitticaulis, Gurley. Not defined
- DIPHYPHYLLUM stokesi, instead of Lithostrotion stokesi, and refer to Lower Silurian.

- DIPLOGRAPTUS, folium, Hisinger. Probably not an American species.
 - ruedemanni, Gurley, 1896, Jour. Geol. vol. 4, p. 307, Utica Slate.
 - stenosus, Gurley, 1896, Jour. Geol., vol. 4. p. 78. Definition worthless.
- trifidus, Gurley, 1890, Geo. Sur. Ark., vol. 3, p. 417, Low. Sil.
- Diplotrypa is a synonym for Dianulites, to which the species must be referred.
- DUNCANELLA rudis, Girty, 1896, 14th Rep. N. Y. St. Geol., p. 299, Low. Held. Gr.
- *Emmonsia*, seems to be a Syn. for Favosites. ERIDOPHYLLUM is retained by some as distinct from Diphyphyllum on the ground that the corallites are united at intervals by numerous, lateral out-
- growths of the epitheca. FAVOSITES, cervicornis, cristatus, and reticu-
- latus, are not American. conradi, Girty, 1896, 14th Rep. N. Y. St.
- Geol., p. 304, Low. Held. Gr
- gothlandicus and troosti are Upper Silurian, not Devonian species.
- **GRAPTOLITHUS** acanthonotus, Gurley, 1896 (Tetragraptus acanthonotus), Jour. Geol., vol. 4, p. 65, Calciferous Gr.
- arundinaceus. See Dendrograptus arundinaceus.

Ill. St. Mus.

Nat. Hist., p.

HADROPHYLLUM tenneseense, Miller and Gurley, 1895, Bull. No. 7,



87, Keokuk Fig. 1269. - Hadrophyllum Gr.

- tennesseense, lateral and HELIOPHYLLUM summit views. juvene, Ro-
- minger, instead of Cyathophyllum juvene. INOCAULIS canadensis, Whiteaves, 1897, Pal.
- Foss. Can., vol. 3, p. 149, Low. Sil. Leptograptus macrotheca, Gurley, 1896,
- Jour. Geol., vol. 4, p. 69. Definition worthless
- Lichenaria, Winchell and Schuchert, 1893, Geo. Sur. Minn., vol. 3, p. 83. [Ety. as given by the authors, "Leichen, treemoss; and aria, the latter portion of Columnaria, its most likely relative, which makes an absurd compound.] It may be a synonym for Columnaria, but it is too poorly defined to be reccognized.
 - typa, Winchell and Schuchert. Too poorly defined to be recognized.
- LITHOSTROTION, published 1669, instead of 1869. Corallites surrounded with an epitheca. Primary septa extend from the outer wall, nearly or quite to the columella. Columella compact, styliform. Central area formed by irregular, somewhat elevated tabulæ. Interseptal loculi filled with dissepiments, producing in longitudinal sections a series of small lenticular cells, arranged in layers which are directed upward and outward. Growth by calicular gemmation or lateral budding.

junceum, may be ta is not American stokesi, refer to and to Lower Sil LOPHOPHYLLUM profu Geo. Sur, Ill., v MICHELINIA branner 1893, Bull. No. Hist., p. 68, Coa MONOGRAPTUS beech Rep. N. Y. St. G Gr. MONOTRYPA cumula Sur. Minn., vol. intabulata, Ulrich.

vol. 3, p. 305, Ga magna, Ulrich, 1 vol. 3, p. 304, Tr nodosa, Ulrich, 1 vol. 3, p. 306, Hu

rectimuralis, Ulric

pora undulata. MONOTRYPELLA appr Sur. Ill., vol. 8, 1

crassimuralis, Uli Ill., vol. 8, p. 45:

MONTICULIPORA arbo Sur. Minn., vol. cannonensis, Ulr Minn., vol. 3, p. consimilis, Ulrich,

ensis.

eccentrica, James Nat. Hist., vol. Gr.

falesi, James, 1884 Hist., vol. 7, p. 1 incompta, Ulrich,

vol. 3, p. 219, Tr inflecta, Ulrich, 1 flecta,) Geo. Su

Hud. Riv: Gr. lamellosa, Ulrich,

vol. 8, p. 408, Hu

ohioensis, James, Nat. Hist., vol. 7

prolifica, Ulrich, 1 lifica,) Geo. Sur

Hud. Riv. Gr. singularis, Ulrich

singularis,) Geo 415, Hud. Riv. G

winchelli, Ulrich,

vol. 8, p. 408, Ha Nebulipora, McCoy,

pora and N. pape

OLDHAMIA fruticosa, nopsis fruticosa.

PERONOPORA, Nichol Affin. Montic., p buckle or clasp lum laminar. fronds; corallite latter interspers and sometimes ters. Walls of th

and seemingly f Monticulipora fr M. decipiens, if i LOP.-ZAP.

IT.

ba-

ol.,

. 4.

rk.,

to

ep

Gr.

tes.

lis-

the

ted

ut-

icu.

St.

ilu-

896

mr.

un-

and

395.

lus.

, p

u k

UM

Ro-

ju-

Pal

896,

ion

893.

Ety.

ree-

1 of

nd.]

ria.

rec-

Too

1 of

an

rom

the

yli-

·gu-

ter-

nts.

18 8

ged

ard

ular

te.

7.

- junceum, may be taken from the list, as it is not American.
- stokesi, refer to Diphyphyllum stokesi and to Lower Silurian.
- LOPHOPHYLLUM profundum, Worthen, 1890,
- Geo. Sur, III., vol. 8, p. 79, Coal Meas. MICHELINIA branneri, Miller and Gurley, 1893, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 68, Coal Meas.
- MONOGRAPTUS beecheri, Girty, 1896, 14th Rep. N. Y. St. Geol., p. 288, Low. Held. Gr.
- MONOTRYPA cumulata, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 307, Trenton Gr. intabulata, Ulrich, 1893, Geo. Sur. Minn.,
 - vol. 3, p. 305, Galena Gr. magna, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 304, Trenton Gr. nodosa, Ulrich, 1893, Geo. Sur. Minn.,
 - vol. 3, p. 306, Hud. Riv. Gr.
- rectimuralis, Ulrich, Syn. for Monticulipora undulata.
- MONOTRYPELLA appressa, Ulrich, 1890, Geo. Sur. Ill., vol. 8, p. 453, Ham. Gr. crassimuralis, Ulrich, 1890, Geo. Sur.
- Ill., vol. 8, p. 452, Hud. Riv. Gr.
- MONTICULIPORA arborea, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 220, Galena Gr. cannonensis, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 221, Galena Gr.
 - consimilis, Ulrich, Syn. for M. cincinnatiensis.
 - eccentrica, James, 1894, Jour. Cin. Soc. Nat. Hist., vol. 16, p. 185, Hud. Riv. Gr.
 - falesi, James, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 138, Hud. Riv. Gr.
 - incompta, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 219, Trenton Gr.
 - inflecta, Ulrich, 1890, (Heterotrypa inflecta,) Geo. Sur. Ill., vol. 8, p. 414, Hud. Riv: Gr.
 - lamellosa, Ulrich, 1890, Geo. Sur. Ill., vol. 8, p. 408, Hud. Riv. Gr.
 - ohioensis, James, 1884, Jour. Cin. Soc. Nat. Hist., vol. 7, p. 137, Hud. Riv. Gr.
 - prolifica, Ulrich, 1890, (Heterotrypa prolifica,) Geo. Sur. Ill., vol. 8, p. 413, Hud. Riv. Gr. singularis, Ulrich, 1890, (Heterotrypa
 - singularis,) Geo. Sur. Ill., vol. 8, p. 415, Hud. Riv. Gr.
 - winchelli, Ulrich, 1890, Geo. Sur. Ill., vol. 8, p. 408, Ham. Gr.
- Nebulipora, McCoy, Syn. for Monticulipora and N. papallata, is not American.
- OLDHAMIA fruticosa, refer to Callithamnopsis fruticosa.
- PERONOPORA, Nicholson, 1881, Struct. and Affin. Montic., p. 215. [Ety. perone, a buckle or clasp; poros, pore.] Coral-lum laminar, forming undulating fronds; corallites large and small, the latter interspersed among the former, and sometimes aggregated into clusters. Walls of the corallites thickened, and seemingly fused together. Type Monticulipora frondosa, and including M. decipiens, if it is a good species.

think this subgenus of Nicholson should be raised to the rank of a genus, but I am not sure that any other species than the two mentioned belong to it.

- PHYCOGRAPTUS, Gurley, 1896, Jour. Geol. vol. 4, p. 89. [Ety. phukos, seaweed; grapho, I write.] Long, slender, flexuous, segmented stems, with a single central pit in each segment. Type P. brachymera, described at the same place. Group not given.
- PRASOPORA insularis, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 251, Galena Gr. lenticularis, Ulrich, 1893, Geo. Sur.
- Minn., vol. 3, p. 253, Trenton Gr. PROTAREA magna, Whiteaves, 1897, Pal.
 - Foss., vol. 3, p. 155, Low. Sil.
 - verneuili was defined in less than four lines, and has never been illustrated. It was found in the range of Protarea retusta, about forty-five miles from Cincinnati, and, no doubt, is a synonym for it. It may be stricken from the list of fossils
- STELLIPORA parva, Ulrich, 1890, (Constellaria parva,) Geo. Sur. Ill., vol. 8, p. 424, Hud. Riv. Gr.
 - varia, Ulrich, 1893, (Constellaria varia,) Geo. Sur. Minn., vol. 3, p. 311, Galena Gr.
- STENOPORA. Waagen says there are no mural pores, and that Nicholson and Etheridge mistook accidental grooves for them.
 - carbonaria, Worthen, instead of Chetetes carbonarius.
- Stephanograptus crassicaulis and exilis, Gurley, Jour. Geol., vol. 4, p. 68. Definitions worthless.
- STREPTELASMA breve, Ulrich, 1893, Geo. Sur.
 - Minn., vol. 3, p. 92, Trenton Gr. parasiticum, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 89, Trenton Gr.
 - robustum, Whiteaves, 1896, Can. Rec Sci., vol. 6, p. 351, and Pal. Foss., vol. 3, p. 153, Low. Sil.
- STYLASTREA anna is described and figured in Ohio Geol., vol. 7, p. 420.
- SYRINGOPORA occidentalis, Meek. 1877. Expl. 40th Parallel, vol. 4, p. 50, Carboniferous.
 - parallela, Etheridge, is not American, beside the name was preoccupied for a Carboniferous species.
- TETRADIUM peachi var canadense, Foord. Syn. for Stromatopora compacta.
- THAMNOGRAPTUS affinis, Whiteaves, 1897 Pal. Foss. Can., vol. 3, p. 148, Low. Sil.

ZAPHRENTIS. The word "septa" is preferred



Fig. 1270.—Zaphrentis calyculus. Front view, showing calyx, and side view.

" lamellæ " to in the definition. The corallum is usually more or less curved, and coated with a thin epitheca. The fossula varies from the concave or ventral side to the convex or dorsal

by the coalescence of a greater or less number of the septa which unite near the center of the visceral cham-

ber and form the walls of the

fossette. The

septa are usually very thick

at the margin of

the corallum.

side ; it is large and deep, and is formed



Fig. 1271.—Zaphrentis chouteauensis. Front view, showing calyx, and side view.

nd side view. and there is generally one secondary septum between each pair of primary septa.



Fig. 1272.— Zaphrentis exigua. Front view, showing calyx, and side view, magnified two diameters.

calcariformis, Hall, is from the War-



Fig. 1274.—Zaphrentis tenella. Front view, showing radiating septa, and side view.

ACA.-ACT.

Fig. 1273. Zaphrentis tantilla. Front view, showing calyx, and side view, magnified two diameters.

saw Gr. instead of Up. Held. Gr. denticulata, Goldfus, 1826, (Anthophyllum denticulatum,) Petref. Germ. t. 1, p. 46, Niagara Gr. knappi, Hall. Syn.

Niagara Gr. knappi, Hall. Syn. for Z. deformis. Exactly the same description. ACT.

augustatus, Mill Bull. No. 3, Il



Fig. 1276.—Actinocr botruosus, a z y g side.

lyculoides. concinnus, refer t

cinnus. corniculum, refer

lum. daphne is from th denticulatus,Waa 1897, (Cactocrinus dentic-

ulatus,) N. Am. Crin. Cam., vol. 2, p. 606, Bur-

lington Gr. erraticus, Miller and Gurley, 1894, Bull. No. 3, Ill., St. Mus. Nat. Hist., p. 14, Burlington

Gr. excerptus, Hall, 1861, is also in Bost. Jour. Nat

extensus, Wachsn (Cactocrinus e

Cam., vol. 2, p.

foveatus, Miller No. 7, Ill. St. 1



Fig. 1278.—Actineer and s

gibsoni, Miller a No. 3, Ill. St. M Keokuk Gr. glans. See Mem vol. 1, p. 10, and

SUBKINGDOM ECHINODERMATA.

.....

- ACACOCRIMUS, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 515. [Ety. akakos, simple; krinon, lily.] Basals three; primary radials three by five; arms ten; azygous and regular interradial areas connect with the vault. Type A. elrodi.
- vault. Type A. elrodi. elrodi, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 515, Niagara Gr.
- ACROCRINUS amphora, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 808, St. Louis Gr.
- ACTINOCRINIDÆ. As to this family see Bull. No. 10, 111. St. Mus. Nat. Hist., p. 73.
- ACTINOCRINUS, adolescens, Wachsmuth and Springer, 1897, (Teleiocrinus adolescens,) N. Am. Crin. Cam., vol. 2, p. 635, Burlington Gr.
- albersi, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 46, Chouteau Gr.

amplus, instead of Saccocrinus amplus. arrosus, Miller and Gurley, 1894, Bull.

No. 3, Ill. St. Mus. Nat. Hist., p. 15, Burlington Gr.

asterius, McChesney, 1860, Desc. New

Pal. Foss., p. 13, Burlington Gr., is not a syn. for B. verrucosus.



augustatus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist.,

p. 11, Keokuk Gr. bischoffi, Miller and Gurley, 1896, Bull. No. 10, Ill.St. Mus. Nat. Histo, p. 8, Burlington Gr. botruosus, Miller

and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 22, KeokukGr.

Batocrinus ca-

Fig. 1276.—Actinocram botruosus, a z y g o u s calyculoides, see

lyculoides.

concinnus, refer to Shumardocrinus concinnus. corniculum, refer to Dorycrinus cornicu-

lum. daphne is from the Keokuk Gr.

denticulatus, Wachsmuth and Springer, 1897, (Cacto-

crinus denticulatus,) N. Am. Crin. Cam., vol. 2, 606, Burlington Gr. erraticus. Mil'ler and Gurley, 1894, Bull. No. 3, Ill., St. Mus. Nat. Hist., p. 14, Burlington

opposite

Fig. 1277.—Actinocrinus botruosus, opposite Gr. excerptus, Hall, 1861, is also in

azygous side. Bost. Jour. Nat. Hist., p. 276.

extensus, Wachsmuth and Springer, 1897, (Cactocrinus extensus,) N. Am. Crin. Cam., vol. 2, p. 616, Burlington Gr.

foveatus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 49, Burlington Gr.



Fig. 1278.—Actinocrinus fossatus, azygous and side views.

- gibsoni, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 10, Keokuk Gr.
- glans. See Mem. Am. Mus. Nat. Hist., vol. 1, p. 10, and illustration.

- gracilis, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 572, Burlington Gr.
- griffithi, Wachsmuth and Springer. Syn. for Steganocrinus albersi.
- inflatus, refer to Amphoracrinus inflatus. jessieæ, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 32, Burlington Gr.
- limabrachiatus is also in Mem. Am Mus. Nat. Hist., vol. 1, p. 5, and illustrated.
- lobatus, in Geo. Sur. Ill., vol. 8, p. 97, is A. augustatus.
- matuta var attenuatus. See Batocrinus attenuatus.
 - monticuliferus, Miller and Gurley, 1894. Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 46, Keokuk Gr.
 - multiramosus, Wachsmuth and Springer. Syn. for Actinocrinus gibsoni.
 - obesus, Keyes, 1895, Mo. Geo. Sur., vol. 4, p. 187, Burlington Gr.

opusculum is also in Mem. Am. Mus. Nat. Hist., vol. 1, p. 9, and illustrated. pettisensis, Miller and Gurley, 1896, Bull.



Fig. 1279.—Actinocrinus pettisensis, azygous and opposite views.

- No. 10, Ill. St. Mus. Nat. Hist., p. 6,
- Burlington Gr. plagosus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 16, Burlington Gr.
- pollubrum, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 26, Burlington Gr.
- proboscidialis, Hall, refer to Batocrinus proboscidialis.
- quaternarius is also in Mem. Am. Mus. Nat. Hist., vol. 1, p. 7, and illustrated.
- ramulosus, refer to Batocrinus ramulosus.
- sampsoni, Miller and Gurley, 1896, Bull. No. 10, Ill., St. Mus. Nat. Hist., p. 5, Burlington Gr.
- securis is figured in Geo. Sur. Ill., vol 5, pl. 9, see also p. 328.
- senectus, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 36, Chouteau Gr.
- sobrinus, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 10, Burlington Gr.
- spectabilis, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 9, Burlington Gr.

ide led aread Gr. oldthoticref.

. 46.

3yn.

nis.

he

ip-

la.

w

ACT.

not

AES. -AGA.

subpulchellus, Miller and Gurley, 1896, Bull. No. 10, Ill., St. Mus. Nat. Hist., p. 13, Burlington Gr.



Fig. 1280.—Actinocrinus subpulchellus, azygous and opposite views.

- subscitulus, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 12, Burlington Gr.
- thetis, is figured in Mem. Am. Mus. Nat. Hist., vol. 1, p. 6. tuberculosis, Wachsmuth and Springer,
- N. Am. Crin. Cani., vol. 2, p. 573, Burlington Gr.

validus. See Steganocrinus validus.

- Aesiocrinus angulatus, Miller and Gur-ley, 1894, Bull. No. 3, Ill. St. Mus. Nat.
- Hist., p. 59, Up. Coal Meas. AESIOCYSTITES, Miller and Gurley, 1894, Bull. No. 5, Ill., St. Mus. Nat. Hist., p. 13. [Ety. aisios, auspicious; kustis, a bladder.] Body highly convex or hemispherical; free, not parasitic. Plates and arms curve over the margin. Interbrachial plates, nonimbricating. Arms five, convex, radiate from the center, and composed externally of a double series of alternating and interlocking plates, that cover a deep, angular furrow. Ovarian pyramid in the larger interbrachial area near the margin. Type, A. priscus.

conicus, Wachsmuth and Springer, 1897. N. Am. Crinoidea Camerata, vol. 2, p. 501, Keokuk Gr.

eris is from the Keokuk Gr.

excavatus is also in Mem. Am. Mus. Nat. Hist., vol. 1, p. 26, and illustrated.



Fig. 1283.—Agaricocrinus blairi, basal and summit views.

helice is from the Keokuk Gr.

- hodgsoni, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 23, Burlington Gr.
- illinoisensis, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 25, Burlington Gr.
- iowensis, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 5, Keokuk Gr.

keokukensis, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 7, Keokuk Gr.



Keokuk Gr. ornotrema is also in ^{Fig. 1284}.—Agarleocrinus blairi, lateral view. Mem. Am. Mus.

Nat. Hist., vol. 1, p. 24, and illustrated ; but as the word was not properly made, it was changed to bellatrema.

pentagonus is also in Mem. Am. Mus. Nat. Hist., vol. 1, p. 25, and illustrated. profundus, Miller and Gurley, 1895, Bull.



Fig. 1281.-Aesiocystites priscus. Two summit and one lateral view.

priscus, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 14, Trenton Gr.



Fig. 1282.-Agaricocrinus arcula, summit view. Keokuk Gr.

AGARICOCRINUS. The type of this genus is A. tuberosus, and for remarks see Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 9. adamsensis, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 24, Burlington Gr. arcula, Miller and

mmit view. Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 30,



Fig. 1285.—Agaricoerinus profundus, basal view.

No. 6, Ill. St. Mus. Nat. Hist., p. 26, Keokuk Gr.

- tugurium, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 28, Keokuk Gr.
- AGASSIZOCRINUS OVALIS, Miller and Gurley, 1896, Bull. No. 9 Ill. St. Mus. Nat. Hist., p. 36, Kaskaskia Gr.



AGE.





Fig. 1289.—Agari

Fig. 1288.-Agarico view, cal



AGE.

AGA. 1897. 2, p.

Nat.

1

d

Bull. 23. 896, ., p. Bull.). 5,

inus

ted; ıde,

Ius. ted. Jull.

26,

ull.

28,

ley, lat.

Fig. 1286.—Agaricocrinus profundus, summit view. æ



Fig. 1287.—Agaricocrinus profundus, azygous side of a small specimen.



Fig. 1288.—Agaricocrinus sampsoni, basal view, calyx and arms.



Fig. 1289.—Agaricocrinus tugurium, basal view.



733

Fig. 1290.-Agaricocrinus tugurium, summit



Fig. 1291.-Agaricocrinus tugurium, azygous side view.



Fig. 1292.—Agassizocrinus ovalis, calyx and arms, azygous view.



Fig. 1298. Agelacrinus blairi, magnified two di-ameters.

and Gurley, 1894, Bull. No. 5, Ill. [St. Mus. Nat. Hist., p. 15 Kinderhook Gr. pulaskiensis, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus.

Cin. Soc. Nat. Hist., vol. 17, p. 156, Hud. Riv. Gr. legrandensis," Miller

Nat. Hist., p. 16 Kaskaskia Gr,

AGELADISCUS n. gen. [Ety. agele, herd; diskos, quoit.] This name is proposed instead of Echinodiscus, Worthen and Miller, which was preoccupied by Breynius. It will include A. optatus, A. kaskaskiensis, and A. sampsoni. Jgeladiscus will be a much better word, because the fossils belong to the Agelacrinidar, and have no near affinity to the Echinida.

ALLAGECRINUS americanus, Rowley, 1895, Am. Geol., vol. 16, p. 219, Chouteau Gr. ALLOPROSALLOCRINUS celsus, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus.

Gurley, 1894, Bull. No. 5, 111. St. M Nat. Hist., p. 47, Warsaw Gr.

AMPHORACRINUS blairi, Miller and Gurley, 1896, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 26, Burlington Gr.

inflatus, Hall, 1860, (Actinocrinus inflatus,) Supp. Geo. Iowa, p. 20, and Mem. Am. Mus. Nat. Hist., vol. 1, p. 22, Burlington Gr.

jessieæ, Miller and Gurley, 1896, Bull.



Fig. 1294.—Amphoracrinus jessieæ, azygous and basal views.

No. 10, Ill. St. Mus. Nat. Hist. p. 21, Chouteau Gr.

- planobasalis was described in 1860 in the Supp. to Geo. of Iowa.
- sampsoni, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 27, Chouteau Gr.

sedaliensis, Miller, and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 54, Chouteau Gr.



Fig. 1295.—Amphoracrinus sedaliensis, azygous and basal views.

viminalis refer to the Keokuk Gr. Aorocrinus, Wachsmuth and Springer, Syn.

- for Dorycrinus. Type Dorycrinus immaturus.
- Aristocrinus, Rowley, 1895, Am. Geol., vol. 16, p. 217. [Ety. aristos, best; krinon, lily.] Type Taxocrinus concavus. Imperfectly defined, probably a synonym.

AGE.-AST.

ARCHEOCRINUS asperatus, Miller and Gur-





Fig. 1296.—Archæocrinus asperatus, basal and summit views.

ley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 19, Trenton Gr.

Fig 1297.-Archæo-

azygous side.

crinus asperatus,

knoxensis, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 34, Trenton Gr. parvus, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 21, Trenton Gr.





Fig. 1298.—Archæocrinus parvus, basal, azygous, and summit views.

peculiaris, Miller and Gurley, 1894, Bull.



Fig. 1200.—Archæocrinus peculiaris, lateral and azygous views.

No. 5, Ill. St. Mus. Nat. Hist., p. 17, Trenton Gr.



Fig. 1300.—Archæocrinus peculiaris, basal view.

- ARTHRACANTHA depressa, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 751, Chemung Gr.
- ASTROCYSTITES, Whiteaves, 1897, Can. Rec. Sci., p. 287. [Ety. aster, star; kustis, bladder.] General form obovate, terminating in a column below. Summit, in structure, much like that in Æsiocystites, with five radiating grooves

BAR.-BAT.

covered with p the superior ce interambulacrs waensis. ottawaensis, Whi

Sci., p. 287, Tre BARYCRINUS elrodi,



Fig. 1301.—Barycrin boonvillensis.

sampsoni, Miller No. 10, Ill. St. Mus. Nat. Hist., p. 81, Burlington Gr. sculptilis is figured in Mem. Am. Mus. Nat. Hist., vol. 1, p. 29. washingtonensis, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 49, Keokuk Gr. BATOCRINUS adamsensis, B Miller and Gurley, 1896, Bull. No. 8, Ill. p. 14, Burlington adultus, Wachsmu (Eretmocrinus a Nat. Sci. Phil., p æquabilis, Miller a No. 3, Ill. St. M Burlington Gr. æquibrachiatus va in Mem. Am. M p. 11. affinis, Miller and 10, Ill. St. Mus. lington Gr. albersi, Miller and No. 10, Ill. St. 1 Burlington Gr.



AST.

Jur-

and

Nat.

and u11. Mus. 34. jur-0.5.

iat.

nton

Bull.



ind). 17.

> basal and

> > vol.

Rec. istis. termit, Csiooves ECHINODERMATA.

covered with plates. Anal opening in the superior central part of one of the interambulacral areas. Type A. ottawaensis.

BAR.-BAT.

ottawaensis, Whiteaves, 1897, Can. Rec. Sci., p. 287, Trenton Gr.

BARYCRINUS elrodi, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. St. Mus. Hist., p. 38, St. Louis Gr. expansus, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat.

Hist., p. 41, Keokuk Gr. Miller formosus, and Gurley, 1894, Bull, No. 3, Ill. St. Mus. Nat. Hist., p. 33, Keokuk Gr. neglectus, Miller and Gurley, 1896,

Bull. No. 9, Ill.

Hist., p. 28, Keo-

Nat.

St. Mus.

Fig. 1301.-Barycrinus boonvillensis.

kuk Gr. sampsoni, Miller and Gurley, 1896, Bull.

No. 10, Ill. St. Mus. Nat. Hist., p. 81, Burlington Gr. sculptilis is figured in Mem. Am. Mus. Nat.

Hist., vol. 1, p. 29. washingtonensis, Miller and Gurley, Bull. 1895, No. 6, Ill. St. Mus. Nat. Hist., p. 49, Keokuk Gr.

BATOCRINUS ad-Fig. 1302. Barycrinus washingtonenamsensis, Miller and sis, azygous side

- Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 14, Burlington Gr.
- adultus, Wachsmuth and Springer, 1881, (Eretmocrinus adultus,) Proc. Acad. Nat. Sci. Phil., p. 349, Keokuk Gr.
- æquabilis, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat Hist., p. 25, Burlington Gr.
- æquibrachiatus var. alatus is illustrated in Mem. Am. Mus. Nat. Hist., vol. 1, p. 11.
- affinis, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 55, Burlington Gr.
- albersi, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 38, Burlington Gr.

altiusculus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 20, Burlington

Gr. approximatus, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 56, Burlington Gr.



- Gurley, 1895, Bull. No. 6, Ill. St. Mus. Fig. 1303. - Batocrinus arcula, azygous side. Nat. Hist., p. 16, St. Louis Gr.
- argutus, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 9, and Bull. No. 10, p. 66, Burlington Gr
- asper, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 13, Burlington Gr
- asperatus, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 12, Burlington Gr.
- aspratilis, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 21, Burlington Gr.
- attenuatus, Hall, 1861, and Whitfield, 1895, (Actinocrinus matuta var. attenuatus,) Mem. Am. Mus. Nat. Hist., vol. 1, p. 18, Burlington Gr.
- basilicus, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 11, Burlington Gr.
- bisbrachiatus, Whitfield, 1895, Mem. Am. Mus. Nat. Hist., vol. 1, p. 13, Burlington Gr.



Fig. 1304.-Batocrinus blairi, azygous and side views.

- broadheadi, Miller, and Gurley, 1895, Bull. No. 7, Hl. St. Mus. Nat. Hist., p. 15, Keokuk Gr.
- burketi, Miller and Gurley, 1895, Bull. No 6, Ill. St. Mus. Nat. Hist., p. 19, Keokuk Gr.
- calyculoides, Hall, 1860, Supp. to Geo. Sur. Iowa, p. 17, (Actinocrinus calyculoides,) Burlington Gr.
- calyculoides var. nodosus, Wachsmuth and Springer, 1897, (Eretmocrinus,) N. Am. Crin. Cam., vol. 2, p. 396, Burlington Gr.
- casualis, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 15, Keokuk Gr.

- casula, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Must Nat. Hist/, p. 8, Keokuk Gr
- cistula, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 18, St. Louis Gr.
- clavigerus is from the Keokuk Gr.

736

- clio, Hall, 1861, (Actinocrinus clio,) Bost. Jour. Nat. Hist., vol. 7, p. 262, Burlington Gr.
- cloelia, Hall, 1861, (Actinocrinus cloelia.) Bost. Jour. Nat. Hist., vol. 7, p. 266, Burlington Gr.
- cognatus, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 60, Burlington Gr.
- commendabilis, Miller and Gurley, 1895, (Eretmocrinus commendabilis,) Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 25, Keokuk Gr.
- complanatus, Miller and Gurley, 1896, Bull. No. 10, Ill., St. Mus. Nat. Hist., p. 27, Burlington Gr.
- consanguineus, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 63, "Burlington Gr.
- copiosus, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 51, Warsaw Gr.
- corbulis, Hall, 1861, (Actinocrinus cor-bulis,) Bost. Jour. Nat. Hist., vol. 7, p. 265, Burling-

ton Gr

coronatus, Hall, 1861, (Actinoerinus coro n a tus,) Supp. Geo. Sur. Iowa, p. 28, Burlington Gr.

curiosus, Miller and Gurley, 1895, Bull. No. 6,

Ill. St. Mus. Nat. Hist., p. 6, Keokuk

Gr. delicatulus. Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 12, Keokuk

Fig. 1305.—Batocrinus curio-

sus, azygous side.

Gr. depressus, Keyes, 1895, (Eretmocrinus depressus,) Geol.



Sur. Mo., vol. Fig. 1306.-Batocrinus curiosus, basal view. 4, p. 176, Bur-

lington Gr douglassi, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 29, Keokuk Gr.

enodatus, Miller and Gurley, 1896, Bull.

No. 10, Ill. St. Mus. Nat Hist., p. 46, Burlington Gr.



Fig. 1307.—Batocrinus enodis, basal and azygous views

- enodis, Miller and Gurley, 1896, Bull. No. 10, IN. St. Mus. Nat. Hist., p. 25, Burlington Gr.
- faberi, Miller and Gurley, 1896, Bull. No. 9 Ill. St. Mus. Nat. Hist., p. 18, Burlington Gr.
- folliculus, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 15; Burlington Gr.
- formaceus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 24, Burlington Gr.
- gemmiformis, Hall, 1860, (Actinocrinus gemmiformis,) Supp. Geo. Sur. Iowa, p. 23, Burlington Gr.
- germanus, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 5. Burlington Gr.

glaber, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. His., p. 32, Burlington Gr. heteroclitus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus.Nat.Hist., p. 31, Keokuk Ġr.

hodgsoni, Miller

1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 8, Burlington Gr. honorabilis, Mil-

ler and Gurley, 1895, Bull. No. 6, Ill. St. Mas. Nat. Hist., p. 10, Keokuk Ĝr. ignotus, Miller and Gurley, 1895, Bull. No. 7. Ill. St. Mus. Nat. Hist., p. 28, KeokukGr. imparilis, Miller and Gurley, 1895, Bull. No. Nat. Hist., p. 20, Burlington

Gr.

Fig. 1308. — Batocrinus glaber, opposite åzygous

7, Ill. St. Mus. Fig. 1309 .- Batoerinus honorabilis, opposite azy-gous side.

and Gurley,

side.



Fig. 1812.-Batoer and sum

BAT. inconsuetus, Mi Bull. No. 7, Il p. 25, Keokuk incultus, Miller No. 7, Ill. St. **Burlington** Gr inopinatus, Mille No. 7, Ill. St. Keokuk Gr. insolens, Miller No. 10, Ill. St. Burlington Gr. insperatus, Mille No. 7, Ill. St. Burlington Gr. insuetus, Miller No. 7, Ill. St. 1 Keokuk Gr. intermedius, Wa 1881, (Eretmo Proc. Acad. Na kuk Gr. jessieæ, Miller a No. 8, Ill. St. 1 Burlington Gr. konincki, Shuma konincki,) Geo. lington Gr. Fig. 1810.—Bato-crinus labellum, azygous ley, 1894, Bull. Hist., p. 24, Bu laterna, Miller and Gurley 1895, Bull. No 6, Ill. St. Mus Nat. Hist., p. 12 Keokuk Gr. laura is figured in Mem. Am. Mus Nat. Hist., vol 1, p. 17. lepidus, is figured in Mem. Am. Mus. Nat. Hist., vol. 1, p. 16. leucosia, Hall, 18 cosia,) Bost. Jou p. 261, Burlingto levigatus, Miller a

- inconsuetus, Miller and Gurley, 1895, Bull. No. 7, Ill., St. Mus. Nat. Hist., p. 25, Keokuk Gr.
- incultus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 21, Burlington Gr.
- inopinatus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 36, Keokuk Gr.
- insolens, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 35, Burlington Gr.
- insperatus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 22, Burlington Gr.
- Insuetus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 14, Keokuk Gr.
- intermedius, Wachsmuth and Springer, 1881, (Eretmocrinus intermedius,) Proc. Acad. Nat. Sci. Phil., p. 348, Keokuk Gr.
- jessieæ, Miller and Gurley, 1896, ^{*}Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 20, Burlington Gr.
- konincki, Shumard, 1855, (Actinocrinus konincki,) Geo. Sur. Mo., p. 194, Burlington Gr.



Fig. 1810.—Batocrinus labellum, azygous side.

in us labeln, azygous Gr. e. lætus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 24, Burlington Gr.

laterna, Miller and Gurley, 1895, Bull. No.
6, Ill. St. Mus.
Nat. Hist., p. 12, Keokuk Gr.
laura is figured in Mem. Am. Mus.
Nat. Hist., vol.
1, p. 17.

lepidus, is figured

in Mem. Am. Fig. 1311.—Batocrinus la-Mus. Nat. Hist., terna, azygous area on vol. 1, p. 16.

leucosia, Hall, 1861, (Actinocrinus leucosia,) Bost. Jour. Nat. Hist., vol. 7, p. 261, Burlington Gr.

levigatus, Miller and Gurley, 1896, Bull.



Fig. 1812.—Batocrinus levis, azygous and summit views. No. 10, Ill. St. Mus. Nat. Hist., p. 29, Burlington Gr.

- levis, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 23, Burlington Gr.
- lyonanus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 18, St. Louis Gr.
- magnificus, Lyon and Casseday, 1859, (Eretmocrinus magnificus,) Am. Jour.

Sci., vol. 28, p. 241, Keokuk Gr. minor, Wach-

smuth and Springer, 1897, (Eretmocrinus minor,) N. Am. Crin. Cam., vol. 2, p. 391, Burlington Gr. d

modestus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 30, Keokuk Gr.

modulus, Mil- Fig. 1313.—Batocrinus meler and Gur-

ley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 16, Burlington Gr.

- nanus, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 17, Bur-/ lington Gr.
- neglectus, Meek and Worthen, 1869, Proc. Acad. Nat. Sci., p. 355, and Geo. Sur. Ill., vol. 5, p. 377, Burlington Gr.
- nitens, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 15, Burlington Gr.
- nitidulus, Miller and Gurley, 1895, Bull. No. 7, 111. St. Mus. Nat. Hist., p. 17, Keokuk Gr.



- Fig. 1314.—Batocrinus nodosarius, lateral view, with azygous area on the right, and summit view.
 - nodosarius, Miller and Gurley, 1896, Bull. No. 10, 111. St. Mus. Nat. Hist., p. 22, Burlington Gr.
 - nodosus, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 5, Burlington Gr.
 - nodulosus, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 6, Burlington Gr.
 - oblatus is figured in Mem. Am. Mus. Nat. Hist., vol. 1, p. 12.

46

BAT.

Į

BAT.

Bull. . 25, . No.

gous

Bur-Bull. . 15,

Bull. . 24.

inus owa, Bull.

p. 5,

ller ley, No. Mus. p. 32, i Gr. , Mil-Gur-Bull.

list., okuk liller ley, Nat.

St.



honazyin us. ol. red m. Fig. 1811.—Ba st., terna, asy st., terna, asy

BAT

originarius, Wachsmuth and Springer, 1881, (Eretmocrinus originarius,) Proc. Acad. Nat. Sci., p. 348, Keokuk Gr.



