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Mr. H. B. Witton on Haeckel, His Life Work and Companions, at Hamilton Association.

Mr. Lyman Lee, B. A., Elected President-Year Has Been One of Progress.

Honorary President-Adam Brown. President-Lyman Lee.

Vice-Presidents-G. Parry Jenkins and J. F. Ballard. nding Secretary-W. A. Child.

Corresponding Secretary—W. A. Child. Recording Secretary—Jas. Gadsby. Treasurer—P. L. Scriven. Curator—Col. C. C. Grant. Council—Rev. W. Delos Smith, A. Harper, B. O. Hooper, T. H. Winghan, E. S. Hogarth, A. H. Baker. Auditors—Rev. J. J. Morton and E. H. Derling.

Auditors-Rev. J. J. Morton and E. H. Darling. A resolution was passed in regard to the proposition to sell the library build-ing. It was to the effect that the asso-ciation was very much opposed to the

proposition. Mr. Jenkins, the corresponding secre-"Mr. Jenkins, the corresponding secre-tary, read two interesting letters from Wm. Yates, of Hatcheley, a naturalist who is held in high esteem, and who takes a deep interest in scientific re-search, although over 90 years of age. This was followed by the address of the evening by Mr. H. B. Witton, whose subject was "Hacekel: His Life, Work and Companions." This was a splendid paper, and is her-given in full. Mr. Witton was given the warm thanks of the meeting. Ernst Heinrich Hacekel was born at Potsdam, in the Province of Bran-

Ernst Heinrich Haeckel was born at Potsdam, in the Province of Bran-denburg, Prussia, February the 6th, 1834. His birthplace is notable for its royal palace and souvenirs of Frederick the Great. From his youth up, his motto was: "Each minute has its value; play or work, but do some-thing." His life was in keeping with his motto. In youth he became a good Greek and Latin scholar; an acquirement he found serviceable when he had to coin names for more acquirement he found serviceable when he had to coin names for more than three thousand new species. In token of his learning, and as reward for service, during a long life to science, Haeckel has had conferred many medals, degrees and dip-Of the latter he has received on him ma lomas. Of nearly hundred from colleges and

niversities of renown. Haeckel always deemed himself a universities of renown. Hackel always deemed himself a child of the nineteenth century. In that opinion he can hardly be gain-sayed, for perhaps no man ever lived in closer sympathy with the advanced spirit of his age. The science of zoo-logy to which his life has been de-voted, in the time immediately pre-ceding our own stamped on the thoughts and opinions of men an in-effaceable impress. In the sixteenth and seventeenth centuries the new light thrown on the world of inor-ganic matter, was hardly more mar-vellous than was that in the nine-teenth century shed on the world of organic life. The doctrine of Cop-ernicus confirmed a hundred years alterwards by the telescope of Cali-leo, and accepted as it was by the reason of the learned, and common sense of the multitude, was no nobler contribution to a knowledge of the universe than was made by the biolo-gists of the nineteenth century. Her-orbalic mebulae and Chrenberrö universe than was made by the biolo-gists of the nineteenth century. Her-schel's nebulae and Chrenberg's monads may well excite in thought-ful minds admiration and reverence, those of their grandeur, those by their minuteness; for both make known vast regions of the great universe which, so far as human records show, were never before unveiled to mortal vision

The annual business meeting of the Hamilton Scientific Association was held Library building, when reports of the work of the past year were presented and officers elected for the ensuing year. In the absence of the president, Mr. H. B. Witton occupied the chair. The re-port of the treasurer showed that the receipts were \$425.58, and the disburs-ments \$398.32, the balance on hand be-ing \$27.26. During the year 41 new fossils received for the museum and 200 mw specimens received. The reports of the geological, astronomical and camera sciences were particularly good. All the officers for the ensuing year. Monorary President—Adam Brown.

