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ANNUAL REPORT
OF
THE CURATOR
OF THE
MUSEUM OF COMPARATIVE ZOOLOGY
AT HARVARD COLLEGE,
TO THE
PRESIDENT AND FELLOWS OF HARVARD COLLEGE,
FOR
1881-82.

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March 11/4

FACULTY OF THE MUSEUM.

CHARLES W. ELIOT, *President.*

ALEXANDER AGASSIZ, *Curator.*

THEODORE LYMAN.

JOSIAH D. WHITNEY, *Secretary.*

GEORGE L. GOODALE.

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- JOSIAH D. WHITNEY *Sturgis-Hooper Professor of Geology.*
- HERMANN A. HAGEN *Professor of Entomology.*
- NATHANIEL S. SHALER *Professor of Palæontology.*
- WILLIAM JAMES *Assist. Prof. of Physiol. and Comp. Anat.*
- WALTER FAXON *Assistant Prof. of Zoölogy.*
- THEODORE LYMAN *Assistant in Zoölogy.*
- CHARLES E. HAMLIN *Assistant in Conchology and Palæontology.*
- JOEL ASAPH ALLEN *Assistant in Ornithology.*
- W. M. DAVIS *Assistant in Geological Laboratory.*
- SAMUEL GARMAN *Assistant in Herpetology and Ichthyology.*
- E. L. MARK *Assistant in Zoölogical Laboratory.*
- M. E. WADSWORTH *Assistant in Lithology.*
- J. W. FEWKES *In charge of Radiates.*
- PAULUS ROETTER *Artist.*
- MISS F. M. SLACK *Librarian.*

REPORT.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE:—

DURING the past year the corner-piece of the Museum has been plastered, and some of the rooms are already occupied. This part of the building can be completed in such time that the Zoölogical and Geological laboratories will be ready for use at the opening of the next academic year.

The usual courses of instruction have been given at the Museum by Professors Whitney, Hagen, James, Farlow, and Faxon, and by Messrs. Mark, Davis, and Wadsworth.

For the details of this instruction and that in charge of Professor Whitney, I would refer to their several reports.

Two of the assistants of the Museum and two advanced students spent the greater part of the summer at my Newport laboratory. The former devoted their time principally to embryological studies of annelids, fishes, and polyyps. The collections sent for study to Professors Verrill, Smith, and Mackintosh have been returned by them.

About eight hundred volumes have been added to the Library during the past year. A special list of the Museum publications is given to Appendix A of this Report; they are somewhat more extensive and numerous than has usually been the case, consisting of twelve numbers of the Bulletins, and of two numbers of the Memoirs. The publications issued elsewhere by several specialists, based mainly upon Museum materials, are mentioned in the special Reports of the Assistants of the Museum.

The publication of the preliminary Reports on the "Blake" collections has made excellent progress during the past year. There now remain unfinished of these only those upon the Fishes, Halcyonoids, Foraminifera, Ostracoids, Nemerteans, and some

minor groups, as well as the Report on the bottoms. It has been decided to publish only the final Reports of the fishes of the east coast and of the Holothurians. That on the fishes will be published in connection with the United States Fish Commission, and include many species of shallower waters, first brought to light by the dredgings of the "Fish Hawk." Professor G. B. Goode and Dr. Bean have already prepared the greater part of this Report. Dr. H. Theel, of Stockholm, who has undertaken to work up the Holothurians, hopes next spring to transmit his final Report to the Royal Swedish Academy of Stockholm, where it is to be published. Professor Verrill has completed the examination of the east coast Halcyonarians and Actinariae, and is preparing a Report of these and of those of the Caribbean and Gulf of Mexico for the Museum Bulletin. Work is progressing favorably on the other Reports. I have myself nearly completed Part I. of the final Report on the Echini, twenty plates are already on stone, and the remaining plates are well advanced. Concerning the results of the explorations of the Tortugas, undertaken in 1881 under the auspices of the United States Coast Survey, I am preparing for the Museum Memoirs a monograph on the Porpitidæ and Vel-ellidæ of the Gulf Stream. The twelve plates to accompany this Memoir are completed. A second memoir on the structure of the Tortugas, and the distribution of the corals forming that part of the Florida Reefs, is also nearly completed. It will be illustrated by two maps and two plates, representing sections of the reef.