Fig. 1315.-Batoerinus parilis, calyx and arms, azygous view of calvx

parilis, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat Hist., p. 17, Burlington Gr.

peculiaris, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 18, Keokuk Gr.



738



Fig. 1816.—Batocrinus pettisensis, azygous and opposite views.

pettisensis, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 19, Burlington Gr.



pileus, Miller and Gurley, 1895, Bull. No 6, Ill. St. Mus. Nat. Hist., p. 18, St. Louis Gr. planus, Miller and

Fig. 1817.—Batocrinus pileus, lateral view.

Gurley, 1895, Bull. No. 7, Ill. St. Mus.

- Nat. Hist., p. 37, Burlington Gr. politus, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 31, Burlington Gr.
- polydactylus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 5. Keokuk Gr.
- proboscidialis, Hall, instead of Actinocrinus proboscidialis.
- procerus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 33, Keokuk Gr.
- prodigialis, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 39, Keokuk Gr
- proximus, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 7, Burlington Gr.
- ramulosus, Hall, 1858, (Actinocrinus ramulosus,) Geo. Sur. Iowa, p. 615, Keokuk Gr.

regalis, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 14, Burlington Gr.



Fig. 1318.-Batocrinus prodigialis, azygous side.

- reliquus, Miller and Gurley, 4897, Bull. No. 12, Hl. St. Mus. Nat. Hist., p. 22, Burlington Gr.
- remibranchiatus var. expansus, Wachsmuth and Springer, Syn. for E. cassedayanus.
- remotus, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 43, Burlington Gr.
- repertus, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 70, Burlington Gr.
- repositus, Miller and Gurley, 1896, Bull. No. 10, III, St. Mus. Nat. Hist., p. 45, Burlington Gr.
- reservatus, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 25, Burlington Gr.
- robustus, Wachsmuth and Springer, 1897, (Lobocrinus robustus,) N. Am. Crin. Cam., vol. 2, p. 436, Keokuk Gr. rotuliformis, Miller and Gurley, 1897,
- Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 26, Burlington Gr.
- rudis, Miller and Gurley, 1896, Bull. No. 10, Ul. St. Mus. Nat. Hist., p. 52, Keokuk Gr.
- rugosus, Wachsmuth and Springer, 1897, (Eretmocrinus,) N. Am. Crin. Cam., vol. 2, p. 402, Burlington Gr.
- rusticellus, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 23, Burlington Gr.
- rusticus, Miller and Gurley, 1897, Bull. No 12, Ill. St. Mus. Nat. Hist., p. 28, Burlington Gr.
- saccellus, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 40, Burlington Gr.
- sacculus, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 52 Warsaw Gr.
- sagetownensis, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 54, Burlington Gr.
- salemensis, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 8, Warsaw Gr.

BAT.-BEL.

sampsoni, Miller No. 7, Ill. St Keokuk Gr. scitulus, Miller No. 12, Ill. St **Burlington** Gr scyphus, Miller No. 3, Ill. St. **Burlington** Gr sedaliensis, Mil Bull. No. 10, 1 p. 71, Burlingt selectus, Miller No. 10, 111. St **Burlington** Gr senex, Miller and 12. Ill. St. Mu. lington Gr. serratus, Miller, No. 7, Ill. St. Keokuk Gr. sharonensis, Mi Bull. No. 12, p. 18, Burlingt shepardi, Rowle 12, p. 305. N recognized. No. 9, Ill. St. Keokuk Gr. simplex, Wach 1897, (Dizygod simplex.) N. A 416, Keokuk G solitarius, Miller No. 8, III. St. **Burlington** Gr. speciosus, Miller No. 10, 111, 8t **Burlington** Gr spinosus, Miller

Fig. 1819.—Batocrinu: spinosus, azygou side,

subæquatus, Mil Bull. No. 10, Il o. 72, Burlingto sublevis, Miller a No. 10, 111, 8t. Burlington Gr. subovatus, Mille Bull. No. 10, 11 p. 50. Burlingto BAT.-BEL.

- sampsoni, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 7, Keokuk Gr.
- scitulus, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 19, Burlington Gr.
- scyphus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 23, **Burlington Gr.**
- sedaliensis, Miller and Gurley, 1896, Bull. No. 10, 111. St. Mus. Nat. Hist., p. 71, Burlington Gr.
- selectus, Miller and Gurley, 1896. Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 37, Burlington Gr.
- senex, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 21, Burlington Gr.
- serratus, Miller, and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 27, Keokuk Gr.
- sharonensis, Miller and Gurley, 1897. Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 18, Burlington Gr.
- shepardi, Rowley, 1893, Am. Geol., vol. 12, p. 305. Not defined so as 40 be recognized.
- signatus, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 10, Keokuk Gr.
- Wachsmuth and Springer. simplex, 1897, (Dizygocrinus indianensis var. simplex,) N. Am. Crin. Cam. vol. 2, p. 416, Keokuk Gr.
- solitarius, Miller and Gurley, 1896, Bull No. 8, III. St. Mus. Nat. Hist., p. 22, Burlington Gr.
- speciosus, Miller and Gurley, 1896, Bull No. 10, III. St. Mus. Nat. Hist. p. 47, Burlington Gr.

No. 6, III. St. Mus.

Nat. Hist., p. 5,

Gurley, 1896, Bull. No. 9, Ill. St. Mus.

Nat. Hist., p. 20,

and Gurley, 1896,

Bull. No. 9, 111. St. Mus.

Hist., p. 9, Keo-

Gurley, 1896, Bull:

No. 9, Ill. St. Mus.

Nat. Hist., p. 11,

kuk Gr.

Nat.

Burlington Gr.

Keokuk (ir.



Fig. 1819,-Batocrinus spinosus, azygous side.

- Keokuk Gr. subsequatus, Miller and Gurley, 1866, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 72, Burlington Gr.
- sublevis, Miller and Gurley, 1896, Bull. No. 10, III. St. Mus. Nat. Hist., p. 41, Burlington Gr.
- subovatus, Miller and Gurley, 1896, Bull. No. 10, 111, St. Mus. Nat. Hist., p. 50. Burlington Gr.

- subrotundus, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 48, Burlington Gr.
- subscitulus, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 51, Burlington Gr.
- superbus, n. sp. Proposed instead of Eretmocrinus cassedayanus, Miller and Gurley in Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 17, which name is preoccupied in this genus. (By typographical error, it was also printed Eretmocrinus lyonanus at same place.) **Burlington** Gr.
- tuberculatus, Wachsmuth and Springer. 1897, N. Am. Crin. Cam., vol. 2, p. 379, Burlington Gr.
- variabilis, Miller and Gurley, 1896, Bull. No. 10, 111. St. Mus. Nat. Hist., p. 58, Burlington Gr.
- varsouviensis, Worthen, 1882, (Eretmocrinus varsouviensis,) Geo. Sur. Ill., vol. 7, p. 306, Warsaw Gr.
- venustulus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 12, Keokuk Gr.
- verneuilianus, Shumard, 1855, (Actinocrinus verneuitianus), Geo. Sur. Mo., p. 198, Burlington Gr.
- veterator, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 8, Keokuk Gr.
- vetustus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 10, Keokuk Gr.
- vicinus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 34, Keokuk Gr.
- wetherbyi, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 11, Keokuk, Gr.

BELEMNOCYS-TITES. Miller and Gur-1894. ley. Bull. No. 5, III. St. Mus. Nat. Hist., p. 8. [Ety. helemnon, dart ; kustis, bladder. Body compressed. moderately convex, in the central, part, on both sides.

but margin-

thin; out-

line ovoid.

Fig. 1320.-Belemnocrinus sampsoni.

Plates irregularly disposed. The marginal rim of plates covers an equal portion of the dorsal and ventral sides. There are a few large plates on the dorsal side without arms or apertures. Plates more numerous on the



Jull. 14.

P

side.

Sull.

22

chs-

cas-

Bull

. 43.

Bull.

. 70,

Bull

. 45,

Bull

1. 25,

1897.

rin.

1897.

list ...

No.

Keo-

1897.

am.,

Bull.

. 23.

Bull.

28.

Bull

40.

Bull

p. 52

1896.

list..

1896.

list.

BAT.

myelodactylus. See Dichocrinus myelodactylus.

CARABOCRINUS OVALIS, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., 25, Trenton Ġr.

CARYOCRINUS bulbu-lus, Miller and Gurley, 1894. Bull. No. 5, Ill.

Fig. 1324.—Carvoerinus bulbulus, anterior and posterior views.

No. 9, Ill. St. Mus. Nat. Hist., p. 65,

kentuckiensis, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 59, Niagara Gr.

Fig. 1326.—Caryocrinus kentuckiensis, anterior,

milliganæ, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist.

Y. Acad. Sci., vol. 4, p. 388. This name was proposed for one of the divisions, to be made of the genus Calceocrinus, with Calceocrinus furcillatus as the type, and to include, C. rugosus, C. articulosus, C. inxequalis, and a new species, C. billingsianus, described, in the same place, from the Trenton Gr. It would seem that the name should stand, (it was accidentally overlooked in the first appendix,) and, if so, it will include Calceocrinus kentuckiensis.

BLA. CAS.

Hist., p. 10,

Niagara Gr.

Fig. 1323. - Caraboerinus ovalis, azygous and opposite views,

St. Mus. Nat. Hist., p. 11, Niagara Gr. ellipticus, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus.

Fig. 1325.—Caryocrinus ellipticus, anterior and summit views.



Niagara Gr.



posterior, and summit views

p. 63, Niagara Gr.







Fig. 1327.-Codaster sun

COD.-DIA.

CODASTER blairi,

Bull. No. 7, 1

p. 86, Choutes

jessieæ, Miller No. 10, Ill. 8 Chouteau Gr. whitei, refer to (CODONITES CONICU: p. 201, Whitfie is a syn. for (whitei, Hall, 18 figured, by V Mus. Nat. Hi collected in th CŒLIOCRINUS dilat Mem. Am. M p. 33. **CATHOCRINUS** and 1894, Bull. N Hist. p. 30, Ko blairi, Miller a Gurley, 1895, I No. 7, p. 67, Bull. No. 8, p Ill. St. Mus. Hist., Chout Gr.

brittsi, Miller an 7, Ill. St. Mus



Fig. 1829.—Cyathocri villensis. Nat. Hist., p. inæquidactylus, villensis. labyrinthicus. rinthicus. macadamsi, Mi Bull. No. 7, Ill 69, St. Louis (maxvillensis, W vol. 7, p. 465. inæquidactylus preoccupied.



Fig. 1822. - Calceocrinus kentuckiensis, anterior and azygous views.

Camptocrinus, Wachsmuth and Springer, Syn. for Dichocrinus.

cirrifer. See Dichocrinus cirrifer.



Cactocrinus, Wachsmuth and Springer. Syn. for Batocrinus. Type Batocrinus proboscidialis.

denticulatus, Wachsmuth and Springer. See Actinocrinus denticulatus.

obesus, Keyes. See Actinocrinus obesus.

extensus. See Actinocrinus extensus.

- CALCEOCRINUS. This name was applied by Hall, in 1852-Pal. N. Y., vol. 2, p. 352-to the basal plates of a crinoid from the Niagara Gr., without proposing a specific name. In 1860-13th Rep. N. Y. St. Mus. Nat. Hist., p. 122he described and illustrated Cheirocrinus chrysalis from the Niagara Gr. The name Cheirocrinus was preoccupied. Shumard, in 1866, discovered that Cheirocrinus was identical with Calceocrinus and classified the species under that name. This being the fact, the type became *Calceocrinus chrysalis* from 1860, not from 1852. There is no excuse for the recent synonyms proposed for this genus.
 - bidentatus, contractus, halli, typus, Ringueberg, 1889, Ann. N. Y. Acad. Sci., vol. 4, p. 388, Niagara Gr. kentuckiensis, Mil-

ler and Gurley, 1894, Bull. No. 5,

Ill. St. Mus. Nat.

Hist., p. 29, Tren-ton Gr. See Cas-

ALLICRINUS beach-

leri, Wachsmuth

and Springer,

1897, N. Am. Crin.

Cam., vol. 1, p. 355,

Niagara Gr.

toerinus.

é.



ventral side, with an arm in the an-terior part. Type B. wetherbyi.



740

COD.-DIA.

CAS

elo

oeri

gous lews.

Nat

ìr

11,

Mil-

jur-

194.

Mus

ìr.

5,

10,

' and

Bull.

). 65,

1895.

t., p.

erior,

1896.

Hist.

I N

name

ions,

inus.

8. C

the

new

d. in

inton

name itany

and,

ken-

CODASTER blairi, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 86, Chouteau Gr.



Fig. 1327.-Codaster blairi, basal, lateral, and summit views.

- jessieæ, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 89, Chouteau Gr.
- whitei, refer to Codonites whitei
- CODONITES CONICUS, in Geo. Sur. Ill., vol. 8, p. 201, Whitfield says, in Mem. Mus., is a syn. for C. whitei.
 - whitei, Hall, 1861, (Codaster whitei,) is figured, by Whitfield, in Mem. Am. Mus. Nat. Hist., vol. 1, p. 36, and was collected in the Kinderhook Gr.
- COLLOCRINUS dilatatus, Hall, is figured in Mem. Am. Mus. Nat. Hist., vol. 1, p. 33.
- CATHOCRINUS andersoni, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist. p. 30, Keokuk Gr. blairi, Miller and

Gurley, 1895, Bull. No. 7, p. 67, and Bull. No. 8, p. 50,



chouteauen sis, Miller

and Gur-

ley, 1895, Bull. No.7,

III. St.

Mus. Nat.

Hist., p.68, and Bull.

No. 9, p. 38,

Chout e a u

ler and

Gurley

1896, Bull. No. 10, Ill.

St. Mus.

faberi, Mil-

Gr.

Ill. St. Mus. Nat. Fig. 1328. -Cyathoeri-Hist., Chouteau nus blairi, azygous and summit views. Gr. brittsi, Miller and Gurley, 1895, Bull. No.



- Fig. 1329.—Cyathocrinus boon-villensis.
 - Nat. Hist., p. 85, Burlington Gr. inæquidactylus, Whitfield. See C. maxvillensis.
 - labyrinthicus. See Poteriocrinus labyrinthicus.
 - macadamsi, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 69, St. Louis Gr.
 - maxvillensis, Whitfield, 1895, Ohio Geo. vol. 7, p. 465. Proposed instead of C. inæquidactylus of Whitfield, which was preoccupied.

- meekanus, Shumard, 1855, (Poteriocrinus meekanus,) Geo. Rep. of Mo., p. 188, Chouteau Gr.
- signatus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 32, Keokuk Gr

tumidulus, Miller and Gurley, 1894, Bull

No. 3, Ill. St. Mus. Nat. Hist., p. 31, Keokuk Gr. waldronensis, redescribed and refigured in Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 49. illi-

CYCLOCYSTOIDES.



noisensis, Miller Fig. 1330.-and Gurley, 1895, Fus wal -Cvathoeri nus waldronensi Bull. No. 6, Ill. azygous and oppo-St. Mus. Nat. site views.

Hist., p. 61, Hud. Riv. Gr.

CYLICOCRENUS indianensis, Miller and Gur-



Fig. 1331.—Cylicocrinus indianensis, basal, azygous, and lateral views.

ley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 31, Niagara Gr. CYPHOCRINUS. The advance sheets of the

18th Rep. Geo. Sur. Indiana were printed in August, 1892, and were mailed and distributed on the 1st day of September, 1892, as can be proven by the State geologist, at that time, and by his assistants and by many who re-ceived the work. The statements, therefore, which appear in North American Crinoidea Camerata, by Wachsmuth and Springer, vol. 1, pp. 200 to 203, that it was published October 26, 1892, are untrue.

Diabolocrinus, Wachsmuth and Springer, Syn. for Archæocrinus.

hieroglyphicus, Wachsmuth and Springer, Syn. for Archæocrinus asperatus.

perplexus, Wachsmuth and Springer, Syn. for Archæocrinus knoxensis.

DICHOCRINUS bozemanensis, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 44, Keokuk Gr.

- cirrifer, Wachsmuth and Springer, 1897, (Camptocri-nus cirrifer,) N. Amer. Crin. Cam., vol. 2, p. 780, Kaskaskia Gr.
- delicatus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 766, Kinderhook Gr
- huntsvillæ, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 773, St. Louis nus blairi. Gr



1332.

Dichocri -

741

- myelodactylus, Wachsmuth and Springer, 1897, (Camptocrinus myelodactylus,) N. Am. Crin. Cam., vol. 2, p. 779, Keokuk (†r.
- oblongus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 759, Wachsmuth and Springer, Warsaw Gr.
- pendens, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 774, Burlington Gr.
- superstes, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 766, Kaskaskia Gr.
- Dizygocrinus, Wachsmuth and Springer, syn. for Batocrinus. Type Batocrinus indianensis,
 - indianensis var. simplex. See Batocrinus simplex.
 - cantonensis, Wachsmuth and Springer, Syn. for Batocrinus labellum.
- mutabilis, Wachsmuth and Springer, Syn. for Batocrinus vicinus.
- DOLATOCRINUS amplus, Miller and Gurley, ATOCHINES ampros. Miller and Convey. 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 45, Ham. Gr. aplatus, Miller and Gurley, 1896, Bull. No. 8, Ill., St. Mus. Nat. Hist., p. 48,
 - and Bull. No. 9, p. 49, Ham. Gr. approximatus, Miller and Gurley, 1894,
 - Bull. No. 4, Ill. St. Mus. Nat Hist., p. 25, Ham. Gr.
 - argutus, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 41, Ham. G.
 - arrosus, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 52, Ham. Gr.



Fig. 1333.—Dolatocrinus asper, basal and sum-mit views.

asper, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 47, Ham. Gr.



Fig. 1334.-Dolatoerinus aspratilis, basal and summit views.

aspratilis, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat Hist., p. 49, Ham. Gr. aureatus, Miller and Gurley, 1894, Bull.

No. 4, Ill. St. Mus. Nat. Hist., p. 24, Ham. Gr.

basilicus, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 43, Ham. Gr.



- Fig. 1335.-Dolatocrinus basilicus, basal and summit views.
- bellarugosus, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 43, Ham. Gr.
- bellulus; Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 57, Ham. Gr.
- bulbaceus, Miller and Gurley, 1894, Bull. No. 4, Ill. St. Mus. Nat. Hist., p. 22, Ham. Gr.
- cælatus, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 46, Ham. Gr



Fig. 1396.—Dolatocrinus charlestownensis, basal and summit views.

charlestownensis, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat Hist., p. 44, Ham. Gr. cistula, Miller and Gurley, 1896, Bull.



Fig. 1837.-Dolatocrinus corporosus, azygous side.

No. 9, Ill. St. Mus. Nat. Hist., p. 46, Ham. Gr. corporosus, Miller and Gurley, 1895,



Bull. No. 6, 11

50, Ham. Gr.

DOL.

Fig. 1338.-Dolatoo

dispar, Miller a No. 9, Ill. St. Ham. Gr.



Fig. 1339.-Dolatocrin sum

dissimilaris, Mil «Bull. No. 9, Ill. 54 Ham. Gr. excavatus, Wacł



Fig. 1340.—Dolatocrin ornatus, basal and views.

grandis, Miller a No. 4, Ill. St. 1 Ham. Gr. greenei, Miller a No. 4, Ill. St. 1 Ham. Gr. hammelli, Miller No. 6, Ill. St. 1 Ham. Gr. icosidactylus, Wa syn. for D. gree indianensis, Mill Bull. No. 8, Ill. 40, Ham. Gr. laguncula, Miller No. 9, Ill. St. Ham. Gr.

Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 50, Ham. Gr.



Fig. 1338.—Dolatocrinus corporosus, basal view.

dispar, Miller and Gurley, 1896, Bull. o. 9, Ill. St. Mus. Nat. Hist., p. 40, Ham. Gr.



Fig. 1339.-Dolatocrinus dissimilaris, basal and summit views.

dissimilaris, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 54 Ham. Gr.

excavatus, Wachsmuth and Springer, Syn. for D.

> grandis. exornatus, Mil-

ler and Gurley, 1895, Bull. No. 6,

Ill. St. Mus.

Nat. Hist.,

p. 54, Ham.

Gr.

Fig. 1340.—Dolatocrinus ex ornatus, basal and lateral views.

- grandis, Miller and Gurley, 1894, Bull. No. 4, Ill. St. Mus. Nat. Hist., p. 14, Ham. Gr.
- greenei, Miller and Gurley, 1894, Bull. No. 4, Ill. St. Mus. Nat. Hist., p. 28, Ham. Gr.
- hammelli, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 52,
- Ham. Gr. icosidactylus, Wachsmuth and Springer.
- syn. for D. greenei. indianensis, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 40, Ham. Gr.
- laguncula, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 51, Ham. Gr.

- lineolatus, Miller and Gurley, 1894, Bull. No. 4, Ill. St. Mus. Nat. Hist., p. 27, Ham. Gr.
- lyoni, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 44, Ham. Gr.
- lyoni, Wachsmuth and Springer, 1897. The name was preoccupied.
- major, Wachsmuth and Springer, Syn. for D. spinosus.
- magnificus, Miller and Gurley, 1894, Bull. No. 4, Ill. St. Mus. Nat. Hist., p. 5, Ham. Gr.
- marshi var, hamiltonensis, Wachsmuth and Springer, Syn. for D. ornatus var. asperatus
- neglectus, Miller and Gurley, 1894, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 37, Ham. Gr
- nodosus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 56, Ham. Gr.
- ornatus var. asperatus, Miller and Gurley, 1894, Bull. No. 4, ill. St. Mus. Nat. Hist., p. 16, Ham. Gr. peculiaris, Miller and Gurley, 1896, Bull.
- No. 9, Ill. St. Mus. Nat. Hist., p. 55, Ham. Gr.
- preciosús, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 41, Ham. Gr.
- pulchellus, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 55, Ham. Gr.
- sacculus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 58, Ham. Gr.
- salebrosus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 59, Ham. Gr.
- spinosus, Miller and Gurley, 1894, Bull. No. 4, Ill. St. Mus. Nat. Hist., p. 8, Ham. Gr.
- stellifer, Miller and Gurley, 1894, Bull. No. 4, Ill. St. Mus. Nat. Hist., p. 20, Ham. Gr.



Fig. 1341.-Dolatocrinus vascułum, basal view.

tuberculatus, Wachsmuth and Springer, Syn. for D. bellulus. vasculum, Miller and Gurley, 1895, Bull.

743

DOL.

DOL.

24.

bull.

43.

and

896.

ist.,

ull.

57.

ull.

22.

ull.

46.

asal

ley, Nat

ull.

46.

895,

us

No. 6, Ill. St. Mus. Nat. Hist., p. 53, Ham. Gr.



Fig. 1342.-Dolatoerinus vasculum, azygous side.

venustus, Miller and Gurley, 1894, Bull. No. 4, Ill. St. Mus. Nat. Hist., p. 23, Ham. Gr.

DORYCRINUS alabamensis, Miller and Gur-



Fig. 1343 .- Dorycrinus amoenus, azygous and side views.

ley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 15, Keokuk Gr.



Fig. 1344.-Dorycrinus elegans, azygous and summit views.



No. 10, Ill. St. Mus. Nat. Hist., p. 19, Burlington Gr. greenei, Millerand Gurley, 1894.

Bull. No. 5,

Fig. 1345.—Dorycrinus faberi, azygous and opposite views.

Ill. St. Mus. Nat. Hist., p. 48, Keokuk Gr.

parvus, refer to the St. Louis Gr. pendens is illustrated in Mem. Am. Mus.

Nat. Hist., vol. 1, p. 18.

præcursor is better referred to Batocrinus.



Fig. 1846.- Dorycrinus sampsoni, azygous and opposite views.

DOR. -ERE.

- sampsoni, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 17, Burlington Gr.
- suboviformis, Miller and Gurley, 1897. Bull. No. 12, Ill. St. Mus. Nat Hist., p. 30, Burlington Gr.
- tricornis, Hall, 1858, (Actinocrinus tricornis,) Geo. Sur. Iowa, vol. 1, p. 569. and Am. Mus. Nat. Hist., vol. 1, p. 19. Burlington Gr.
- ECHINOCYSTITES was used in 1861, in the Edinbugrh Phil. Jour., vol. 13, p. 106.
- Echinodiscus, Worthen and Miller, 1883. This name was preoccupied by Breynius, in 1732, as the 7th genus in his Dissertatio Physica de Polythalamiis. p. 63. See Ageladiscus.
- EMPEROCRINUS, Miller and Gurley, 1895. Bull. No. 6, 111.

St. Mus. Nat. Hist., p. 42. [Ety. emperos, deformed; krinon, lily.] Basals three, unequal: subradials five, three



view. ular interradials, one or more. Azygous plates, two or more. Ten am-

bulacral openings to the vault. Type E. indianensis. indianensis, Miller

and Gurley, 1895. Fig. 1348. - Emperocrinus indianensis, azy-Bull. No. 6, Ill. gous side view. St. Mus. Nat.

Hist., p. 43, Niagara Gr.

Eretmocrinus. It has been shown, in Bulletins 7 to 10 of the Ill. St. Mus. Nat. Hist., that this genus is founded upon characters of specific value only, and that it is a synonym of Batocrinus. This has unfortunately resulted in a few preoccupied names, requiring others to be substitued in their places. I illustrate two of the most strongly-marked species that have been referred to this genus, and a comparison of them, with those illustrated under Batocrinus, will show they are congeneric.

adultus, attenuatus, calyculoides, calyculoides var. nor dosus, clio, cloelia, commendabilis, corbulis, coronatus, depressus, gemmiformis, intermedius, konincki, leucosia, magnificus, minor, neglectus, originarius, ramulosus, remibrachiatus, rugosus, varsoviensis, and verneuilianus, all belong to Batocrinus.



Fig. 1350

cassedayanus, N **Batocrinus** su depressus, Wac



Fig. 1351.-Eucalypt



EUC. -EUP.



744

ERE.

Bull 1. 17. 1897.

t., p. tri-569. . 19,

in 13. 1883. lrev-1 his

miis, 1895.



·oeribasal

vo or am-)enault. dian-

Tiller 1895. . III. at in

Mus. nded **alue** Bay remes, d in f the that , and ie ilshow

lycu-. nor imennatus. 8, incosia, ectus. remiarsoanns. 18.



Fig. 1858. — Eucalyptocrinus gorbyi, side view.

Springer, Syn. for E. com-

Eucalyptocrinus subglobosus.

Am. Crin. Cam., vol. 1, p. 341, Niag-

- wortheni, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 53,
- Meek and Worthen, 1873, Geo. Sur. Ill. vol. 5, p. 443. This name was suggested as a possibility, rather than defined. If it is to stand, it has priority over Deltacrinus, and, properly spelled, the type would be Euchirocrinus wachsmuthi. Clearly it can not stand, if the law of nomen-
- N. Am. Crin. Cam., vol. 2, p. 722, Bur-lington and Keokuk Gr.

745

Mem. Am. Mus. Nat. Hist., vol. 1, p. 30.

746

- parvus, Miller and Gurley, 1893, Bull. No. 3, Ill. St. Mus. Nat. Hist ?? p. 60, Up. Coal Meas.
- sanctiludorici, refer to Hydreionocrinus sanctiludovici.
- Eutrochocrinus, Wachsmuth and Springer, Syn for Batocrinus. Type Batocrinus christyi.
- FORBESOCRINUS communis, refer to the Keokuk Gr.



Fig. 1355.—Forbesocrinus elegantulus, azygous and opposite views.

greenei, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus.



Fig. 1856. - Forbesocrinus washingtonensis, azygous side.

pyriformis, Miller and Gurley, 1894. Bull. No. 3, Ill. St. Mus. Nat. Hist., p.

Nat. Hist., p. 57,

and Gurley, 1896,

Bull. No. 8, Ill. St. Mus. Nat.

Hist., p. 58, War-

kelloggi, refer to the Keokuk Gr.

macadamsi, Miller

and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat.

Hist., p. 58, Keo-

multibrachiatus, Il-

lustrated Bull.

No. 8, Ill. St. Mus. Nat. Hist.,

jersevensis Miller

Keokuk Gr

saw Gr.

kuk Gr.

p. 55.

47, Keokuk Gr. tardus, refer to the Keokuk Gr.

- washingtonensis, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 54, Keokuk Gr.
- GAZACRINUS. The advance sheets of the 18th Rep. Geo. Sur. Ind. were printed in August, 1892, and were mailed and distributed, on the 1st day of September, 1892, as can be proved by the State Geologist and his assistants, and by many who received the work. The statements therefore, which appear in North American Crinoidea Camerata, by Wachsmuth and Springer, vol. 1, pp. 202 and 203, that the work was

published October 26, 1892, are untrue.



Fig. 1857.-Forbesocrinus washingtonensis, opposite side.

- Gilbertsocrinus dispansus, Wachsmuth and Springer, Syn. for Goniasteroidocrinus yonanus.
 - indianensis, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 38, Ham. Gr.



eral views.

greenei, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 35, Ham. Gr. spinigerus, in-

Fig. 1358,—Gilbertsocrinus greenet, basal and latstead of Goniasteroidoc ri-

nus spinigerus. See Ohio Geol., vol. 7, p. 447.

- GLYPTASTER milliganæ, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 87, Niagara Gr.
- GLYPTOCRINUS billingsi, Wachsmuth and Springer, 1897, (Periglyptocrinus billingsi,) N. Am. Crin. Cam., vol. 1, p. 277, Trenton Gr.
 - mercerensis, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 28, Trenton Gr.
 - typus, Wachsmuth and Springer, 1897, (Tanaocrinus typus,) N. Am. Crin. Cam., vol. 1, p. 186, Hud. Riv. Gr.
- GONIASTEROIDOCRINUS faberi, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 84, Keokuk Gr.
 - lyonanus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 55 Keokuk Gr.
 - papillatus is figured in Mem. Am. Mus. Nat. Hist., vol. 1, p. 36.
 - spinigerus, refer to Gilbertsocrinus spinigerus.
- GRANATOORINUS leda, refer to Pentremites leda.
 - magnibasis, Rowley, 1895, Am. Geol., vol. 16, p. 220, Burlington Gr.
 - mutabilis, Rowley, 1893, Am. Geol., vol. 12, p. 306, Chouteau Gr.
 - sphæroidalis, Miller and Gurley, 1894,

Burlington G GRAPHIOCRINUS II genus. The authors to S retained in th Heterocidaris, Ha Not defined s keokuk and leris so as to be re-HEXACRINUS, Aus cent and Fos six ; krinon, 1 Platyerinus. radials subqu sides of the c for a second r is axillary, a arms arise. third primar bearing arml convex. Typ leai, instead of occidentalis, W 1897, N. Am. Ham. Gr. HOLOCYSTITES as 1895, Bull. N Hist., p. 84, N gyrinus, Miller No. 5, IH. St Niagara Gr.



Fig. 1359.—Holocyst



Fig. 1860.-Holocyst splendens, left ai rior view.

granuliferus, 1

GRA.-HYP.

Bull. No. 3, I

65, Kaskaskia

winslowi, Mille No. 3, Ill. St

GRA.-HYP.

Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 65, Kaskaskia Gr.

- winslowi, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 66, Burlington Gr.
- GRAPHIOCRINUS may not be an American genus. The species referred by the authors to Scaphiocrinus should be retained in that genus.
- Heterocidaris, Hall, 1861, Desc. New Crin. Not defined so as to be recognized.
- keokuk and levispina, Hall. Not defined so as to be recognized.
- HEXACRINUS, Austin, 1843, Monogr. Recent and Foss. Orin., p. 48. [Ety. her, six; krinon, lily.] Strongly resembles Platycrinus. Basals 3, subequal. First radials subquadrangular, and form the sides of the calyx, with a narrow facet for a second radial, which in some cases is axillary, and from which the free arms arise. In other cases there is a third primary radial. Arms ten, and bearing armlets. Vault more or less convex. Type *H. melo*. Jeai, instead of Platycrinus leai.
- occidentalis, Wachsmuth and Springer, 1897, N. Am. Crin. Cam. vol. 2, p. 745, Ham. Gr.
- Holocystites asper, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 84, Niagara Gr.
 - gyrinus, Miller and Gurley, 1894, Bull. No. 5, IH. St. Mus. Nat. Hist., p. 5, Niagara Gr.



Fig. 1359.-Holocystites scitulus, side and summit views



Fig. 1860,-Holocystites splendens, left ante-rior view.

sphæroidalis, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 85, Ni-agara Gr.

splendens, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 7, Niagara Gr.

HYDREIONOCRINUS crassidiscus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 43, Up. Coal Meas. granuliferus, Miller and Gurley, 1894. Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 44, Up. Coal Meas.



Fig. 1361 — Holocystites gyrinus, ventral view.

- noduliferus, Miller and Gurley, 1894. Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 41, Up. Coal Meas.
- sanctiludovici, Worthen, figured in Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 40.
- subsinuatus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 40, Up. Coal Meas.
- Hyptiocrinus, Wachsmuth and Springer, Syn. for Cyphocrinus, as I learn from N. Am. Crin. Cam., vol. 1, p. 200. Cyphocrinus was published and distributed Sept. 1, 1892, and the American Geologist, which contained the unintelligible definition of Hyptiocrinus, was received by me on the 11th day of September, and I suppose, therefore, it was distributed on the 9th at Minneapolis.

i, op-

GRA.

un-

and rinus

1895. t., p. liller

rley.

No. Mus. p. Gr. in-Goncriol. 7, rley,

Nat. and

bil-1, p.

1894.

t., p. 1897.

Crin.

and Mus.

Bull.

p. 55

Mus.

spin-

nites ieol.,

, vol.

1894.

- ICHTHYOCRINUS clarkensis, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 43, Warsaw Gr.
- spinosulus, Miller and Gurley, 1894, Bull. No. 5. Ill. St. Mus. Nat. Hist., p. 44, Keokuk Gr.
- Idiocrinus, Wachsmuth and Springer, Syn. for Gazacrinus, as I learn from N. Am. Crin. Cam., vol. 1, p. 202. Gazacrinus was published and distributed Sept. 1, 1892, and before the Sept. No. of the Am. Geologist, which contained the unintelligible definition of Idiocrinus was printed.
- elongatus and I. ventricosus, Wachsmuth and Springer, Syn. for Gazacrinus inornatus.
- INDIANOCRINUS, Miller and Gurley, 1895. Bull. No. 7, Ill. St. Mus. Nat. Hist., p. [Ety. proper name; krinon, lily.] 83. Basals 5. No subradials. Primary radials one by four. Arms four. No regular interradials. Azygous interradial rests between the upper sloping sides of two basals, and is followed by two plates at the top of the calyx. Type I. punctatus.
- punctatus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 83, Niagara Gr.



Fig. 1362 .- Indianocrinus punctatus, basal, summit, and lateral views, magnified two diam-



748

LECANOGRINUS greenei, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 52, Niagara Gr.

- oswegoensis, Miller and Gurley, 1894, Bull. No. 4, Ill. St. Mus. Nat. Hist., p. 33, Niagara Gr.
- LEPIDESTHES wortheni, Jackson, 1896, Bull. Geo. Soc. Am., vol. 7, p. 207, Keokuk Gr.
- Fig. 1363.azygous side.
- crinus Lobocrinus, Wachsmuth and greenel. Springer Samuth and Springer, Syn. for Bato-crinus. Type Batocrinus nashvillæ.
- robustus. See Batocrinus robustus.
- spiniferus, Wachsmuth and Springer, Syn for Batocrinus marinus.
- MACROSTYLOCRINUS indianensis, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus.
- Nat. Hist., p. 33, Niagara Gr. Macrocrinus, Wachsmuth and Springer, Syn. for Batocrinus. Type Batocrinus konincki.
- MARSUPIOCRINUS striatus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 732, Niagara Gr.

MEGISTOCRINUS, expansus, Miller and Gur-

ley, 1894, Bull. No. 4, Ill. St. Mus. Nat. Hist., p. 35, Ham. Gr.

ICH.-MIT.