Haeckel went with Kolliker in 1856 on a holiday trip to the Riviera. Two or three others, and Mueller himself, were there at the same time; and to-gether they caught, studied and made drawing of all sorts of living creatures. Haeckel carried home materials for fu-ture work; and at Berlin during the fol-lowing winter he prepared for his de-gress of doctor a dissertation on "the tissues of the cray-fish." He took his degree in medicine in March, 1859, Eh-renberg, the great microscopist, presid-ing on the occasion. During the same year he had a friendly discussion with Mueller on the development of the gre-garins; and before the close of the year was striken with grief by the news of Mueller's sudden death. In compliance with his father's wish, he then entered on the practice of med-ions. but his heart was with Haeckel went with Kolliker in 1856

e then entered on the practice of med-cine; but his heart was with

HIS ZOOLOGICAL STUDIES; and to gain time to follow them up, it is said his hours for consultation were fixed at from 5 to 6 o'clock in the morn ing. During the whole year in which he was a medical practitioner, he had but three patients; not one of whom died under his earnest attention. In

but three patients; not one of whom died under his earnest attention. In the same year Haeckel was betrothed to his cousin, Anna Sothe. From January, 1859, to April, 1860, Haeckel lived and studied in Italy. There is an old saw that Italy is charm-ing in books, but one should never go there. That, however, was not Haeckel's experience. On every side he found there abundant means of enjoyment. He was pleased with the Italian people, and says that the charming scenery of Sicily nearly seduced him to turn land-scape painter. But an artistic tempera-ment is the exclusive privilege of no one class. Here and there one of every class inherits that endowment. Haeckel was blessed with it. His house is a gallery of water colors, his own handy work, and average a statistic barbaba they how ork, obessed with it. His nouse is a gallery of water colors, his own handy work, and a number of his sketches have been published in Germany as "Travel Pic-tures." His son, too, has succeeded to his father's skill, and is a professional artist. Much of Hacckel's time was tures." His son, too, has succeeded to his father's skill, and is a professional artist. Much of Haeckel's time was spent at Messina, then so beautiful, since, alas, so desolate. To him the sub-lime beauty of that strait, exceeded that of the bay of Naples. As one of Haeck-el's biographers says: "That is a land of ancient myths. The Cyclops hammer their work in Etna. Seylla and Charyb-dis lurk in the strait. In the days of Homer, when the sun of civilization rested on a corner of Asia, a dim Mun-chausen world was lived there." More-over, it was Messina, that by his thor-ough study of the radiolaria Haeckel laid the foundation of his fame. The radiolaria are microscopic forms of life, encased in shells of rare beauty. The shells are siliceous in substance, have projecting radiating spines, and are pierced with minute holes, through which in life the amoeboidal almost attructureless animal protrudes long hair. like threads of its substance, after the manner of the sun animalculae actino-phrys sol, common in fresh water. The

nanner of the sun animalculae actino phrys sol, common in fresh water. They were first found by Ebrenberg in the North Sea, were called by him polycis-tina, and were afterwards renamed by Mueller radiolaria. They have been found in many seas, and in a fossil state in manine marks of the world

HAMILTON EVENING TIMES SATURDAY. MAY 15 1909

home by the Challenger, all the radio-laria dredged from the deep sea were entrusted to Hacekel for examination, classification and description. He de-voted ten years to the task. His report is in English. It fills two volumes, com-prising 2,760 pages, with. 140 large plates. When the Challenger's collection was submitted to Hacekel, the radio-laria included 810 species. When his re-port was finished the number was 4,310 especies, arranged in 730 genera.

becies, arranged in 739 genera. THE RADWIN THEORY.

