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NOVEMBER, 1895.
VOL. IX, No. 8.

# THE OTTAWA NATURALIST.

Published by the Ottawa Field-Naturalists' Club.

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# THE OTTAWA NATURALIST.*

## A Monthly Magazine devoted to the Natural Sciences.

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THE OTTAWA NATURALIST.

VOL. IX. OTTAWA, NOVEMBER, 1895. No. 8.

## HOW ROCKS ARE FORMED.

By R. W. ELLS, LL.D, F.R.S.C. of the Geological Survey of Canada.

Before taking up the general subject of rock formation, which in the limited time at my disposal, can only be touched upon in the briefest possible manner, we may for a moment glance, first of all, at some of the theories which have been put forth to account for the formation of the earth itself, in order that we may obtain a good starting point or acquire some idea of the conditions under which the foundations of the earth's crust were laid down, upon which the many thousands of feet of rock material which are known by the names of sandstone, slates, shales and limestones have been deposited.

Many theories have been put forth to explain the formation of the earth and to account for the many changes which transpired thereon before it became fitted for the advent of animal and plant life. Of these some are of interest from their legendary character, while others, regarded from the standpoint of modern science, present many features not reconcilable with the knowledge of the present day, and are of value, chiefly as illustrating the crude ideas that prevailed on this subject, prior to the advent of the present century. But few of the propounders of these theories made any attempt to approach so complicated a problem from a purely scientific standpoint. It must be borne in mind that the scientific study of the earth's crust is a matter of comparatively recent date, and our present knowledge is the result of very careful study, both in the field upon the rock masses themselves and in the laboratory, in which the science of chemistry and the microscope have played very important parts.

According to the theory now most generally accepted regarding the formation of the crust of the earth, viz., that of Laplace, there undoubtedly was a period in its history when rock structure, as we now know it, did not exist. This theory, which is commonly styled "the nebular hypothesis," most completely satisfies all the conditions required and may be briefly stated thus. It supposes that in the beginning the universe existed simply in a state of cosmic ether; that this in process of time gave off immense masses to which a rotary motion was imparted through various forces; that from these whirling masses large rings were separated, which by rupture and gradual condensation gradually assumed a spherical shape, as a consequence of the rotary movement, till at length the solar system, with its central sun and accompanying planetary bodies was evolved.

The cosmic matter, in process of time cooled down sufficiently to produce a crust, composed of various mineral constituents: and the cooling and hardening of the earth's mass proceeded either from the centre as a nucleus outward or by a gradual thickening of a first formed crust inward. Several theories have been proposed to explain this stage of the earth's history, but the greater number of physicists and geologists at the present day regard the globe as a more or less solid mass with areas of liquid matter at various points throughout the interior. Be that as it may we can safely say that the first rock material was produced by the gradual decrease in temperature of the original nebular mass, and in this way a foundation was laid down for the subsequent deposition of rock material, for the introduction of living organisms, and finally for the advent of man himself.

From a careful examination of many portions of this crust which have been brought to the surface either by denudation of overlying formations or by the extrusion of liquid matter, as in the case of volcanoes, it has been ascertained to be composed of a number of simple or undecomposable substances or elements of which about seventy have now been recognized. Of these the greater part apparently exist in very limited quantity, while the main mass of the crust is made up of a few easily recognized compounds formed from the union of two or more simple elements. The most abundant of these is silica which is the result of a chemical union of silicon and oxygen, and this constitutes more than half the mass of the earth's crust. The other principal elements which enter into its composition are carbon, sulphur, hydrogen, chlorine, phosphorus and fluorine. All these are styled metalloids while among the metals are aluminum, calcium, magnesium, potassium, sodium, iron, manganese and barium.

Having thus secured a solid rock floor, of which we have most excellent illustrations in the range of Laurentian hills to the north of the river Ottawa, great portions of which presumably represent some of our first formed rock, the next development presumably was the precipitation of water, through the chemical union of the oxygen and hydrogen which entered largely into the composition of the gaseous envelope surrounding the newly created earth. From the geologist's standpoint, this may almost be regarded as our next rock formation; for throughout the whole subsequent history of the earth's devlopment, down to the present day, water has played a very important part. Gradually the watery envelope increased till, possibly, it swept resistless around the entire globe. By degrees, through the cooling and shrinking of the crust, ridges would be produced which formed barriers against which the mighty waves beat with the terrible force of the primeval ocean surge, tearing down and grinding to powder the newly formed coast line, and in this way the conditions were furnished by which the great thickness of the sedimentary formations which form so instructive a field of study to the working geologist, was laid down.