- hemisphericus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 44. Ham. Gr.
- indianensis, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 27, Ham. Gr.
- ornatus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 42, Ham. Gr.
- spinosulus, Lyon, instead of spinulosus. whitei is illustrated in Mem. Am. Mus.
- Nat. Hist., vol. 1, p. 27. MELOCRINUS calvini, Wachsmuth and Springer, 1897, Nº Am. Crin. Cam., vol. 1, p. 300, Ham. Gr.
 - gracilis, Wachsmuth and Springer, 1897. N. Am. Crin. Cam., vol. 1, p. 298, Ham. Gr.
- gregeri, Rowley, 1893, Am. Geol., vol. 12, . 303, Ham. Gr.
- lylii, Rowley, 1894, Am. Geol., vol. 13, p. 151, Ham. Gr.
- oblongus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 1, p. 300, Niagara Gr.
- parrus, Wachsmuth and Springer, Syn. for M. æqualis.
- roemeri, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 1, p. 301, Niagara Gr
- sampsoni, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 55, Chouteau Gr.
- tersus, Rowley, 1894, Am. Geol., vol. 13, p. 152, Ham. Gr.
- tiffanyi, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 1, p. 299, Ham. Gr.
- Melonites giganteus, Jackson, 1896, Bull. Geo. Soc. Am., vol. 7, p. 172, Keokuk Gr.
 - indianensis, Miller and Gurley, 1894. Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 5, St. Louis Gr.
 - septenarius, Whitfield, 1896, Bull. Geo. Soc. Am., vol. 7, p. 182, Warsaw Gr.
- MESPILOCRINUS scitulus is described in Bost. Jour. Nat. Hist., vol. 7, p. 321.
- MITROCRINUS, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 22. [Ety. mitra, a turban; krinon, lily.] Calyx depressed ; vault elevated. Basals three, equal. Primary radials three by six. Secondary radials. No



Fig. 1364.-Mitrocrinus wetherbyi, basal and summit views.

subradials. Regular interradials three. Azygous interradials three or more,



the first one 1 Type, M. wethe wetherbyi, Mille No. 5, Ill. St. Trenton Gr. MYELODACTYLUS pe

extending fr outer rim and ally tapering center, when

formed a funne cavity resemb closed umbili Goniatite. M Hammell, of Indiana, has as

of M. gorbyi, side plates in The genus ha

crinoid. Prol cystoides than Echinodermato

NUCLEOCRINUS gre

1894, Bull. No Hist., p. 62, U

venustus, Miller No. 3, Ill. St. 1

Up. Held. Gr. OLIGOPORUS bellu

ley, 1894, Bull Nat. Hist., p.

blairi, Miller an

No. 3, Ill. St. Keokuk Gr.

missouriensis, Ja Soc. Am., vol. sulcatus, Miller

Bull, No. 3, Il 8, St. Louis G



asper, large spec men showing out integument. Nat. Hist., p. pulaskiensis, M Bull. No. 6, p. 40. Kaskask PALEASTER Wyko 1897, Bull. No. Hist., p. 46, H PALÆCHINUS elega genus.

Pentatrematites, Re tremites. Ro to correct the from penta, fiv

PENTREMITES leda nus leda.

lycorias was der N. Y. St. Mus MYE.-PLA.

-MIT.

Nat.

1895.

t., p.

1896.

list.

Bull.

. 42.

SUS

Mus.

and

, vol.

1897.

298.

1. 12.

3, p.

iger. 300,

Syn.

iger. 301. Bull.

). 55,

1. 13.

1897.

299.

Bull.

okuk

1894. t., p.

Geo

in 1

1894,

t., p.

lily.]

dials

Ba-

No

the first one resting on a single basal. Type, M. wetherbyi.

- wetherbyi, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 22, Trenton Gr.
- MYELODACTYLUS possessed long side plates extending from the

outer rim and gradually tapering to the center, where they formed a funnel-shaped cavity resembling the

closed umbiliicus of a Goniatite. Mr. J. S. Fig. Hammell, of Madison, Indiana, has a specimen of M. gorbyi, with the side plates in position.



1365, -- Mye lodactylus gor-byi, side and anterior views. Side plates removed.

- The genus has no near relation to a crinoid. Probably, it is nearer Cyclocystoides than to any other genus of the Echinodermata.
- NUCLEOCRINUS greenei, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 62, Up. Held. Gr.
 - venustus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 63, Up. Held. Gr.
- OLIGOPORUS bellulus, Miller and Gur-ley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 7, Keokuk Gr. blairi, Miller and Gurley, 1894, Bull.
 - No. 3, Ill. St. Mus. Nat. Hist., p. 6, Keokuk Gr.
 - missouriensis, Jackson, 1896, Bull. Geo. Soc. Am., vol. 7, p. 184, Keokuk Gr. sulcatus, Miller and Gurley, 1894,
 - Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 8, St. Louis Gr.



ONYCHOCRINUS asteriformis was described in Bost. Jour. Nat. Hist., vol. 7, p. 320. norwoodi is not a Syn. for O. exculptus and is from the Keokuk

parvus, Miller and

Gurley, 1894, Bull.

- Fig. 1866.—Onychaster asper, large speci-men showing outer e speciintegument.
 - No. 3, Ill. St. Mus. Nat. Hist., p. 52, Kaskaskia Gr. pulaskiensis, Miller and Gurley, 1895,

Gr.

- Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 40. Kaskaskia Gr. PALEASTER wykoffi, Miller and Gurley,
- 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 46, Hud. Riv. Gr.
- PALECHINUS elegans is the type of the genus.
- Pentatrematites, Roemer, is a Syn. for Pen-tremites. Roemer simply attempted to correct the word, which was derived from penta, five; and trema, foramen.
- PENTREMITES leda, instead of Granatocrinus leda.
 - lycorias was described in the 15th Rep. N. Y. St. Mus. Nat. Hist.

sampsoni, Hambach, Syn. for Granatocrinus roemeri.

- Periglyptocrinus, Wachsmuth and Springer, Syn. for Glyptoerinus.
 - billingsi, Wachsmuth and Springer. See Glyptocrinus billingsi.
- PETALOCRINUS, Weller, 1896, Journal of Geology, vol. 4, p. 166. The genus is valid, but the definition is so doubtful that, without seeing specimens, I am unwilling to undertake to give the generic characters. Type P. mirabilis, described, at the same place, from the Niagara Gr., and P. major proposed for a fragment.
- Phialocrinus barydactylus, Keyes, 1895, Geo. Sur. Mo., vol. 4, p. 220. Not intelligently defined.
- PHOLIDOCIDARIS meeki, Jackson, 1896, Bull. Geo. Soc. Am., vol. 7, p. 210, Keokuk Gr.
- PHYSETOCRINUS lobatus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 599, Burlington Gr
 - sampsoni, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 14, Burlington Gr.



Fig. 1367. Physetocrinus sampsoni, azygous and opposite views.

PISOCRINUS baccula, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 79, Niagara Gr.



Fig. 1368. - Pisocrinus baccula, lateral, basal, and summit views.

milliganæ, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 80, Niagara Gr. PLATYCRINUS agassizi, Wachsmuth and Springer, 1897, N. Fig. 1369 .- Pisocri-Am. Crin. Cam., vol. 2, p. 669, Kinderhook Gr. bozemanensis, Miller



nusmilliganæ, lateral view of a perfect specimen without sutures, basal view of same magnified two diameters.

1897, and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 42, Keokuk Gr.



Fig. 1870.-Pisocrinus milliganæ, basal, side, and summit views, showing sutures of the calyx.

hree. lore.

and

bridgerensis, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 43, Keokuk Gr.



750

Fig. 1371. - Platycrinus æquiturnus.

Fig. 1372. - Platyerinus allophyllus.

casula, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 76, Burlington Gr.



Fig. 1373.—Platycrinus Fig. 1374.—Platycrinus annosus. blairi.

clinatus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 74, Chouteau Gr.



- Fig. 1375. Platycrinus casula, basal, azygous and opposite views.
 - concinnulus, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 63, Burlington Gr.
 - contritus, refer to the Keokuk Gr.
 - cortina, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 40, Chouteau Gr.
 - davisi, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 684, Burlington Gr
 - douglassi, Miller and Gurley, 1896, Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 86, Burlington (?) Gr.

elegans is illustrated in Mem. Am. Mus. Nat. Hist., vol. 1, p. 3.

excavatus is illustrated in Mem. Am. Mus. Nat. Hist., vol. 1, p. 3.

formosus, Mil-

ler and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat Hist.,

p. 72, Bur-Fig. 1376. – Platyerinus for-lington Gr. mosus, basal and azygous formosus var. side views.

approximatus, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 60, Burlington Gr.

geometricus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 697; Burlington Gr.

germanus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 78,

Chouteau Gr. graphicus, refer to the Keokuk Gr. hodgsoni, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 63, Burlington Gr.

PLA

- huntsvilla, Wachsmuth and Springer, Syn. for P. alabamensis. illinoisensis, Miller and Gurley, 1896.
- Bull. No. 8, Ill. St. Mus. Nat. Hist , p. 62, Burlington Gr.
- inornatus, McChesney, 1859, Desc. New Spec. Foss., p. 6, Burlington Gr., is not a Syn. for P. burlingtonensis.
- missouriensis, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 73, Chouteau Gr.
- modestus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 77, Burlington Gr.
- nodostriatus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 1, p. 698, Burlington Gr.
- perasper, Meek and Worthen. Not recognized.
- peculiaris, Wachsmuth and Springer, N. Am. Crin. Cam., vol. 2, p. 700, Burlington Gr.
- pettisensis, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 73, Chouteau Gr.
- pratteni is on page 569, Trans. St. Louis Acad. Sci, vol. 1,
- richfieldensis, refer to the Keokuk Gr.
- semifusus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus Nat. Hist., p. 77, Burlington Gr.
- sharonensis, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 42, Burlington Gr.
- spinifer, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 708, Burlington Gr.
- spinifer, var. elongatus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 709, Burlington Gr.
- striobrachiatus is illustrated in Mem. Am. Mus. Nat. Hist., vol. 1, p. 4.
- subscitulus, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 62, Burlington Gr.
- sulciferus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 75, Burlington Gr.
- tugurium, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 70, Burlington Gr.



Fig. 1377. — Platyerinus tugurium, basal and azygous views.

vascellum, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 32, Keokuk Gr.

PLE.-PO

Verrue Crin





and basa

POTERIOC

5, Ill

p. 24.

and

No. Hist. altonen ley, 1 St. M St. L arrecta ley, 1 St. M



Fig. 1381.-



Fig. 1382.-F

PLA.

, 1896, Bull. Hist., p. 63,

1 Springer.

urley, 1896. Nat. Hist .

. Desc. New n Gr., is not sis. iurley, 1895, Nat. Hist.,

7, 1895, Bull. Hist., p. 77,

nd Springer, ol. 1, p. 698,

n. Not rec-

Springer, N. 700, Burling-

urley, 1895, Nat. Hist.,

ns. St. Louis

leokuk Gr. y, 1895, Bull. Hist., p. 77,

iurley, 1897, . Nat. Hist.,

oringer, 1897, , p. 708, Bur-

Wachsmuth . Crin. Cam., Fr. ed in Mem. 1, p. 4. Jurley, 1896, Nat. Hist., p.

y, 1895, Bull. Hist., p. 75,

y, 1895, Bull. Hist., p. 70,



im, basal and

Jurley, 1895, Nat. Hist., p.



ECHINODERMAT.I.

verrucosus, illustrated. See N. Am. Crin. Cam., vol. 2, p. 705.



Fig. 1378.—Platycrinus vascellum, basal, lateral, and summit views.



PLEUROCYSTITES mercerensis. Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p.60,TrentonGr. POROCRINUS ken-

Fig. 1379.-Pleurocystites mercerensis, dorsal and basal views.

p. 24, Trenton Gr.

St. Louis Gr.

tuckiensis, Miller and Gurley, 1894, Bull. No.

5, Ill. St. Mus. Nat. Hist., POTERIOCRINUS albersi, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 29, Kaskaskia Gr. altonensis, Miller and Gur-

ley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 62, Fig.1380.-Pc-rocrinus kentucki-ensis, latarrectarius, Miller and Gur-ley, 1896, Bull. No. 9, Ill. eral view. St. Mus. Nat. Hist., p. 33, St. Louis Gr.



Fig. 1381.-Poteriocrinus albersi, azygous and opposite views.



Fig. 1382.-Poteriocrinus blairi, azygous and opposite views.





blairi, Miller and Gurley, 1895, Bull. No.

1383. - Poteriocri-

No. 7, Ill. St. Mus.

Fig. 1385. - Poteriocrinus cir-

cumtextus, azygous and opposite views.

Nat. Hist., p. 63, Chouteau Gr. circumtextus, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat.

Hist., p. 31, Keokuk Gr.



Fig. 1386. - Potecorycia, refer to Keokuk riocrinus cory-phæus, view opposite azy-gous side. Gr. crineus, refer to Keokuk Gr.

^a douglassi, Miller and Gurley, 1896, Bull.



Fig. 1384.—Poteriocrinus altonensis, azygous and opposite views.

No. 10, Ill. St. Mus. Nat. Hist., p. 83, Burlington (?) Gr.

hammondi, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 35, Kinderhook Gr.

labyrinthicus, S. A. Miller, 1891, (Cyathocrinus labyrinthieus,) Adv. sheets 17th Rep. Geo. Sur. Ind., p. 48 and final Report, p. 659, Keokuk Gr.



Fig. 1388.-Poteriocrinus lautus, azygous and opposite views.

- lautus, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 30, Keokuk Gr
- maccabei, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 34, Kinderhook Gr.
- maccabei var. decrepitus, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus.
- Nat. Hist., p. 36, Kinderhook Gr. neglectus, Miller and Gurley, 1896, Bull. No. 9, Ill St. Mus. Nat. Hist., p. 31, Keokuk Gr.

pleias, refer to the Keokuk Gr.

- pulaskiensis, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 39, Kaskaskia Gr.
- sampsoni, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 65, Chouteau Gr.
- vagulus, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 46, Kaskaskia Gr.

Proclivocrinus, Ringueberg, Syn. for Calceocrinus.



Fig. 1389.—Pterotocrinus wetherbyi, azygous and basal views.

PTEROTOCRINUS we ther by i, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p.

Fig. 1890.- 44, Kaskaskia Gr. Retlocri - RETIOORINUS alveolatus, Miller nus alveand Gurley, 1894, Bull. No. olatus azygous side. 5, Ill. St. Mus. Nat. Hist., p. 26, Trenton Gr.

RHODOCRINUS barrisi var. striatus, Wachsmuth and Springer, 1897, N. Am. Crin.

Cam., vol. 1, p. 281, Burlington Gr. blairi, Miller, and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 37, Chouteau Gr.

bozemanensis, Miller and Gurley, 1897,

Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 40, Keokuk Gr.

PRO.-SAM.



Fig. 1391.-Rhodocrinus blairi, basal, azygous, and opposite views.

bridgerensis, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 41, Keokuk Gr.

douglassi, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 39, Keokuk Gr.

truncatus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 1, p. 231, Burlington Gr.

tuberculatus,



- Wachsmuth & Fig. 1392.-Rhodocrinus Springer, 1897, parvus, azygous and op-N. Am. Crin. posite views.
- Cam., vol. 1, p. 232, Burlington Gr. vesperalis, White. This species was de-scribed from the Upper Coal Measures west of Humboldt, Kansas. It is now asserted that it came from the Trenton Group of Tennessee, and is an Archæocrinus. If so, the definition was wholly erroneous, and the specific name must be disregarded.
- wortheni var. urceolatus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 1, p. 221, Burlington Gr.
- Saccocrinus amplus, refer to Actinocrinus amplus.
 - umbrosus, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist. p. 24, Niagara Gr.

SAMPSONOCRINUS, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat Hist., p. 51. [Ety. proper name; krinon, lily.] Body globose. Basals three, one pentagonal, two hexagonal. Primary radials, two or three in each radial series, and differing, in this respect, in the same specimen. Secondary and ter-tiary radials. Interradials connect with the vault, and in three of the areas the first plate abuts upon the basals, by which arrangement eight plates unite with the basal disk. Proboscis subcentral. Type S. hemisphericus.



Fig. 1893.—Sampsonocrinus hemisphericus, basal and summit views.



hemis Bull p. 51



Fig. 1394.-SCAPHIOC

store with cies (crinn the h to Pe muth aside ægina, arrosus No. Keok carinat Mus. lyriope martin Bull 38, K notatus No. Kind subcari subtort tortuos Mus. SHUMARD Bull. **4**0. Basal Regu inter conne Orific concinr conci lingto SIPHONOCI and S vol. 1 STEGANOC 1897, Hist. blairi, 1



Fig 1895. hammeli side vews vol. 2, griffithi

PRO.-SAM.

Nat. Hist., p.



asal, azygous,

iurley, 1897, Nat. Hist.,

y, 1897, Bull. Hist., p. 39,



Rhodo cyinus ygous and op-WS.

igton Gr. cies was deoal Measures us. It is now 1 the Trenton is an Archæofinition was the specific d.

Wachsmuth 1. Crin. Cam., Gr. Actinocrinus

y, 1895, Bull. . Hist. p. 24,

Gurley, 1895, Nat Hist., p. krinon, lily.] free, one pen-

Primary raradial series, spect, in the ary and terlials connect e of the areas the basals, by t plates unite boscis subcen-



isphericus, basal

SCA.-SYN.

hemisphericus, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 51, Chouteau Gr.



Fig. 1394.—Sampsonocrinus hemisphericus, azygous and lateral views

- SCAPHIOCRINUS. This genus must be restored, as originally defined by Hall, with S. simplex as the type. The species described by Worthen as Poteriacrinus, and referred to Scaphiocrinus in the body of this work, may be restored to Poteriocrinus. The work of Wachsmuth on this genus may be wholly set aside.
- ægina, refer to the Keokuk Gr.
- arrosus, Miller and Gurley, 1894, Bull No. 3, Ill. St. Mus. Nat. Hist., p. 39, Keokuk Gr.
- carinatus, is illustrated in Mem. Am. Mus. Nat. Hist., vol. 1, p. 31.
- lyriope, refer to the Keokuk Gr.
- martinensis, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 38, Kaskaskia Gr.
- notatus, Miller and Gurley, 1896, Bull. No. 9, Ill. St. Mus. Nat. Hist., p. 34,
- Kinderhook Gr. subcarinatus, refer to the Keokuk Gr.
- subtortuosus, refer to the Keokuk Gr.
- tortuosus is illustrated in Mem. Am.
- Mus. Nat. Hist., vol. 1, p. 32. SHUMARDOCRINUS, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 40. [Ety. proper name; krinon, lily.] Basals three. Radials two by five. Regular interradials one. Azygous interradials three. Interradial areas connect with the vault. No proboscis. Orifice subcentral. Type S. concinnus. concinnus, Shumard, 1855, (Actinocrinus
- concinnus,) Geo. Sur. Mo., p. 189, Burlington Gr.
- SIPHONOCRINUS pentagonus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 1, p. 213, Niagara Gr.
- STEGANOCRINUS albersi, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 33, Burlington Gr.
- blairi, Miller and Gurley, 1897, Bull. No.



35, Burlington Gr. globosus, Wachsmuth and Springer, 1897, N. Am.

12.III.St. Mus.

Nat. Hist., p.

Crin. Cam.,

1395. -Stephanocrinus hammelili, summit and side vews.

vol. 2, p. 585, Kinderhook Gr. griffithi, Miller and Gurley, 1897, Bull.

No. 12, Ill. St. Mus. Nat. Hist., p. 34, Burlington Gr.



Fig. 1396.-Stephanocrinus osgoodensis, side and summit view

- sharonensis, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 32, Burlington Gr.
- spergenensis, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 29, St. Louis Gr. validus, Meek and Worthen, 1860, (Ac-
- tinocrinus validus,) Proc. Acad. Nat. Sci., p. 384, and Geo. Sur. Ill., vol 2, p. 200, Burlington Gr.
- STEREOCRINUS barrisi, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 1, p. 326, Ham. Gr.
 - indianensis, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 38, Ham. Gr.



Fig. 1397.—Stribalocystites sphæroidalis, ante-rior, basal, and summit views.

- STRIBALOCYSTITES sphæroidalis, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 58, Niagara Gr.
- STROTOCRINUS ægilops is illustrated in the Mem. Am. Mus. Nat. Hist., vol. 1, p. 20.
 - blairi, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 48, Burlington Gr.
 - ornatus, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus.

Nat. Hist., p. 30, Burlington Gr. regalis is illustrated in Geo. Sur. Ill., vol. 5,

p. 357. venustus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 26, Burlington Gr.

SYNBATHOCRINUS angularis, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. His., p. 42, Keokuk Gr.

illinoisensis, Miller & Gurley, 1896, Bull. Fig. 1398.-Syn-No. 8, Ill. St. Mus. blathocrinus Nat. Hist., p. 53, Burlington Gr.



and azygous views.

Proc. Acad. Nat. Sci., p. 67, and Geo. Sur. Ill., vol. 5, p. 437, Burlington Gr. TALAROCRINUS decornis, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol.

754

- 2, p. 788, St. Louis Gr. patei, Miller and Gurley 1897, Bull. No. 12, Ill. St. Mus. Nat Hist., p. 44, Kaskaskia Gr.
- subglobosus, Wachsmuth and Springer, 1897, N. Am. Crin. Cam., vol. 2, p. 789,/ St. Louis Gr.
- trijugis, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 45, St. Louis Gr.
- Tanaocrinus, Wachsmuth and Springer, Syn. for Glyptocrinus.

typus. See Glyptocrinus typus.

- TAXOCRINUS colletti, White, 1881, (T. multibrachiatus var. colletti,) is a good species.
 - concavus, Rowley, 1893, Am. Geol., vol. 12, p. 304, and vol. 13, p. 153, Ham. Gr.
- crawfordsvillensis, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 49, Keokuk Gr.
- juvenis is illustrated in Mem. Am. Mus.
- Nat. Hist., vol. 1, p. 35. splendens, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 61, Keokuk Gr.
- ungula, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 59, Keokuk Gr.



Fig. 1899 .- Taxocrinus wetherbyi, basal view, azygous side down.

wetherbyi, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 41, Kaskaskia Gr.

THALAMOORINUS, Miller and Gurley, 1895, ZEAORINUS bellulus, Mil-



Fig. 1400. - Taxocrinus wetherbyi, lateral view.

> Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 81. [Ety. thalamos, a small house; krinon, lily.] Body pear-



diameters.

shaped or fusiform, and covered by three ranges of plates and a small vault. First circle, five plates, equal. Second circle, five plates. Third circle, six plates. Type *T. oratus*. cylindricus, Miller and Gurley,

1895 Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 82, Niagara Gr.

ovatus, Miller and Gurley, 1895, Bull. No. 7,



TAL.-ZEA.

Ill. St. Mus. Fig. 1402.-Thalamocrinus Nat. Hist., ovatus, lateral, azygous, and summit views, magni-fied two diameters. p. 81, Niagara Gr.

Teleiocrinus, Syn. for Strotocrinus.

adolescens. See Actinocrinus adolescens. THYLACOCRINUS, Oehlert, 1878, Bull. Soc. Geol. de France, Tome VIII, p. 6. [Ety. thylakos, a bag; krinon, lily.] The French Devonian species are very large,

and the calyx, as high as the secondary radials, seems to be constructed as in Rhodocrinus. Above this there are intersecondary and intertertiary radials, and twenty or more large arms. Type *T. vannioti.* clarkei, Wachsmuth and Springer, 1897,

N. Am. Crin, Cam., vol. 1, p. 248, Ham. Gr.



Fig. 1403.—Thysanocrinus milliganæ, basal, azy-gous, and opposite side views.

THYSANOCRINUS milliganæ, Miller and Gurlèy, 1896, Bull. No. 8, Ill. St. Mus. Nat.

Hist., p. 51, Niagara Gr. ULOCRINUS blairi, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 57, Up. Coal Meas. occidentalis, Miller & Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 58, Up. Coal Meas. ler and Gur-

ley, 1894, Bull.

No. 3, Ill. St. Mus Nat. Hist., Fig. 1404.–Zeacrinus p. 34, Kaskas- gous side. kia Gr.

blairi, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat, Hist., p. 66, Keokuk Gr.

cylindricus, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist , p. 38, Kaskaskia Gr.

doverensis, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 35, Kaskaskia Gr.



No. 6 Kask grandic Bull. 32, K kentuel Bull. 57, K manifor p. 682 merope moores 7, p. 4 nitidus, No. 3 Kask obesus.

SEVE belong to work was but not Illinois Go would be to open up several ge the family words "S published volume®wa family na stricken ou I will not, could only Micro

exposing t three gene place mucl

Ample.ropor affinis. winchel pora; a synony Batosto Anolotichia

durabil

TAL.-ZEA.

covered by and a small lates, equal. Third cir-

ratus. 1895, urley Nat. Hist., p.



lamocrinus eral, azygous views, magnieters.

inus. s adolescens.

8, Bull. Soc. I, p. 6. [Ety. lily.] The re very large, he secondary tructed as in is there are rtertiary ralarge arms.

oringer, 1897, p. 248, Ham.



næ, basal, azynews.





404.-Zeacrinus ndiculus, azys side.

ey, 1895, Bull. Nat, Hist., p.

and Gurley, St. Mus. Nat. ia Gr. Gurley, 1896, us. Nat. Hist., AMP.-ARC

MOLLUSCOIDA.

durabilis, Miller and Gurley, 1895, Bull. No. 6, Ill. St. Mus. Nat. Hist., p. 48, Kaskaskia Gr.

- grandiculus, Miller and Gurley, 1894, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 32, Kaskaskia Gr.
- kentuckiensis, Miller and Gurley, 1896, Bull. No. 8, Ill. St. Mus. Nat. Hist., p. 57. Kaskaskia Gr.
- maniformis is figured in Geo. SuA Iowa, 👔 p. 682.
- merope, refer to the Keokuk Gr.
- mooresi is reproduced in Ohio Geol., vol. 7, p. 483.
- nitidus, Miller and Gurley, 1894, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 36, Kaskaskia Gr.

obesus, Miller and Gurley, 1894, Bull.

No. 3, Ill. St. Mus. Nat. Hist., p. 35, Kaskasika Gr.

paternus, refer to the Keokuk Gr. peculiaris, Miller and Gurley, 1896, Bull.

No. 8, Ill. St. Mus. Nat. Hist, p. 34, Kaskaskia Gr.

pulaskiensis, Miller and Gurley, 1895, Bull. No. 5, Ill. St. Mus. Nat. Hist., p. 47, Kaskaskia Gr.

salemensis, Miller and Gurley, 1894, Bull. No. Fig. 1405.-5, Ill. St. Mus. Nat.

crinus pulaskiensis, azygous scoparius is figured in views

-Zea

Mem. Am. Mus. Nat. Hist., vol. 1, p. 34.

SUBKINGDOM MOLLUSCOIDA. CLASS BRYOZOA.

SEVERAL genera included among the Bryozoa, in the original text of this work, belong to the polyp corals. See remarks under Cœlenterata. In 1889, when the work was in part printed, and most of the article on the Bryozoa was in the galleys, but not yet made up into pages, part of the printed pages of Vol. VIII of the Illinois Geo. Sur. was presented to me, and, on the representation that the volume would be published at about the same time that my work would be, I was induced to open up the galleys and insert the Bryozoa from the Illinois Report. This caused several genera, by oversight, to appear in different families, and practically destroyed the family arrangement, and it, probably, also led to the accidental placing of the words "Subkingdom Mollusca" over the word Brachiopoda. While, therefore, I published the species from the Illinois Report as "in press," the fact is, that the volume^awas not published for a year or more after my work was published. Such family names as Amplexoporidæ, Batostomellidæ, Rhabdomesontidæ, etc., must be stricken out; but as so many genera of polyp corals are printed with the Bryozoa, I will not, at this time, undertake a family arrangement of the Class, which, at best, could only be approximately correct.

Microscopic sections, in the hands of a scholar, are no doubt of great service in exposing the life history of the Bryozoa; but there are some who can make two or three genera and five or six species out of a single specimen, and it will not do to place much confidence in their microscopic work.

Amplexopora is not a valid genus and affinis, pustulosa, septosa, superba, and winchelli may be referred to Monticulipora; and canadensis, cingulata, and its synonym robusta, may be referred to Batostomella, if they are valid species. Anolotichia, Ulrich, 1890, Geo. Sur. Ill., vol. 8, p. 381. Too poorly defined to be recognized. The species impolita and ponderosa are also too poorly defined to be recognized.

Archimedes grandis, Ulrich, Syn. for A. wortheni

negligens, Ulrich, Syn. for A. owenanus.

755

- ARTHROCLEMA striatum Ulrich, 1893, Geo. | Sur. Minn. vol. 3, p. 198, Trenton Gr.
- ARTHROPORA bifurcata, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 178, Trenton and Galena Gr.
- reversa, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 178, Trenton Gr.
- Aspidopora, Ulrich, Syn for Prasopora. elegantula, Ulrich, 1893, Geo. Sur. Minn.,
- vol. 3, p. 256, Galena Gr., refer to Prasopora elegantula.
- ASTROPORITES, Lambe, 1896, Can. Jour. Sci., A. ottawensis is described as the type from the Trenton Gr.
- Ataetopora septosa is a Monticulipora. ATACTOPORELLA crassa, Ulrich, 1893, Geo.
- Sur. Minn., vol. 3, p. 225, Galena Gr.
 insueta, Ulrich, 1893, Geo. Sur. Minn.,
 vol. 3, p. 224, Trenton Gr. ortoni, refer to Monticulipora ortoni.
- ramosa, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 226, Trenton Gr.
- BATOSTOMA decipiens, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 298, Trenton Gr. humile, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 294, Galena Gr.
 - magnopora, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 291, Trenton Gr. minnesotense, Ulrich, 1893, Geo. Sur.
 - Minn., vol. 3, p. 297, Trenton Gr. montuosum, Ulrich, 1893, Geo.
 - 1893, Geo. Sur. Minn., vol. 3, p. 293, Trenton Gr. varium, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 292, Trenton Gr.
- Buscopora, Ulrich, Syn. for Fistulipora. BYTHOPORA alcicornis, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 264, Trenton Gr.
- Bythotrypa, Ulrich. Too poorly defined to be recognized.
- CALLOPORA ampla, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 281, Trenton Gr.
 - angularis, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 277, Trenton Gr.
- cincinnatiensis, Ulrich, Syn. for Fistulipora occidens.
- crenulata, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 284, Trenton Gr.
- dumalis, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 282, Trenton Gr.
- goodhuensis, Ulrich, 1893, Geo. Sur. Minn., vot. 3, p. 282, Galena Gr. minutissima, instead of Leioclema minu
 - tissimum. onealli, James, Syn. for Callopora sigillarioides.
 - pulchella, Ulrich, 1893, Geo. Sur. Minn.,
 - vol. 3, p. 283, Trenton Gr. punctata, instead of Leioclema punctatum.
- Calloporella, Ulrich, Syn. for Prasopora. nodulosa, Ulrich. Too poorly defined to be recognized.
- CERAMOPHYLLA, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 331. No generic characters are given by which it can be distinguished. Type C. frondosa.
 - frondosa, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 331, Trenton Gr.

CERAMOPORA inclusa, Ulrich, 1893, (Ceramoporella,) Geo. Sur. Minn., vol. 3, p. 329, Trenton Gr.

ART.-FEN.

- interporosa, Ulrich, 1893, (Ceramoporella,) Geo. Sur. Minn., vol. 3, p. 330, Hud. Riv. Gr.
- Ceramoporella, Ulrich, Syn. for Ceramopora.
- CREPIPORA perampla, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 323, Trenton Gr. *spatiosa*, Ulrich. Too poorly defined to
- be recognized. subæquata, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 322, Trenton Gr.
- Cystodictya, Ulrich, seems to be a synonym for Stictopora.
- DIAMESOPORA trentonensis, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 330, Trenton Gr.
- Discotrypa, Ulrich, Syn. for Prasopora. Eridopora minima, Ulrich, Syn, for Pileotrypa denticulata.
- ERIDOTRYPA, Ulrich, 1893, Geo. Sur. Minn; vol. 3, p. 264. [Ety. eridos, in dispute., trypa a perforation.] Zoaria ramose, branches slender. Zoœcia more or less oblique, with thick walls, the tubes intersected by diaphragms only. The latter may be wanting in the axial region, are in most cases absent for a short distance within the apertural edge, but always present and closest together in the turn from the axial into the narrow peripheral region. Mesopores with close-set diaphragms, varying in number; sometimes abundant, at other times very few. Acanthopores small, never numerous, some-
- times wanting Type E. mutabilis. exigua, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 266, Galena Gr.
- mutabilis, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 265, Galena Gr.
- ESCHAROPORA angularis, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 168, Trenton Gr. confluens, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 171, Trenton Gr.

limitaris, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 172, Trenton Gr.

- EVACTINOPORA radiata is from the Keokuk Gr.
- FENESTELLA. The nonporiferous side of the branches is a basal plate on which the cells take their origin, and is usually longitudinally striated. There is no axis. There are two rows of cells on the branches, on each side of a high keel. Sometimes there are accessory pores on the keel. There are no pores on the dissepiments. Species are distinguished by the size of the branches and of the fenestrules. and from the arrangement of the cell openings. Age thickens the basal plate, and sometimes closes part of the pores, and there is great difference in the appearance in different states of preservation.
- bigeneris, Ulrich, Syn. for F. perplexa.

FIS.-SPA

patelli

sculpti

Lich

Fistulipo

oweni,

and Glyptopo cinit HELOPOR Min harrisi vol. quadra yol. Hemiphr stom tenuim irras HOMOTRY Mini insigni interca vol. : separat sis. similis. Cam tuberc Minn HOMOTRY Geo. Gr. mundu vol. 8 ovata, 3, p. 1 rustica vol 3 subgrad vol. 3 LEPTOTRY Sur. clavifor vol. 3 informi vol. 3 Leioclemaprine spir pores are m in the ment Leiocleme to be ensis nized Lichenotry longis Lyropora cunci ranoscu Mesatrypa spinosa, sitica Nematopo ovalis NICHOLSON Sur. M

756
ART.-FEN.

93, (Ceram-., vol. 3, p.

(Ceramopol. 3, p. 330,

or Ceramo-

1893, Geo. Frenton Gr. defined to

Geo. Sur. on Gr. a synonym

lrich, 1893. 30, Trenton

isopora 1, for Pileo-

Sur. Minn ; .* in dispute., ria ramose, more or less he tubes in-The only. he axial rebsent for a e apertural and closest h the axial eral region. liaphragms, times abunfew. Acanerous, someutabilis. Sur. Minn.,

Sur. Minn.,

1, 1893, Geo. **Frenton** Gr. Sur. Minn.,

Sur. Minn.,

the Keokuk

ous side of te on which , and is usuted. There wo rows of each side of s there are ceel. There issepiments. by the size fenestrules, t of the cell the basal s part of the lifference in nt states of

perplexa.

patellifera, Ulrich, Syn. for F. variapora. sculptilis, Ulrich, Syn. for F. stellata. Fistulipora normalis, Ulrich, Syn. for

FIS.-SPA.

- Lichenalia substellata. oweni, James, is probably a Diamesopora,
- and may be so referred.
- Glyptopora megastoma, Ulrich, Syn. for Coscinium keyserlingi.
- HELOPORA elegans, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 194, Hud. Riv. Gr.
- harrisi, James, 1893, Geo. Sur. Minn, vol. 3, p. 195, Hud. Riv. Gr.
- quadrata, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 193, Galena Gr.
- Hemiphragma, Ulrich. Syn. for Batostoma.
- tenuimurale, Ulrich, Syn. for Batostoma irrasum.
- HOMOTRYPA callosa, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 243, Galena Gr.
- insignis, Ulrich, Syn. for H. subramosa. intercalaris, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 238, Trenton Gr.
- separata, Ulrich, Syn. for H. minnesotensis.
- similis, Foord, 1883, Cont. Micro Pal. Cambro. Sil. Rocks, p. 10, Trenton Gr. tuberculata, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 240, Trenton Gr.
- · HOMOTRYPELLA multiporata, Ulrich, 1893,
- Geo. Sur Minn., vol. 3, p. 230, Trenton Gr.
 - mundula, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 232, Galena Gr.
 - ovata, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 231, Galena Gr.
 - rustica, Ulrich, 1893, Geo. Sur. Minn., vol 3, p. 234, Hud. Riv. Gr.
 - subgracilis, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 230, Trenton Gr.
- LEPTOTRYPA acervulosa, Ulrich, 1893, Geo. Sur. Minn., vol. 3 p. 318, Galena Gr
- claviformis, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 319, Trenton Gr.
- informis, Ulrich, 1893, Geo Sur. Minn., vol. 3, p. 317, Trenton Gr. Leioclema, Ulrich, Syn. for Callopora. The
- principal character is the presence of spiniform corallites" or "acanthopores," which, as Waagen has shown, are merely the newly-developed gems in the intermural development or fragments of the secondary walls.
- Leioclemella, Foerste. Not defined so as to be reconized as a genus and L. Ohioensis is too poorly defined to be recognized as a species.
- Lichenotrypa cavernosa, Ulrich, Syn. for L. longispina
- Lyropora ovalis, Ulrich, Syn. for L. quincuncialis.
- ranosculum, Ulrich, Syn. for L. lyra.
- Mesatrypa, Ulrich, Syn. for Dianulites. spinosa, Uhrich, Syn. for Prasopora parasitica.
- Nematopora quadrata, Ulrich, Syn. for N. ovalis.
- NICHOLSONELLA laminata, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 315, Trenton Gr.

pulchra, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 314, Trenton Gr.