THE RADWIN THEORY. It was in that monograph Haeckel first expressed his admiration for Dar-win's theory of the origin of species. The ground of that satisfaction was not be-cause the theory itself was new, but for the reason that the mode by which in process of time new species originate was' described with a precision and wealth of illustration before altogether unknown. The belief that plants and animals had been developed from pris-



Who was elected president of the Hamilton Scientific Association last night.

tine garms, so far from being new, found expression in some of the oldest cos-mogonies. In point of age it ranks with the earliest speculations of the race. the earliest speculations of the race. Among other representative men who held that belief may be named Aristotle, St. Augustine and Thomas Aquinas. Those were great men, who influenced the thought of their time ages ago. Of a later date were Buildon Lamarck, Geöffrey St. Hilaire and Erasmus Dar-win: while contemporaneous with Chas win; while contemporaneous with Chas. Darwin himself were Wells, Mathews, Darwin himself were Weils, Mathews, Chambers and Herbert Spencer, whose essay in the Leader in 1852 contrasted the theories of direct creation and evolu-tion of species in favor of the latter. All these eminent men, with others who might be named, each after his own nides beld to a theorem of the latter.

ideas, held to a theory of the evolution of life in the world.

Jucas, need to a theory of the evolution of life in the world. To but few men were these facts so well known as to Haeckel. Yet Darwin had presented his theory with such logi-cal completeness, lucidity and fulness of illustration from all departments of organic life that Haeckel wrote: "I can-not refrain from expressing the great admiration Darwin's able theory of the origin of species has inspired in me. This is the first great attempt to construct a scientific physiological theory, chemical and physical forces that ta day rule in nature, must also have been in the world of yesterday." Haeckel devoted himself to populariz-ing Darwinsm, to defending it against cpponents, and to supplementing and ex-tending 'its doctrine. But he did more than that. He undertook a restatement of biological science, and revision of zoo-logical classification on the baits of the first of the first of the first for the first optical science.

than that. He undertook a restatement of biological science, and revision of zoo-logical classification on the basis of evo-lution. To that strenuous task he brought rare natural gifts, comprehen-sive precise knowledge, and, what was also essential to success, an iron consti-tution. Bolsche, his biographer, says: From his splendid physique in early manhood, he won at Leipzig a laurel crown for the athletic deed of leaping twenty feet. And he humorously adds twenty feet. And he humorously add that the night after the contest, the friendly host put a pair of dumb-bell into Hacekel's bed, in case he desired to take another spell of exercise befor-merging adds

Darwinism and the labors of Haeckel

ering in a new creation. This was the widely accepted theory of cataclysms, favored to some degree by no lees an authority than Cuvier. But early in 1830 appeared the first volume of Lyell's Principles of Goology, a work destined to be a landmark in the history of sci-ence. It was from the first recognized as a dispassionate, well-reasoned refu-tation of the catastrophic school of ge-ologists, and a lucid exposition of the doctrine that the geological history of the earth has run a course of uniform, continuous development in conformity with laws like those now in operation. When in 1831 Darwin, as naturalist on the Beagle, embacked for South Ameri-

with laws like those now in operation. When in 1831 Darwin, as naturalist on the Beagle, embarked for South Ameri-ca on a scientific expedition, he took with him Lyell's newly published vol-ume. And in part from Lyell's reason-ing, and in greater part from his own observations, Darwin, after his five years' voyage, returned to England a confirmed uniformitarian in geology. During his expedition Darwin kept in mind the subject destined to be his life-work, the transmutation of species. In the Pampas he noted great fossil ani-mals, armo-clad after the manner of the armadillos, one species of which is scarcely a foot long; and he had seen in going southwards that closely allied ani-mals replace one another. And soon af-ter his return home he commenced to compile note-books on the same subject. The first of these books was opened in 1837, and facts were collected wholesale, for he says: "I worked on true Bacon-ian principles."

IDEAL STATE OF SOCIETY. IDEAL STATE OF SOCLETY. Godwin, in his "Political Justice," published in 1793, pictured an ideal state of society free from crime and mis-ery; and at the close of his book he controverted the teaching of Robert Wallace, that the advantages of such a community would be nullified by the excessive population that would ensue. Five years afterwards, Malthus, in his famous essay, restated the objections of Wallace with greater force. His more comprehensive argument, tersely put comprehensive argument, tersely put was that population increases in a ge-ometrical and means of subsystence in an arithmetical ratio; and that vice and crime are but necessary checks on that increase of numbers. In the autumn of