Taking this then as our starting point in geological time we may say that the greater part of the subsequent formations, as we now know them, was produced through the agency of fire or water. By the first we mean that certain portions of the earth's crust have been brought to the surface by means of volcanoes or great fissures in its surface, through which the liquified interior rock issued. These rocks are therefore known as igneous or volcanic, and are styled intrusive when the liquid has solidified before reaching the surface as in the case of granites, syenites &c., or eruptive when the intrusive matter has cooled or hardened after reaching the surface. Among these latter are the diorites, traps and volcanic ejectamenta generally. There is however a manifest difference in the character and composition of these two groups, the latter being ofen darker hued and finer grained, the difference in texture being probably due to more rapid crystallization or cooling just as in the case of solutions of salt, sugar, alum &c., where we find that the slower the cooling the larger the grain of the crystal. These rocks, since they penetrated the oldest of the sedimentary formations, by which term we mean those which have been laid down by the action of water in some form may be regarded, as representing in some cases at least, certain portions of the original mass or crust of the earth.

The sedimentary or aqueous rocks are composed largely of grains of sand or often of pebbles, cemented together by sandy or calcareous particles. These grains of sand and pebbles have been derived from pre-existing rocks which in the first place presumably formed the first floor, and which have been broken down and reduced by the action of the elements, such as the force of waves, the rush of streams, the infiltration of rains or the action of frost. In addition to the beds of sandstone and conglomerate, others, composed largely of calcareous matter, in which the presence of organisms, as shells, plants, etc., can be recognized ; as can be seen in the many quarries in the vicinity of this city, where they extend over large areas, while yet others, composed of fine material, such as mud and silt, now occur as shales, and are easily recognized in the dark brownish or greyish material which is dug up in many of our streets or seen along the banks of the Rideau and Ottawa Rivers.

The manner in which many of these sedimentary rocks have been produced can be readily seen by any one who has ever studied, in the slightest degree, the action of water upon our sea coasts, lake shores, or along our river courses. Thus it will be observed that a coast line is generally composed of masses of rock jutting out here and there in the form of cliffs or projecting points. These are separated by stretches of beach or low shore in which rock ledges are frequently absent, but which are composed of sand, gravel, mud, clay or boulders. These have been produced by the long continued action of wave or current against the rocky barriers, the force of which, by mechanical impact, tends to break down the mass of the cliff into scattered blocks and distribute them about its base. Subsequent rolling and dashing against each other gradually reduce these to a state of sand or clay, and in this way are produced the materials which make up the sandstones and conglomerates. These, by the various changes which are taking place in the earth's surface, become buried under other deposits and are acted upon by the agencies of heat, pressure and other causes till they become firm and enter into the solid constituents of the earth's crust. The softer muds and silts of the beach also undergo a change and pass into shales. This material is deposited under quieter conditions, in sheltered bays or creeks, where the finer earth particles held in water, are gradually deposited. Shales pass into slates through the formation of cleavage planes which have been induced by pressure in the shaly mass, and by hardening through metamorphic agencies. Wherever organic life has existed on the beach or shore, these remains gradually become entombed and we now find the impression of the long extinct bird, fish, plant or insect, often so perfectly preserved that the most delicate points of structure can be readily determined. These organic remains are found to vary in character at different horizons, so that what are found in one rock series often do not appear in others more recent; and upon this peculiarity of distribution, palæontologists and geologists have built up a scheme of rock formations, which comprises all the sediments from the Laurentian time or the original deposition of the earth's crust, down to the present day, each division of which is distinguished by certain fossil forms peculiar in large part to itself. In this way we can depict the whole life history of the globe, from the advent of the first forms, through plant, fish, bird, reptile, etc., to the mammalia, and up to the highest type of all the genus *Homo*, or man himself.

While, however, sedimentary rocks are deposited as sands, clays or calcareous matter in generally horizontal attitudes, such as we see in the strata surrounding this city, very frequently these strata are tilted at all angles, and in some cases completely overturned. This change in position is accompanied often by a change in the character of the original sediments, and is due to some agency, either of contraction or shrinking of the crust or to dislocations which have produced crumplings, upheavals, displacements, etc. In this way sandstones have been frequently changed to hard quartzites, shales to cleaved slates, and limestones to a crystalline condition, as marbles. Often all the alteration is directly due to the presence of heated masses of intrusive rock, as granite, syenite or diorite, which have ascended from the heated interior along lines of fracture or least resistance, and the heat has deprived the rock in contact of much of the contained moisture, changing the texture and altering its character for a considerable distance from the line of contact of the intrusive mass.