- PACHYDICTYA elegans, Ulrich, 1893, Geo.
- Sur. Minn, vol. 3, p 154, Galena Gr. PHENOPORA incipiens, Ulrich, 1893, Geo. Sur. Minn., vol 3, p. 174, Trenton Gr.
- wilmingtonensis, Ulrich, 1893, Geo Sur. Minn., vol 3, p 175, Hud Riv Gr.
- PHYLLODICTYA varia, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 144, Trenton Gr.
- PHYLLOPORA. The basal plate on the nonporiferous side is composed of fine capillary tubes and is longitudinally striated or granulated. The cells ascend from their origin a short distance along the basal plate and then bend directly outward. The branches are
- anastomosing.
- Pinacotrypa, Ulrich, Syn. for Fistulipora. POLYPORA The nonporiferous side is occupied by the basal plate, composed of one or more layers of capillary fibers, and is longitudinally striated. On the obverse side, mostly the inner one, there are from three to ten longitudinal rows of pores; they are round, and usually the margin is elevated. No keel. The cells originate at the axis of the branches, and rise in an oblique direction upward and outward. Dissepiments without cells.

simulatrix, Ulrich, Syn. for P. hallana. PROBOSCINA tumulosa, Ulrich, Syn. for Sto-

- matopora frondosa. PTILODICTYA whitfieldi, Foerste, Syn. for Phænopora expansa
- RHINIDIOTYA grandis, Ulrich, 1893, Geo. Sur Minn., vol. 3, p. 136, Trenton Gr. humilis, Ulrich, Syn. for Pachydictya pumula.
 - neglecta, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 130, Galena Gr.
- pediculata, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p 137, Trenton Gr.
- Rhabdomesontidæ, Vine, Syn. for Petaloporidæ, Waagen, which includes Rhombopora.
- Waagen says the little RHOMBOPORA. granules or spinules on the surface are due to the method of preservation. The cause of this character is the accumulation of sparry matrix at the mouths of such very narrow canals, which often protrudes in hemispherical masses and is of very general occurrence in widely different fossils.
- RHOPALONARIA pertennis, Ulrich, Syn. for Stomatopora proutana.
- SEMICOSCINIUM obliquatum, Ulrich, Syn. for Fenestella obliquatum.
- SEPTOPORA biserialis, instead of Synocladia biserialis.
- rectistyla, instead of Synocladiar ectistyla It is described and figured in Ohio Geol., vol. 7, p. 467.
- Spatiopora, Uhrich, Syn. for Atactopora. iowensis, Ulrich, 1893, not defined so as to be recognized.

labeculosa, Ulrich, 1893, Geo. Sur. Minn., vol 3, p. 320, Trenton Gr.

Not de-STICTOPORELLA dumosa, Ulrich. fined so as to be recognized.

STOMATOPORA canadensis, Whiteaves, 1897, Pal. Foss., vol. 3, p. 161, Low. Silpertenuis, Ulrich, Syn. for S. proutana.

tenuissima, Ulrich, Syn. for S proutana. STROMATOTRYPA, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 301. [Ety. stroma,

layer; trupa, opening.] Zoarium consisting of one or more thin layers on foreign bodies. Zocecial tubes short, few diaphragms, proximal end scarcely prostrate, oval in cross section; walls thin, containing one or more constricted, bead-like tubuli to each zocecium. Apertures oval, separated by depressed interspaces, the peristomes minutely papillose. Mesopores abundant, beginning on the basal lamina,

decreasing in size with age, closely tabulated, the diaphragms finely punctured; mouths rarely visible, closed by a common dermal sheet. True acanthopores wanting. Type S. ovata.

STL-UNI.

- ovata, Ulrich, 1893, Geo. Sur. Minn., vol. 3, p. 302, Trenton Gr.
- SYNOCLADIA. This is a Permian genus in the Eastern hemisphere, and is not known in America
- biserialis, refer to Septopora biserialis rectistylu, refer to Septopora rectistyla.
- THAMNISCUS is a Permian genus and many species referred to it probably belong elsewhere.
- Trigonodictya, Ulrich. Not defined so as to be reconized.
- UNITRYPA conferta, Ulrich, Syn. for U. acaulis.

retrorsa, Ulrich, Syn. for U. tegulata.

CLASS BRACHIOPODA.

DR. WAAGEN proposed, in Palæontologia Indica, to subdivide the Arthropomata into three Suborders, Kampylopeqmata, sive Terebratulacea, comprising the families Terebratulida, Thecideida, Rhynchonellida, and Stringocephalida; Helicopegmata, sive Spiriferacea, comprising the families Atrypidæ, Nucleospiridæ, Athyridæ, and Spiriferida; Aphaneropegmata, sive Productacea, comprising the families Strophomenida; and Productida. As a matter of course, the words Terebratulacea, Spiriferacea, and Productacea are much to be preferred as Subordinal names over Kampylopegmata, Helicopegmata, and Aphaneropegmata. He proposed to divide the Order Lyopomata into the Suborders, Gastropegmata, sive Craniacea, comprising the family Craniada; Daikaulia, sive Discinacea, comprising the families Discinida, and Siphonotretida; Mesokaulia, sive Lingulacea, comprising the families Obolida, Trimerellidæ, and Lingulidæ. And it is equally clear that Craniacea, Discinacea, and Lingulacea are to be preferred as Subordinal names to Gastropegmata, Daikaulia, and Mesokaulia. But how different are the views of Professor James Hall, who uses Articulata instead of Arthropomata, and Inarticulata instead of Lyopomata, and uses no Subordinal names or family names! He says the classification even into families, if attempted, must be arbitary, procrustean, and embarrassing to the student, without any corresponding benefit, and that, in the present state of our knowledge, it is better to avoid them altogether. I agree with Professor Hall, that the Subordinal names may be dispensed with; but as the grouping into families is probably correct, in some respects, I prefer to retain the family names for the purpose of approximating the truth in classification.

Professor Hall, however, uses subgeneric names, which Thomson and Nicholson in their work on the "Generic Types of the Palæozoic Corals," say "are nearly useless, if not absolutely obstructive, in actual practice." And Professor Hall has proposed to divide the genus Orthis into fourteen groups, viz. : Orthis, Plectorthis,

ACR.-CO

Dinorthi Dalmane in the I divided cal name do not a as to ove

I p after hea kindly s dent, th than, 18 cies, tho genera a without I receive

ACROTHE thew 14, p AMBOCCEI Desc Meas spinose N. Y ANASTRO Schu 3, p. ATHYRIS 8, pt. differen prinsta Hind ATRYPA l retic ATRYPINA pt. 2 cata BARRAND pt. 2. scrib Clint CAMAREL tal pl the b are f which stron CAMAROS 8, pt. aroph p. 368 CAMAROT 8, pt. gregaplena æquir the sp Steno CAPELLIN 2, p. 2 but h

STI.-UNI.

ge, closely ms finely ly visible, mal sheet. g. Type S.

Minn., vol.

n genus in and is not

i biserialis rectistyla. s and many ibly belong

fined so as

yn. for U.

egulata.

e Arthropoig the fam-Helicopeg-Athyridæ, ilies Strophacea, Spiriover Kame the Order the family and Siphoa, Trimer-1, and Linkaulia, and l, who uses a, and uses ito families, ident, withvledge, it is Subordinal bly correct, of approxi-

l Nicholson 'are nearly or Hall has Plectorthis,

ACR.-CON.

BRACHIOPODA.

Dinorthis, Plæsiomys, Hebertella, Orthostrophia, Platystrophia, Heterorthis, Bilobites, Dalmanella, Rhipidomella, Schizophoria, Orthotichia, and Enteletes. Any genus found in the Palæozoic rocks, in which there are more than two defined species may be divided into groups, in like manner and for as good reasons. The coining of technical names for groups may be made to exhaust the Greek Lexicon, but to me they do not appear consistent with binomial nomenclature, or of such value to the science as to overcome the burthen they place upon it.

I purchased a copy of Pal. N. Y., vol. 8, pt. 2, in August, 1897, immediately after hearing that it had been published. Mr. Jacob Van Deloo, at the same time, kindly sent me the last reports of the State Geologist of N. Y., from which it is evident, that some part at least of vol. 8, pt. 2, was published as early as, or earlier than, 1896, and I have arbitrarily assumed that, as the date of the genera and species, though the dedication of the book is dated November 29, 1894. The old genera are subdivided into new genera and subgenera, which I have catalogued without time to give them much examination, as this Appendix was prepared before I received the books, and the matter is inserted in the manuscript.

- ACROTHELE matthewi var. costata, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 128, Up. Taconic.
- AMBOOGLIA gemmula, McChesney, 1859, Desc. New Spec. Foss., p 41, Coal Meas.
- spinosa, Clarke, 1894, 13th Rep. St. Geol. N. Y., p. 177, Ham. Gr. Амаяткорны (?) scofieldi, Winchell and
- ANASTROPHIA (?) scofieldi, Winchell and Schuchert, 1895, Geo. Sur., Minn., vol. 3, p. 3×3, Galena Gr. Camarella (?)
- Атнукія densa, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 364, St. Louis Gr.
- differentius, instead of A. differens.
- prinstana, Billings, may be referred to Hindella, instead of Meristella.
- ATRYPA laticorrugata, Foerste, Syn. for A. reticularis.
- ATRYPINA, Hall, 1896, Pal. N. Y., vol., 8, pt. 2, p. 161. Type Leptocalia imbricata and including Calospira disparitis.
- BARRANDELLA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, pp. 241-368. Type B. areyi, described at the same place from the Clinton Gr.
- CAMARELLA. In the ventral valve the dental plates form a small chamber below the beak; in the dorsal valve the crura are fixed to two strong septal plates, which unite to form a very long and strong median septum.
- CAMAROSPIRA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 82. Genus founded on Camarophoria eucharis, Pal. N. Y., vol. 4, p. 368, as the type.
- CAMAROTŒCHIA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 189. Type Rhynchonella congregata, and including R. altilis, R. plena, R. fringilla, R. glacialis, R. æquiradiata, R. obtusiplicata, and all the species included under the name Stenoschisma in Pal. N. Y. vol. 4
- Stenoschisma in Pal. N. Y., vol. 4. CAPELLINIA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 248. This genus is like *Pentamerus*, but has the valves reversed. Type C.

mira, described at the same place, from the Niagara Gr.

- CATAZYGA, Hall, 1896, Pal. N. Y., vol. 8, p. 157. This name is proposed as a subgenus of Zygospira, with Zygospira headi as the type.
- headi as the type. CHONETES pulchellus is described and figured in Bull. Denison Univ., vol. 3, p. 37. reversus is figured and described, in
- 1895, in Ohio Geol., vol. 7, p. 443. CLINTONELLA, Hall, 1896, Pal. N. Y., vol. 8,
- pt. 2, p. 159. [Ety. proper name.] Shells small suboval. Valves subequally biconvex, greatest convexity oblique. Pedicle valve with a small umbo, compressed laterally, apex incurved. Cardinal area replaced by a wide triangular delthyrium, without a trace of deltidial plates. Umbo merges anteriorly into a sinus, which makes a flexure at the margin and bears two plications which reach the beak, and from four to eight radial plications on the lateral slopes. Beak in brachial valve inconspicuous. Surface with concentric striæ. Shell substance, fibrous, impunctate. Type C. ragabunda, described at the same place from the Clinton Gr.
- CLIOTHYRIS, King, 1850, Perm. Foss. Eng., p. 137. [Ety. kleio, I close; thuris, a small door.] Lenticular, minutely punctured, laminar. Spirals pectinated. Dental plates large and separated. Crural base perforated. Foramen situated at the point of the umbone, and open inferiorly by the fissure. Type, C. pectinifera. It includes Athyris americana, A. hirsuta and A. sublamellosa.
- CONCHIDIUM, Linne, 1753, Museum Tessinianum, p. 90. Type C. biloculare. Hall includes in this genus Pentamerus nysius, P. tenuicosta, P. knappi, P. colletti, P. decussatus. C. nettlerothi,

proposed by Hall in Pal. N. Y., vol. 8, pt. 2, p. 234, for P. knighti of Nettleroth, in Kentucky Foss. Shells, p. 57, and Gypidula unguiformis.

crassiplica, greenei, and georgiæ, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 369, the first two Niagara Gr.; the last,

Clinton Gr. CRANIA albersi, Miller and Faber, 1894, Jour. Cin. Soc. Nat. Hist., vol. 17, p. 154, Hud. Riv.

Fig. 1406. — Crania albers magnified from $1\frac{3}{4}$ to $3\frac{1}{2}$ Gr. diameters.

carbonaria is described and figured, in 1896, in Ohio Geol., vol. 7, p. 484.

chesterensis, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 47, Kaskaskia Gr.

dubia, Foerste. Too poorly defined to be recognized.

granulosa is described and figured in Geo. Sur. Minn., vol. 3, p. 373.

minutula, Winchell and Schuchert, 1895, (Schizotreta minutula,) Geo. Sur. Minn., vol. 3, p. 366, Hud. Riv. Gr.

reversa, Sardeson, 1896, Bull. Minn. Acad. Sci., vol. 4, p. 77, St. Peter Sand-

stone.

Craniella clintonensis, Foerste. Too poorly defined to be recognized. ulrichi, Hall, Pal. N.



umbonata var.

alpenensis,

Hall, 1896, Pal.

Y., vol. 8; pp. 153, 181, Syn. for Cra-Fig. 1407. - Crypto-nella ovalis, dorsal nia halli. and side views.

CYCLORHINA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 206. Founded on Rhynchospira nobilis.

CYCLOSPIRA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 146. This genus is founded on Orthis bisulcata, Emmons, Geol. N. Y. 2d District, p. 395. The name was used by permission without definition in Geo. Sur. Minn., vol. 3, p. 469. sparsiplica, Foerste. Too poorly defined to be recognized.

CYRTIA radians, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 362, Clinton Gr.

CYRTINA burlingtonensis, Rowley, 1893, Am. Geol, vol. 12, p 308, Burlington Gr. lachrymosa, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 362, Waverly Gr.



N. Y., vol 8, pt. 2, p. 362, Ham. Gr. Fig. 1408.—Discina samp-soni, large and small Discina. Dall and

dorsal valve, and cast of ventral valve. Hall have shown that

this genus is not known from the palæozoic rocks, and that nearly all the HUSTEDIA, Hall, 1896, Pal. N. Y., vol. 8, -

species referred to it belong to Orbiculoidea.

CRA.-HUS.

- illinoisensis, Miller and Gurley, refer. to Orbiculoidea illinoisensis.
- meekana is described and illustrated, in 1896, in Ohio Geol., vol. 7, p. 483.
- munda, Miller and Gurley, refer to Orbiculoidea munda.
- EATONIA, Waagen distinguishes this genus by the absence of dental plates in the ventral valve, strong median septum in the dorsal valve, and the four crural processes
- coulteri, Miller and Gurley, 1893, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 72, Oriskany Gr.
- Enteletes, Fischer de Waldheim, 1830, Oryctographi du Gouv. de Moscou, p. 144. Not defined so as to be recognized by any one, and, without any proper excuse, Waagen has proposed to supplant Syntrielasma with it. He might have used any other catalogue name, and he would have had his followers
- HALLINA, Winchell and Schuchert, 1895, Geo. Sur. Minn., vol. 3, p. 471. (It first appeared by name without proper definition in 1892, in Am. Geol., vol. 9, p. 291.) [Ety. proper name.] Shells small, articulate, rostrate, biconvex, and semiplicate. Pedicle opening usually, bounded laterally by incomplete deltidial plates. Calcified brachial supports longer than half the length of the dorsal valve. Crural plates.of the dorsal valve probably coalesce. Shell structure fibrous, impunctate. Type H. saffordi.
 - nicolletti, Winchell and Schuchert, Syn. for Atrypa exigua.
 - saffordi, Winchell and Schuchert, 1895, Geo. Sur. Minn., vol. 3, p. 473, Birdseve limestone.

HIPPARIONYX, Vanuxem, 1842, Geo. of N. Y. Rep. 3d Dist., p. 29. [Ety. hippos, horse; onyx, nail, hoof.] Shell large, subhemispherical. Pedicle valve slightly convex or concave; hingeline short, straight; cardinal area low; beak retrorse; delthyrium broad, and covered by an imperforate convex deltidium; teeth large, and supported by lamelia which extend to the bottom of the umbonal cavity, and are produced into strong ridges that surround a large muscular area composed of broad, flabellate diductors, inclosing an elongate or cordate adductor impression. Slight median septum in both valves. No cardinal area in brachial valve. General appearance externally like Streptorhynchus, to which genus it has sometimes been referred. Type H. proximus.

proximus, Vanuxem, 1842, Geo. N. Y. Rep. 3d Dist., p. 124, Oriskany sandstone.

pt. This but Тур HYATTE pt. 2 cons the KUTORG amt LEIORHY Che LEPTEN cher gibbos (Ple Min produc prod 360, sord LINGULA tiqu beltra Geo Riv. clathra Geo. Gr. compt p. 17 deflect Geo. Riv. dolata Sci. flabell p. 17 hurbut Geo. indian Bull 69, E lamella lingula p. 17 modest norwoo palifor paracle p. 17 scutell 171, (tæniola 18, C L. lawaverl othe of D LINGULEI 1894. p. 12 LINGULOR vol. 8 LIORHYNG Y., v LISSOPLE Mus. lissos CRA.-HUS.

g to Orbicu-

ey, refer, to

- ustrated, in p. 483. refer to Or-
- s this genus plates in the lian septum e four crural
- 1893, Bull. Hist., p. 72,
- neim, 1830, Moscou, p. be recogvithout any as proposed vith it. He r catalogue had his fol-
- chert, 1895, p. 471. (It hout proper teol., vol. 9, ne.] Shells , biconvex, pening usuincomplete d brachial the length al plates.of ly coalesce. mpunctate.
- chert, Syn.
- chert, 1895, 473, Birds-

Geo. of N. Ety. hippos, Shell large, valve cle ve; hingedinal area rium broad, rate convex 1 supported to the boty, and are s that surarea comdiductors. eordate adnt median lo cardinal ieneral ap-Streptorhynsometimes oximus. Geo. N. Y. kany sand-

Y., vol. 8, .

pt. 2, p. 120. [Ety. proper name.] This genus is externally like *Eumetria*, but differs in the internal structure.

HYA.-ORB.

- Type Terebratula mormoni. HYATTELLA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 61. Genus founded on Atrypa congesta, Pal. N. Y., vol. 2, p. 67, as the type.
- KUTORGINA ambigua, instead of Obolella ambigua.
- LEIORHYNCHUS newberryi is from the Chemung Gr.
- LEPT.ENA charlottk, Winchell and Schuchert, Syn. for Strophomena halli.
 - gibbosa, Winchell and Shuchert, 1895, (Plectambonites gibbosa,) Geo. Sur.
 - Minn., vol. 3, p. 416, Galena Gr. producta, Hall, 1896, (Plectambonites producta.) Pal. N. Y., vol. 8, pt. 2, p. 360, Niagara Gr.

sordida, refer to Leptella sordida.

- LINGULA antiqua, refer to Lingulepis antiqua
 - beltrami, Winchell and Schuchert, 1895, Geo. Sur. Minn., vol. 3, p. 351, Hud. Riv. Gr.
- clathrata, Winchell and Schuchert, 1895, Geo. Sur. Minn., vol. 3, p. 345, Trenton Gr.
- compta, Hall, 1892, Pal. N. Y., vol. 8, p. 171, Ham. Gr.
- deflecta, Winchell and Schuchert, 1895, Geo. Sur. Minn., vol. 3, p. 348, Hud. Riv. Gr.
- dolata, Sardeson, 1896, Bull. Minn. Acad. Sci., vol. 4, p. 95, Magnesian Gr.
- flabellula, Hall, 1892, Pal. N. Y., vol. 8, p. 172, Waverly Gr.
- hurbuti, described and illustrated in Geo. Sur. Minn., vol. 3, p. 347. indianensis, Miller and Gurley, 1893,
- Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 69, Keokuk Gr.

lamellata, Hall; is from the Niagara Gr. lingulata, Hall, 1892, Pal. N. Y., vol. 8, p. 173, Clinton Gr.

- modesta, Ulrich, Syn. for L. norwoodi. norwoodi, refer to Lingulops norwoodi. paliformis, refer to Lingulella paliformis. paracletus, Hall, 1892, Pal. N. Y., vol. 8,
 - p. 172, Waverly Gr. scutella, Hall, 1892, Pal. N. Y., vol. 8, p. 171, Chemung Gr.
 - tæniola, Hall, 1892, Pal. N. Y., vol. 8, p. 18, Clinton Gr. Proposed instead of L. lamellata in Pal. N. Y., vol. 2, p. 55.
 - waverlyensis, Herrick, is the same that others have identified with L. scotica of Davidson.
- LINGULELLA inflata var. ovalis, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 127, Up. Taconic.
- LINGULOPS granti, Hall, 1892, Pal. N. Y., vol. 8, p. 173, Niagara Gr.
- LIORHYNCHUS lesleyi, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 368, Up. Devonian. LISSOPLEURA, Whitfield, 1896, Bull. Am.
- Mus. Nat. Hist., vol. 8, p. 232. [Ety. lissos, smooth; pleura, rib.] A brachio- ORBICULOIDEA, D'Orbigny, 1850, not 1847.

podous shell, more or less inequivalve, with a small imperforate beak; surface radiately ribbed; ribs smooth, without interspaces. Shell substance Ventral valve with a spoonfibrous. shaped cavity in the beak, formed by the dental plates, and a deep, bilobed, muscular imprint in front of it. Dorsal valve with a strong median sep-Type Rhynchonella aquivalvis, tum. Hall. Low. Held. Gr.

- MARGINIFERA, Waagen, 1887, Palæontologia Indica, p. 17. [Sig. bearing a margin.] Externally somewhat like Productus, but the shell margin readily breaks off and exposes a thick, prominent, shelly ridge, placed vertically on the internal surface of the dorsal valve, and by which the visceral part of that valve is girt. In the ventral valve there is a similar ridge, developed within the wings only. In this way the visceral part of the shell is perfectly chambered off from the remainder of the shell. These ridges are smooth, striated, or crenulated. Type M. splendens. Professor Hall doubted the generic value of these distinguishing characters, while I regard them as of more importance than the characters ascribed to Orthothetes or Derbya, or many other proposed genera among the Brachiopods.
- lasallensis, instead of Productus lasallensis.
- splendens, instead of Productus splendens.
- wabashensis, instead of Productus wabashensis.
- MARTINIA was described on page 139, instead of 128. It is also distinguished from Spirifera by having no dental plates in the ventral valve.
- MEEKELLA occidentalis, Newberry, 1861, (Streptorhynchus occidentalis,) Ives
 - Rep. Col., p. 126, Up. CoalMeas. pyramidalis, Newberry, 1861, (Strepto-rhynchus pyramidalis,) Ives Rep. Col., p. 126, Up. Coal Meas.
- MERISTA bella, refer to Meristella bella.
- tennesseensis, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 365, Up. Sil.
- MERISTELLA walcotti, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 365, Oriskany Gr. METAPLASIA, Hall, 1896, Pal. N. Y., vol 8,
- pt. 2, p. 56. A genus based on Spirifera pyxidata, Pal. N. Y., vol. 3, p. 428, as the type.
- NUCLEOSPIRA rotundata is described and illustrated in Ohio Geol. vol. 7, p. 413.
- OBOLELLA ambigua, refer to Kutorgina ambigua.
- cingulata, refer to Kutorgina cingulata. Obolus pristinus, Matthew, 1894, Trans. N. Y., Acad. Sci., vol. 14, p. 112, Up.
- Taconic. pulcher, Matthew, 1889, Can. Rec. Sci.,
- p. 306, St. John Gr.

Hall has shown in Pal. N. Y., vol. 8, p. 128, that O. morrisi, Davidson, is the type of the genus, and that it includes nearly all the forms described as Discina in the palæozoic rocks. Diagnosis. Shells subcircular or subelliptical, inequivalve. Pedicle valve depressed convex, or flattened, with the apex slightly elevated and inclined posteriorly. On the exterior a narrow pedicle furrow begins just below and behind the apex, extends over a greater or less portion of the radius of the valve, and at its distal end is produced into a short tubular sipho, which traverses the substance of the shell obliquely backward, emerging on the interior surface, where it produces a narrow groove, which terminates before reaching the margin. On the interior there is a thickened ridge corresponding with the external groove. The apex of the larger or brachial valve is directed backward, and on the interior there is a longitudinal ridge or septum extending backward. Shell substance corneous, lamellæ appearing phosphatic. Surface marked by fine lamellose concentric striæ and radiating lines.

conica, refer to Schizotreta conica. illinoisensis, Miller and Gurley, 1893,

(Discina illinoisensis,) Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 70, Coal Meas. munda, Miller and Gurley, 1893, (Discina munda,) Bull. No. 3, Ill. St. Mus.

Nat. Hist., p. 71, Coal Meas. ORISKANIA, Hall, 1896, Pal. N. Y., vol. 8,

- pt. 2, p. 269. Type O. navicella, figured at the same place from the Oriskany Gr. ORTHIDIUM, Hall, 1892, Pal. N. Y., vol. 8, p.
 - 244. Shell small, externally resembling Scenidium. Pedicle valve the more convex, broad open delthyrium, strong teeth, inconspicuous dental plates. Brachial valve less convex, cardinal area narrow, dental sockets developed. Crural plates short, erect, coalesced with the cardinal process, which is a vertical, transverse, subcrescentic plate, at the base of which the shell is excavated. Muscular scar quadriplicate. Surface bearing radiating strike fold and sinus. Type 0. gemmicula.
- gemmicula, instead of Orthis gemmicula. Октнія acutiloba, Ringueberg, Syn. for O. biloba.
 - *billingsi* is referred to Protorthis billingsi.
 - charlottx, Winchell, Syn. for O. pectinella.
- circularis, Winchell, Syn. for O. subæquata.
- fausta and var. squamosus, synonyms for O. rugiplicata.
- flabellites, Hall, 1892, Pal. N. Y., vol 8, p. 227, Niagara Gr. Instead of O. flabellum, which is not an American species.

- futilis, Sardeson, 1897, Am. Geol., vol. 19, Hud. Riv. Gr.
- glypta, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 359, Niagara Gr.
- ignota, Sardeson, 1897, Am. Geol., vol. 19, p. 99, Hud. Riv. Gr.
- inæqualis, refer to Streptorhynchus inæquale.
- kaskaskiensis, refer to Streptorhynchus kaskaskiense.
- macrior, Sardeson, Syn. for O. emacerata. media, Winchell, Syn. for O. subæquata. meedsi, Winchell and Schuchert, Syn. for O. minnesotensis.
- michelini var. nevadensis, Meek, 1877, Expl. 40th Parallel, vol. 4, p. 63, Carboniferous.
- minneapolis, Winchell, Syn. for O. subæquata.
- porrecta, Sardeson, 1897, Am. Geol., vol. 19, p. 104, Hud. Riv. Gr.
- proavita, Winchell and Schuchert, Syn. for O. petræ.
- proximus is referred to Hipparionyx proximus.
- *quacoensis* is referred to Protorthis quacoensis.
- richmondi is Streptorhynchus richmondi.
 sweeneyi, Winchell, 1895, Geo. Sur.
 Minn., vol. 3, p. 426, Trenton Gr.
- whitfieldi, Winchell, 1895, Geo. Sur. Minn., vol. 3, p. 437, Hud. Riv. Gr. ORTHORHYNCHULA, Hall, 1896, Pal. N. Y.,
- ORTHORHYNCHULA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 181. This genus is founded on Orthis linneyi, Nettleroth. Orthothetes, Fischer de Waldheim, 1830,
 - Oryctographie. This genus was not defined as required by the laws of nomenclature, but is revived by Waagen, in Palæontologia Indica, p. 607, for such forms as Spirifera crenistria, Phillips, and Strophomena arctostriata, Hall, and Streptorhynchus pandora, Billings. The name can not stand as used by Waldheim, or as used by Evans in 1829, nor by reason of being a catalogue name. And though Waagen de-fined it in 1887, he had no right to use the word. He says it is not to be distinguished by any external characters, but the cardinal process is small and not supported by septa, but instead in general there is a septum in the dorsal valve and none in the ventral
 - bellulus, Clarke, 1894, 13th Rep. St. Geol. N. Y., p. 176, Marcellus Shale, refer to Streptorhynchus bellulum.
- desideratus, Hall, refer to Streptorhynchus desideratum.
- PARASTROPHIA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 221. Type Atrypa (Camarella) hemiplicata, and including Pentamerus reversus.
 - divergens, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 366, Hud. Riv. Gr.
 - greenei, latiplicata, and multiplicata, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 367, Niagara Gr.
- PARAZYGA, Hall, 1896, Pal. N. Y., vol. 8,

ORI.-PAR.

PEN.-S

Tre

4, p

ORI.-PAR.

Geol., vol.

., vol. 8, pt.

Geol., vol.

ynchus in-

torhynchus

emacerata. subæquata.

rt, Syn. for Meek, 1877,

p. 63, Car-

for O. sub-

Geol., vol.

chert, Syn.

ionyx prox-

orthis qua-

richmondi. Geo. Sur. m Gr. Geo. Sur. liv. Gr. Pal. N. Y., s genus is Nettleroth. ieim, 1830, is was not he laws of ed by Waaca, p. 607, crenistria, irctostriata, pandora, ot stand as d by Evans ing a cata-Vaagen deight to use t to be discharacters, small and instead in 1 the dorsal al. o. St. Geol. hale, refer n.

reptorhyn-

N. Y., vol. pa (Camaling Penta-

Y., vol. 8,

altiplicata, 8, pt. 2, p.

Y., vol. 8,

PEN.—SCH.

pt. 2, p. 127. This genus is founded on *Trematospira hirsuta*, Pal. N. Y., vol. 4, p. 274.

PENTAGONIA is recognized by Hall, in his latest work, as a good genus.

- PENTAMERUS oblongus var. corrugatus, Weller, 1896, Jour. Geo., vol. 4, p. 171, Niagara Gr.
- pesovis is described and illustrated in Ohio Geol., vol. 7, p. 414.
- PHOLIDOPS cincinnations is inequivalve, and the pedicle valve has a subcircular foramen.
 - greenei, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 48, Ham. Gr.
- Plectambonites, Syn. for Leptæna.
- PRODUCTELLA marquesi, Rowley, 1894, Am. Geol., vol. 14, p. 153, Ham. Gr.
- PRODUCTUS inflatus, McChesney, 1859, Desc. New Spec. Foss., p. 40, Coal Meas.

lasallensis, refer to Marginifera lasallensis.

- longus, Meek, 1877, Expl. 40th Parallel, vol. 4, p. 67, Col Meas.
- pileiformis, McChesney, 1859, Desc. New Spec. Foss., p. 40, Kaskaskia Gr.

splendens, refer to Marginifera splendens. tubulospinus, McChesney, 1859, Desc. New Spec. Foss. p. 37, Up. Coal Meas. wabashensis, refer to Marginifera wabash-

- ensis. wilberanus, McChesney, 1859, Desc. New Spec. Foss., p. 36, Cool Meas
- Spec. Foss., p. 36, Coal Meas. PROTORHYNCHA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 180. This genus is founded on Atrupa dubia, Hall.
- PROTORTHIS, Hall, 1892, Pal. N. Y., vol. 8, p. 231. [Ety. protos, first; Orthis, a genus.] Shells small, transversely subquadrate or semicircular. Hinge-line straight, equal to the greatest width of the valves. Valves unequally biconvex or subplano-convex, the pedicle-valve being the larger. Cardinal area narrow on both valves, but wider on the pedicle valve; delthyrium broad, closed below by a concave plate; teeth present. Brachial valve with a delthyrium, dental sockets obscure, crural plates small. Surface plicated, and having interstitial radii and concentric striæ, sinus and fold. Shell substance fibrous. Type P. billingsi.

billingsi, instead of Orthis billingsi.

- quacoensis, instead of Orthis quacoensis. PROTOZYGA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 149. This genus is founded on Atrypa exigua, Pal. N. Y., vol. 1, p. 141.
- Atrypa exigua, Pal. N. Y., vol. 1, p. 141. PTYCHOSPIRA, Hall, 1896, Pal. N. Y., vol 8, pt. 2, p. 112. Like *Retzia*, but having a convely and sparsely plicated surface. Type P. ferita, and includes *Retzia sexplicata*, which is illustrated on pl. 50, Figs. 13, 14.
- PUGNAX, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 202. A subgenus of Rhynchonella, with R. acuminata as the type, and including R. pugnus, R. reniformis, R.

alta, R. missouriensis, R. striatocostata, R. explanata, R. mutata, R. ottumwa, R. uta, R. eatoniiformis, and Camarophoria swalloviana.

Rafinesquina, Hall, 1892, Pal. N. Y., vol. 8, p. 280, Syn. for Strophomena.

lata. See Strophomena lata.

BRACHIOPODA.

- RENSSELERIA formosa is described and illustrated in Ohio Geol., vol. 7, p. 413.
- RETICULARIA, McCoy, 1844, Synop. Carb. Foss., p. 143. [Ety. reticulum, a little net] Shells rounded, orbicular, or elongately or transversely oval. Hingeline shorter than the greatest width of the shell. Surface covered by fine hairlike spines, arranged in concentric rows, and representing double tubes, that pass below the surface of the shell, but do not pass through it. Shell fibrous. The muscular impressions of the ventral valve are in an elongately oval groove. There are no partitions, dental plates, or median septum in the valve. In the dorsal valve there are no partitions, septum, or shelly support of the dental sockets. No hinge-plate. The crura are fixed with a broad base to the inner side of the dental sockets, and extend down to the frontal region, where they abruptly bend up to form the first volution of the spiral. No lateral branch. Apex of the spiral directed laterally or toward the hingeline. Type R. lineata, instead of Spirifera lineata.
- RHYNCHONELLA *æquivalvis*, refer to Lissopleura æquivalvis.
- hydraulica and raricosta are described and illustrated in Ohio Geol., vol. 7, pp. 414 and 421.
- RHYNCHOTREMA, Hall, 1860, 13th Rep. N. Y. St. Mus. Nat. Hist., p. 68. [Ety. rhynchos, beak; trema, an opening.] Hall proposed to distinguish this from Rhynchonella on the ground that the cardinal area of the ventral valve results from the bending inward and coalescing of the deltidial plates, but Waagen has suggested that the absence of dental plates in the ventral valve is of far greater importance, and establishes the genus. Type R. capax, and including R. increbescens, R. dentata, R. speciosa, and Trematospira quadriplicata, S. A. Miller, heretofore referred to Rhynchotreta.
- SCENIDIUM halli, as figured in Pal. N. Y., vol. 8, pl. VII A., is a syn. for Scenidium anthonense.
- SCHIZAMBON (?) dodgei, Winchell and Schuchert, 1895, Geo. Sur. Minn., vol. 3, p. 361, Trenton Gr.
- lockei, Winchell and Schuchert, Syn. for Trematis terminalis.
- ? canadensis, Ami, 1892, Pal. N. Y., vol. 8, p. 116, Utica Slate.
- Schizotreta, Kutorga, 1848, Ueber die Siphonotretææ; Verhandl. der russ. kais, mineral. Gesellsch. zu St. Pe-

tersburg, p. 272. [Ety. schiza, a cleft; tretos, perforated.] The external, slitshaped pedicle aperture is the reverse of that in *Siphonotreta*. The apex of the beak is high, eccentric, and posterior to it there is a narrow elliptical slit, which extends for one-half the face of the cone, and then merges into the inner sipho. The brachial valve is depressed convex, or even flat; its beak is sharply defined, depressed, and directed toward the cardinal margin, but not marginal. Type S. elliptica.

764

conica, instead of Orbiculoidea conica. minutula, Winchell and Schuchert. See Crania minutula.

SELENELLA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 270. Type S. gracilis, figured

at the same place from the Niagara Gr. SEMINULA, McCoy, 1844, Synop. Carb. Foss.,

- p. 150. He spelled the word, in 1855, Semiluna. Shell smooth, subpentahedral; valves sinuate. Muscular impressions consisting of two pairs of very narrow elongate scars. Type S. ambigua. It includes Athyris trinuclea and A: subtilita.
- dawsoni, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 364, Carboniferous. rogersi, Hall, 1896, Pal. N. Y., vol 8, pt.
- 2, p. 364, Up. Held. Gr.
- Siphonotreta scotica is referred by Hall to Schizambon (?) canadensis.
- SPIRIFERA aciculifera, Rowley, 1893, Am. Geol., vol. 12, p. 307, Chouteau Gr.
- canandaiguæ, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 360, Ham. Gr.

clavatula, McChesney, is a good species. crispata, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 360, Niagara Gr. lineata, Martin, refer to Reticularia line-

- ata.
- macbridei, Calvin, 1892, Bull. State Univ. Iowa, vol. 2, p. 165, Ham. Gr.
- mundula, Rowley, 1893, Am. Geol., vol. 12, p. 307, Burlington Gr.
- norwoodi is described in Expl. 40th Parallel, vol. 4, p. 39.

perplexa, McChesney, is a good species from the Coal Meas.