an archimeterial rates, and thus vice and crime are but necessary checks on that increase of numbers. In the autumn of 1838, fifteen months after Darwin began his systematic inquiry, he chanced to read "Malthus on Population." He had already learned much as to the strug-gle for existence going on in the world of life, and as he read the thought struck him, that under such stress, fav-orable variations would tend to be pre-served, and those unfavorable to be destroyed. So the reading of Malthus af-forded a provisional theory aiding him to gather in facts, and gave him heart 'to continue his labors. As his mass of facts accumulated, his views took more definite shape. But not till 1.42, when he had worked five years, did he induge in the satisfaction of a slight pencil-written abstract of his theory. What he wrote barely filled thirty-five pages. But a longer sketch soon followed. And in 1856, after more than nincen years labor, he yielded to the advice of Lyell and began to write out his views "pretty fully." Darwin's collection of facts established befond cavil, that organisms of the same spe-cies differ, no one being exactly like an-other; that these various characteris-tics tend to go down from generation to generation; and that more organisms come into the world than there is room for, hence the struggle for life which leads to survival of the fittest. Of the particulars leading up to these conclusions regarding variation, heredi-

leads to survival of the fittest. Of the particulars leading up to these conclusions regarding variation, heredi-ty, and survival in living organisms, all are interesting, many are curious, and one or two should be mentioned. Darwin found that the elephant, though living nearly a hundred years, is the least pro-lific of animals, having an average of only six young. Yet if that ratio of in-crease in succeeding generations went on without any casualties for on without any casualties for 750 years, at the end of that period

750 years, at the end of that period there would be eighteen millions of elephants living. In the case of flies, the house-fly lays batches of eggs hav-ing about 130 eggs in a batch; and five or six batches in a season. In three weeks a egg becomes a fly, itself lay-ing eggs. If all these lived, and half were femals, the progeny in one season of a single female fly would be a million cubic feet of flies, reckoning 200,000 flies to a cubic foot. But in fact, house-flies vary but little in number from flies vary but little in number from flies vary but little in number from year to year. The mass perish. Among plants the hedge-mustard, sisymbrium sophia, often has in a single plant three quarters of a million seeds. If these, and their products, at the same rate of in-crease, grew to maturity for three years, the land surface of the globe would not hold them all. But the mass perish by the way-side; only a few of the fittest survive. the fittest survive. LIFE FROM DEATH.

Hence arose the conclusion, that from such selective action of external condi-tions come permanent varieties of plants and animals; and the same cous-es in long periods of time give rise to

spot was deemed by his countrymen a fitting resting place for his ashes, but the venerable Abbey, where near to her great heart England treasures the memgreat heart England treasures the mem-ory of her noblest and dearest sons. By Hooker, Huxley, Earl Derby, the Dukes of Argyle, of Devonshire, and by others who also loved him, Charles Robert Darwin was borne to his grave in West-minster Abbey, a grave which fittingly is but a few feet from that of Newton, and is marked only by the simple in-scription of his name, and dates of birth and death. His life is an additional in-stance that: stance that:

"Every truth that yet In brightness rose and sorrow set, That time to ripening glory murs't Was called an idle dream at first."

A recent authoritative historian has A recent authoritative historian has recorded in the Cambridge Modern Lis-tory that Darwin first made effectivé the idea of devotion, which has been applied not only to natural history, but "to religion, to philosophy, to history, to criticism; and he will likely influence the treatment of such subjects in the fu-ture even more than in the past." SVSTEM OF THE MEDICAE

SYSTEM OF THE MEDUSAE.