As regards some of the more important minerals found in the stratified rock, their formation has proceeded on somewhat similar lines. Thus, if we study the early history of the coal beds, some of which have a thickness of from thirty to forty feet, we find that they have originated probably from swampy deposits somewhat of the nature of our present peat mosses, and that the growth and decay of vegetable matter went on for very long periods. On the basis of eight to ten feet of peat or swamp mud being required for every foot of coal produced, a thirty foot coal seam would have required a swamp of enormous depth to have furnished the material necessary for the formation of such a coal bed. That the coaly matter has been derived from the decomposition of plants, such as tree ferns and other allied forms, which grew in the marshes of the Carboniferous time is very clear, since the remains of the coal-plants can be found well preserved in the shales which overlie the coals and in the clays which form their underlying strata, as well as in the tissue of the coal itself. It would appear that the woody or interior tissue gradually became destroyed, while the carbon of the bark principally formed the mass of the coal itself. These masses of swamp or peaty matter, gradually by submergence become overspread with sand, gravel or silt, which by continued increase in thickness acquired sufficient weight to press down the mass of bog, until by long continued pressure and other causes it became transformed into the coal which we mine and burn to-day.

Somewhat similar changes and conditions are going on at many places at the present time in our own peat deposits. Thus at the great bog near the city known as the "Mer Bleu" which is a great expanse of peat of from 8—10,000 acres in extent, the surface is covered with green moss, ferns, shrubs and stunted trees, the whole forming a light colored layer of two or three feet in thickness. Beneath this the contents of the bog gradually become dense and darker colored ; the green living vegetation has disappeared, but its remains yet exist in the form of rootlets, stems &c. Still lower down the bog presents a still more homogenous aspect. the vegetable matter is almost entirely decomposed, and the mass is of a uniform dark brown or black color and of a very considerable density, forming a very excellent fuel when dug out and dried. Where this material is subjected to great pressure it furnishes a material known as compressed peat which can be so manufactured as to have all the density and calorific power of coal itself, and thus is able to furnish a material of very great value for all the purposes for which ordinary coal is now applied. There is therefore a manifest resemblance between these modern bogs and those from which our beds of mineral fuel were derived ; with this exception, that the character of the growing vegetation, and the nature of the animal life which inhabited these were widely different ; while the presumption is strong that if these peat bogs could be subjected to the same conditions which affected those of the Carboniferous time, the resulting material would be a coal of somewhat similar character. Coals of an intermediate character are also found as in the great lignite deposits of the Saskatchewan and Souris areas, where the mineral still retains to a marked extent its original woody fibre. On the other hand when the bituminous coals have been subjected to the action of further heat and pressure, the result appears in the form of anthracite or hard coal, in which much of the volatile matter has been driven off. A still further alteration results in the formation of graphite. Beautiful illustrations of this latter condition are found in some deposits in southern New Brunswick, where the coal is graphitized anthracite, the containing rocks being thrown on edge and much altered.

Other kinds of rock masses may be mentioned, such as rock-salt, gypsum, shell-marl, infusorial earth, chalk, iron ores of various kinds, petroleum and petroleum-bearing shales. Of these, rock-salt has probably been formed by the evaporation of saline waters in enclosed basins, a process which has been going forward at many stages of the world's history, and is seen at the present day in nature in the Great Salt Lake of Utah, as well as at all points where salt is produced by solar evaporation or action. Gypsum is formed principally as a chemical precipitate from solution in water, as well as by the action of sulphurous vapours from volcanic vents upon calcareous rocks. Shell marls are mostly of organic origin, formed by the accumulation of the remains of shells in the bottoms of lakes or ponds, often seen underlying peat bogs, as is also the case with certain of the limestones where the mass of the rock is made up almost entirely of organisms. Certain of the limestones, however, are formed by chemical action, by deposition of calcareous matter in solution, in which case they are frequently highly siliceous and devoid of all trace of organic life. Chalk is formed like shell marl, only differing in its being of marine instead of fresh water origin; the mass of the deposit being principally calcareous, while with infusorial earth which is formed from portions of diatoms, the mass is chiefly siliceous. This substance although requiring a high power of the microscope to detect the traces of the organisms is often found in deposits of many feet in thickness.