- pulchra, Meek, refer to Spiriferina pul-It is described in Expl. 40th chra. Parallel, vol. 4, p. 85.
- solidirostris is described in Bull. Deni-
- son Univ., vol. 3, p. 47. subventricosa, McChesney, 1859, Desc. New Spec. Foss., p. 44, Coal Meas.
- transversa, McChesney, is a good species, and is on p. 42.
- urbana, Calvin, 1892, Bull. State Univ. Iowa, vol. 2, p. 165, Ham. Gr. williamsi, Hall, 1896, Pal. N. Y., vol. 8,
- pt. 2, p. 361., Chemung Gr.
- SPIRIFERINA gonionota, Meek, 1877, Expl. 40th Parallel, vol. 4, p. 84, Carboniferous.
- STREPTORHYNCHUS crenistria. Phillips. (misspelled on p. 378, crenistriatum,) is not an American species.

desideratum, Hall, 1892, (Orthothetes desideratus,) Pal. N. Y., vol. 8, p. 345, Waverly Gr

SEL.-WHI.

- flabellum and hydraulicum are described and illustrated in Ohio Geol., vol. 7, pp. 410 and 421
- inæquale, Hall, 1858, (Orthis inæqualis,) Geo. Rep. Iowa, p. 490, Chouteau or Kinderhook Gr.
- kaskaskiense, McChesney, 1859, (Orthis kaskaskiensis,) Desc. New Spec. Foss., p. 31, Kaskaskia Gr.
- occidentalis. See Meekella occidentalis.
- pyramidalis. See Meekella pyramidalis. richmonda, McChesney, 1859, (Orthis
- richmonda,) Desc. New Spec. Foss., p. 32, Coal Meas.
- winchelli, Hall, 1892, (Strophomena winchelli,) Pal. N. Y., vol. 8, p. 344, Galena Gr
- STRICKLANDINIA triplesiana, Foerste. Not defined so as to be recognized
- ROPHALOSIA beecheri, Rowley, 1893, Am. Geol., vol. 12, p. 308, Chouteau Gr. STROPHEODONTA, Hall, instead of Stropho-
- donta. [Ety. stropheos, heart; odous, tooth?)
- STROPHOMENA billingsi, Winchell and Schuchert, Syn. for Streptorhynchus rectum.
- emaciata, Winchell and Schuchert, 1895, Geo. Sur. Minn., vol. 3, p. 399, Galena Gr. It looks like an Orthis, and is not a Strophomena.
- hanoverensis, Foerste. Not defined so as to be recognized.
- lata, Whiteaves, 1896, (Rafinesquina lata,) Can. Rec. Sci., vol. 6, p. 172, Low Sil
- planodorsata, Winchell and Schuchert, Syn. for Streptorhynchus planumbonum
- schofieldi, Winchell and Schuchert, Syn. for Streptorhynchus subsulcatum.
- septata, Winchell and Schuchert, Syn. for Streptorhynchus subtentum.
- trentonensis, Winchell and Schuchert, Syn. for Steptorhynchus subtentum.
- STROPHONELLA costatula, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 359, Niagara Gr. crassa, Rowley, 1894, Am. Geol. vol. 13,
- p. 153, Ham. Gr. SYNTROPHIA, Hall, 1896, Pal. N. Y. vol. 8, pt. 2, p. 216. The type is *Triplesia lateralis*, Whitfield, and intended to include Orthis barabuensis, Stricklandinia arachne, and S. arethusa.
- SYRINGOTHYRIS missouri, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 363, Chouteau Gr.
- TRIMERELLA galtensis refer to Rhinobolus galtensis
- TRIPLASIA ulrichi, Winchell and Schuchert, 1895, Geo. Sur. Minn., vol. 3, p. 409, Hud. Riv. Gr.
- WHITFIELDELLA, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, p. 58. A genus founded on Atrypa nitida or Meristina nitida, Pal.

RI.

N. Y., vol. 2, p. 268, as the type.

ZYG.-A

ZYGOSP che

468

COLEOL fined CONULA

Mil

III.

it i

bela troi hila eve Sub Con plac CONULA defi blairi 3, I teau cheste Ill., gratio No. St. green No. Keo misso newbe 2, p roepei No.

Coa

Bull

p. 28

ANTHRAC

Fig. 1410.-na belli

dium

all a

illus

sedali

SEL.-WHI.

Orthothetes ol. 8, p. 345,

re described eol., vol. 7,

inæqualis,) Chouteau or

859, (Orthis Spec. Foss.,

occidentalis. pyramidalis. 59, (Orthis ec. Foss., p.

iomena win-344, Galena

perste. Not zed. y, 1893, Am. teau Gr.

of Strophoeart; odous,

ll and Schuvnchus rec-

ichert, 1895, 399, Galena s, and is not

lefined so as

lafinesquina , p. 172, Low

Schuchert, planumbo-

achert, Syn. leatum. ert, Syn. for m. Schuchert, ibtentum.

l, 1896, Pal. Niagara Gr. Feol. vol. 13,

N. Y. vol. 8, Triplesia latended to intricklandinia

1896, Pal. 363, Chou-

o Rhinobo-

d Schuchert, ol. 3, p. 409,

1. N. Y., vol. founded on nitida, Pal. type.

ZYG.-ARC.

ZYGOSPIRA uphami, Winchell and Schuchert, 1895, Geo. Sur. Minn., vol. 3, p. 468, Galena Gr.

PTEROPODA.

000

aquila, Sardeson, Syn. for Atrypa exigua. putilla, Hall, 1896, Pal. N. Y., vol. 8, pt. 2, pp. 157-365, Hud. Riv. Gr.

SUBKINGDOM MOLLUSCA. CLASS PTEROPODA.

COLEOLUS clintonensis, Foerste. Not defined so as to be recognized. CONULARIDA is an Order established by

- Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 22, where it is claimed that the Order may not belong to the Pteropoda or to the Gastropoda, and as the Order was anni-hilated, in Palæozoic times, it may even belong to an extinct class in the Subkingdom Mollusca. The family Conulariidæ is discussed at the same place.
- CONULARIA bilineata, Foerste. Too poorly defined to be recognized.
 - blairi, Miller and Gurley, 1893, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 73, Chouteau Gr.
 - chesterensis is illustrated in Geo. Sur. Ill., vol. 8, pl. 11.
 - gratiosa, Miller and Gurley, 1893, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 74, St. Louis Gr.
 - greenei, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 27, Keokuk Gr.
 - missouriensis is from the Keokuk Gr. newberryi is illustrated in Ohio Pal., vol. 2, pl. 18.
 - roeperi, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 26, Coal Meas.
 - sedaliensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 28, Burlington Gr.

- spergenensis, Miller and Gurley, 1893, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 74, St. Louis Gr.
- ENCHOSTOMA, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 29. [Ety. enchos, sword; stoma, blade.] Shell smooth, elongate, lanceolate; transverse section more or less rounded or narrowly subovate. Shell substance thin, solid, flexible, horny, lime-phosphate. Type E. lanceolatum.
- lanceolatum, S. A. Miller, 1892, Advance Sheets 18th Rep. Geo. Sur. Ind., p. 63, Chouteau Gr.
- Hyolithellus is generally regarded as a Brachiopod, and the same that was named by Hall, Discinella.
- HYOLITHES alatus, Whiteaves, 1892, Cont.

gracilior, Matthew,

1894, Trans. N. Y. Acad. Sci., vol. 14, p. 130, Up. Ta-

conic. versaillesensis, Mil-ler and Faber, nified 4 diameters. 1894, Jour. Cin. Soc. Nat. Hist., vol.

17, p. 155. Hud. Riv. Gr.

CLASS GASTROPODA.

.000.

ANTHRACOPUPA ohioensis is described and illustrated in Ohio Geol., vol. 7, p. 491. Archinacella, Ulrich, 1897,



Fig. 1410.—Aclisi-na bellilineata.

Geo. Sur. Minn., vol. 3, p. 821. No generic character is mentioned that will distinguish it from Trybli-

dium, and, if not a full synonym, in all aspects it can not have the force of more than a catalogue name. Part of the species referred to it belong to Tryblidium, and others may belong to Carinaropsis.

cingulata. See Tryblidium cingulata. depressa. See Tryblidium depressum. powersi. See Tryblidium powersi.

richmondensis, Syn. for Tryblidium indianense

rotunda. See Tryblidium rotundum.



765

semicarinata, Syn. for Carinaropsis patelliformis.

simulatrix, Syn. for Carinaropsis patelliformis.

subrotunda, Syn. for Tryblidium validum. ASTRALITES, Whiteaves, 1892, Cont. to Can.

Pal., p. 323. [Ety. from the living genus *Astralium*.] Shell conical, imperforate, flattened at the base; periphery subangular, fringed with a thin, regularly lobate or sinuate lateral expansion; columella encircled with a single narrow but prominent spiral fold, which is represented by a deep spiral groove in casts of the interior. Type A. fimbriatus, described at the same place, from the Devonian.

BELLEROPHON alternodosus is illustrated and described in Ohio Geol., vol. 7, p. 479.

bilineatus, Ulrich, Syn. for B. troosti.



Fig. 1411.-Bellerophon gorbyi, front and dorsal views.

blairi, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 21, Chouteau Gr.

capax, Ulrich, Syn. for B. mohri.

cincinnatiensis, Miller and Faber, 1894, Jour. Cin. Soc. Nat. Hist., vol. 17, p. 29, Hud. Riv. Gr.

clausus, Ulrich, Syn. for B. troosti. exiguus, Foerste, 1896, Ohio Geol., vol. 7, p. 548, Niagara Gr.

globularis, Miller and Faber, 1894, Jour. Cin. Soc. Nat. Hist., p. 28, Hud Riv. Gr.

lindsleyi is described and figured in Geo. Sur. Minn., vol. 3, p. 889.

opertus, Foerste, Syn. for B. exiguus. recurvus, Ulrich, Syn. for B. cincinnatiensis.

sedaliensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 21, Chouteau Gr.

similis, Ulrich, Syn. for B. platystoma. subangularis, Ulrich, Syn. for Bellero-

phon cincinnatiensis.

Subglobulus, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 917, Trenton Gr. BUGANIA crassa, Ulrich, 1897, Geo. Sur.

Minn., vol. 3, p. 893, Hud. Riv. Gr. elliptica, Ulrich, Syn. for B. intexta. emmonsi, Ulrich, Syn. for B. halli.

frankfortensis, Ulrich, Syn. for Bellero-

- phon lindsleyi. halli, Ulrich, 1897, Geo. Sur. Minn., vol.
- 3, p. 886, Trenton Gr. imbricata, Ulrich, 1897, (Salpingostoma imbricata,) Geo. Sur. Minn., vol. 3, p. 902, Hud. Riv. Gr.

- micronema, Ulrich, Syn. for Bellerophon lindsleyi.
- minnesotensis, Ulrich, Syn. for B. halli. nana, Ulrich, 1897, Geo. Sur. Minn., vol.
- 3, p. 895, Trenton Gr. nashvillensis, Ulrich, Spn. for Bellerophon lindsleyi.
- obsoleta, Ulrich, 1897, Tetranota obsoleta,) Geo. Sur. Minn., vol. 3, p. 880, Trenton Gr.
- peracuta, Ulrich. Not defined so as to be recognized.
- richmondensis, Ulrich, 1897, (Salpingostoma richmondensis,) Geo. Sur. Minn., vol. 3, p. 908, Hud. Riv. Gr. rugatina, Ulrich, Syn. for Bellerophon
- lindsleyi.
- sculptilis, Ulrich, 1897, (Salpingostoma sculptilis,) Geo. Sur. Minn., vol. 3, p. 902, Trenton Gr.
- simulatrix, Ulrich, Syn. for Bucania expansa.
- singularis, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 894, Trenton Gr.

subangulata, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 891, Trenton Gr. sublata, Ulrich, Syn. for B. halli.

- Bucanopsis, Ulrich, Syn. for Bucania. carinifera, Ulrich, Syn. for Bucania costata.
- Bucanospira, Ulrich. Proposed without intelligent definition.
- CARINAROPSIS acuta, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 928, Black Riv. Gr. explanata, Ulrich. Not defined so as to
- be recognized.

minima, Ulrich, Syn. for C. phalera.

- Clathrospira, Ulrich, Syn. for Pleurotomaria
- conica, Ulrich, Syn. for Pleurotomaria subconica.
- convexa, Ulrich, Syn. for Pleurotomaria subconica.
- Cælocaulus. A subgenus of Murchisonia, proposed by Oehlert in 1888, but not recognized by any American palæontologist.
 - negelctus, Ulrich, founded on a fragment of Murchisonia gracilis.

whlerti. See Murchisonia *whlerti*.

- CONCHOPELTIS compressa, Ulrich, 1897, (Scenella compressa,) Geo. Sur. Minn., 1897. vol. 3, p. 840, Trenton Gr.
- Conradella, Ulrich, Syn. for Cyrtolites. bellula, Ulrich, Syn. for Cyrtolites elegans.

fimbriata. See Cyrtolites fimbriatus.

- grandis, obliqua, similis, and triangularis, Ulrich, Synonyms for Cyrtolites compressus.
- CYCLONEMA gracile, humerosum, inflatum, limatum, mediale, pulchellum, (preoccupied,) simulans, sublave, and transversum, Ulrich, Synonyms for Cyclonema bilix.
 - pulchellum, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 19, Keokuk Gr.
 - textile, Ulrich, 1897, (Strophostylus tex-

CYR.-I

CYRTOL

tili

Tre

Sur

Gr.

AST.-CYC.

766

AST.-CYC.

Bellerophon

or B. halli. Minn., vol.

for Bellero-

ranota obso-

ol. 3, p. 880,

ied so as to

(Salpingo-. Sur. Minn.,

Bellerophon

lpingostoma 1., vol. 3, p.

Bucania ex-

Sur. Minn.,

Geo. Sur. on Gr. alli. icania.

Jucania cos-

ed without

)7. Geo. Sur. Riv. Gr. ied so as to

halera. r Pleuroto-

eurotomaria

eurotomaria

Iurchisonia, 188, but not can palæon-

a fragment

lerti. lrich, 1897, Sur. Minn., 1897,

rtolites. rtolites ele-

ibriatus. triangularis, tolites com-

n, inflatum, um, (preocand transfor Cyclo-

urley, 1896, Nat. Hist.,

ostylus tex-

CYR.-LIO.

GASTROPODA.

tilis,) Geo. Sur. Minn., vol. 3, p. 1064, Trenton Gr.

- CYRTOLITES dilatatus, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 865, Black River Gr.
 - disjunctus, Ulrich, Syn. for C. ornatus. fimbriatus, Ulrich, 1897, (Conradella fimbriata,) Geo. Sur. Minn., vol. 3, p. 907, Trenton Gr.

nitidulus, Ulrich, Syn. for C. carinatus. parvus, Ulrich, Syn. for C. carinatus.

retrorsus, Ulrich, Syn. for C. ornatus. subacutus, Ulrich, 1897, (Oxydiscus subacutus,) Geo. Sur. Minn., vol. 3, p.

- 913, Trenton Gr. Not defined so as to youngi, Foerste.
- be recognized. CYRTONELLA horrida, Clarke, 1893, 12th Ann. Rep. N. Y. St. Geol., p. 48. Probably a Platyceras, but too poorly

defined for recognition. Cyrtospira, Ulrich, Syn. for Subulites.

bicurvata, tortilis, and wykoffensis. See **Subulites**

DENTALIUM martini is described and illustrated in Ohio Geol., vol. 7, p. 423.

Dyeria, Ulrich, Syn. for Bucania.

- ECCYLIOMPHALUS contiguus, Ulrich, 1897, Géo. Sur. Minn., vol. 3, p. 1037, Trenton Gr.
- subrotundus, Ulrich, Syn. for Eccyliomphalus undulatus.
- Eccyliopterus beloitensis, Ulrich, Syn. for Ophileta owenana.
- Eotomaria, Ulrich, Syn. for Pleurotomaria. canalifera, see Pleurotomaria canalifera. elevata, see Scalites elevatus.

labiosa, Ulrich, Syn. for Pleurotomaria canalifera.

- vicina, Ulrich, Syn. for Pleurotomaria dryope.
- Euconospira, Ulrich, Syn. for Pleurotomaria.
- planibasalis, Ulrich, Syn. for Pleurotomaria missouriensis.
- EUNEMA brevispira, Whiteaves, 1892, Cont. to Can. Pal., p. 320, Devonian. clathratulum, Whiteaves, 1892, Cont. to
- Can. Pal., p. 322, Devonian. speciosum, Whiteaves, 1892, Cont. to
- Can. Pal., p. 321, Devonian. subspinosum, Whiteaves, 1892, Cont. to
- Can. Pal., p. 321, Devonian.
- subtrigonalis, Whiteaves, EUOMPHALUS 1892, Cont. to Can. Pal., p. 326, Devonian.
- winonensis, Sardeson, 1896, Bull. Minn., Acad. Sci., vol. 4, p. 96, Magnesian Gr. FUSISPIRA angusta, Ulrich, 1897, Geo. Sur.
- Minn., vol. 3, p. 1079, Trenton Gr
- convexa, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1078, Trenton Gr.
 - intermedia, Ulrich, Syn. for F. inflata.
 - nobilis, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1078, Trenton Gr. planulata, Ulrich, 1897, Geo. Sur. Minn.,
- vol. 3, p. 1078, Trenton Gr.
- schucherti, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1076, Black Riv. Gr.

subbrevis, Ulrich, Syn. for F. inflata. sulcata, Ulrich, Syn. for F. schucherti." Gyronema, Ulrich, Syn. for Cyclonema.

- duplicatum, Ulrich, Syn. for Pleurotomaria percarinata.
- Helcionopsis, Ulrich, Syn. for Tryblidium. subcarinata, Ulrich, may be a Carinaropsis.
- HELICOTOMA declivis is figured in Geo. Sur. Minn. vol. 3, p. 1036, from the Trenton Gr
- marginata, Ulrich. Not defined so as to be recognized.
- peccatonica, Sardeson, 1896, Bull. Minn. Acad. Sci., vol. 4, p. 97, Magnesian Gr.
- HOLOPEA ampla, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1065, Trenton Gr.
- appressa, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1065, Trenton Gr.
- concinnula, Ulrich, 1897, Geo. Sur.
- Minn., vol. 3, p. 1066, Trenton Gr. excelsa, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1067, Trenton Gr.
- grandis, Miller and Gurley, 1896, Bull.



Fig. 1412.-Holopea grandis, lateral view.

- No. 11, Ill. St. Mus. Nat. Hist., p. 19, Keokuk Gr.
- insignis, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1065, Trenton Gr.
- newtonensis is described and illustrated
- in Ohio Geol., vol. 7, p. 477. parvula, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1067, Trenton Gr.
- vol. 3, p. 1007, Frenton Gr. rotunda, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1066, Trenton Gr. similis, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1066, Trenton Gr. supraplana, Ulrich, 1897, Geo. Sur.

Minn., vol. 3, p. 1068, Trenton Gr.

- HORMOTOMA was suggested by Salter as a subgenus of Murchisonia, with Murchisonia gracilis as the type, in 1859, Can. Org. Rem. Dec. 1, p. 18. It has not come into use among palæontologists.
- Salteri, Ulrich, Syn. for Murchisonia gracilis.
- subangulata, Ulrich, Syn. for Murchisonia gracilis
- trentonensis, Ulrich, Syn. for Murchisonia bellicincta.
- winnipegensis. See Murchisonia winnipegensis.
- Kokenia, Ulrich, Syn. for Bucania.

Liospira, Ulrich, Syn. for Raphistoma.

abrupta, Ulrich, Syn. for Raphistoma lapicida.

768

- angustata and obtusa, Ulrich, Synonyms for Pleurotomaria progne.
- angulata, mundula, subconcava, and rugata, Ulrich, Synonyms for Pleurotomaria eugenia.
- decipiens, refer to Raphistoma decipiens. persimilis, Ulrich, Syn. for Pleurotomaria helena.
- Lophospira abnormis, Ulrich, Syn. for Murchisonia medialis.

acuminata. See Murchisonia acuminata. ampla. See Murchisonia ampla.

centralis. See Murchisonia centralis.

concinnula, fillmorensis, obliqua, perforata, procera, and pulchella, Ulrich, Synonyms for Murchisonia milleri.

conoidea. See Murchisonia conoidea. conradana, Ulrich, Syn. for Murchisonia ventricosa.

decursa, producta, and tenuistriata, Ulrich, Synonyms for Murchisonia perangulata.

humilis. See Murchisonia humilis.

knoxvillensis. See Trochonema knoxvillense.

lirata. See Murchisonia lirata.

medialis and medialis var. burginensis. See Murchisonia medialis.

notabilis. See Trochonema notabile.

oweni. See Murchisonia oweni.

perAcuta. See Murchisonia peracuta. perlamellosa. See Murchisonia perlamellosa

quadrisulcata. See Murchisonia quadrisulcata.

saffordi. See Murchisonia saffordi. spironema. See Murchisonia spironema. trochonemoides. See Trochonema trochonemoides.

LOXONEMA altivolve, Whiteaves, 1892, Cont.

to Can. Pal., p. 334, Devonian. cingulatum, Whiteaves, 1892, Cont. to Can. Pal., p. 336, Devonian.

gracillimum, Whiteaves, 1892, Cont. to Can. Pal., p. 337, Devonian.

parvulum and plicatum are described and illustrated in Ohio Geol., vol. 7, pp. 424 and 486.

regulare, refer to Macrochilina regularis. winnipegense, Whiteaves, 1893, Can. Rec. Sci., p. 326, Trenton Gr.

MACLUREA crassa, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1040,

Trenton Gr. depressa, Ulrich, Syn. for

Maclurea bigsbyi knoxvillensis, Ulrich. Not

defined so as to be recognized

nitida, Ulrich, Syn. for Mac-

lurea bigsbyi. Maclurina, Ulrich, Syn. for Maclurea.

Fig. 1413.-Macrochilina MACROCHILINA blairi. subcorpula prisca and subcorpulenta are described and illustrated in Ohio Geol., vol. 7, pp. 424 and 478.

- cpulehlla, Whiteaves, 1892, Cont. to Can. Pal., p. 340, Devonian.
- regularis, instead of Loxonema regulare. It is described and illustrated in Ohio Geol., vol. 7, p. 485.
- Meekospira, Ulrich, Syn. for Polyphemopsis. subconica. See Subulites subconica.
- MURCHISONIA ampla, Ulrich, 1897, (Lophospira ampla,) Geo. Sur. Minn., vol. 3 p. 981, Hud. Riv. Gr.
 - acuminata, Ulrich, 1897, (Lophospira acuminata,) Geo. Sur. Minn., vol. 3, p. 973, Hud. Riv. Gr.
 - argylensis, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 97, Shakopee Dolomite.
 - centralis, Ulrich, 1897, (Lophospira centralis,) Geo. Sur. Minn., vol. 3, p. 979, Trenton Gr
 - conoidea, Ulrich, 1897, (Lophospira conoidea,) Geo. Sur. Minn., vol. 3, p. 976, Trenton Gr.
 - elevata, Ulrich, 1897, (Lophospira elevata,) Geo. Sur. Minn., vol. 3, p. 977, Trenton Gr.
 - humilis, Ulrich, 1897, (Lophospira humilis,) Geo. Sur. Minn., vol. 3, p. 968, Trenton Gr.
 - indianensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 18, Keokuk Gr.

lirata, Ulrich, 1897, (Lophospira lirata,) Geo. Sur. Minn., vol. 3, p. 968, Utica Gr.

- medialis, Ulrich, 1897, (Lophospira medialis,) Geo. Sur. Minn., vol. 3, p. 973, Trenton Gr.
- cehlerti, Ulrich, 1897, (Cœlocaulus cehlerti,) Geo. Sur. Minn., vol. 3, p. 1020, Galena Gr.
- oweni, Ulrich, 1897, (Lophospira oweni,) Geo. Sur. Minn., vol. 3, p. 980, Trenton Gr.
- peracuta, Ulrich, 1897, (Lophospira peracuta,) Geo. Sur. Minn., vol. 3, p. 976, Trenton Gr.
- perlamellosa, Ulrich, 1897, (Lophospira perlamellosa,) Geo. Sur. Minn., vol. 3, p. 985, Hud. Riv. Gr.
- putilla, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 98, Oneota Dolomite.
- pygmæa, Rowley, 1895, Am. Geol., vol. 16, p. 222, Chouteau Gr. Very poorly defined.
- quadrisulcata, Ulrich, 1897, (Lophospira quadrisulcata,) Geo. Sur. Minn., vol.
- 3, p. 967, Hud. Riv. Gr. saffordi, Ulrich, 1897, (Lophospira saffordi,) Geo. Sur. Minn., vol. 3, p. 982, Trenton Gr
- spironema, Ulrich, 1897, (Lophospira spironema,) Geo. Sur. Minn., vol. 3, p. 983, Black Riv. Gr.
- textilis, Ulrich, 1897, (Schizolopha textilis,) Geo. Sur. Minn., vol. 3, p. 992, Hud. Riv. Gr.
- winnipegensis, Whiteaves, 1897, (Hormotoma winnipegensis,) Pal. Foss, vol. 3, p. 192, Low. Sil.

ortoni trat ventri of v Omospir laticin **ONYCHO** Rep Shal OPHILET Min One angula gula

1031

compla

NAT.--PO

NATICOP

to C

manit

Can

Para fausta Nat.

ston sublax

laxa Tren Ophiletin Oxydiscu

cutu Owenella PALÆACN Sur.

Palæopuj abru ognia

PELAGIEI 1894. Acad

p. 13

lower

Shell disco outer

sligh low;



Fig. 1415. -ras indi lateral v large spec

trated

LOB-MUR.

ont. to Can.

na regulare. ted in Ohio

yphemopsis. oconica. 397, (Lopho-

inn., vol. 3 (Lophospira n., vol. 3, p.

Bull. Minn. 7, Shakopee

nospira cenol. 3, p. 979,

phospira corol. 3, p. 976,

phospira elol. 3, p. 977,

hospira huol. 3, p. 968,

urley, 1896, Nat. Hist.,

pira lirata,) 68, Utica Gr. 10spira medol. 3, p. 973,

(Cœlocaulus 1., vol. 3, p.

spira oweni,) 5. 980, Tren-

phospira pervol. 3, p. 976,

(Lophospira Minn., vol. 3,

Bull. Minn.). 98. Oneota

1. Geol., vol. Very poorly

(Lophospira . Minn., vol.

phospira safvol. 3, p. 982,

(Lophospira inn., vol. 3, p.

izolopha tex-70l. 3, p. 992,

1897, (Hor-Pal. Foss, NAT .--- POL.

- NATICOPSIS inornata, Whiteaves, 1892, Cont. to Can. Pal., p. 333, Devonian. manitobensis, Whiteaves, 1892, Cont. to
 - Can. Pal., p. 332, Devonian.
 - ortoni and ziczac are described and illustrated in OhioGeo., vol.7, pp. 489 and 477. ventrica, Norwood and Pratten, instead of ventricosa.
- Omospira, Ulrich, Syn. for Scalites. laticincta. See Scalites laticinctus.
- ONYCHOCHILUS nitidulus, Clarke, 1894, 13th Rep. St. Geol. N. Y., p. 172, Marcellus Shale.
 - OPHILETA alturensis, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 98, **Oneota** Dolomite.
 - angularis, Ulrich, 1897, (Ophiletina angularis,) Geo. Sur. Minn., vol. 3, p. 1031, Black Riv. Gr.
 - complanata var. nana is in Expl. 40th Parallel, instead of 4th.
 - fausta, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 75, St. Peter Sandstone.
 - sublaxa, Ulrich, 1897, (Ophiletina sublaxa,) Geo. Sur. Minn., vol. 3, p. 1030, Trenton Gr.
- Ophiletina, Ulrich, Syn. for Ophileta.
- Oxydiscus subacutus. See Cyrtolites subacutus.
- Owenella, Ulrich, Syn. for Bellerophon.
- PALÆACMÆA humilis, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 837, Trenton Gr. Palxopupa, Foerste, and also the type P. abrupta. Too poorly defined to be recognized.
- PELAGIELLA, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 131, Up. Taconic. Shell few, whorled, discoid, flattened, outer edge angular,

Fig. 1415. - Platyce-



slightly tumid be-Fig. 1414.-Platyceras low; upper and boonvillense. lower lips arched

- forward in the middle. Type P. atlantoides, described at the same place from the Up. Taconic.
 - PLATYCERAS cyrtolites is from the Burlington Gr.
 - depressum, Ulrich. Not defined so as to be recognized.
 - indianense, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 48, Ham. Gr.
 - parvulum, Whiteaves. 1892, Cont. to Can. Paf., p. 331, Devo-
 - nian. squalodens is de-
- rasindianense, lateral view of a large specimen. scribed and illustrated in Ohio Geol., vol. 7, p. 423.

- vetulum, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 76, St. Peter Sandstone
- wisconsinensis, Ulrich. Not defined so as to be recognized.
- The PLATYSCHISMA. type is P. cirroides.

GASTROPODA.

PLATYSTOMA tumidum, Whiteaves, 1892. The



sp. Proposed

instead of P. tumidum,

Whiteaves,

in Cont. to

name was preoccupied by Meek Fig. 1416 .- Platy ceras and Worthen in missouriense. 1860. See P. whiteavesi.

whiteavesi, n.

Fig. 1417. ig. 1417. — Platystoma broadheadi, front and summit views.

Can. Pal., p. 331, pl. 43, fig. 12, Devonian, Pentamerus Point, Lake Manitoba.

Plethospira, Ulrich, Syn. for Pleurotomaria.

striata. See Pleurotomaria striata.

PLEUROTOMARIA aiens, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 76, St. Peter Sandstone.



- Fig. 1418. Pleurotomaria harii, front view, showing aperture and height of shell.
 - canalifera, Ulrich, 1897, (Eotomaria canalifera,) Geo. Sur. Minn., vol. 3, p. 1002, Trenton Gr.
 - filitexta, Foerste. The name was preoccupied.
 - margaritoides, Whiteaves, 1897. Pal. Foss., vol. 3, p. 190, Low. Sil.
 - minima, Rowley, 1895, Am. Geol., vol. 16, p. 222, Chouteau Gr. Poorly defined. providencis, Broadhead, 1896, Am. Jour.
 - Sci., vol. 152, p. 237, Ham. Gr. spenceri, Whiteaves, 1892, Cont. to Can.
 - Pal., p. 341, Devonian.
 - stokesiana, Whiteaves, 1897, Pal. Foss., vol. 3, p. 199, Low. Sil. striata, Ulrich, 1897, (Plethospira stri-
 - ata,) Geo. Sur. Minn., vol. 3, p. 1011, Hud. Riv. Gr.
- ventricosa, Ulrich, 1897, (Seelya ventricosa,) Geo. Sur. Minn., vol. 3, p. 1009, Calciferous Gr.
- POLYPHEMOPSIS melanoides is described and illustrated in Ohio Geol., vol. 7, p. 478.

769

PRO.-TRO.

Protowarthia, Ulrich, Syn. for Bellerophon. concinna and subcompressa, Synonyms for Bellerophon morrowensis.

770

- granistriata and planodorsata, Ulrich, Synonyms for Bellerophon globularis.
- obesa, pervoluta, and rectangularis, Ulrich, Synonyms for Bellerophon bilobatus.
- Pseudophorus tectiformis, Whiteaves, 1892, Cont. to Can. Pal., p. 330, Devonian.
- RAPHISTOMA affine, Foerste, 1895, Ohio Geol., vol. 7, p. 550, Niagara Gr.
 - decipiens, Ulrich, 1897, (Liospira decipiens,) Geo. Sur. Minn., vol. 3, p. 998, Trenton Gr.
 - leiosomellum, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 99, Oneota Dolomite.
 - lewistonense, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 99, Oneota Dolomite.
 - oweni, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 100, Oneota Dolomite.
 - peracutum, Ulrich, Syn. for R. lenticulare. richmondensis, Ulrich, Syn. for R. lenticulare.
 - ruidum, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 101, Shakopee Dolomite.
- Raphistomina, Úlrich, Syn. for Raphistoma. R. denticulata, modesta, and rugata, Synonyms for R. lapicida.
- Salpingostoma imbricata. See Bucania imbricata.
 - richmondensis. See Bucania richmondensis
 - sculptilis. See Bucania sculptilis.
- SCALITES elevatus, Ulrich, 1897, (Eotomaria elevata,) Geo. Sur. Minn., vol. 3, p. 1005, Trenton Gr.
 - laticinctus, Ulrich, 1897, (Omospira lati-cincta,) Geo. Sur. Minn., vol. 3, p. 945, Trenton Gr
- SCENELLA affinis, Syn. for Conchopeltis compressa.
 - beloitensis, Syn. for Conchopeltis minnesotensis.
- See Conchopeltis compressa. compressa. magnifica. Not defined so as to be recognized.
- radialis, Syn. for Conchopeltis obtusa. Schizolopha, Ulrich, Syn. for Murchisonia. moorei, Syn. for Murchisonia multigruma.
- textilis. See Murchisonia textilis.
- Seelya, Ulrich, Syn. for Pleurotomaria. mundula, Ulrich. Not recognized; probably distorted specimens of Cyclonema. ventricosa. See Pleurotomaria ventri-
- COS8. Solenospira, Ulrich, Syn. for Murchisonia. STENOTHECA unguiformis. See Tryblidium unguiforme.
- STRAPAROLLINA obtusa, Whiteaves, 1892, Cont. to Can. Pal., p. 328, Devonian.
- STRAPAROLLUS incarinatum, Foerste, 1895, Ohio Geol., vol. 7, p. 552, Niagara Gr. intralobatus, Sardeson, 1896, Bull. Minn.

- Acad. Nat. Sci., vol. 4, p. 101, Calciferous-Oneota Dolomite
- missouriensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 20, Chouteau Gr.
- STROPHOSTYLUS textilis. See Cyclonema textile.
- SUBULITES beloitensis, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1072, Trenton Gr. bicurvatus, Ulrich, 1897, (Cyrtospira bi-
- curvata,) Geo. Sur. Minn., vol. 3, p. 1074, Trenton Gr.
- canadensis, Ulrich, Syn. for Subulites elongatus.
- conradi, Ulrich, Syn. for S. elongatus.
- directus, Foerste, Syn. for S. gracilis.
- dixonensis, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1071, Trenton Gr.
- exactus, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 101, Calciferous Gr
- nanus, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1072, Trenton Gr.
- parvus, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1072, Trenton Gr. pergracilis, Ulrich. Not defined so as to
- be recognized.
- planilateralis, Foerste. Too poorly defined to be recognized.
- regularis, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1072, Trenton Gr.
- subconicus, Ulrich, 1897, (Meekospira subconica,) Geo. Sur. Minn., vol. 3, p. 1080, Hud. Riv. Gr.
- tortilis, Ulrich, 1897, (Cyrtospira tortilis,) Geo. Sur. Minn., vol. 3, p. 1074, Trenton Gr.
- wykoffensis, Ulrich, 1897, (Cyrtospira wykoffensis,) Geo. Sur. Minn., vol. 3, p. 1074, Trenton Gr. Tetranota, Ulrich, Syn. for Bucania.
- macra and sexcarinata, Synonyms for Bucania bidorsata.
 - obsoleta. See Bucania obsoleta.
- Trepospira, Ulrich, Syn. for Pleurotomaria.
- TROCHONEMA altum, Ulrich, Syn. for Pleuromaria niota
 - arctatum, Ulrich, 1897, Geo. Sur. Minn.,
 - vol. 3, p. 1054, Trenton Gr. bellulum, Ulrich, Syn. for B. eccentricum.
 - eccentricum, Ulrich, 1897, Geo. Sur.
 - Minn., vol. 3, p. 1049, Trenton Gr. fragile, Ulrich, Syn. for T. umbilicatum. knoxvillense, Ulrich, 1897, (Lophospira knoxvillensis,) Geo. Sur. Minn., vol. 3, p. 989, Trenton Gr.
 - madisonense and rugosum, Ulrich, Synonyms for T. umbilicatum.
 - nitidum, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1053, Utica Gr.
 - notabile, Ulrich, 1897, (Lophospira notabilis,) Geo. Sur. Minn., vol. 3, p. 990, Black Riv. Gr.
 - obsoletum, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1054, Trenton Gr.
 - retrorsum, Ulrich, Syn. for T. subcrassum.

TRY.-B

robbi vol. salter vol. simile subcr Min troche Min vagra TRYBLII chir vol.

that the North A Professo into a g sible to generic

Ιт

APHELÆ Soc. aph spec said

APHETO

Soc.

kera the Whe tica than tral ameri Phil (?) attenu Soc. boreal Soc.

compl plan farnsv farn Cal

to exam think an

madis sone

depre

dep

830,

PRO.-TRO.