SYSTEM OF THE MEDUSAE. Many problems connected with Dar-winism arose in Haeckel's mind; though special zoological work claimed much of his attention. In early life the Medusae were his favorite study. In looking back to the days spent with Mueller on the shores of the Mediterranean in 1854, he says: "Never shall I forget the de-light with which I first gazed on the Medusae and strove to sketch their Olynthus.

light with which I first gazed on the Medusae and strove to sketch their beauty of form and color." His enthusi-asm is not surprising. In appearance these little creatures are like bubbes in asm is not surprising. In appearance these little creatures are like bubbes in the water. Agassiz, who made them a special study, and wrote a memoir con-cerning them in his "Contributions to Natural History," mentions that a friend of his asked if they are "organiz-ed water," and the professor thought it was an apropos question, admirably de-scriptive. In sheltered bays of the At-lantic, Agassiz found them in such shoals during summer that an oar could not be dipped into the water without in-jury to many. And in a shallow of the Mediterranean it is a sight not to be forgotten to watch their irridescent forms flashing in the sunlight below the surface of the sea. Many of them are bell-shaped, though where the clapper of the bell should be there is found a stomach provided with a mouth. Zoologically the Medusae are an order of ences inliking in the sunday. Mediterranean coast. But in later life he studied the coral reefs of the Red Sea, visited the Canary Islands, and made a memorable voyage to Ceylon by way of India. His Eastern trip, though but of six months' duration, furnished matter for a fascinating book, as well as supplying him with materials for long investigation. His main object was to supplement his favorite collections of Mediterranean life, with the kindred life of the Indian Ocean towards the equator. In that Object he succeeded, though the heat and moisture of the tropics made preservation of his collec-tions a task which sorely taxed his lim-ited resources. For six weeks he lived and worked at the Singhalese fishing village of Bel-ligam on the southeastern part of the island. There, cut off from European associations, and with none but native companions, he roamed the forest in quest of plants and animals, dived with natives to the bottom of the sea for future use. For all this strenuous work in tropical heat, during four months' so-journ in Ceylon, he escabed without a

Zoologically the Medusae are an order of ocean jellyfish of the class Hydrozoa. The fresh water polyps Trembley so well described a century and a half ago are their dwarfed, distant relations, and the fossil graptolites in the rocks of our Hamilton escarpment are still more dis-tant members of their kindred. Haeckel tant members of their kindred. Hackel intended to describe one family after another of all the Medusae. If his scheme was not carried to completion, his investigations went further than those of his predecessors, who were men of distinction. His work in this field of labor reached over several years. His first paper appeared in 1864, and more than two decades afterwards the twenty-eighth volume of the Challenger Reports contained his elaborate memoir on one form of the strange compound social Medusae-the Syphonaphora. future use. For all this strenuous work in tropical heat, during four months' so-journ in Ceylon, he escabed without a day's illness. These experiences, related as they are with vivacity and humor, and his notes on the physical geography of the island, and the tropical luxuriance of its fauna and flora, make Haeckel's "Visit to Ceylon" a pleasant, edifying book of travel. Early in his professional life Haeckel became convinced that accurate knowl-Medusae-the Syphonaphora. Haeckel's "System of the Medusae,"

Hacekel's "Bystem of the Medusae." with atlas of fine plates, he published in 1879. It was mainly technical—a work written by a specialist for special-ists—but nevertheless had its popular side. Even in the dry work of naming species, the human, imaginative side of Hacekel's nature could not be hidden. became convinced that accurate knowl-edge of cell structure was the founda-tion of biological science, and each fresh discovery confirmed that "conviction. Of vertebrates the fertilized germ cell from which the race is perpetuated, is made up of cell-plasm and nucleus. In each such cell—though a mere speck—in some particulars like to other cells, there nevertheless lurks the potentialities of its race, even, it is said, to the tendency in advanced life to develop special disbecame convinced that accurate knowl one species he named melusina formosa, after the old charming legend of the wa-ter fairy who was wedded to the prince. His first wife died in her twenty His first wife died in her twenty-ninth year. Her loss wrung from his heart the cry of Goethe: "What are the hopes and plans built up by man, the creature of a day." Among the names in his list is this note: "The specific name of this most beautiful of the Me-dusae, the Desmonema Annasche, is in memory of Anna Sethe, the gifted and refined wife to whom the author of this work owes the happiest years of his life." ninth in advanced life to develop special dis-ease akin to that endured by its parents. The nucleus of such a cell contains The nucleus of such a cell contains granular matter, easily stained for microscopic observation, and therefore named chromatin. Recently it had been learned that such chromatin separates into minute bodies known as chromo-somes, and to them has been been attri-buted the chief function of heredity. Professor Thomson, of Aberdeen, has tabulated the actual number of such chromosomes negative to sundry species