The deposits of iron ore, which form a very important portion of the economic products of the earth's crust, owe their origin very largely to the action of certain organic acids, which have been produced by the decomposition of vegetable matter upon the ferruginous minerals found in many rock masses, and which thus pass into solution with water. These solutions rapidly decompose under certain conditions and the iron salts are precipitated, and become mixed with sands and clays, gradually forming beds of what is known as bog iron ore. This material in certain areas constitutes deposits of very great extent as in the St. Maurice district, where these ores have been mined and smelted for over 150 years, and are still as abundant as ever, at many points. The other ores of iron, such as limonite, hematite, magnetite &c., which frequently occur in immense masses have also been regarded by some chemists, and geologists as owing their existence to organic agencies, and their present condition is supposed to be due to the great metamorphoses to which they have been subjected during the great lapse of time since their deposition. It seems however probable from the associations of many of these deposits with clearly intrusive rocks that *their origin is more closely related to these latter than to any organic* agencies as is the case with the recent iron ore deposits.

Of late years the microscope has come to the aid of the field geologist and has been of wonderful assistance in solving the problem pertaining to the structure and origin of many rocks, concerning whose genesis much doubt had long existed. By the increased light thus furnished, many new facts have been adduced which have, on certain lines, almost entirely revolutionized our earlier ideas as to rock structure and by the union of the forces of the field and the laboratory much more satisfactory conclusions have been reached. It may be safely said that by this means, the progress in accurate geological investigations during the last ten years has been far greater than in any previous similar period, and the results obtained have been much more reliable.

The *vicinity of* Ottawa *is excellently adopted for the study of many* rock formations. Along the line of the Gatineau railway many beautiful sections of the early crust are exposed in the form of granite, gneiss and crystalline limestone, and their intersections by dyke-like masses of deeper seated rocks are well seen, as syenites, diorites, pyroxenes, felspars, etc. The Ottawa, Arnprior and Parry Sound and the Canada Atlantic Railways both traverse areas occupied by the lower Palæozoic rocks and many instructive outcrops of sandstone, shale and limestone are easily available to the geological student. Some of the strata of the Chazy and Trenton are wonderfully rich in organic remains. The former of these two great rock divisions illustrate the conditions which prevailed when the earliest ocean waves dashed against the oldest outlines of our continent, and strewed the debris of sand and pebbles throughout the Ottawa area, while the limestones and shales of the Chazy and Trenton show the prevalence of deeper water conditions and the abundance of the animal life even in those early days of the world's history. The most recent deposits of clays, sands and gravels can also be studied at many points along the river Ottawa as well as over the country adjacent on either side, and their contained organisms, in the shape of bones of seals and fishes, as well as marine shells, are familiar to many of the members of our club. These shell deposits are found at many points along the hills around Ottawa and away up the river to the west at elevations of hundreds of feet above present sea level, and show that the deposits of these portions of the present crust of the earth were due to the series of rhythmic pulsations which seem to be constantly going on, and by which at one time, the surface is raised to a considerable elevation above tide water and then gradually becomes submerged till the ocean waves wash the sides of our highest hills.

It will be readily admitted by everyone conversant with the study of Geology, that, like all other branches of science, it is extremely progressive in its tendency ; but though the new facts acquired year by year, through our recent sources of knowledge, have led to many changes of view as to the origin, history and manner of formations of the component parts of the earth's crust, it should not be assumed that as a consequence any discredit should attach to the conscientious work of the pioneers in the science, but rather the greater credit should in many cases be given, in that they, with such poor materials at their disposal and such a lack of facilities at their command for investigation, should have been able to accomplish so much, and to obtain results so generally satisfactory to those who have since studied the rocks in the light of modern science.

# REPORT OF THE GEOLOGICAL BRANCH, 1894-95.

(Read December 20th, 1894.)

*To the Council of the Ottawa Field-Naturalists' Club:*

The following notes on geological work carried on in this vicinity by members of the Club and others indicate clearly the interest which still prevails in the study of the geological formations about Ottawa.

Considerable geological work was done at the three general excursions held under the auspices of the Club.