01, Calcifer-

urley, 1896, Nat. Hist.,

Cyclonema

1897, Geo. Trenton Gr. rtospira bi-., vol. 3, p.

or Subulites

longatus. gracilis. Sur. Minn.,

Bull. Minn. 01, Calcifer-

. Minn., vol.

Sur. Minn.,

ined so as to

) poorly de-

Sur. Minn.,

(Meekospira ın., vol. 3, p.

tospira torl. 3, p. 1074,

(Cyrtospira linn., vol. 3,

ania. nonyms for

eta. Pleurotoma-

yn. for Pleu-

Sur. Minn.,

B. eccentri-

Geo. Sur. iton Gr. imbilicatum. (Lophospira-Minn., vol.

Ulrich, Syn-

Sur. Minn.,

phospira no-., vol. 3, p.

). Sur. Minn.,

T. subcras-

TRY.-BAR.

robbinsi, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1053, Trenton Gr. salteri, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1053, Trenton Gr. simile, Ulrich. Not defined.
subcrassum, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 1051, Trenton Gr. trochomenoides, Ulrich, 1897, Geo. Sur. Minn., vol. 3, p. 990. Trenton Gr.

Minn., vol. 3, p. 990, Trenton Gr.

vagrans, Ulrich, Syn. for T. beloitense. TRYBLIDIUM cingulatum, Ulrich, 1897, (Archinacella cingulata,) Geo. Sur. Minn.,

- vol. 3, p. 829, Trenton Gr. depressum, Ulrich, 1897, (Archinacella depressa,) Geo. Sur., Minn., vol. 3, p. 830, Trenton Gr.
- madisonense, refer to Cyrtocerina madisonensis.

- modestum. Too poorly defined to be recognized
- powersi, Ulrich, 1897, (Archinacella powersi,) Geo. Sur. Minn., vol. 3, p. 829, Trenton Gr.
- repertum, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 102, Shakopee Dolomite.
- rotundum, Ulrich, 1897, (Archinacella rotunda,) Geo. Sur. Minn., vol. 3, p. 835, Hud. Riv. Gr.
- striatum, Ulrich, 1897, (Helcionopsis striata,) Geo. Sur. Minn., vol.3, p. 827, Hud. Riv. Gr.
- unguiforme, Ulrich, 1897, (Stenotheca unguiformis,) Geo. Sur. Minn., vol. 3, p. 843, Trenton Gr.

CLASS CEPHALOPODA.

.000.

IT is very clear that the genus Nautilus does not exist in Palæozoic rocks, and that the species referred to that genus belong elsewhere. Lituites is unknown from North America. The early generic references of authors are frequently erroneous. Professor Hyatt, who has given the subject profound study, has divided the Class into a great many genera, and has cited foreign authors, whose works are not accessible to me, and I am frequently unable to understand what are relied upon as generic characters. I have reproduced such definitions as I have had an opportunity to examine, though characters, which he regards as of generic value, I sometimes think are of no more than specific importance.

- APHELÆCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 293. [Ety. apheles, smooth ; keras, horn.] No type specified. Much like Discitoceras, and said to include D. disciforme.
- APHETOCERAS, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 447. [Ety. aphetos, free; keras, horn.] Shell smooth, coiled in the same plane, but not in contact. Whorls in section, compressed, elliptical, or oviform, the venter narrower than the dorsum. Siphuncle subven-tral. Type A. americanum.
 - americanum, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 447, Calciferous (?) Gr.
- attenuatum, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 449, Calciferous Gr. boreale, Hyatt, 1894, Proc. Am. Phil.
- Soc., vol. 32, p. 448. Quebec Gr. complanatum, instead of Lituites com-
- planatus.
- farnsworthi, Billings, 1861, (Lituites farnsworthi,) Pal. Foss., vol. 1, p. 21, Calciferous Gr.

- ASCOCERAS costulatum, Whiteaves, 1896, Can. Rec. Sci., vol. 6, p. 394, Low. Sil. gibberosum, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 102, Oneota Dolomite.
- BARRANDEOCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 299. [Ety. proper name; keras, horn.] Large umbilicus, and compressed, slightly Ventral costated, or smooth whorls. side narrower than dorsal; whorls barely in contact; siphon above the center; septa deeply concave, and su-tures with ventral saddles, lateral lobes, and dorsal saddles, without annular lobes. Type B. natator.
 - convolvans, Hall, 1847, (Lituites convolvans,) Pal. N. Y., vol. 1, p. 53, Black Riv. Gr.
 - elrodi, White, 1882, (Gyroceras elrodi,) 11th Ann. Rep. Geo. Ind., p. 356, Niagara Gr.
 - minganense, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 451, Chazy Gr.

natator, Billings, 1859, (Nautilus natator,)

Cameroceras hennepini. See Endoceras hennepini.

- CENTROCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 283. [Ety. kentron, a spur; keras, horn.] Whorls compressed; abdomen hollow, sometimes narrow, with a row of tubercles on each side. Sutures have deep lateral dorsal and ventral lobes, the latter V-shaped. Type C. marcellense.
 - ammonis, Hall, 1879, (Discites ammo-nis,) Pal. N. Y., vol. 5, pt. 2, p. 425, Up. Held. Gr.
- marcellense, Vanuxem, 1842, (Goniatites marcellensis,) Geo. Sur. 3d Dist. N. Y., p. 146, Marcellus Shale.
- CŒLOGASTEROCERAS, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 498. He says the genus is defined in 4th Ann. Rep. Geo. Sur. Texas, but it is not in my copy. He describes Calogasteroceras canaliculatum in Proc. Am. Phil. Soc., vol. 32, p. 498, from the Carboniferous.
- COLOCERAS, Hyatt, 1893, 4th Ann. Rep. Geo. Sur. Texas, p. 449. Type C. globatum. globulare, Hyatt, 1893, 4th Ann. Rep. Geo. Sur. Texas, p. 452, Coal Meas.
- CYCLOLITUITES, Remele, but I have no reference to his work.
 - americanus, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 505. Group of rocks not referred to. No illustration.
- CYRTOCERAS clintonense, Foerste, 1895, Ohio Geol., vol. 7, p. 534, Niagara Gr. cretaceum is described and illustrated in Ohio Geol., vol. 7, p. 429
 - dresbachense, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 102, Oneota Dolomite.
 - dunleithense, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 30, Trenton Gr.
 - eatonense, Claypole, 1878, (Glyptodendron eatonense,) Am. Jour. Sci., vol. 115, p. 302, Niagara Gr. The specimen is so poor that the specific name is of no value.
 - Fatherstonhaughi, Clarke, 1897, Geo. Sur. Minn., vol. 3, p. 807, Trenton Gr. houghtoni, Clarke, 1897, Geo. Sur. Minn.,
 - vol. 3, p. 807, Trenton Gr.
 - kansasense, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 88, Up. Coal Meas.
 - laticurvatum, Whiteaves, 1896, Can. Rec. Sci., vol. 6, p. 365, Low. Sil.
 - maximum. See Nephriticeras maximum. instead of Nautilus maximus.
 - metellus. See Mælonoceras metellus. minneapolis, Clarke, 1897, Geo. Sur.
 - Minn., vol. 3, p. 808, Trenton Gr. norwoodi, Clarke, 1897, Geo. Sur. Minn.,
 - vol. 3, p. 809, Trenton Gr. scofieldi, Clarke, 1897, Geo. Sur. Minn.,
 - vol. 3, p. 810, Trenton Gr. shumardi, Clarke, 1897, Geo. Sur. Minn.,
 - vol. 3, p. 810, Trenton Gr.

undulatum, refer to Halloceras undulatum

- CYRTOCERINA madisonensis, instead of Tryblidium madisonense.
- schoolcrafti, Clarke, 1897, Geo. Sur.
- Minn., vol. 3, p. 774, Trenton Gr. DELTOCERAS, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 449. [Ety. deltos, a Social; keras, horn.] Shell similar to Aphetoceras, but more complicated. Whorls similar in section, but grow more rapidly in the ventro-dorsal diameters. Siphuncles large and ventral. Whorls in contact in the earlier epembryonic stages or throughout the ephebic stage. A departure from the spiral regularly takes place in the gerontic stage or earlier; sometimes the entire ephebic stage is free. No impressed zone. Type D. planum.
- planum, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 450, Calciferous Gr.
- Discites. This name was twice preoccupied before DeHaan used it in 1825, in his monograph, page 41. His defini-tion was without illustration, and too brief to describe a genus. ' McCoy, in 1844, used the word in his Synop. Carb. Foss., p. 17, and for the genus defined by McCoy, Hyatt has proposed Discitoceras.
- ammonis. See Centroceras ammonis. marcellensis. See Centroceras marcellence
- DISCITOCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 292. It includes species with quadragonal whorls, having the abdomen slightly convex, sides flattened, the dorsum very gibbous, and having a slight impression. The young are ridged longitudinally, with prominent transverse striæ, not subspinous. The sutures have ventral and lateral lobes and broad dorsal saddles, with small annular lobes. Siphon above the center. Living chamber from one-fourth to three-fourths of a volution. Aperture with a deep ventral sinus. Type D. costellatum. The Discites must be referred to this genus.
- DISCOCERAS, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 500. [Ety. diskos, quoit; keras, horn.] Discoid, planorbicular, concave on both sides. Volutions three or more, slightly embracing, with transverse section nearly circular. Surface marked by distant costæ, which cross the sides obliquely backward, curving more strongly on the periphery, indicating a profound sinus in the lip. Imbricating striæ cf growth between the costæ. Type D. antiquissimum.
 - canadense, Whiteaves, 1897, Pal. Foss., vol. 3, p. 227, Low. Sil.
 - graftonense, Meek and Worthen, instead of Lituites graftonensis
 - marshi, Hall, instead of Lituites marshi.

uite orton DOMATO tion tur milita Geo simpl Sur EDAPHO Soc edashe gro tion tral but whe cen flat dles niotei (Te Nat Ill., ENDOCE aulen vol Gr. consu Aca ope henne hen 779 ENDOLO roce Ерніррі Soc ephi coil ven sub sho lobe med Typ mont mor EURYST Dan eury stor cera nep com late rem mor who ven may auii ter uml tion a co the

DOM.-C

multi

CAM.-DIS.

ras undula-

tead of Try-

Geo. Sur. on Gr. Am. Phil.

y. deltos, a l similar to omplicated. but grow lorsal diamnd ventral. rlier epemut the ephem the spiral he gerontic s the entire impressed

Am. Phil. rous Gr. ce preoccut in 1825, in His definion, and too McCoy, in ynop. Carb. nus defined sed Discito-

mmonis. as marcel-

Bost. Soc. It includes vhorls, havonvex, sides ry gibbous, ssion. The inally, with æ. not subventral and sal saddles. Siphon 8. g chamber -fourths of ith a deep costellatum. red to this

Am. Phil. Ety. diskos, oid, planordes. Volutly embracnearly cirdistant coss obliquely strongly on a profound ing striæ cf e. Type D.

Pal. Foss.,

nen, instead

ites marshi.

DOM.-GON.

multicostatum, Whitfield, instead of Lituites multicostatus.

CEPHALOPODA.

ortoni, instead of Lituites ortoni.

- DOMATOCERAS, Hyatt. The whorl in section is distinctly hexagonal in a mature state.
 - militarium, Hyatt, 1893, 4th Ann. Rep. Geo. Sur. Texas, p. 445, Coal Meas.
- simplex, Hyatt, 1893, 4th Ann. Rep. Geo.
- Sur. Texas, p. 441, Coal Meas. APHOCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 288. [Ety. EDAPHOCERAS, edaphos, a seat; keras, horn.] Young shells arcuate until a late stage of growth, with whorls fusiform in section, and sutures with dorsal and ventral lobes and angular lateral saddles; but the siphon shifts from the venter, where it is in the larva, to near the center. The adult is close coiled, with flattened sides and broad lateral saddles. Type E. niotense. iotense, Meek and Worthen, 1865,
- niotense, (Temnochilus niotense,) Proc. Acad. Nat. Sci. Phil., p. 260, and Geo. Sur. Ill., vol. 5, p. 523, Keokuk Gr. ENDOCERAS. The type is E. subcentrale. aulema, Clarke, 1897, Geo. Sur. Minn.,
- - vol. 3, p. 770, (Nanno aulema,) Trenton Gr.
 - consuetum, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 103, Shakopee Dolomite.
 - hennepini, Clarke, 1897, (Cameroceras hennepini,) Geo. Sur. Minn., vol. 3, p. 779, Galena Gr.
- ENDOLOBUS gibbosus, Hyatt, refer to Stearoceras gibbosum.
- EPHIPPIOCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 290. [Ety. ephippion, a saddle; keras, horn.] Shell coiled and having subacute, prominent ventral saddles; broad lateral lobes; subacute lateral saddles near the shoulders, and broad, shallow dorsal lobes. Septa creased or raised into a median ridge between the two saddles. Type E. ferratum.
 - montgomeryensis, instead of Nautilus montgomeryensis.
- EURYSTOMITES, Schröder, 1891, Pal. Abh. Dames et Kayser, vol. 5, p. 26. [Etv. eurys, broad; stoma, mouth; lithos, Discoid, much like Tarphystone.] Siphuncle subventran in the ceras. nepionic and ananeanic substages, becoming extracentroventran in all the later stages of development, or it may remain nearer the venter. Growth more rapid than in Tarphyceras, fewer whorls in the same diameter, and ventro-dorsal diameter longer. Whorl may be rounded in early life, but acquires a more or less flattened venter and primitive lateral and ill-defined umbilical zones. Umbilical perforation large, and the impressed zone is a contact furrow not generated until the whorls come in contact. The con-

tact furrow is deeper than in Tarphyceras, body chamber free and variable in length. The aperture has lateral crests, most prominent opposite the centers of the lateral zones. Sutures straight or sinuous. Type E. kelloggi. apollo, instead of Lituites apollo.

- gibbosum, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 443, Calciferous Gr.
- imperator, instead of Lituites imperator
- kelloggi, Whitfield, 1886, (Nautilus kelloggi,) Bull. Am. Mus. Nat. Hist., vol. 1, p. 328, Calciferous Gr.
- plicatus, Whiteaves, 1896, Can. Rec. Sci., vol. 6, p. 395, Low. Sil.
- robertsoni, instead of Lituites robertsoni
- rotundus, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 443, Calciferous Gr.
- undatus, Emmons, 1842, (Inachus unda-tus,) Geo. Rep. N. Y. 394, and Pal. N. Y., vol 1, p. 52, Black Riv. Gr.
- undatus, var. occidentalis, Hall, 1861, (Lituites undatus var. occidentalis,) Rep. of Progr. Wis., p. 38, Black Riv. Gr
- virginianus, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 444, Calciferous Gr.
- Gastrioceras branneri. See Goniatites branneri.
- GLYPHIOCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 328. [Ety. glyphus, the notch in an arrow; keras, horn.] Whorls in section semilunar, trapezoidal, or compressed ; abdomen broad and convex; sides divergent outwardly, and frequently costated. Sutures with acute angular lobes and saddles, and siphonal saddle frequently bottle-shaped. Siphonal saddles small, and occupy only the apex of the straightsided, deep ventral lobes. First pair of saddles spatulate. Type G. crenistria.
 - cumminsi, Hyatt, 1893, 4th Ann. Rep. Geo. Sur. Texas, p. 467, Coal Meas.
 - incisum, Hyatt, 1893, 4th Ann. Rep. Geo. Sur. Texas, p. 471, Coal Meas.
- GOMPHOCERAS amphora, hyatti, and sciotoense are described and illustrated in Ohio Geol., vol. 7, pp. 428 and 533. indianense, Miller and Faber, 1894, Jour.
 - Cin. Soc. Nat. Hist., vol. 17, p. 137, Hud. Riv. Gr.
 - mitriforme, Clarke, 1894, 13th Rep. St. Geol. N. Y., p. 171, Marcellus Shale.
- ortoni, Foerste, 1895, Ohio Geol., vol. 7, p. 533, Niagara Gr.
- GONIATITES blairi, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 35, Chouteau Gr.
 - branneri, Smith, 1897, (Gastrioceras branneri,) Marine Foss. from Coal Meas., p. 47, Lower Coal Meas.
 - elkhornensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., 1896, p. 37, Coal Meas.
 - fultonensis, Miller and Gurley, 1896, Bull.

CEPHALOPODA.

No. 11, Ill. St. Mus. Nat. Hist., p. 39, Coal Meas.

774



Fig. 1419.—Goniatites greencastlensis, lateral and ventral views.

grencastlensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 44, St. Louis Gr.



Fig. 1420.—Goniatites illinoisensis, lateral and ventral views.

- illinoisensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 42, Coal Meas.
- jessieæ, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 46, Chouteau Gr.

kansasensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 43, Up. Coal Meas.



Fig. 1421.—Goniatites kentuckiensis, showing outer shell.

- kentuckiensis is redescribed and illustrated in Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 40.
- louisianensis Rowley, 1895, Am. Geol., vol. 16, p. 221, Chouteau Gr.

lunatus, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 41, Coal Meas.

GYR.-LIT.

- montgomeryensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 38, Coal Meas.
- parrishi, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 36, Up. Coal Meas.



Fig. 1422.—Goniatites subcavus, lateral and ventral views.

- subcavus, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 45, Coal Meas.
- GYROCERAS *baeri*, refer to Trochoceras baeri, where it was first_referred.
 - columbiense and seminodosum are described and illustrated in Ohio Geol., vol. 7, pp. 430 and 431.
 - elrodi, refer to Barrandeoceras elrodi. inelegans, liratum, and subliratum, refer to Nephriticeras.
- undulatum refer to Halloceras undulatum.
- HALLOOERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 284. [Ety. proper name; keras, horn.] Whorls triangular in section, abdomen broad, sides divergent, dorsum narrow. Thick costæ or large nodes on the angles of the sides. Sutures have ventral and lateral lobes. Siphon small and near the venter. Type H. undulatum. undulatum, Vanuxem, 1842, (Cyrtoceras
 - undulatum, Vanuxem, 1842, (Cyrtoceras undulatum,) Geol. Rep. N. Y., p. 139, and Pal. N. Y., vol. 5, pt. 2, p. 378, Up. Held. Gr.
- LITOCERAS, Hyatt, 1894, Proc. Am. Phil. Soc. vol. 32, p. 474. [Ety. litos, plane; keras, horn.] Shells discoid. Siphuhcle dorsal or below the center in adults, but ventral in the neanic and earlier Umbilicus of good size. stages. Whorls larger and broader than in Schroederoceras, and have in the ephebic stage similar abdomens and convex, divergent sides, without umbilical shoulders. The aperture is less compressed than in Schroederoceras, but not flaring as in Trocholites. Hyponomic sinus smaller and shallower than in Schroederoceras, and the contact furrow broader and deeper. Sutures have deep dorsal lobes, saddles on the lines of involution, and broad lateral lobes. Type L. whiteavesi. Not L. versutum, as in the first definition of the genus, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 268.

LIT.-NE

biangu Phil hercul cule Hud insole lens erou versut tus, white Soc. Lituites. ica 1808 ica, Ame rone mos and americ rand apollo, bickmo anui compla atun convolu volv eatoni. eatonicera farnsw wort farnsw farns grafton impera interni stria magnif marshi multico tatu niagar fined ortoni. palinu nuru pluto, 1 reco robertse seeleyi. undatu undatu ites MITROCE Soc., ban ; posed Troch the g cupie genu thoug same MÆLONOG Soc.] melon GYR.-LIT.

1896, Bull. Iist., p. 41,

nd Gurley, Mus. Nat.

1896, Bull. Hist., p. 36,



ateral and

1896, Bull. Hist., p. 45,

'rochoceras erred. m are de-**Ohio** Geol.,

s elrodi. atum, refer

as undula-

Bost. Soc. 284. [Ety. Whorls .1 nen broad, row. Thick e angles of rentral and 1 and near atum. Cyrtoceras Y., p. 139,

. 2, p. 378,

Am. Philas litos, plane; 1. Siphuher in adults. and earlier good size. er than in the ephebic convex, dilical shoulcompressed not flaring omic sinus a Schroederow broader deep dorsal of involus. Type L. i, as in the

enus, 1883, , vol. 22, p.

biangulatum, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 479, Calciferous Gr. hercules, Billings, 1856, (Nautilus her-cules,) Rep. Geo. Sur. Can., p. 306, Hud. Riv. Gr.

LIT.-NEP.

- insolens, Billings, 1865, (Nautilus inso-lens,) Pal. Foss., vol. 1, p. 258, Calciferous Gr.
- versutum, Billings, 1865, (Nautilus versutus,) Pal. Foss., vol. 1, p. 259, Quebec Gr. whiteavesi, Hyatt, 1894, Proc. Am. Phil.

Soc., vol. 32, p. 475, Calciferous Gr. Lituites, Breynius, 1732, Dissertatio Phys-

- ica de Polythalamis, p. 27, Montfort, 1808. This genus is unknown in America, and therefore all the references of American authors to it have been erroneous. Professor Hyatt has referred most of the species to other genera, and all of them must be so distributed. americanus, D'Orbigny, Syn. for Barrandeoceras convolvans.
- apollo, refer to Eurystomites apollo. bickmoreanus. See Plectoceras bickmoreanum.
- complanatus. See Aphetoceras complanatum
- convolvans. See Barrandeoceras convolvans.
- eatoni. See Schroederoceras eatoni.
- eatoni var. cassinensis. See Schroederoceras cassinense.
- See Aphetoceras farnsfarnsworthi. worthi
- farnsworthi, in part. See Tarphyceras farnsworthi.

graftonensis. See Discoceras graftonense. imperator. See Eurystomites imperator.

internistriatus. See Trocholites Internistriatus.

magnificus. See Aspidoceras magnificum. marshi. See Discoceras marshi.

- multicostatus. See Discoceras multicostatum.
- niagarensis, Spencer. Too poorly defined to be recognized.

ortoni. See Discoceras ortoni.

- palinurus. See Schroederoceras palinurus.
- pluto, Billings. Not defined so as to be recognized.

robertsoni. See Eurystomites robertsoni. seeleyi. See Tarphyceras seeleyi.

undatus. See Eurystomites undatus.

undatus var. occidentalis. See Eurystomites undatus var. occidentalis.

- MITROCERAS, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 503. [Ety. mitra, tur-ban; keras, horn.]. This name is pro-posed instead of *Trochoceras*, with *Trochoceras gebhardi* as the type, on the ground that Barrande had preoccupied Trochoceras for a different genus, though Barrande and Hall thought their species belonged to the
- same genus. MELONOCERAS, Hyatt, ^{\$1883}, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 280. [Ety. melon, goat; keras, horn.] Arcuate

cones, section compressed, ovate; dorsum wider than venter. Siphon near the venter. Sutures have ventral and dorsal saddles, and slight lateral lobes. Living chamber short. Aperture entirely open, and partially subtriangular or contracted and pear-shaped. Type M. præmaturum.

- metellus, Billings, 1865, (Cyrtoceras metellus,) Pal. Foss., vol. 1, p. 191, Quebec Gr.
- præmaturum, Billings, 1866, (Phragmo-ceras præmaturum,) Can. Nat. and Geol., vol. 5, p. 173, Black Riv. Gr.
- Nanno, Clarke, 1894, Am. Geologist, vol. 14, p. 205. A generic name, signifying a player upon the flute, applied to what has been generally called the siphuncle of an Endoceras, or what I regard as the body chamber, and years ago described under the names of E. egani, E. bristolense, and E. inæqua-Type N. aulema. bile.

aulema. Šee Endoceras aulema.

NAUTILUS acraus. See Nephriticeras acræum.

bucinum. See Nephriticeras bucinum. cancellatus, McChesney, not a Nautilus.

cavus. See Nephriticeras cavum.

- champlainensis. See Tarphyceras champlainense.
- cornulum. See Rhadinoceras cornulum.

divisus. See Ephippioceras divisum.

ferratus. See Ephippioceras ferratum. See Litoceras hercules. hercules.

hyatti. See Rhadinoceras hyatti.

insolens. See Litoceras insolens.

- jason. See Plectoceras jason.
- kelloggi. See Eurostomites kelloggi. liratus. See Nephriticeras liratum.
- liratus var. juvene. See Nephriticeras juvene.
- See Nephriticeras magister. magister. maximus. See Nephriticeras maximum.
- See Ephippioceras montgomeryensis. montgomeryense.
- natator. See Barrandeoceras natator.
- nodocarinatus, McChesney, 1859, Desc. New Spec. Foss., p. 66, Coal Meas., is a good species, but not a Nautilus.
- oriens. See Nephriticeras oriens.
- ortoni, pauper, and subquadrangularis are described and illustrated, in Ohio Geol., vol. 7, pp. 481, 486, and 487. ponderosus. See Titanoceras ponderosum.
- quadrangulus, McChesney, instead of quadrangularis. See Tainoceras quadrangulum.

 $sublivatus. \ {\bf See \ Nephriticer as \ sublivatum}.$ versutus. See Litoceras versutum.

NEPHRITICERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 300. [Ety. nephrites, kidney-shaped; keras horn.] Whorls kidney-shaped or elliptical. Umbilicus large, impressed zone on the dorsum. Siphon nummuloidal and above the center. Sutures have broad ventral saddles and slight ventral lobes. Dorsal V-shaped annular lobes 776

- Pal. N. Y., vol. 5, pt. 2, p. 417, Ham. Gr. bucinum, Hall, 1876, (Nautilus bucinum,)
- Duchum, Hall, 1876, (Nauthus Duchum,) Illust. Dev. Foss., pl. 60, and Pal. N. Y., vol. 5, pt. 2, p. 412, Ham. Gr.
 cavum, Hall, 1879, (Nautilus cavus,) Pal. N. Y. vol. 5, pt. 2, p. 416, Ham. Gr.
 inelegans, Meek, 1871, (Gyroceras inelegans), Proc. Acad. Nat. Soi. p. 80 and
- gans,) Proc. Acad. Nat. Sci., p. 89, and Ohio Pal., vol. 1, p. 232, Up. Held. Gr. juvene, Hall, 1879, (Nautilus liratus var. juvenis,) Pal. N. Y., vol. 5, pt. 2, p.
- 411, Ham. Gr.
- liratum, Hall, 1860, (Gyroceras liratum,) 13th Rep. N. Y. Mus. Nat. Hist., p. 104, Marcellus Shale.
- magister, Hall, 1879, (Nautilus magister,) magister, Hall, 1849, (Nauthus magister,) Pal. N. Y., vol. 5, pt. 2, p. 422, Ham. Gr. maximum, Conrad, 1838, (Cyrtoceras maximus,) Ann. Rep. N. Y., p. 117, and Pal. N. Y., vol. 5, pt. 2, p. 418, Ham. Gr. oriens, Hall, 1876, (Nauthus oriens,) Unit Due Borg, pd. 41 and Pal. N. Y.
- Illust. Dev. Foss., pl. 61, and Pal. N. Y., vol. 5, pt. 2, p. 420, Ham. Gr. subliratum, Hall, 1876, (Gyroceras sub-
- liratum,) Illust. Dev. Foss., pl. 58, and Pal. N. Y., vol. 5, pt. 2, p. 409, Ham. Gr.
- ONCOCERAS carveri, Clarke, 1897, Geo. Sur. Minn., vol. 3, p. 801, Trenton Gr. douglassi, Clarke, 1897, Geo. Sur. Minn., vol. 3, p. 801, Galena Gr.

minnesotense, Clarke, 1897, Geo. Sur. Minn., vol. 3, p. 798, Galena Gr. OTHOCERAS albersi, Miller and Faber, 1894,



Fig. 1428.—Orthoceras albersi.

Jour. Cin. Soc. Nat. Hist., vol. 17, p. 140, Hud. Riv. Gr.

beltrami, Clarke, 1897, Geo. Sur. Minn.,

ONC.-PLE.

- vol. 3, p. 789, Galena Gr. caldwelli, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 31, Up. Held. Gr.
- crawfordi, Foerste. Too poorly defined to be recognized.
- daytonense, Foerste. Too poorly defined to be recognized.
- erraticum, Foerste. Too poorly defined to be recognized.
- fenestrulatum, Clarke, 1894, 13th Rep. St. Geol. N. Y., p. 168, Marcellus Shale. geneva, Clarke, 1894, 13th Rep. St. Geol.
- N. Y., p. 168, Corniferous Gr.
- noverense, Foerste. Too poorly de-fined to be recognized. hanoverense, Foerste.
- ignotum, Foerste. Too poorly defined to be recognized.
- incarceratum., Clarke, 1894, 13th Rep. St. Geol. N. Y., p. 170, Marcellus Shale.
- inceptum, Foerste. Too poorly defined to be recognized.
- lata-nummulatum, Foerste. Too poorly defined to be recognized.
- leseuri, Clarke, 1897, Geo. Sur. Minn., vol. 3, p. 785, Trenton Gr.
- ludlowense, Miller and Faber, 1894, Jour. Cin. Soc. Nat. Hist., vol. 17, p. 139, Hud. Riv. Gr.
- minnesotense, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 77, St. Peter Sandstone.
- nicolleti, Clarke, 1897, Geo. Sur. Minn., vol. 3, p. 784, Trenton Gr. nova-carlislense, Foerste.
- Too poorly defined to be recognized.
- nuntioides, Clarke, 1894, 13th Rep. St. Geol. N. Y., p. 170, Marcellus Shale. perroti, Clarke, 1897, Geo. Sur. Minn.,
- vol. 3, p. 785, Hud. Riv. Gr. spyroceroides, Foerste. Too poorly de-
- fined to be recognized.
- staffordense, Clarke, 1894, 13th Rep. N. Y. St. Geol., p. 169, Marcellus Shale.
- turgido-nummulatum, Foerste. Too poorly defined to be recognized.
- youngi, Foerste, 1895, Ohio Geol., vol. 7. p. 537, Niagara Gr.
- PHRAGMOCERAS præmaturum, refer to Mælonoceras præmaturum.
- PILOCERAS corniculum, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 103, Oneota Dolomite.
 - vol. 3, p. 767, Calciferous Gr. [It is spelled newton-winchelli, but as that is not binomial I have dropped the middle name newton, and probably the whole name should be stricken out for not conforming to the binomial system.]
- PLECTOCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat, Hist., vol. 22, p. 268. [Ety. plek-tos, twisted or plaited; keras, horn.] Whorls quadrate, abdomen narrower than dorsum, and sides convergent outward. Surface having costæ curved

POT.-SCH

postei Sipho Type bickmon ites Nat. Gr. jason. Can Chazy obscuru Soc., POTERIOCE ley, 1 Nat. 1 PYCNOCER Soc., close much tum. apertum Soc., calcifor Phil. Gr. REMELECE Soc., name perfor having section sum.

clarkens

Fig. 1424. 12. Ill. kuk Ga impressu Soc., v verly (ONC.-PLE.

Sur. Minn.,

1896, Bull. list., p. 31,

rly defined

poorly de-

rly defined

13th Rep. allus Shale. p. St. Geol.

r. poorly de-

defined to

13th Rep.

Marcellus

ly defined

foo poorly

ur. Minn.,

ber, 1894. vol. 17, p.

Bull. Minn.

, St. Peter ur. Minn.,

'oo poorly

1 Rep. St. is Shale. ur. Minn.,

poorly de-Rep. N. Y.

Shale. Too poorly

eol., vol. 7,

er to Mælo-

son, 1896, , vol. 4, p.

Jur. Minn., ir. [It is ut as that opped the probably e stricken o the bi-

Bost. Soc. [Ety. plek-ras, horn.] narrower onvergent stæ curved POT.-SCH.

posteriorly and crossing the abdomen. Siphon ventral and holochonoidal. Type P. jason.

- bickmoreanum, Whitfield, 1885, (Lituites bickmoreanus,) Bull. Am. Mus. Nat. Hist., vol. 1, p. 191, Niagara Gr.
- jason, Billings, 1859, (Nautilus jason,) Can. Nat. and Geol., vol. 4, p. 164, Chazy Gr.
- obscurum, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 499, Black Riv. Gr.
- POTERIOCERAS jerseyense, Miller and Gur-ley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 32, Kinderhook Gr.
- PYCNOCERAS, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 454. [Ety. puknos, close; keras, horn.] This genus is very much like Sphetoceras. Type P. apertum.
- apertum, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 455, Calciferous Gr. calciforme, Hyatt, 1894, Proc. Am.
- Phil. Soc., vol. 32, p. 456, Calciferous Gr.
- REMELECERAS, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 525. [Ety. proper name; keras, horn.] Wide umbilicus, perforated, shallow contact furrow, having V-shaped sutures. Transverse section elliptical. Type R. impressum.

clarkense, Miller and Gurley, Bull. No.



Fig. 1424.—Remeleceras clarkense, lateral view. 12, Ill. St. Mus. Nat. Hist., p. 49, Keo-

kuk Gr. impressum, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 525, Keokuk or Wa-verly Gr.

RHADINOCERAS, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 530. [Ety. radinos, slen-

der; keras, horn.] More slenderthan Nephritoceras; discoid whorls compressed elliptical, or rounded, and have an impressed zone in mature shells. Type R. cornulum. cornulum, Hall, 1876, (Nautilus cornulum,) Illust. Dev. Foss., pl. 60, and Pal. N. Y., vol. 5, pt. 2, p. 414, Ham. Gr. hyatti, Beecher, 1888, (Nautilus

CEPHALOPODA.



N.Y., vol. 7, Fig. 1425.-Remeleceras clarkp. 37, Ham. ense, dorsal view. Gr.

- Schroederoceras, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 458. [Ety. proper name; keras, horn.] Type S. angulatum. It includes forms that have been referred to Lituites, and is related to Litoceras, and Trocholites. Umbilical perforation large; whorls few; sutures sinuous; living chamber short.
 - casinense, Whitfield, 1886, (Lituites eatoni var. casinensis,) Bull. Am. Mus.



Fig. 1426.—Solenochilus henryvillense, lateral view.

Nat. Hist., vol. 1, p. 332, Calciferous Gr. eatoni, Whitfield, 1886, (Lituites eatoni,) Bull. Am. Mus. Nat. Hist., vol. 1, p. 331, Calciferous Gr.

palinurus. Billings, instead of Lituites palinurus.

SOLENOCHILUS kentuckiense, Hyatt, 1893, 4th Am. Rep. Geo. Sur. Texas, p. 461, Coal Meas.

henryvillense, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 51, Keokuk Gr.



att, 1893, Geo. Sur. Texas. 4th Rep., p. 422. Distinguished from Endolobus by the deep, narrow umbilici; slight, shallow lobes on the venter, and small dorsal and annular lobes. Type S. gibbosum. gibbosum, Hyatt, 1890, (Endolo-

bus gibbosus.)

Geo. Sur. Tex-

as, 2d Rep., p.

Fig. 1427. — Solenochilus henryvillense, dorsal view.

- 353, Coal Meas. TAINOCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 269. [Ety. tainia, a head-band; keras, horn.] Discoid, whorls quadrate, and having on each side, and also on the abdomen, two rows of tubercles. Siphon above the center. Type *T. quadrangulum*. duttoni, Hyatt, 1893, Geo. Sur. Texas,
- 4th Rep., p. 401, Coal Meas.
- quadrangulum, McChesney, 1865, (Nautilus quadrangulus,) Desc. New Pal. Foss., p. 65, Coal Meas.
- TARPHYCERAS, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 433. [Ety. tarphus, close; keras, horn.] Resembles Eurystomites, but more discoidal, more numerous, and more slowly growing whorls, longer living chamber; the whorls sometimes flattened on the abdomen and approximating a quadrangular form, and the aperture is like that of Trocholites, with a deep broad hypo-
- nomic sinus. Type T. prematurum. ancoini, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 435, Calciferous Gr. champlainense, Whitfield, 1886, (Nau-
- tilus champlainensis,) Bull. Am. Mus.
- Nat. Hist., vol. 1, p. 329, Calciferous Gr. extensum, Hyatt, 1894, Proc. Am. Phil.
- Soc., vol. 32, p. 438, Calciferous Gr. farnsworthi, Billings, 1861, (Lituites farnsworthi, in part.) Pal. Foss., vol. 1, p. 21, Calciferous Gr.
- macdonaldi, Hyatt, 1894, Proc. Am. Phil
- Soc., vol. 32, p. 435, Calciferous Gr. prematurum, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 437, Calciferous Gr.