ORGANIC LIFE.

tabulated the actual number of such chromosomes peculiar to sundry species of living things. Forty years ago Hacekel's teaching pointed the way to the later discoveries of Strasherger, Hertwig and their followers. On these facts conflicting theories have been built up. But the subject is obscure and science moves at a rapid pace. Cautious men point-fuit that not long are it more In 1866 Haeckel published his "Gen-ral Morphology of Organic Life." A second title added that it was grounded on the theory of descent propounded by Charles Darwin. Huxley described the book as "one of the greatest scientific works ever published," and years after he had written it Haeckel referred to it men point-out that not long ago it was impossible to look through solid matter; that dogmatism is unseemly, and that "science commits suicide when it adopts as a comprehensive, difficult work that had found few readers. It could hardly be a popular book. The morphologist



1909, Haeckel retired from his profes-sorship at Jena. The leisure of his re-maining days he will spend in writing a history of biology. One of his pupils becomes his successor. His concluding lecture at the university, on the 10th of February last, characteristically end-ed with these words: "I am firmly con-vinced that my successor, Prof. Plate, one of my most capable pupils, will not only fill my place, but will surpass me." Some of Haeckel's speculative opin-ions have been warmly controverted during his lifetime, and doubtless will furnish matter for controversy in the days to come. Still, apart from the res-iduum of error inseparable from human knowledge, time, the great arbitor, bids fair to place on the body of his prac-tical teaching its seal of approval. But, however that may be, the extent and precision of his knowledge compels admir-ation; while his ideal of duty, and his exemplification of that ideal in the deeds of daily life, make it doubtful if impossible it is to draw fixed limits for animal species. Varieties of the chalk sponges he found passed from each other and back again, with such frequency and with such differences, that he hum-orangly spid. "You way that he humand with such differences, that he main-orously said: "You may reckon on one genus and three species; three genera and twenty-one species; or thirty-nine genera and two hundred and eighty-one species." His conclusions were that all these forms are transitional and were species." His conclusions were that all these forms are transitional and were derived from one ancestral form, the HE TRAVELLED MUCH. In the prosecution of his zoologica work, Haeckel became a somewhat not work, have became a somewhat not able traveller. In early life his sojourn-ings were confined to the shores of the North Sea, and to various parts of the Mediterranean coast. But in later lift he studied the coral reefs of the Ree for which the Coras Leader and

exemplification of that ideal in deeds of daily life, make it doubtful if any amongst us dare ask to be judged by as high a standard.

MODERN DON JUAN.

Love Swindler Sent to Penitentiary For Five Years.

Kansas City, Mo., May 14 .-- Charles E. Nord, formerly of Haileybury, Ont., a twentieth century Don Juan, who made twentieth century Don Juan, who made love to women in different parts of the United States, Canada, Europe, Asia and Africa for the purpose of inducing them to part with their money, was to-day sentenced to serve five years in the Missouri Penitentiary. When he starts on his journey to the biggest prison iu the world the hundreds of women who wrote to him more than 2,000 letters hreathing undring affection will not be breathing undying affection will not b at the station to bid him farewell. Sinc the evidence at his trial has shown that e used the wiles of Cupid to conceal e cloven foot of Mephistophele there the cloven foot of Mephistophele there has been a startling reversal of femi-nine sentiment. The same women who once kept his fervid love messages in lavender wère eager to come forward and testify that he was a base deceiver. Mrs, Carrie Hamilton, a Frankfort milliner, was chosen as the witness whose testimony would form the basis of a case against Nord. At his trial on a charge of obtaining money under false pretences. Mrs. Ham-ilton testified that after writing fervid love letters to her he induced her to sell her -home and her store and give the proceeds to him to be invested in a food preserving company which did not exist.

food preserving company which did hot exist. While posing as a real estate dealer in Kansas City, Nord was noted for his bewildering array of clothes. He was faultlessly clad to-day when he stood at the bar and heard Judge Latshaw pro-nounce the sentence, which is the maxi-mum for the offence. Many women were in the court room, and it is believ-ed that several of them were of the number whom Nord had duped.