The following table shows the various places visited and the geological formations noticed and reported upon either orally at the excursions by the leaders, or in the NATURALIST* :—

| | | | | |
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| EXCURSION | No. 1. CHELSEA. | Saxicava sand, Leda clay. | Fossils abundant. | Sands and gravels, clay, &c. |
| | | Boulder clay. | | |
| | | Archæan. | | Gneisses, limestone, ophite, diorite, &c. |
| | No. 2. WAKEFIELD. | Leda clay. Boulder clay. | No fossils collected | Marine clay and boulder clays, glaciated rocks. |
| | | Archæan. | | Gneisses, pegmatites, &c. |
| | No. 3. GALETTA. | Pleistocene. | Marine Fossils in the gravel pit at Carp Station. | Chrondrodite limestone, syenite, &c., overlain by marine clays and sands. |
| | | Archæan, &c. | | |

Besides the three general excursions, above mentioned, there were held a number of sub-excursions in which various members of the Club and others interested took part.

These are some of the localities visited :—

1. PORTER'S ISLAND. RIDEAU RIVER, OTTAWA. In April, 1894,

*(a) Vol. VIII., No. 3, pp. 42-43, 1894.
(b) Vol. VIII., No. 5, pp. 74-75, 1894.
(c) Vol. VIII., No. 7, pp. 109-110, 1894.

the writer, together with Mr. B. E. Walker, F.G.S., of Toronto, Mr. N. J. Giroux, C.E., Mr. J. C. Reichenbach, and others visited this island, where extensive excavations made by the civic authorities had brought to view the fossiliferous strata of the middle Utica. Large blocks of black bituminous shale were examined and a perfect harvest of interesting forms obtained.

Slabs covered with the remains of graptolites of the genus *Leptograptus*, beautifully preserved and showing the hydrothecæ and other points of structure wonderfully well; colonies of the sponges recently described for the writer by Dr. Hinde as *Stephanella sancta*, together with remarkably well-preserved specimens of *Triarthrus spinosus* were found in tolerable abundance.

A complete list of the species collected on Porter's Island will be published in a future number of the NATURALIST, if desired.

2. HULL, Que. The quarries at Hull both north and south of the C. P. R. track, were again visited and as usual yielded a number of interesting forms, especially crinoids.

On one occasion, in two hour's search the writer and two friends secured no less than 30 heads of crinoids besides a large number of beautiful examples of *Trematis Ottawaensis*, Billings and an undescribed bryozoary.

3. BESSERERS, *Ottawa River*.—9 miles below Ottawa City. In company with Mr. Lambe of the Geological Survey the writer spent a day collecting in the Post Pliocene marine clays of this locality during low water in September. Besides some *fifty* specimens of fossil fishes —*Mallotus villosus*, Cuvier, collected on this occasion—there were obtained remains of shells and plants in tolerable abundance. Some fifty specimens of plants were sent to Sir William Dawson and include remains of algæ or seaweeds, mosses, equisetaceæ, fruits, grasses, sedges and leaves of trees and flowering plants.

Two fossil feathers were also collected. The first specimen of a fossil feather from those marine clays discovered as far as we know was that obtained by the Marquis of Lorne at Green's Creek, during his term of office, about 1881, and is now on exhibition in the Pleistocene case at the Geological Museum on Sussex street.

Several papers bearing on the Geology of this district have appeared from time to time in the NATURALIST during the past year.

The Director of the Geological Survey of Canada (Dr. Selwyn) has undertaken to publish a series of Geological maps of this portion of Canada and entrusted this work to Dr. Ells who is also one of the leaders in Geology of our club. I have no doubt that he will find useful and interesting material in the published records of the geology of Ottawa or in the unpublished notes of the leaders in geology.

Records and notes have been kept during the past fifteen years at least, an amount of useful information which will be useful in preparing a more detailed and accurate geological map than has heretofore been published. Early in the spring of '94, one of your leaders, the writer, issued a chart of the Geological formations of Ottawa and its environs extracted from a paper published in 1888 on the formations of this district.

What is now required is a good topographical map of this district upon which to lay the geological features. Considerable difficulty has been met in the fact that the surveys on the Ontario side do not correspond with those on the Quebec side of the Ottawa and require to be corrected at numerous points. Considerable progress however was made in this direction by the late Mr. Scott Barlow, Chief Draughtsman of the Survey, and this branch of the Club's work looks forward to the time when such a map will be prepared for the Ottawa district.