- seeleyi, Whitfield, 1886, (Lituites see-leyi,) Bull. Am. Mus. Nat. Hist, vol. 1, p. 330, Calciferous Gr.
- TEMNOCHILUS greenenes, Miller and Gurley, 1897, Bull. No. 12, Ill. St. Mus. Nat. Hist., p. 52, Kaskaskia Gr.
 THRINCODERAS, Hyatt, 1893, 4th Ann. Rep.
- Texas, p. 430. Shells large and retaining the longitudinal ridges. Sutures similar to those of Discitoceras, except that they correlate with the broader venter and lateral zones of the whorls, the lobes being broader -and shorter, especially on the zones, than in Discitogeras. Type T. depressum.
- kentuckiense, Hyatt, 1893, 4th Ann. Rep. Geo. Sur. Texas, p. 432, Subcarboniferous.
- depressum, Hyatt, 1893, 4th Ann. Rep. Geo, Sur. Texas, p. 430, Subcarboniferous.
- TITANOCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol 22, p. 289. [Ety. Titan, mythological name; keras, horn.] The whorl has a narrower abdomen than in Apsidoceras, and longer abdominodorsal diameter, and is more compressed or shield-shaped. There is a narrow impressed zone on the dorsum, and an undivided, narrow dorsal lobe. Type T. ponderosum.
- ponderosum, White, 1872, (Nautilus ponderosus,) Pal. E. Neb., p. 236, Coal Meas
- TREMATOCERAS ohioense is described and illustrated in Ohio Geol., vol. 7, p. 426.
- TRIPTEROCERAS, Hyatt, 1883, Proc. Bost. Soc. Nat. Hist., vol. 22, p. 287. [Ety. tripter, a rubbing tool; keras, horn.] Lateral saddles acute; venter flattened and broader than the dorsum which forms the apex of the subtriangular section. Siphon ventral, nummuloidal; whorl arcuate in the young, but straight in the full-grown. Type T. hastatum.
 - hastatum, instead of Orthoceras hastatum, and to this genus may also be referred O. planoconvexum.
- oweni, Clarke, 1897, Geo. Sur. Minn., vol. 3, p. 792, Trenton Gr.
- TROCHOCERAS baeri, instead of Gyroceras baeri.
- TROCHOLITES canadensis, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 486, Trenton Gr. dyeri, Hyatt, 1894 Proc. Am. Phil. Soc.,
- vol. 32, p. 489, Hud. Riv. Gr. internastriatus, Whitfield, 1886, (Lituites internastriatus,) Bull. Am. Mus. Nat. Hist., vol. 1, p. 332, Calciferous Gr.
- TROCHOLITOCERAS, Hyatt, 1894, Proc. Am. Phil. Soc., vol. 32, p. 480. [Ety. from Trocholites, a genus; keras, horn.] This is distinguished from Trocholites only by having the siphuncle ventral of the center in the earlier substages of development. Type T. walcotti. walcotti, Hyatt, 1894, Proc. Am. Phil.
 - Soc., vol. 32, p. 480, Calciferous Gr.

Actinomy kentone -cinna subcari iolifo Allodesm p. 61 cast (chara calle nus r atten he ha confie lopsis Allonychi Foun ovata. subrotu ALLORISM illust pleurop pisth AMBONYC plani casei, r cincinn Jour 24, H excava cavat Riv. obesa. Ohio This casts as A speci perang perat ĥud doub subund unda Slate tenuist tenui Hud ANOMALO Amb Anoptera, casts misener eatur Anthraco dites Meas mytiloi tiloid SOL.-TRO.

ituites see-Hist, vol.

r and Gurl. St. Mus. Gr.

Ann. Rep. and retains. Sutures toceras, exwith the ones of the roader .and zones, than pressum.

h Ann. Rep. ubcarbonif-

Ann. Rep. ubcarbonif-

Bost. Soc. Ety. Titan. horn.] The omen than abdominonore com-There is a he dorsum, torsal lobe.

(Nautilus p. 236, Coal

cribed and ol. 7, p. 426. Proc. Bost. 287. [Ety. ras, horn.] enter flathe dorsum the subtrintral. numthe young, own. Type

eras hastaay also be

ur. Minn.,

Gyroceras

1894. Proc. FrentonGr. Phil. Soc.,

1886, (Lit-Am. Mus. iferous Gr. Proc. Am. [Ety. from as, horn.] **Frocholites** cle ventral · substages valcotti. Am. Phil. ous Gr.

ACT.-BLA.

LAMILLIBRANCHIATA.

CLASS LAMILLIBRANCHIATA.

Actinomya, Ulrich, Syn. for Modiolopsis. kentonensis, Syn. for Modiolopsis cincinnatiensis.

subcarinata, Syn. for Modiolopsis modioliformis.

- Allodesma, Ulrich, 1894, Geo. Sur. Minn., p. 617. Probably founded on a poor cast of an Orthodesma. There are no characters ascribed to it that can be called generic. The author of the genus refers it to the Cycloconchidæ, and attempts to establish it, upon the forms he had shortly before described, with confidence, under the name of Modiolopsis subelliptica
- Allonychia, Ulrich, Syn. for Ambonychia. Founded on Ambonychia jamesi.
 - ovata, Syn. for Ambonychia jamesi.
- subrotunda, Syn. for Ambonychia jamesi. ALLORISMA and rewsi and A. maxvillensis are illustrated in Ohio Geo., vol. 7, p. 475. pleuropistha, refer to Pholadella pleuro-
- pistha. AMBONYCHIA affinis, Ulrich, Syn. for A.
 - planistriata. casei, refer to Opisthoptera casei.
 - cincinnatiensis, Miller and Faber, 1894, Jour. Cin. Soc. Nat. Hist., vol. 17, p. 24. Hud. Riv. Gr.
 - excavata, Ulrich, 1895, (Clionychia excavata,) Ohio Geol., vol. 7, p. 651, Hud. Riv. Gr.
 - obesa, Ulrich, 1895, (Byssonychia obesa,) Ohio Geol., vol, 7, p. 630, Hud. Riv. Gr. This species was founded upon poor casts that have generally been regarded as A. radiata, but it may be a distinct species.
 - perangulata, Ulrich, 1895, (Psilonychia perangulata,) Ohio Geol., vol. 7, p. 649, Hud. Riv. Gr. This species is of very doubtful value.
 - subundata, Ulrich, 1895, (Clionychia subundata,) Ohio Geol., vol. 7, p. 651, Utica Slate Gr.
 - tenuistriata, Ulrich, 1894, (Byssonychia tenuistriata), Geol. of Minn., p. 500, Hud. Riv, Gr.
- ANOMALODONTA plicata, Ulrich, Syn. for Ambonychia costata.
- Anoptera, Ulrich, Founded upon poor casts of Angellum cuneatum.
- miseneri, Ulrich, Syn. for Angellum cuneatum.
- Anthracoptera longa, Dawson, 1894, (Naiadites longus,) Can. Rec. Sci., Coal Meas
- mytiloides, Dawson, 1894, (Naiadites mytiloides,) Can. Rec. Sci., Coal Meas.

8

ARISTERELLA, Ulrich, 1894, Geo. Sur. Minn., p. 524. [Ety. aristera, the left; ella, diminutive.] The left valve is smaller than the right. Founded on small shells of uncertain relations. Type A. nitidula, described at the same place from the Trenton Gr.

ASTHENODONTA Whiteaves, 1893, Trans. Roy. Soc. Can., p. 23. [Ety. a'sthene's, weak; odous, a tooth.] A large shell having an outline similar to Margaritana margaritifera. Type A. westoni, described at the same place from the Coal Meas

AVICULA whitfieldi, Foerste, Syn. for Cyp-

ricardites ferru-gineus, Hall and Whitfield, which is not an Avicula or a Cypricardites. AVICULOPECTEN utah-

ensis is figured in Expl. 40th Parallel, vol. 4, p. 95. BLAIRELLA, Miller and Gurley, 1896, Bull.



valve.

p. 6. [Ety. proper Fig. 1428.—Aviculo-name.] Equi- pecten sculptilis, left valve.

inequilatvalve, eral, elliptical, subovate, or subcircular. Beaks anterior incurved. Um-



Fig. 1429.-Blairella sedaliensis, right valves of two casts.

bones high. Cardinal line straight, posterior to the beaks. Margins closed. Ligament exter-

nal. A pit beneath the beak of the right valve, a single tooth anterior,



and a bifid tooth Fig. 1430,-Blairella seposterior. Type daliensis, cardinal view. B. sedaliensis

sedaliensis, Miller and Gurley, 1896, Bull.

LAMILLIBRANCHIATA.

BOD.-CUN.

Chouteau Gr.





Fig. 1431.—Blairella sedaliensis, hinge-line and outside of same valve.

BODMANNIA, Miller and Faber, 1894, Jour.

Cin. Soc. Nat. Hist., vol. 17, p. 23. • [Ety. proper name.] Equivalve, profoundly inequilateral; ventricose; general outline like Cypricardites; beaks anterior, incurved ; hinge-line short, at a high angle to the base of the shell; ligament external; shell thin, concentrically lined. Type B. insuetum.

insuetum, Miller and Faber, 1894, Jour. Cin. Soc. Nat. Hist., vol. 17, page 23, Hud. Riv. Gr.

ventricosa, instead of Edmondia ventricosa, in Pal. N. Y., vol. 1, p. 155, which has been frequently referred to Cypricardites.

Byssonychia, Ulrich, Syn. for Ambonychia. acutirostris, byrnesi, and imbricata, Synonyms for Ambonychia costata.

alveolata, præcursa, and suberecta, Synonyms for Ambonychia radiata.

cultrata, grandis, and richmondensis, Synonyms for Ambonychia robusta.

obesa, refer to Ambonychia obesa. tenuistriata, refer to Ambonychia tenuistriata.

vera, Syn. for Ambonychia cincinnatiensis.



Fig. 1432.-Chænomya longa, left side view.



Fig. 1433.-Chænomya longa, cardinal view.

CHENOMYA longa, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 8, Chouteau Gr

CLEIDOPHORUS major, Ulrich, refer to Lyro- CUNEAMYA oblonga, Ulrich, 1894, Geo. Sur. desma major.

No. 11, Ill. St. Mus. Nat. Hist., p. 7, | CLINOPISTHA antiqua, Whiteaves, 1897, Pal. Foss., vol. 3, p. 185, Low. Sil.

Clionychia, Ulrich, is a synonym for Ambonychia.

excavata, refer to Ambonychia excavata. nitida, Syn. for Ambonychia lamellosa. subundata, refer to Ambonychia subundata.

COLPOMYA, Ulrich, 1894, Geo. Sur. Minn., p. 522. [Ety. kolpos, sinus; Mya, a genus.] This ge-

nus agrees in form, muscular scars, and pallial line with Modiolopsis, but is said to differ somewhat, in



CORALLIDO MUS.

Whit field,

1895, Ohio Geol., vol. 7,

p. 493. [Ety.

korallion, a

coral; domos,

a house.]

Shell ob-

the cardinal Fig. 1434. - Conocardium indianense. tooth. Type

C. constricta, described at the same place from the Trenton Gr.

demissa, Ulrich, 1894, Geo. Sur. Minn., p. 524, Trenton Gr.



Fig. 1435.-Conocardium parvulum and Conocardium exiguum, magnified two diameters.

long, somewhat modioliform ; ligament external ; anterior and posterior muscular scars integral pallial line; burrowing habit of life. Type C. concentricus, described at the same place from the Hud. Riv. Gr

- Ctenodenta albertina, cingulata, and madisonensis. Ulrich, Synonyms for Tellinomya pectunculoides.
 - calvini, refer to Tellinomya calvini.
 - carinata, refer to Tellinomya carinata.
 - cuneiformis, refer to Tellinomya cuneiformis.
 - filistriata, Syn. for Tellinomya levata.
 - intermedia. recurva, compressa, and similis, Ulrich, Synonyms for Tellinomya alta.
 - medialis, Ulrich, Syn. for Tellinomya nitida.
 - oviformis, Ulrich. It may be a Tellinomya, but the characters given do not describe a species. perminuta, Ulrich, Syn. for Pa-
 - læoconcha obliqua. scofieldi, refer to Tellinomya

Scofieldi simulatrix, Ulrich. Not defined

so as to be recognized.

socialis, refer to Tellinomya socialis. subnasuta, Syn. for Tellinomya ovata. Minn., p. 623, Galena Gr.



CYC.-ER

780

BOD.-CUN.

s, 1897, Pal. iĺ. m for Am-

a excavata. lamellosa. ehia subun-

Sur. Minn., Mya, a ge-



onocardium iense.

the same

ur. Minn.,

LIDOMUS. 'hit field, 195, Ohio eol., vol. 7, 493. [Ety. orallion, a oral; domos, house.] hell obng, someexternal; ular scars : wing habit , described Hud. Riv.

and madiionyms for uloides. iomya cal-

'ellinomya

'ellinomya

'ellinomya

compressa, Synonyms

for Telli-

may be a characters a species. n. for Pa-

ellinomya

ot defined

cialis. ovata. Geo. Sur. tralis,) Geo. Sur. Minn., p. 626, Hud. Riv. Gr.

- Cyrtodonta affinis, Ulrich, refer to Cypricardites affinis.
- ampla, Ulrich refer to Cypricardites amplus.
- billingsi, Ulrich, refer to Cypricardites billingsi.
- gibbera, and obesa, Ulrich, Synonyms for Cypricardites rotundatus.
- janesvillensis, Ulrich, Syn. for Cypricardites huronensis.
- parva, Ulrich, Syn. for Modiolopsis plana.
- persimilis, Ulrich, refer to Cypricardites persimilis.
- rotulata, Ulrich, Syn. for Cypricardites niota.
- suborata, refer to Cypricardites subovatus.
- The type of the genus is D. DOLABRA. anausta.
- sterlingensis, refer to Whitella sterlingensis.
- EDMONDIA albersi, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 8, Chouteau Gr.



Fig. 1437.-Edmondia albersi, right valve.

- vetusta, Whiteaves, 1897, Pal. Foss., vol-3, p. 187, Low. Sil. Probably the cast of a Lyrodesma.
- ELYMELLA missouriensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 15, Chouteau Gr.



Fig. 1438.-Elymella missouriensis, left valve and cardinal view.

- Endodesma, Ulrich, Syn. for Orthodesma. compressum, Ulrich, refer to Orthodesma compressum.
- cuneatum, Ulrich, refer to Orthodesma cuneatum
- postlatum, Ulrich, refer to Orthodesma postlatum.
- undosum, Ulrich, refer to Orthodesma undosum.
- Eridonychia, Ulrich, Syn. for Ambonychia; and E. apicalis, crenata, and paucicostata, Synonyms for Ambonychia costata.

truncatula, Ulrich, 1894, Geo. Sur. Minn., p. 622, Galena Gr. Cycloconcha ovata, Ulrich, Syn. for Cyclo-

- concha mediocardinalis.
- Cymatonota, Ulrich, Syn. for Orthodesma. attenuata, constricta, and typicalis, Synonyms for Orthodesma cylindricum. productifrons, Ulrich, refer to Ortho-
- desma productifrons. recta, Ulrich, probably synonymous with
- Orthodesma cylindricum. semistriata, Ulrich, refer to Orthodesma
- semistriatum.

CYPRICARDELLA

CYC.-ERI.

eximia Miller and Gurley, 1896, Bull.



- No. 11, 111. Fig. 1436.—Cypricardella gor-St. Mus. byl, right valve and cardinal Nat. Higt. view. Nat. Hist.,
- p. 15, Chouteau Gr.
- CYPRICARDITES affinis, Ulrich, 1894, (Cyrtodonta affinis,) Geo. Sur. Minn., p. 540, Trenton Gr
- amplus, Ulrich, 1894, (Cyrtodonta ampla,)
- Geo. Sur. Minn., p. 538, Trenton Gr. billingsi, Ulrich, 1894, (Cyrtodonta billingsi,) Geo. Sur. Minn., p. 538, Trenton Gr.
- . caswelli, Foerste, Ohio Geol., vol. 7, p. 561. Niagara Gr. 1t has no resemblance to a Cypricardites.
- descriptus, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 70, St. Peter Sandstone.
- dignus, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 71, St. Peter Sandstone.
- finitimus, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 70, St. Peter Sandstone.
- fragosus, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 70, St. Peter Sandstone
- glabellus, Ulrich, Syn. for Cypricardites niota.
- islandicus. This specific name will be dropped, if Hall's C. rentricosus of 1847 is, as we believe, a Bodmannia.
- minnesotensis, Sardeson, Syn. for Cypricardites niota.
- miseneri, Ulrich, 1895, (Ischyrodonta miseneri,) Ohio Geol., vol. 7, p. 675, Hud. Riv. Gr.
- ovalis, Ulrich, 1895, (Ischyrodonta ovalis,) Ohio Geol., vol. 7, p. 674, Hud. Riv. Gr.
- persimilis, Ulrich, 1894, (Cyrtodonta persimilis,) Geo. Sur. Minn., p. 544, Trenton Gr.
- sterlingensis, Meek and Worthen, refer to Whitella sterlingensis.
- subovatus, Ulrich, 1894, (Cyrtodonta subovata,) Geo. Sur. Minn., p. 536, Trenton Gr.
- sulcodorsatus, Ulrich, 1894, Geo. Sur. Minn., p. 626, Hud. Riv. Gr.

ventralis, Ulrich, 1894, (Saffordia ven-

LAMILLIBRANCHIATA.

Eurymya, Ulrich, Syn. for Modiolopsis. GONIOPHORA dubia, Hall, instead of Modiolopsis dubia.

782



Fig. 1439.—Grammysia blairi, view of the two valves.

Ischyrodonta, Ulrich, Syn. for Cypricardites.

decipiens and truncata, Ulrich, Synonyms for Cypricardites hainesi.

elongata, Ulrich. Probably a Cypricardites.

miseneri, Ulrich, refer to Cypricardites miseneri.

modioliformis, Ulrich. Probably a Modiolopsis, but the name is preoccupied. ovalis, Ulrich, refer to Cypricardites ovalis.

LEPTODOMUS. The type is L. fragilis. LIOPTERIA speciosa, Miller and Gurley, 1896,

Bull. No. 11, Ill.



subovata, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist, p. 13, Chou-

teau Gr.

St. Mus. Nat. Hist., p. 13, Chou-

- Fig. 1440.—Liopteria speciosa, left valve. teau Gr. Lucina livonensis, Clarke. Not defined so
- as to be recognized. LUNULICARDIUM grande, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 5, Chouteau Gr.

lineolatum, Clarke, 1894, 13th Rep. St. Geol. N. Y., p. 175, Ham. Gr. livoniæ, Clarke, 1894, 13th Rep. St. Geol., N. Y., p.

175, Ham. Gr, etrorsum, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 6, Chouteau Gr.



- LYRODESMA acuminatum, Ul- Fig. 1441.-Lurich, 1894, Geo. Sur. Minn., dium rep. 609, Trenton Gr. rorsum. right valve.
 - cannonense, Ulrich, 1894, ^{right} valv Geo. Sur. Minn., p. 610, Trenton Gr. conradi, Ulrich, Syn. for Lyrodesma cin-
- cinnatiense grande, Ulrich, too obscure for determi-
- nation.
- inornatum, Ulrich, Syn. for Lyrodesma planum.

major, instead of Cleidophorus major. subplanum, Ulrich, Syn. for Lyrodesma cincinnationse.

EUR.-MOD.



Fig. 1442.-Macrodon blairi, right and left valves.

MACRODON blairi, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 11, Chouteau Gr.



Fig. 1448.-Macrodon facetus, cardinal view and right valve.

- facetus, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 10, Chouteau Gr.
- pettisensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 11, Chouteau Gr.
- MEGAMBONIA aviculoidea, Hall, refer to Pterinea aviculoidea.
- Modiolodon, Ulrich, Syn for Modiolopsis. declivus, Ulrich, Syn. for Modiolopsis subrecta.

gibbus, Ulrich, refer to Modiolopsis gibba. obtusus, Ulrich, Syn. for Modiolopsis

- modiolaris. oviformis, Ulrich, refer to Modiolopsis oviformis.
- oviformis var. ampla, Ulrich, Syn. for Modiolopsis oviformis. .
- patulus, Ulrich, refer to Modiolopsis patula.
- subovalis, Ulrich, Syn. for Modiolopsis unionoides
- subrectus, Ulrich, refer to Modiolopsis subrecta.
- MODIOLOPSIS affinis, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 72, St. Peter Sandstone.
 - angustifrons, Whiteaves, 1897, Pal. Foss., vol. 3, p. 183, Low. Sil. arguta, Ulrich, 1894, Geo. Sur. Minn., p.
 - 506, Trenton Gr.
 - chatfieldensis, Ulrich, 1894, Geo. Sur. Minn., p. 508, Trenton Gr.
 - consimilis, Ulrich, 1894, Geo. Sur. Minn., p. 505, Syn. for M. similis.
 - contigua, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 71, St. Peter
 - Sandstone. dubia, Hall, refer to Goniophora dubia,
 - Trenton Gr.
 - excellens, Ulrich, 1894, Geo. Sur. Minn., p. 511, Hud. Riv. Gr.
 - fountainensis, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 71, St. Peter Sandstone.
 - gibba, Ulrich, 1894, (Modiolodon gibbus,) Geo. Sur. Minn., p. 522, Trenton Gr. gregalis, Sardeson, 1896, Bull. Minn.

Act

Sar litora Ace San nana, 507 obsol p. 5 oweni rece patul lus, postic Nat stor senec Aca San subre rect

Riv

Fig. 144

MYTILAI

Bull

p. 14

vol.

mytili

percar vol. Naiadite mytilo loide NUCULIT fined subcur Geol triang of ti OPISTHO 1895. Amb alterna ampla, tata. casei, i extenu 7, p. fissicos Ohio laticos 7, p. notabil p. 648 oblique p. 64 EUR.-MOD.

rus major. Lyrodesma



d left valves.

ırley, 1896. Nat. Hist.,



al view and

1896, Bull. ist., p. 10,

1896, Bull. list., p. 11,

, refer to

[odiolopsis. **Aodiolopsis**

opsis gibba. **I**odiolopsis

fodiolopsis

, Syn. for

Aodiolopsis

Aodiolopsis

Iodiolopsis

1896, Bull. 4, p. 72, St.

Pal. Foss.,

. Minn., p.

Geo. Sur.

Sur. Minn.,

Minn. ull. , St. Peter

iora dubia,

Sur. Minn.,

Bull. Minn. , St. Peter

on gibbus,) enton Gr. ull. Minn. MYT.-ORT.

LAMILLIBRANCHIATA.

Sandstone.

- litoralis, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 71, St. Peter Sandstone
- nana, Ulrich, 1894, Geo. Sur. Minn., p. 507, Galena Shales.
- obsoleta, Ulrich, 1894, Geo. Sur. Minn., p. 509, Trenton Gy.
- oweni, Ulrich. Not defined so as to be recognized.
- patula, Ulrich, 1894, (Modiolodon patulus,) Geo. Sur. Minn., p. 521, Galena Gr. postica, Sardeson, 1896, Bull. Minn. Acad.
- Nat. Sci., vol. 4, p. 71, St. Peter Sandstone.
- senecta, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 72, St. Peter Sandstone
- subrecta, Ulrich, 1895, (Modiolodon subrectus,) Ohio Geol., vol. 7, p. 653, Hud. Riv. Gr.



Fig. 1444 .-- Mytilarca jessieæ, two left valves.

- MYTILARCA jessieæ, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 14, Chouteau Gr.
 - mytiliformis, Foerste, 1895, Ohio Geol., vol. 7, p. 559, Niagara Gr.
- percarinata is illustrated in Ohio Geol., vol. 7, p. 422. Naiadites longus. See Anthracoptera longa.
- mytiloides. See Anthracoptera mytiloides.
- NUCULITES ferrugineum, Foerste. Not defined so as to be recognized.
- subcuneatus, Clarke, 1894, 13th Rep. St.

Geol. N. Y., p. 173, Ham. Gr. triangulus, Hall and Whitfield, instead of triangularis.

OPISTHOPTERA, Meek, is defined by Ulrich, 1895, Ohio Geol., vol. 7, p. 642, with Ambonychia casei as the type.

alternata, Ulrich, Syn. for O. fissicosta. ampla, Ulrich, Syn. for Ambonychia costata.

casei, instead of Ambonychia casei.

extenuata, Ulrich, 1895, Ohio Geol., vol. 7, p. 645, Hud. Riv. Gr.

fissicosta, Meek, as defined by Ulrich, 1895, Ohio Geol., vol. 7, p. 643, Hud. Riv. Gr. laticostata, Ulrich, 1895, Ohio Geol., vol. 7, p. 644, Urd. Bio. G

7, p. 646, Hud. Riv. Gr. (a) notabilis, Ulrich, 1895, Ohio Geol., vol. 7, p. 648, Hud. Riv. Gr. Doubtful species. obliqua, Ulrich, 1895, Ohio Geol., vol. 7, p. 646, Hud. Riv. Gr.

Acad. Nat. Sci., vol. 4, p. 71, St. Peter | ORTHODESMA affine, Whiteaves, 1897, Pal. Foss., vol. 3, p. 184, Low Sil.



Fig. 1445.-Orthodesma cymbula, right and left valves and cardinal view.

ashmani, Miller and Faber, 1894, Jour. Cin. Soc. Nat. Hist., vol. 17, p. 146, Hud. Riv. Gr.

canaliculatum, Ulrich, 1894, Geo. Sur. Minn., p. 520, Hud. Riv. Gr.

cylindricum, Miller and Faber, 1894,



Fig. 1446.—Orthodesma ashmani, right and left valves.

Geol., vol. 7, p. 665, Hud. Riv. Gr. minimum, Ulrich, 1895, (Psiloconcha minima,) Ohio Geol., vol. 7, p. 669, Hud. Riv. Gr.



1447. — Ortho-Fig. 1447. - Ortno-desma scaphula, right valve and cardinal view.

Gint valve and scaphula, Miller and scaphula, Miller and rdinal view. Faber, 1894, Jour. Cin. Soc. Nat. Hist., vol. 17, p. 145, Hud. Riv. Gr.

Nat. Hist., vol. 17, p. 22, Hud. Riv. Gr. cymbula, Miller and Faber, 1894, Jour. Cin. Soc. Nat. Hist., vol. 17, p. 143, Hud. Riv. Gr. ellipticum, U1rich, 1895, Ohio

Geol., vol. 7, p. 667, Hud. Riv. Gr.

grande, Ulrich, 1895, (Psiloconcha grandis,) Ohio

Geo. Sur. Minn., p.

Ohio Geol., vol. 7, p. 660, Hud. Riv. Gr.

productifrons,)

Ohio Geol., vol. 7, p. 665, Hud. Riv. Gr.

531, Galena Gr.

parvum, Ulrich, 1895,

productifrons, Ulrich, 1895, (Cymatonota

minnesotense, Ulrich, 1894, (Psiloconcha minnesotensis,)

Jour. Cin. Soc.

- schucherti, Ulrich, 1894, Geo. Sur. Minn., | PTERINEA aviculoidea, Hall, instead of Mep. 518, Galena Gr.
- semistriatum, Ulrich, 1895, (Cymatonota semistriata,) Ohio Geol., vol. 7, p. 663, Hud. Riv. Gr.
- sinuatum, Ulrich, 1894, (Rhytimya sinuata,) Geo. Sur. Minn., p. 619, Galena Gr.
- subangulatum, Ulrich, Syn. for O. rec-• tum.
- tenuistriatum, Ulrich, 1895, (Psiloconcha tenuistriata,) Ohio Geol., vol. 7, p. 668, Hud. Riv. Gr.

Ortonella, Ulrich, Syn. for Cypricardites. PALÆONEILO similis is illustrated in Ohio Geol., vol. 7, p. 453.

Palxopteria, Whiteaves, Syn. for Pterinea. PALEOSOLEN occidentalis, Miller and Gur-



784

ley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 16. Chouteau Gr.

PHOLADELLA pleuropistha, Meek, instead of Allorisma

Fig. 1448.—Palæosolen occipleuropistha. dentalis, cardinal view PHYSETOMYA, Ul-and left valve. rich 1895. Obio

rich, 1895, Ohio Geol., vol. 7, p. 693. [Ety. physetos, in-flated; Mya a genus.] Shell thin, elongate, inflated anteriorly, tapering posteriorly; base arcuate. Beaks in front of the middle, incurved; umbones rounded. Escutcheon and lunule. Surface lined concentrically. Type P. acuminata.

acuminata, Ulrich, 1895, Ohio Geol., vol. 7, p. 693, Hud. Riv. Gr.

PINNA maxvillensis is illustrated in Ohio Geol., vol. 7, p. 474.

POSIDONOMYA lasallensis, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p.



Prolobella, Ulrich, Fig. 1449. – Posidonomya Syn. for Pter-iasallensis, left valve; same magnified. inea

striatula, refer to Pterinea striatula.

Psiloconcha, Ulrich, Syn. for Orthodesma. elliptica, refer to Orthodesma ellipticum. grandis, Ulrich, refer to Orthodesma grande.

- inornata, sinuata, and subrecta, Ulrich, Synonyms for Orthodesma subovale.
- minima, Ulrich, refer to Orthodesma minimum.
- minnesotensis, Ulrich, refer to Orthodesma minnesotense
- tenuistriata, Ulrich, refer to Orthodesma tenuistriatum.

PSILONYCHIA, Ulrich, Syn. for Ambonychia. perangulata, Ulrich, refer to Ambonychia perangulata.

- gambonia aviculoidea.
- cincinnatiensis, Miller and Faber, 1874, Jour. Cin. Soc. Nat. Hist., vol. 17, p. 25, Hud. Riv. Gr.
- parvula, Whiteaves, 1897, (Palæopteria parvula,) Pal. Foss. Can., vol. 3, p. 181, Low. Sil.
- rugatula, Miller and Faber, 1874, Jour. Cin. Soc. Nat. Hist., vol. 17, p. 26, Hud. Riv. Gr.
- similis, Whitfield, is illustrated in Ohio



Geol., vol. 7, p. 445. striatula, Ulrich, Fig. 1450. – Pte 1894, (Prolobella Fig. 1450. – Pte r inopecten sedaliensis, right valves, one striatula,) Geo. wing broken off. Sur. Minn., p. 532, Galena Gr.

Rhytimya, Ulrich, Syn. for Orthodesma.

- compressa, convexa, and radiata, Ulrich. Synonyms for Orthodesma ashmani.
- whana, Ulrich, Syn. for Orthodesma mickelboroughi.
- producta, Ulrich, Syn. for Orthodesma scaphula.
- recta, Whiteaves, near Orthodesma rectum, but probably a distinct species of Orthodesma.
- sinuata, Ulrich, refer to Orthodesma sinuatum.
- Saffordia, Ulrich, Syn. for Cypricardites. sulcodorsata, Ulrich, refer to Cypricardites sulcodorsata.



Fig. 1451.-Schizodus harii, interior of left valve.



Fig. 1452.- Schizodus harii, left valve

ventralis, Ulrich, refer to Cypricardites ventralis.

SANGUINOLITES. The type is S. angulatus.





Fig. 1455.-

SPHENOTI 1896, Hist.



Fig. 1456.-

TECHNOPI Fabe vol. 1 punctos cinna TELLINOM Bull. 74, St

ORT.-SAN.

SCH.-WI

1896, Hist teau SPHENOL Ulrie RT.-SAN.

ad of Me-

ber, 1874, . 17, p. 25,

læopteria 3, p. 181,

374, Jour. 17, p. 26,



r inoedaliensis, lves, one cen off.

lesma. , Ulrich, hmani. thodesma

thodesma

sma recspecies of

thodesma

ardites. Cypricar-



left valve.

valve ricardites ngulatus. SCH.-WHI.

LAMILLIBRANCHIATA.

Ă

SCHIZODUS sedaliensis, Miller and Gurley,



Fig. 1453.-Schizodus harii, cardinal view.

1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 17, Chouteau Gr. SPHENOLIUM parallelum, Ulrich, 1894, Geo. Sur. Minn., p. 624, Trenton Gr. striatum, Ulrich, 1894, Fig. 1454.-Schizodus Geo. Sur. Minn., p. sedaliensis, right valve. 624, Galena Gr.

Fig. 1455.—Sphenolium cuneiforme, part of shell broken off and hinge and ligamental furrows.

SPHENOTUS sinuatus, Miller and Gurley, 1896, Bull. No. 11, Ill. St. Mus. Nat. Hist., p. 9, Chouteau Gr.



Fig. 1456. — Sphenotus sinuatus, right and left valves.

- TECHNOPHORUS cincinnationsis, Miller and Faber, 1894, Jour. Cin. Soc. Nat. Hist., vol. 17, p. 147, Hud. Riv. Gr. punctostriatus, Ulrich, Syn. for T. cin
 - cinnatiensis.

TELLINOMYA absimilis, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 74, St. Peter Sandstone.

calvini, Ulrich, 1894, (Ctenodonta calvini,) Geo. Sur. Minn., p. 596, Hud. Riv Gr.



- Fig. 1457.—Technophorus cincinnatiensis, nat-ural size and magnified four diameters.
- carinata, Ulrich, 1894, (Ctenodonta carinata,) Geo. Sur. Minn., p. 589, Galena Gr.
- clintonensis, Foerste, 1895, Ohio Geol., vol. 7, p. 563, Clinton Gr.
- compressa, intermedia, recurva, and similis, Ulrich, Synonyms for T. alta.
- cuneiformis, Ulrich, 1894, (Ctenodonta cuneiformis,) Geo. Sur. Minn., p. 587, Trenton Gr.
 - minima, Foerste, 1895, Ohio Geol., vol. 7, p. 563, Niagara Gr.
 - novicia, Sardeson, 1896, Bull. Minn. Acad. Nat. Sci., vol. 4, p. 74, St. Peter Sandstone.
 - scofieldi, Ulrich, 1894, (Ctenodonta scofieldi.) Geo. Sur. Minn., p. 593, Trenton Gr.
 - socialis, Ulrich, 1894, (Ctenodonta socialis,) Geo. Sur. Minn., p. 594, Trenton Gr.

socialis, Foerste, 1895. The name was preoccupied.

- VANUXEMIA abrupta, Ulrich, 1894, Geo. Sur. Minn., p. 560, Galena Gr.
 - crassa, media, and suberecta, Ulrich, Synonyms for Cypricardites rotundatus.
 - decipiens, Ulrich, Syn. for Modiolopsis plana.
 - subrotunda, Ulrich, 1894, Geo. Sur. Minn., p. 559, Trenton Gr. umbonata, Ulrich, 1894, Geo. Sur. Minn.,
 - p. 556, Trenton Gr.
 - wortheni, Ulrich, Syn. for Cypricardites rectirostris.
- WHITELLA, rugatina, Ulrich, 1894, Geo. Sur. Minn., p. 569, Trenton Gr. subcarinata, Ulrich, 1894, Geo. Sur. Minn., p. 572, Galena Gr.
- Whiteavesia, Ulrich, Syn. for Modiolopsis. kentonensis, Ulrich, Syn. for Modiolopsis
- cincinnatiensis.

ANNELIDA.

ARA.-ASA.

AVA.-E

vigilar Nile AVALONI N. 3 Tace BATHYUI Sur. stonem Bergonia Acad a sul BEYRICH trian Acad BEYRICHI nella 3, p.



melli, m meters.

margins

ginate Trent simplex plex,) Trente spinosa, nosa,) Trent BOLLIA sul Minn. typa, Ul Sur. M unguloid Minn., BRONTEUS Cont. t BUMASTUS Geo. R Minn., BYTHOCYPR Minn., granti, U vol. 3, robusta, vol. 3, 1 CALYMENE the Hu may be form, a neapolita 3d ser., vogdesi, F CARCINOSOM Geol., v CERATIOCAR Bull. A: 301, Lov poduriform Mus. Na Held. G

SUBKINGDOM ARTICULATA. CLASS ANNELIDA.

I AM most fully convinced that the Conodonts are not the teeth of Annelids, but belong to the masticatory apparatus of Crustaceans. Several different forms belonged to a single animal. It is idle work to give specific names to these fragments, and a load upon the science. I reprint the names, but with no idea that they represent species.

Gr.

teau Gr.

ARABELLITES procursus, Foerste, 1888, Am. Geol., vol. 2, p. 417, Hud. Riv. Gr.

EUNICITIES confinis, Foerste, 1888, Am. Geol., vol. 2, p. 418, Hud. Riv. Gr. falcatus, Foerste, 1888, Am. Geol., vol.

2, p. 418, Hud. Riv. Gr. paululus, Foerste, 1888, Am. Geol., vol.

2, p. 418, Hud. Riv. Gr. LUMBRICONEREITES austini, Foerste, 1888,

CLASS CRUSTACEA.