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vision

STUDIED MEDICINE.

STUDIED MEDICINE. Following the wish of his father, Haeckel studied medicine. But the bent of his mind was to the study of zoology; and the works of Goethe(Alexander Von Humboldt and Schleid-en further influenced him in that di-rection. At that time in Germany, a band of notable men by their skill and industry, did much to make biol-ogy a new science. Of this group was Von Baer, by birth a Russian, whose ovological discoveries still keep his name famous. With them also were Gchleiden and Schwann, noted for their respective discoveries in the cell-structure of vegetable and animal IHe; and Virchow, who first turned the cell theory to account in patholo-rical investigation. Among others of that band were Kollicker, the foremost histologist of his day; and Johann Mueller, often referred to as the father of modern physiology. All these me were personally known to Haeckel and several of them were his inimate friends. these men were personally known to Haeckel and several of them were his imate friends.

Heckel and several of them were his intimate friends. Gegenbaur the comparative anatom-it, in 1853, told Haeckel that marine life could be profitably studied on the Mediterranean coast, and first studied in him the desire to visit the Mediterranean coast, and first studied in him the desire to visit the order of the strong personality and professional skill, did much to many years Mueller's portrait had a place over Haeckel's desk; and he wrote to a friend, "whenever I get tired I look at it, and gain fresh strength." He went to Heligoland with Mueller on a zoological expedi-tion, where the master was well pleas-ed with his pupil, especially with his skill in sketching the objects of their study; and predicted for him a bril-liant future. Haeckel's Heligoland wite future. Haeckel's Heligoland be over of certain fishes—the scom-berosces—and was printed in Muel-ley's Archives for 1855. In ae same volume was started the well-known controversy over Virchow's conten-tion that each human body is a

found in many seas, and in a lossil state in various parts of the world. The Barbadoes earth, well known to microseopists, has them in abundance, in many forms, all of which are of ex-quisite' beauty. Before the year 1850 Hackkel knew but little about these tiny forms of life; but by the following year he had discovered one hundred, and forms of life; but by the following year he had discovered one hundred, and judg forty-four new species. In the Sep-boon about them at the scientific congress at Koningsburg. And in 1862 he published life. his monograph, "Die Radiolarian" in a sumptuous folio volume of nearly six hundred pages, with a second volume of thirty-five descriptive plates, from his Study of the radiolaria occupied no beli

Study of the radiolaria occupied no small fraction of Haeckel's life. The small fraction of Haeckel's life. The value of his work is best seen from his report on these forms of life for the British Government. As is well known the British ship Challenger, from 1872 to 1876, made a voyage for exploration of the deep sea. With the best appli-auces, coze was brought up from the bottom of the ocean from nearly four hundred places. Some of these spots were more than a mile below the surface of the sea. The results of that voyage

of the sea. The results of that voyage are embodied in fifty quarto volumes, sold at £100. Of these volumes four fifths—40 volumes-are natural history reports by men of unquestioned ability. Besides some other forms of life brought



to take another spell of exercise before morning. Darwinism and the labors of Hacekel are so inimately connected, that for a right estimate of his character a sum-mary of that theory is relevant, and next to indispensable. A library would be needed to show the ramifications of Darwin's doctrine. Still, a glimpse at the leading facts on which his theory rests, the order in which these facts im-pressed him, and the chief conclusions he deduced from them may suffice. These, may be compressed into a few sentences. In his early studies Darwin suspected that species might be mutable. But, pending due investigation, he suspended judgment. Linnaeus had conferred a boon on science by his use of combined words denoting genus and species, to designate certain differences of organic life. That method admirably served to distinguish the various members of each family of living blings, after the manner that each member of a household is us-tinguished by use of a conjoint Christian name and surname. Linnaeus, it is said, believed that some one species of that genus originated from direct creature fait; but that kindred species of that genus originated from direct creature fait; but that kindred species of that genus originated from direct and followers, every species was held to be immutable, and to have been originnted by creative fiat. The described species of organic life now exceed half a mil-tion; though in the days of Linnaeus that number. those known were hardly a twelfth of that number.