In the meantime a great deal remains to be done in geology about Ottawa The structure and composition of the older crystalline rocks at our very door, their origin and age are only begining to be studied and understood, whilst the fossiliferous rocks always prove to the diligent searcher that many forms new to science are still awaiting to be discovered.

In conclusion we trust that good results will long continue to be forthcoming in this branch of the Club's work.

(On behalf of the leaders) H. M. AMI.

## NOTES, REVIEWS, AND COMMENTS.

**Glacial Deposits in Europe and America.**—In the April-May issue of the *Journal of Geology*, Vol. III, No. 3. pp. 241-269, James Geikie contributes a valuable paper entitled:— "The Classification of European glacial deposits."

It is a clear and conscise résumé of the evidence gathered by one whose intimate acquaintance with the facts of the case enable him to present the various stages which characterized glacial times in Europe. From the earliest glacial deposits of northern Europe—the Scanian—to the latest, the Upper Turbarian or sixth glacial period, Dr. Geikie notes **five interglacial periods** and **six** glacial periods, which he designates as follows:—

EUROPEAN GLACIAL AND INTERGLACIAL STAGES.

XI. Upper Turbarian—Sixth Glacial Period.
X. Upper Forestian—Fifth Interglacial period.
IX. Lower Turbarian—Fifth Glacial Epoch
VIII. Lower Forestian—Fourth Interglacial Epoch.
VII. Mecklenburgian—Fourth Glacial Epoch.
VI. Neudeckian—Third Inter Glacial Epoch.
V. Polandian—Third Glacial Epoch.
IV. Helvetian—Second Interglacial Epoch.
III. Saxonian—Second Glacial Epoch.
II. Norfolkian—First Interglacial Epoch.
I. Scanian—First Glacial Epoch.

This admirable paper by Dr Geikie is followed by another on "The classification of America's glacial deposits" 270—277, (*loc-cit.*) by Prof. T. C, Chamberlin in which the latter points out the relations which exist between the stages mentioned by Dr. Geikie in his paper on European glacial deposits and the stages in america. Prof. Chamberlin remarks: "Our knowledge of the formations that were deposited during the advancing stages of the glacial period in America is extremely imperfect." This strikes the key-note to a series of careful investigations which ought to be made in the lowest glacial deposits of North America and specially in British North America such as will enable the correlations of the different stage in Europe and America to be more accurately established. Prof. Chamberlin attempts to correlate the *Kansan formation* with the *Saxonian* of Europe owing to their striking similarity, in that they "al ke repre sentthe greatest extension of the ice-sheet. The *Aftonian* and the *Helvetian* are then compared indicating a retreat of the ice-sheet.

Then the *Iowan* formation of Dr. McGee — which Chamberlin co-relates with the *Polandian* with some doubt.

The *Toronto* formation correlated with the *Neudeckian* (?); the *Wisconsin* formation with the *Mecklenburgian* (?) and the later deposits are compared with the *Forestian* and *Turbarian* deposits of Europe.

These two papers are most interesting contributions to glaciology.

H. M. AMI.

**Botany.**—RARE MANITOBAN PLANTS.— I beg to note the finding of the following plants at Stony Mountain, Man., on August 12th 1895.

(1) *Gerardia tenuifolia*, Vahl var. *asperula*, Gray.

This was recorded from the same locality by J. M. Macoun. Many years ago I noticed it northwestward towards Lake Manitoba. This would seem to confirm the conjecture made in Prof. Macoun's Catalogue that G. aspera of Douglas, should be referred here.

(2) *Bouteloua racemosa.* Lag. This grass is very rare in Canada, it was found in the same locality by Mr. Fletcher in 1883

(3) *Pellæa atropurpurea*, Link. On limestone rocks. This is the first record for Manitoba, though there are several for the North West Territories.—Rev. W. A. BURMAN, *Winnipeg, Man.*

— ASPLENIUM RUTA-MURARIA, L:—In the OTTAWA NATURALIST for November 1892, Dr. T. J. W. Burgess, F. R. S. C., records the first discovery in Canada of this rare fern by Dr. P. J. Scott, of Southampton, Ont., on Flower-pot Island, near Tobermorey, Bruce Co. Ont.

In looking through some botanical specimens collected by the Rev. W. A. Burman, of Winnipeg, at Banff, Rocky Mountains, in June 1894, I find some good fruiting fronds of this fern. This is the second locality in Canada so far recorded.—J. F.