- ACIDASPIS brevispinosa, Foerste. Too poorly defined to be recognized.
- Agnostus fallax var. trilobatus, Matthew, 1895, Trans. N. Y. Acad. Sci., vol. 15, p. 216, St. John Gr.
 - fissus var. trifissus, Matthew, 1895, Trans. N. Y. Acad. Sci., vol. 15, p. 231, St. John Gr.
 - levigatus var. ciceroides, Matthew, 1895, Trans. N. Y. Acad. Sci., vol. 15, p. 234, St. John Gr.
 - levigatus var. mamilla, Matthew, 1895, Trans. N. Y. Acad. Sci., vol. 15, p. 234, St. John Gr.
 - levigatus var. terranovicus, Matthew, 1895, Trans. N. Y. Acad. Sci., vol. 15, p. 233, St. John Gr.
 - nathorsti var. confluens, Matthew, 1895, Trans. N. Y. Acad. Sci., vol. 15, p. 233, St. John Gr.
- ALUTA, Matthew, 1895, Trans. N. Y. Acad. Sci., vol. 15, p. 198. [Ety. atuta, leather.] Small oval or ovate bivalves, like Aparchites, but having a soft, flexible test and finely punctate. Type A. flex-ilis, described at the same place from the St. John Gr.
- APARCHITES arrectus, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 646, Trenton Gr.

chatfieldensis, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 646, Trenton Gr. ellipticus, Ulrich, 1894, Geo. Sur. Minn.,

Am. Geol., vol. 2, p. 417, Hud. Riv.

lustrated in Ohio Geol., vol. 7, p. 492.

blairi, Miller and Gurley, 1895, Bull. No. 7, Ill. St. Mus. Nat. Hist., p. 89, Chou-

OENONITES- deripiens, Foerste, 1888, Am. Geol., vol. 2, p. 417, Hud. Riv. Gr.

SPIRORBIS anthracosia is described and il-

- vol. 3, p. 644, Trenton Gr.
- fimbriatus, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 645, Hud. Riv. Gr.
- Minn., vol. 3, p. 645, Trenton Gr.
 Minn., vol. 3, p. 644, Trenton Gr.
 millepunctatus, Ulrich, 1894, Geo. Sur.
 Minn., vol. 3, p. 645, Trenton Gr.
 perwulwa Lorge 1807, Bel Exception
- vol. 3, p. 230, Low. Sil. secunda, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 136, Up. Taconic.

- ARGES consanguineus. See Lichas consanguineus.
- wesenbergensis var. paulianus. See Lichas paulianus.
- ARISTOZOE canadensis, Whitfield, 1895, Ohio Geol., vol. 7, p. 462, Trenton Gr.
- ASAPHUS. If Isotelus is to rank as a genus, it will include nearly all American species referred to Asaphus.
- canalis is described and figured in Bull. Am. Mus. Nat Hist., vol. 1, p. 336.
- ulrichi, Clarke, 1894, (Ptychopyge ulrichi,) Geo. Sur. Minn., vol. 3, p. 709, Trenton Gr. Founded on fragments of the pygidium.

786

ARA.-ASA.

Annelids, ent forms hese fragidea that

Hud. Riv.

1888, Am. v. Gr. ed and il-7, p. 492. Bull. No. 89, Chou-

Geo. Sur. Gr. Ir. Minn.,

ur. Minn.,

Geo. Sur. Gr. Geo. Sur. Gr. oss. Can.,

ns. N. Y. . Taconic. is consan-

see Lichas

ld, 1895, enton Gr. sa genus, American

d in Bull. . 336. pyge ul-3, p. 709, ragments AVA.-ECH.

vigilans, Meek and Worthen, refer to | Ceratopsis, Ulrich, Syn. for Beyrichia. Nileus vigilans.

- AVALONIA acadica, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 140, Up. Taconic.
- BATHYURUS schucherti, Clarke, 1894, Geo. Sur. Minn., vol. 3, p. 724, Trenton Gr. stonemani. See Proetus stonemani.
- Bergonia, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 145. Proposed as a subgenus under Protolenus.
- BEYRICHONA ovata, planata, rotundata, and triangula, Matthew, 1894, Trans. N. Y.
- Acad. Sci., vol. 14, p. 134, Up. Taeonic. BEYRICHIA bicornis, Ulrich, 1894, (Dicra-nella bicornis,) Geo. Sur. Minn., vol.

3, p. 665, Trenton Gr. hammelli, Mil-



Fig. 1458.-Beyrichia hammelli, magnified 12 diameters.

Minn., vol. 3, p. 658, Trenton Gr.

ler and Faber.

1894, Jour.Cin. Soc.Nat.Hist., vol. 17, p. 157,

Hud. Riv. Gr.

1894, Geo. Sund

initialis, Ulrich.

- marginata, Ulrich, 1894, (Dicranella marginata,) Geo. Sur. Minn., vol. 3, p. 666, Trenton Gr.
- simplex, Ulrich, 1894, (Dicranella simplex,) Geo. Sur. Minn., vol. 3, p. 666, Trenton Gr.
- spinosa, Ulrich, 1894, (Dicranella spinosa,) Geo. Sur. Minn., vol. 3, p. 665, Trenton Gr.
- Bollia subæquata, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 669, Galena Gr. typa, Ulrich, 1894, (Dilobella typa,) Geo.
 - Sur. Minn., vol. 3, p. 673, Trenton Gr. nguloidea, Ulrich, 1894, Geo. Sur. unguloidea. Minn., vol. 3, p. 669, Galena Gr.
- BRONTEUS manitobensis, Whiteaves, 1892, Cont. to Can. Pal., p. 347, Devonian.
- BUMASTUS trentonensis, Emmons, 1842,
- Geo. Rep. N. Y., p. 390, and Geo. Sur. Minn., vol. 3, p. 718, Trenton Gr. BYTHOCYPRIS curta, Ulrich, 1894, Geo. Sur.
- Minn., vol. 3, p. 689, Trenton Gr. granti, Ulrich. 1894, Geo. Sur. Minn., vol. 3, p. 689, Trenton Gr.
- obusta, Ulrich, 1894, Geo. Sur. Minn.,
- vol. 3, p. 690, Trenton Gr.
- CALYMENE callicephala may be confined to the Hud. Riv. Gr. and senaria Conrad, may be applied to the related Trenton form, according to some authors.
- neapolitana, Clarke, 1892, Am. Jour. Sci., 3d ser., vol. 43, p. 57, Upper Devonian.
- vogdesi, Foerste, Syn. for C. niagarensis. CARGINOSOMA ingens, Claypole, 1894, Am.
- Geol., vol. 13, p. 77, Waterlime Gr. CERATIOCARIS monroei, Whitfield, 1896, Bull. Am. Mus. Nat. Hist., vol. 8, p. 301, Low. Held. Gr.
 - poduriformis, Whitfield, 1896, Bull. Am. Mus. Nat. Hist., vol. 8, p. 302, Low. Held. Gr.

CRUSTACEA.

- chambersi var. robusta, Ulrich, Syn. for Beyrichia chambersi.
- CERAURUS clintoni, Foerste, 1895, Ohio Geol., vol. 7, p./527, Niagara Gr. milleranus, Miller and Gurley, 1893,
 - Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 80, Hud. Riv. Gr.
 - scofieldi, Clarke, 1894, (Cyrtometopus scofieldi,) Geo. Sur. Minn., vol. 3, p. 735, Trenton Gr.
- trentonensis, Clarke, 1894, (Pseudosphærexochus trentonensis,) Geo. Sur. Minn., vol. 3, p. 734, Trenton Gr.
- CIRRIPODITES, Matthew, 1895, Trans. N. Y. Acad. Sci., vol. 15, p. 205. [From a supposed resemblance to Cirripedes.] Small calcareous plates of irregular contour and relief associated with *Eocystites*, and supposed to be covering plates of *Cirripedes*. Type C. cambrensis, described at the same place from the St. John Gr.
- Conolichas, Dames, a subgenus. See Lichas. CTENOBOLBINA is probably a synonym for
- Beyrichia.
- fulcrata, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 674, Trenton Gr.
- CYBELE winchelli, Clarke, 1894, Geo. Sur. Minn., vol. 3, p. 742, Galena Gr.
- Сурнаярія bellula, Whiteaves, 1892, Cont. to Can. Pal., p. 349, Devonian.
- clintonense, Foerste. Too poorly defined to be recognized.
- (?) galenensis, Clarke, 1894, Geo. Sur. Minn., vol. 3, p. 759, Galena Gr.
- Cyrtometopus, Angelin, 1854. Subgenus. See Ceraurus.

scofieldi. See Ceraurus scofieldi.

- CYTHERELLA, Jones, 1848, Monog. Entom. Cret. Form., p. 28. [Ety. diminutive of the genus *Cythere*.] Type *C. ovata*. subrotunda, Ulrich. Not defined so as to
- be recognized. DALMANITES dolphi, Clarke. Not defined so as to be recognized.
- eboraceus, Clarke, 1894, (Pterygometus eboraceus,) Geo. Sur. Minn., vol. 3, p. 728, Trenton Gr.
- schmidti, Clarke, 1894, (Pterygometus schmidti,) Geo. Sur. Minn., vol. 3, p. 729, Trenton and Galena Gr.
- Depranella, Ulrich, should be spelled Drepanella.

- Dicranella, Ulrich, Syn. for Beyrichia. bicornis, Ulrich. See Beyrichia bicornis. marginata, Ulrich. See Beyrichia marginata.
- simplex, Ulrich. See Beyrichia simplex. pinosa, Ulrich. See Beyrichia spinosa.

Dilobella, Ulrich, Syn. for Bollia. typa, Ulrich. See Bollia typa.

- DREPANELLA bigeneris, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 672, Trenton Gr. bilateralis, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 671, Trenton Gr.
- ECHINOCARIS multinodosa, pustulosa, and sublevis are described and figured in Ohio Geol., vol. 7, pp. 458 and 455.

- ELPE ulrichi, Foerste, 1895, Ohio Geol., vol. 7, p. 532, Niagara Gr. Probably a Cutheropsis.
- ELYMOCARIS hindei, Jones and Woodward, 1894, Lond. Geo. Mag., 4th ser., vol. 1, p. 292, Ham. Gr.
- ENCRINURUS cristatus, Clarke, 1894, Geo. Sur. Minn., vol. 3, p. 741, Hud. Riv. Gr. vannulus, Clarke, 1894, Geo. Sur. Minn., vol. 3, p. 739, Trenton Gr.
- ENTOMOCARIS, Whitfield, 1896, Bull. Am. Mus. Nat. Hist., vol. 8, p. 299. [Ety entomos, cut up; karis, a shrimp.] Carapace ovate in outline, bivalvular, with a strong hiatus in front and rounded behind; hinge-line straight for about half its length. Rostrum not known. Abdomen composed of fourteen or more segments, three or four of which may be naked. The postabdomen bears three spines, the central one or telson, elongate and slender, and the lateral ones (cercopods) flattened and articulated to the caudal
- plate. Type E. telleri. telleri, Whitfield, 1896, Bull. Am. Mus. Nat. Hist., vol. 3, p. 300, Low. Held. Gr.
- EURYCHILINA subæquata, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 663, Trenton Gr. symmetrica, Ulrich, 1894, Geo. Minn., vol. 3, p. 663, Trenton Gr. 1894, Geo. Sur.
- ventrosa, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 662, Galena Gr.
- EURYPTERUS eriensis is figured and described in Ohio Geol., vol. 7, p. 416.
- kokomoensis, Miller and Gurley, 1896. Bull. No. 10, Ill. St. Mus. Nat. Hist., p. 90, Waterlime Gr.
- Gerasaphes ulrichana, Clarke, 1894, Geo. Sur. Minn., vol. 3, p. 710. This subgenus and species are founded upon some fragments of Proetus spurlocki, described by Meek, in 1872, in Am. Jour. of Sci., and redescribed and il-lustrated in Ohio Pal., vol. 1, p. 161. The specimens are not very rare, and have been considered by the best authorities as the young of Asaphus megistos, and the species is called the young of Asaphus in N. Am. Geol. and Pal., p. 562. If it is a distinct species, it will wear the name of spurlocki and not ulrichana.
- GRIFFITHIDES ornata, Vogdes, 1895, Proc. Cal. Acad. Sci., vol. 4, p. 589, Low. Coal Meas.
- HALLIELLA labiosa, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 656, Galena Gr.
- HARPES (subgenus Harpina) minnesotensis, Clarke, 1894, Geo. Sur. Minn., vol. 3, p. 755, Galena Gr.
- (subgenus Harpina,) rutrellum, Clarke, 1894, Geo. Sur. Minn., vol. 3, p. 757, Galena Gr.
- ILLAENUS danielsi, Miller and Gurley, 1893, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 76, Niagara Gr.

ovatus, Foerste, Syn. for I. ovatus.

minnesotensis, Foerste, Syn. for Nileus vigilans.

ELP.-LIC.

- orbicaudatus of Billings may be a Bumastus.
- ISOCHILINA scofieldi, Ulrich, 1894, (Macrotonella scofieldi,) Geo. Sur. Minn., vol. 3, p. 684, Trenton Gr.
- Isotelus should probably rank as a genus instead of a subgenus of Asaphus, and made to include most of the American Asaphus.
 - vigilans. See Nileus vigilans.
- JONESELLA obscura, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 668, Galena Gr.
- KRAUSELLA, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 691. [Ety. proper name; ellus, diminutive.] Carapace small, somewhat elongate, subelliptical, obscurely triangular or semi-ovate in outline, the dorsal margin more convex than the ventral, the latter straight or but gently convex; with moderately thick and very unequal valves; right valve the smaller, drawn out posteriorly into a strong, spine-like process left valve overlapping the right all around. Type K. inæqualis. arcuata, Ulrich, 1894, Geo. Sur. Minn.,
 - vol. 3, p. 692, Trenton Gr. inæqualis, Ulrich, 1894, Geo. Sur. Minn.,
 - vol. 3, p. 691, Trenton Gr.
- LEPERDITIA angulifera, is described and illustrated in Ohio Geol., vol. 7, p. 418. anticostiana is a Chazy and Trenton spe-
- cies, not Hud. Riv. canalis, Ulrich, (Leperditella canalis,) Geo. Sur. Minn., vol. 3, p. 637, Tren-
- ton Gr.
- macra, Ulrich, (Leperditella macra,) Geo. Sur. Minn., vol. 3, p. 638, Trenton Gr.
- minor, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 138, Up. Taconic.
- persimilis, Ulrich, (Leperditella persimilis,) Geo. Sur. Minn., vol. 3, p. 637, Trenton Gr.
- primeva, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 138, Up. Taconic.
- Leperditella, Ulrich, Syn. for Leperditia. canalis, macra, and persimilis, Ulrich. See Leperditia.
- LEPIDITTA auriculata and sigillata, Matthew, 1894, Trans. Roy. Soc. Can., vol. 11, p. 99, Up. Taconic.
- LICHAS byrnesanus, Miller and Gurley, 1893, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 78, Niagara Gr.
 - consanguineus, Clarke, 1894, (Arges consanguineus,) Geo. Sur. Minn., vol. 3, p. 746, Low. Held. Gr.
 - cornutus, Clarke, (Conolichas cornutus,) 1894, Geo. Sur. Minn., vol. 3, p. 749, Trenton Gr.
 - hanoverensis, Miller and Gurley, 1893, Bull. No. 3, Ill. St. Mus. Nat. Hist., p. 78, Niagara Gr.
- paulianus, Clarke, 1894, (Arges wesenbergensis var. paulianus,) Geo. Sur. Minn., vol. 3, p. 744, Trenton Gr.

MAC.-T

Macroton whie MICMACO Aca nam cal. eveterio The diffe The exte lipso scrib matti M. p MICRODIE Tran St. J MOOREA Min perpley vol. 5 puncta vol. 8 NILEUS V telus PALEOPA illust Platymeto PLUMULIT Trans 200, 8 POLYCOPE carap is de genus PRIMITIA Minn. constric strict Trent duplicat vol. 3. fillmore moren 649. T fusiform Acad. gibbera. vol. 3. limbata, Geo. S ton Gr mammat vol. 3, micula, vol. 3 minutissi Minn., oculata, Acad. S sanctipau Minn.,

ELP.-LIC.

for Nileus

7 be a Bu-

94, (Macrour. Minn.,

as a genus saphus, and e American

4, Geo. Sur.

Gr. Sur. Minn., oper name; pace small, liptical, obwate in outlore convex · straight or moderately alves; right

out posteike process;

e right all

Sur. Minn.,

Sur. Minn.,

scribed and ol. 7, p. 418. Frenton spe-

la canalis,) . 637, Tren-

lla macra,)). 638, Tren-

ans. N. Y. Up. Taconic. itella persiol. 3, p. 637,

Frans. N. Y. Up. Taconic. eperditia. vilis, Ulrich.

gillata, Matoc. Can., vol.

and Gurley, It. Mus. Nat.

, (Arges connn., vol. 3, p.

as cornutus,) ol. 3, p. 749,

Gurley, 1893, Nat. Hist., p.

Arges wesen-3,) Geo. Sur. ton Gr.

MAC.-TUR.

Macrotonella, Ulrich, Syn. for Isochilina, to which refer M. scofieldi.

- MICMACCA, Matthews, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 141. [Ety. proper name.] Glabella prominent, cylindrical, extending to the front of the shield : eye-lobes continuous, and a short posterior extension of the dorsal suture. The front area is like Zacanthoides, but different in the posterior extension. The long eye lobes and short posterior extension of the suture resemble Ellipsocephalus. Type M. matthewi, described at the same place with M. matthewi var. ingens, M. recurva, and M. plana, from the Up. Taconic.
- đ MICRODISCUS schucherti, Matthew, 1895, Trans. N. Y. Acad. Sci, vol. 15, p. 238, St. John Gr.
 - MOOREA angularis, Ulrich, 1894, Geo Sur. Minn, vol. 3, p. 682, Trenton Gr.
 - perplexa, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 683, Trenton Gr.
 - punctata, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 682, Trenton Gr.
 - NILEUS vigilans, instead of Asaphus (Isotelus) vigilans.
 - PALEOPALEMON newberryi, is described and illustrated in Ohio Geol., vol. 7, p. 461.
 - Platymetopus is a subgenus of Lichas.
 - PLUMULITES manuelensis, Matthew, 1895, Trans. N. Y. Acad. Sci., vol. 15, p. 200, St. John Gr.
 - POLYCOPE has a bivalve circular or ovate carapace, without beak or sinus, and is described on page 122. A living genus. Type P. orbicularis.
 - PRIMITIA celata, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 653, Trenton Gr.
 - constricta, Ulrich, 1894, (Primitiella constricta,) Geo. Sur. Minn., vol. 3, p. 647, Trenton Gr.
 - duplicata, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 654, Trenton Gr.
 - fillmorensis, Ulrich, (Primitiella fill-morensis,) Geo. Sur. Minn., vol. 3, p. 649, Trenton Gr.
 - fusiformis, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 137, Up./Taconic. gibbera, Ulrich, 1894, Geo. Sur, Minn.,
 - vol. 3, p. 655, Hud. Riv. Gr. limbata, Ulrich, (Primitiella limbata,)
 - Geo. Sur. Minn., vol. 3, p. 648, Trenton Gr. mammata Ulrich, 1894, Geo. Sur. Minn.,
 - vol. 3, p. 652, Trenton Gr. micula, Ulrich 1894, Geo. Sur. Minn.,
 - vol. 3, p. 653, Galena Gr.
 - minutissima, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 651, Trenton Gr.
 - oculata, Matthew, 1894, Trans. N. Acad. Sci., vol. 14, p. 136, Up. Taconic. sanctipauli, Ulrich, 1894, Geo. Sur.
 - Minn., vol. 3, p. 652, Trenton Gr.

- simulans, Ulrich, (Primitiella simulans,) Geo. Sur. Minn., vol. 3, p. 648, Trenton Gr
- tumidula, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 655, Hud. Riv. Gr.
- uphami, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 651, Galena Gr.
- PRIMITIELLA, Ulrich, Syn. for Primitia, to which refer constricta, fillmorensis, limbata, simulans.
- PROETUS determinatus, Foerste. Too poorly defined to be recognized.
 - mundulus, Whiteaves, 1892, Cont. to Can.
 - Pal., p. 350, Devonian. placidus, Vogdes, 1896, Cal. Acad. Sci., p. 197, Chouteau Gr.
- stonemani, Vogdes, 1884, (Bathyurus stonemani,) 12th Ann. Rep. Minn., p. 8, Devonian.
- PROTAGRAULUS, Matthew, .1894, Trans. N. Y. Acad. Sci., vol. 14, p. 138. [Ety. protos, first; Agraulus, a genus.] Gla-bella depressed to the level of the cheeks, scarcely traceable except at the posterior end. Cheeks slightly arched down at the front and sides. Eye-lobes long. Anterior ends of the facial sutures approximate. Type P. priscus, described at the same place from the Up. Taconic.
- PROTOLENUS, Matthew, 1892, Bull. Nat. Hist. New Brunswick, p. 34. [Ety. protos, first; Olenus a genus.] Type P. elegans. St. John Gr.
- PSEUDOSPHÆREXOCHUS trentonensis, Clarke. See Ceraurus trentonensis
- Pterygometopus, a subgenus of Dalmanites, to which refer eboraceus and schmidti.
- Ptychoparia, a synonym for Atops, to which all the species should be referred.
- Ptychopyge, a subgenus of Asaphus, to which refer ulrichi, if it is to be regarded as a species.
- SCHMIDTELLA affinis, Ulrich, 1894, Geo. Sur.

 - Minn., vol. 3, p. 641, Galena Gr. brevis, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 642, Trenton Gr. cambrica, Matthew, 1894, Trans. N. Y. Acad. Sci., vol. 14, p. 137, Up. Taconic. incompta, Ulrich, 1894, Geo. Sur. Minn.,
- vol. 3, p. 642, Trenton Gr. subrotunda, Ulrich, 1894. Geo. Sur. Minn., vol. 3, p. 643, Trenton Gr.
- umbonata, Ulrich, 1894, Geo. Sur. Minn., vol. 3, p. 641, Trenton Gr.
- SPHEREXOCHUS pisum, Foerste. Too poorly defined to be recognized.
- Thaleops, Conrad, 1843, Proc, Acad. Nat. Sci. Phil., vol. 1, p. 332, is regarded as a subgenus of Illaenus. But it would be better if all subgeneric names were dropped.
- TURRILEPAS newberryi is described and illustrated in Ohio Geol., vol. 7, p, 463.

790

ANT -FTO

CLASS ARACHNIDA.

INSECTA.

ANTHRACOMARTUS woodruffi, Scudder, 1893, | MAZONIA acadica, Scudder, 1895, Cont. to Can. Pal., vol. 2, p. 63, Coal Meas. Insect Fauna, R. I. Coal Field, p. 9, Coal Meas.

CLASS MYRIAPODA.

ARCHIULUS euphoberioides, Scudder, 1895, Cont. to Can. Pal., vol. 2, p, 59, Coal Meas.

lyelli, Scudder, 1895, Cont. to Can. Pal., vol. 2, p. 60, Coal Meas.

CLASS INSECTA.

- ANTHRACOBLATTINA americana, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 129, Coal Meas.
 - virginiensis, Scudder, 1895, Rev. Am.
- Foss. Cockroaches, p. 130, Permian. ETOBLATTINA accubita, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 88, Low. Permian.
 - angusta, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 100, Low. Permian.
 - aperta, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 80, Low. Permian. arcta, Scudder, 1895, Rev. Am. Foss.
 - Cochroaches, p. 97, Low. Permian.
 - balteata, Scudder, 1879, Mem. Bost. Soc. Nat. Hist., p. 110, Low. Permian.
 - benedicti, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 84, Low Coal Meas. clarki, Scudder, 1893, Insect Fauna, R. I.
 - Coal Field, p. 14, Coal Meas. clintoniana, Scudder, 1895, Rev. Am.
 - Foss. Cockroaches, p. 66, Coal Meas. communis, Scudder, 1895, Rev. Am. Foss.
 - Cockroaches, p. 93, Low. Permian. debilis, Scudder, 1895, Rev. Am. Foss,
 - Cockroaches, p.71, Low. Permian. defossa, Scudder, 1895, Rev. Am. Foss.
 - Cockroaches, p. 108, Low. Permian.
- detecta, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 75, Low. Permian. eakiniana, Scudder, 1895, Rev. Am. Foss
- Cockroaches, p. 88, Low. Permian. exigua, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 76, Low. Permian.

- exilis, Scudder, 1893, Insect Fauna, R. Coal Field, p. 17, Coal Meas. expugnata, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 102, Low. Permian. expulsata, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 89, Low. Permian. expuncta, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 79, Low. Permian. exsecuta, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 96, Low. Permian. exsensa, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 86, Low. Coal Meas. fasciata, Scudder, 1889, Proc. Bost. Soc.
- Nat. Hist., vol. 24, p. 47, Low. Coal Meas
- fossa, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 70, Low. Coal Meas. funeraria, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 78, Low. Permian.
- funesta, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 85, Low. Coal Meas. gorhami, Scudder, 1893, Insect Fauna,
- R. I. Coal Field, p. 16, Coal Meas. gracilenta, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 95, Low. Coal Meas.
- gratiosa, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 90, Low. Permian. hastata, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 94, Low. Coal Meas. hilliana, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 99, Low Coal Meas. hustoni, Scudder, 1889, Proc. Bost. Soc.
- Nat. Hist., vol. 24, p. 53, Low. Coal Meas.

GER.-

illus R. imm Co imp Ĉe

invis C jeffe Fe

M

C late ro mac C mac C

lata

mac Co male

Co

Sc

Co med Co muc Fo mi obat

Co occu Co ovat

Co

Co

Co

Co

Co

patie

præc

rame

recid

reliq

resid

rogi, Co

sagit

scho

secre

stipa Na

strig Na Ma

tenu

varie

Na

Me

Na

Me

Čo

R.

Co

Me

R

Co

mar

ANT.-ETO.

5, Cont. to | Meas.

o Can. Pal.,

Fauna, R. IS. v. Am. Foss. Permian. v. Am. Foss. 'ermian v. Am. Foss. 'ermian. v. Am. Foss. 'ermian. v. Am. Foss. loal Meas. c. Bost. Soc. , Low. Coal

Am. Foss. Joal Meas. v. Am. Foss. Permian. v. Am. Foss. **Coal Meas.** usect Fauna, al Meas. ev. Am. Foss. Joal Meas. v. Am. Foss. Permian. v. Am. Foss. Coal Meas. v. Am. Foss. loal Meas. c. Bost. Soc. 3, Low. Coal GER.-MYL.

illustris, Scudder, 1893, Insect Fauna, R. I. Coal Field, p. 12, Coal Meas.

INSECTA.

- immolata, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 92, Low. Permian. imperfecta, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 104, Low. Permian. invisa, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 106, Low. Permian. jeffersoniana, Scudder, 1895, Rev. Am.
- Foss. Cockroaches, p. 77, Low. Coal Meas.
- lata, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 67, Permian.
- latebricola, 1895, Rev. Am. Foss. Cockroaches, p. 108, Coal Meas.
- macerata, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 91, Low. Permian.
- macilenta, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 101, Low. Permian.
- mactata, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 92, Low. Permian. maledicta, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p, 83. Low. Coal Meas. marginata, Scudder, 1889, Proc. Bost.
- Soc. Nat. Hist., vol. 24, p. 48, Low. Coal Meas.
- mediana, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 69. Low. Permian.
- mucronata, Scudder, 1895, Rev. Am. Foss, Cockroaches, p. 74, Low. Permian.
- obatra, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 103, Low. Permian.
- occulta, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 107, Low. Permian. ovata, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 70, Low. Permian. patiens, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 73, Low. Permian.
- prædulcis, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 98, Low. Permian.
- ramosa, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 81, Low. Coal Meas.
- recidiva, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 109, Low. Permian.
- reliqua, Scudder, 1893, Insect Fauna R. I. Coal Field, p. 18, Coal Meas. residua, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 78, Low. Permian.
- rogi, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 102, Low. Permian. sagittaria, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 68, Permian. scholfieldi, Scudder, 1893, Insect Fauna
- R. I. Coal Field, p. 15, Coal Meas. secreta, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 105, Low. Permian. stipata, Scudder, 1889, Proc. Bost. Soc. Nat. Hist., vol. 24, p. 52, Low. Coal
- Meas.
- strigosa, Scudder, 1889, Proc. Bost. Soc. Nat. Hist., vol. 24, p. 52, Low. Coal Meas.
- tenuis, Scudder, 1889, Proc. Bost. Soc. Nat. Hist., vol. 24, p. 46, Low. Coal Meas.
- variegata, Scudder, 1889, Proc. Bost. Soc. Nat. Hist., vol. 24, p. 51, Low. Coal Meas.

willsana, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 82, Low. Coal Meas.

- GERABLATTINA abdicata, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 118, Low. Permian.
 - apicalis, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 114, Low. Coal Meas.
 - cassvici, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 117, Low. Permian.
 - concinna, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 119, Low. Permian.
 - deducta, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 123, Low. Permian.
 - diversinervis, Seudder, 1895, Rev. Am. Foss. Cockroaches, p. 115, Low Permian.
 - eversa, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 122, Low. Permian.
 - fraterna, Scudder, 1893, Insect Fauna, R. I. Coal Field, p. 19, Coal Meas. inculta, Scudder, 1895, Rev. Am. Foss.
 - Cockroaches, p. 113, Low. Permian.
 - lata, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 125, Low. Permian.
 - minima, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 127, Low. Coal Meas. ovata, Scudder, 1895, Rev. Am. Foss.
 - Cockroaches, p. 126, Low. Permian.
 - perita, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 114, Low. Permian.
 - permacra, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 121, Low. Permian.
 - permanenta, Scudder, 1895, Rev. Am. Foss.Cockroaches, p. 121, Low. Permian. radiata, Scudder, 1895, Rev. Am. Foss.
 - Cockroaches, p. 124, Low. Permian.
 - richmondiana, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 116, Low. Coal Meas.
 - rotundata, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 126, Low. Permian.
 - scapularis, Scudder, 1893, Insect Fauna, R. I. Coal Field, p. 19, Coal Meas.
- uniformis, Scudder, 1895, Rev. Am. Foss. , Cockroaches, p. 120, Low. Coal Meas.
- MICROBLATTINA, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 56. [Ety. mikros, small; Blattina a genus.] Founded on the apical half of a fore wing. The mediastinal area reaches but little beyond the middle of the tegmina. Scapular vein simple until it reaches the end of the mediastinal area, when it throws out numerous short branches to the margin. The externomedian vein runs parallel to the scapular and terminates above the apex of the tegmina, emitting numerous inferior, long, straight branches to the apical margin. The internomedian area is margin. narrow and filled with arcuate veins. Type M. perdita, described at the same place from the Coal Meas.
- MYLACRIS ampla, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 45, Coal Meas.
 - elongata, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 41, Coal Meas.
 - gurleyi, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 43, Coal Meas.

packardi, Scudder, 1893, Insect Fauna, | R. I. Coal Field, p. 11, Coal Meas.

792

凯

- ORYCTOBLATTINA laquata, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 133, Up. Coal Meas.
- PARALOGUS, Scudder. 1893, Insect Fauna, R. I. Coal Field, p. 20. [Ety. paralogos, unlooked for.] Fore wings three or more times as long as wide, costal margin nearly straight, hinder margin arcuate. Mediastinal vein simple, close to the outer margin. Scapular vein near to and parallel with the mediastinal vein; emits an offshoot below the middle of the basal half, which immediately divides, the upper branch bearing a few longitudinal offshoots, the other many arcuate offshoots. Externomedian vein sinuate. Internome-dian and anal veins originate from a single stem, and each bears numerous arcuate branches. The reticulation is quadrangular. Type P. *aschnoides*, described at the same place from the Coal Meas.
- PAROMYLACRIS clintoniana, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 53, Low. Coal Meas.
 - pluteus, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 54, Coal Meas.

triangularis, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 52, Coal Meas.

- PETRABLATTINA hastata, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 141, Low. Permian.
- POROBLATTINA complexinervis, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 139, Low. Permian.
 - fossa, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 137, Low. Permian. gratiosa, Scudder, 1895, Rev. Am. Foss.
- Cockroaches, p. 136, Low. Permian. longinqua, Scudder, 1895, Rev. Am.
- Foss. Cockroaches, p. 135, Low. Coal Meas.
- ohioensis, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 138, Low. Coal Meas.
- PROGONOBLATTINA columbiana, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 131, Low. Coal Meas.
- PROMYLACRIS harei, Scudder, 1895, Rev. Am. Foss. Cockroaches, p. 48, Up. Coal Meas.
- FRIDIOPSIS, Scudder, 1893, Insect Fauna, R. I. Coal Field, p. 10. [Ety. from the resemblance to *Rhaphidia*.] RHAPHIDIOPSIS, Distinguished from Corydaloides by the nonfalcate form of the relatively shorter wings, the excessive breadth of the hind wings, and the less numerous and much more distant scapular branches. Type *R. diversipenna*, described at the same place from the Coal Meas.

SUBKINGDOM VERTEBRATA. CLASS PISCES.

ASPIDICHTHYS notabilis, Whiteaves, 1892, Cont. to Can. Pal., p. 354, Devonian.

- BRONTICHTHYS, Claypole, 1894, Am. Geol., vol. 14, p. 379. [Ety. Brontes, mythological name; *ichthys* fish.] A fish-spine. Type *B. clarkei*, described at the same place from the Cleveland Shale.
- CLADODUS clarki, rivipetrosi, and sinuatus, Claypole, 1893, Am. Geol., vol. 11, p. 327, Cleveland Shale.
- magnificus, Claypole, 1894, Am. Jour., vol. 14, p. 137, Cleveland Shale.
- CLADOSELACHE newberryi, Dean, 1893, Trans. N. Y. Acad. Sci., vol. 13, p. 115, Waverly Gr.
- Coccostrets cuyahoge, Claypole, 1895, Ohio Geol., vol. 7, p. 615, Cleveland Shale.
- halmodeus, Clarke, 1894, 13th Rep. St. Geol., N. Y., p. 161, Marcellus Shale.

CTENACANTHUS acutus, Eastman, 1897,

Am. Jour. Sci., vol. 154, p. 13, Keokuk Gr.

- Dinichthys canadensis, clarkei, gracilis, and lincolni. See Ponerichthys
- prentis clarkei, Claypole. Not binomial.
- MONOCLADODUS, Claypole, 1893, Am. Geol., vol. 11, p. 329. [Ety. monos, single; Cladodus, a genus.] Distinguished from Cladodus by the teeth, which consist of a single cusp each, without lateral denticles. Type M. clarki, which, with M. pinnatus, is described at the same place from the Cleveland Shale.
- PETALODUS securiger, Hay, 1895, Jour. Geol., vol. 3, p. 561, Coal Meas., Syn. for P. alleghaniensis.
- TITANICHTHYS attenuatus, Wright, 1895, Ohio Geol., vol. 7, p. 612, Cleveland Shale.
 - brevis, Claypole, 1896, Am. Geol., vol. 16, p. 167, Cleveland Shale.

TAM.-

Sci gei wh of at VOI

ALLOPU

Sci ma on fee BAROPI Sci m٥ bo DROMO

Sci

TAMIOR
ORY.—TIT.

1895, Rev. 141, Low.

Scudder, baches, p.

m. Foss. rmian. m. Foss. rmian. lev. Am. Low. Coal

Am. Foss. oal Meas. Scudder, aches, p.

395, Rev. , Up. Coal

3, Insect 10. [Ety. aphidia.] des by the relatively preadth of numerous scapular enna, defrom the

13, Keocilis, and

ot bino-

m. Geol., , single nguished h, which , without I. clarki,

lescribed lleveland

Jour. 5. , Syn. for

ht, 1895 lleveland

eol., vol.

TAM .- NAN.

TAMIOBATIS, Eastman, 1897, Am. Jour.
Sci., vol. 154, p. 85. [Ety. Tamias a
genus; batis, a ray.]PONERICHTHYS canadensis, Whiteaves, 1892,
(Dinichthys canadensis,) Cont. to Can.
Pal., p. 353, Devonian. what is supposed to be the cranium of a skate. Type T. vetustus, described at the same place from rocks of Devonian or Subcarboniferous Age.

- clarkei, gracilis, and lincolni, Claypole, 1893, (Ponerichthys clarkei, etc.) Am. Geol., vol. 12, p. 275, Cleveland and Marcellus Shales.

CLASS BATRACHIA.

2

- ALLOPUS littoralis, Marsh, 1894, Am. Jour. Sci., vol. 148, p. 83, Coal Meas. Tracks made by an animal having five toes on its fore feet and four on its hind feet.
- BAROPUS lentus, Marsh, 1894, Am Jour. Sci., vol. 148, p. 83, Coal Meas. Tracks made by an animal having four toes on both its fore and hind feet.
- DROMOPUS agilis, Marsh, 1894, Am. Jour. Sci., vol. 148, p. 82, Coal Meas. Tracks

made by an animal having long, slender

- digits, terminated by sharp claws. LIMNOPUS vagus, Marsh, 1894, Am. Jour. Sci., vol. 148, p. 82, Coal Meas. Tracks made by an animal having four toes on its fore feet and five on the hind feet.
- NANOPUS caudatus, Marsh, 1894, Am. Jour. Sci., vol: 148, p. 82, Coal Meas. Tracks made by an animal having three toes on its fore feet and four on those behind.