EXTINCT FORMS OF LIFE.

that number. EXTINCT FORMS OF LIFE. To many studious men, the species of finnears represented typical forms of life anable of reproducing offspring in continuous succession, which like themselves would remain separatic, distinct, immutable, without variation by ond narrow limits. But to those hold ing such a theory, the remains of fossil were starmer gigantics creatures. In Am-erica the Megatherium was found; the Manmoth was found on the coast of Siberia; and in England Icthyosauria were gound. Numerous explanations re-garding the extinction of these monsters' were given. Sir Anthony Carlisle, a great stream to make and animals, and each period theory parts and animals, and each period being followed by a catastrophe annihil-ating one set of organic beings, and ush

species, and in still longer periods to differences that are generic. Thus in Darwin's own words: "From the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the highest animals directly follows." As Darwin made these inductions from his store of facts, an essay came to him with a request that it might be read before the Lingean Society. It was sent from the Malay Peninsula, where ecies, and in still longer periods to

the highest animals directly follows." As Darwin made these inductions from his store of facts, an essay came to him with a request that it might be read before the Linpean Society. It was sent from the Malay Peninsula, where its author, Mr. Alfred Russell Wallace, a comparatively young Wells hand-surveyor, was making search for natural history treasures, as he had previously done in the valley of the Amazon. The paper was entilled, "The Tendency of Varieties to Depart From Their Original Type"; and to Darwin's surprise it con-tained exactly the same theory as 'his own. The essay was read at the society in' 1858, as its author desired; and at his paper by Darwin, and a letter a year before written by him to Asa Gray were sent with it. Darwin says that the paper by Mr. Wallace was admirabily written; while his own letter to Gray was not intended for publication, and was therefore, but an off-hand statement of his conclusions. Neither at the society of his conclusions. Neither at the societ based of the conclusions. Neither at the societ of his conclusions. Neither at the societ was therefore, but an off-hand statement of his conclusions. Neither at the societ based of a sucusion of the general of his conclusions. Neither at the societ sucusion of the general of his conclusions. Neither at the societ based of a sucusion of the general or and sucusions. Neither at the societ of his conclusions. Neither at the societ of his conc Varieties to Depart From Their Original Type"; and to Darwin's surprise it con-tained exactly the same theory as his own. The essay was read at the society in 1858, as its author desired; and at the instance of Lyall and Hooker, a short paper by Darwin, and a letter a year before written by him to Asa Gray were sent with it. Darwin says that the paper by Mr. Wallace was admirably written; while his own letter to Gray was not intended for publication, and was therefore out an off-hand statement of his conclusions. Neither at the soci-ety's meeting, nor in fits journal, did these papers attract special notice. Prof. Haughton was the only man of note to

greatness." Haeckel's discussion of the general principles of zoology did not, however, divert him from investigating special forms of life. The Spongida had always and zoologists during a long time doubt-ed whether sponges should rank as mem-bers of the animal or vegetable king-dom; and moreover, sponges from their simple structure and plastic form were fitted to throw light on the problem of species. For some time prior to Haec-kel's special investigation sponges had been assigned place on the animal par-ticles of a living sponge were known to be "a subaqueous community of animal life, in which each unit takes its stand by a continuous flowing stream, draw. life, in which each unit takes its stand by a continuous flowing stream, draw-ing sustemance from the water as it passes by." For five years Hackel stud-ied the chalk sponges; twice taking up abode on the sea-coact to have speci-mens for study in their native habitat. His investigations showed how next to

At the beginning of April of this year,

as a comprehensive, difficult work that do a form of the rest is a cred?
impossible to look through solid matter, that dogmatism is unseemly, and that sole to the sole of the sole <text><text><text><text>