**Zoology.**—THE COMMON HOUSE MOUSE, *Mus musculus*, L. Two specimens of a mouse taken by the Rev. J. H. Keen, at Fort Simpson, Northern British Columbia, were forwarded for identification to Mr. S. N. Rhoads, of the Academy of Natural Sciences of Philadelphia Pa., who reports that they are the above species, and, that the capture so far north is of interest.—J. F.

**Entomology.**—PAMPHILA PECKIUS, Kirby.—This pretty and common little Skipper, of which there is normally but one brood in the year at Ottawa, the butterflies appearing in the latter half of June, has this year been practically double-brooded. During the hot weather we had last September numerous specimens were seen darting about the beds of *Phlox Drummondii* at the Experimental Farm. In previous years an occasional specimen has been recorded in the autumn but this year the species was abundant.—J. F.

SPHINX LUSCITIOSA, Cram. A fine male specimen of this rare Hawk Moth was taken by Mr. William Ellis in the Conservatory at the Experimental Farm on June 15th. It was flying by day-light and was watched for some time sipping the nectar from the flowers of some Cattleyas and other orchids. Many years ago a single specimen was taken at rest in New Edinburgh by Mr. Harrington and later Mr. F. W. Warwick of Buckingham, P. Q. took two females at Lilac flowers. An interesting record of this species is that of a specimen taken by Mr. A. W. Hanham at Winnipeg on 1st. July last. It was at rest beneath some loose bark on a fence post. It may be mentioned in case anyone should be fortunate enough to get the eggs at any future time that the food plant of the caterpillar is willow.—J. F.

## PROGRAMME OF WINTER LECTURES IN OTTAWA.

Under the joint auspices of the Ottawa Literary and Scientific Society and the Ottawa Field-Naturalists' Club a special Soirée Committee Meeting was held in the Normal School on the afternoon of Wednesday, Oct. 30th, 1895, when the following programme of lectures, etc., for the ensuing season of 1895-1896 was decided upon :—

1895. PROGRAMME OF LECTURES, SOIRÉES, ETC. 1896.

1895.

NOV. 26th. Conversazione. On this occasion addresses will be given by Dr. MacCabe, F.R.S.C., Dr. R. W. Ells and Mr. F. T. Shutt, M.A., F.I.C. During the evening objects of special interest will be shown under microscopes and in cases prepared for the evening by various members of both societies. Music, vocal and instrumental, will also form a part of this opening entertainment.

DEC. 5th. 1. The value of Botany in Agriculture. By Prof. John Macoun, M.A., F.L.S.
2. A Naturalist in British Columbia. By Prof. James Fletcher, F.R.S.C., etc. Illustrated.

DEC. 12th. A Greek Tragedy. By Prof. MacNaughton, M.A., of Queen's University, Kingston.

1896.

JAN. 9th. Longfellow. By the Hon. Dr. Montague, M.P.

" 23rd. Extinct Monsters By Mr. H. M. Ami, M.A., F.G.S. Illustrated by lantern slides and views.

" 30th. Labrador. By Mr. A. P. Low, B.A.Sc. Illustrated by lime-light views.

FEB. 6th. How to Study Botany. By Dr. T. J. W. Burgess, of Montreal. Illustrated.

" 20th. Pompeii, a Roman City of the first century. By Prof. Frank D. Adams, M.A.Sc., Ph.D., of McGill College, Montreal. Illustrated by lime-light views.

MAR. 5th. 1. Eggs and Nests of Fishes. By Prof. E. E. Prince, B.A., F.L.S., Commissioner of Fisheries for Canada.
2. Bacteria, their functions in Nature. By Mr. F. T. Shutt, M.A., F.C.S. Both papers to be illustrated by specimens.

Lectures at 8. p.m. sharp, in the Lecture Hall of the Provincial Normal School, Cor. of Elgin and Lisgar Streets. **Admission Free.**


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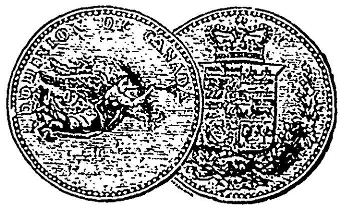

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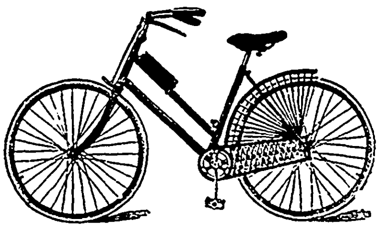

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