Mr. W. H. Dall is now engaged in preparing the final report on the "Blake" mollusca. His preliminary Report on the mollusca collected by the United States Coast Survey Steamer "Blake" has been issued in parts from July to December, 1881. Bull. M. C. Z. IX. No 2; pp. 111.

Mr. P. H. Carpenter has concluded his preliminary Report on the Comatulæ of the "Blake." It was published in October, 1881. Bull. M. C. Z. IX. No. 4; pp. 18. The crinoids of the "Blake" collection, which had been placed in the hands of the late Sir Wyville Thomson for determination, to be worked up in connection with the "Challenger" material, have been transferred by Mr. John Murray, of the "Challenger" office, to Mr. Carpenter. Mr. Carpenter proposes in connection with his father, Dr. W. B. Carpenter, to work out as fully as practicable the

minute anatomy of *Pentacrinus*, for which the material collected by the "Blake" is quite extensive. In addition to the *Pentacrinus* material, our specimens of *Holopus* were also placed in his hands. Mr. Carpenter is now preparing a preliminary report on this part of the "Blake" collection. During the spring, Professor S. I. Smith has completed his Report on the Crustacea collected by the "Blake" off the Atlantic coast of the United States, during the summer of 1880. We are under great obligations to Professor Smith, not only for the masterly manner in which he has accomplished his task, but also for his promptness in writing this Report, and preparing the excellent plates which accompany his Report. Professor Smith's Report was published in June, 1882. Bull. M. C. Z. X. No. 1; pp. 108, pl. 16.

Dr. J. W. Fewkes, who accompanied me as assistant to the *Tortugas* during the winter of 1881, has written a report on the jelly-fishes we collected while carrying on explorations of the *Tortugas*, under the auspices of the United States Coast Survey. Bull. M. C. Z. IX. No. 7; pp. 40, pl. 7. April, 1882.

Dr. Fewkes has also worked up some of the results of his studies on the jelly-fishes of the New England coast, carried on in my laboratory at Newport. Bull. M. C. Z. IX. No. 8; pp. 20, pl. 2. April, 1882.

The other publications of the Museum issued during the past academic year are:—

Observations upon the species of the genus *Partula*, by Dr. W. D. Hartman. Bull. M. C. Z. IX. No. 5; pp. 26, 2 pl. The collection of the species of the genus *Partula*, made by Mr. Garrett for the Museum, forms a large part of the material placed at the command of Dr. Hartman.

Of the *Memoirs*, Part II. of Vol. VII. No. 2,—the climatic changes of later geological times,—has been published by Professor J. D. Whitney. *Memoirs M. C. Z.* VII. No. 2; Part II.; pp. 121–264. March, 1882. The concluding part of this memoir is well advanced.

Of the *Geological Series* Vol. VII. there have been issued No. 6, by Professor Lesquereux, on recent additions to the collections of fossil plants of the Museum, and No. 7 by Mr. Wolff, on the great dyke at Quincy, Mass.

The second part of the sixth volume of the *Bulletin* has been published, completing that volume. It contains an important

paper by Dr. E. L. Mark, on the maturation, fecundation, and segmentation of *Limax campestris*; 5 pl., pp. 552. Besides a general review of what is known of the same phenomena in other classes of the animal kingdom, based upon his own researches on this difficult subject, Dr. Mark has added an exhaustive bibliography.

I have also undertaken, in connection with Professor Faxon and Dr. Mark, to issue in the Museum Memoirs a "Selection from Embryological Monographs," which will contain 4to illustrations compiled from monographs scattered through innumerable scientific transactions and periodicals, and serve as an atlas to accompany any text-book on Embryology, such as Kölliker, Balbiani, Balfour, etc. Such a publication will, I hope, be found most useful to students and teachers. The 4to illustrations will be accompanied by a carefully prepared description of the plates, and an 8vo bibliographical list. The 4to illustrations and the bibliographical lists will be issued in parts limited to special groups of the animal kingdom.

The first part of the illustrations "Crustacea," has been prepared by Professor Faxon, and was published during this summer. Mem. M. C. Z. IX. No. 1; 14 pl., with an explanation of the Plates, June, 1882. Professor Faxon also prepared the Bibliography to accompany the Crustacea; it was published in March, 1882. Bull. M. C. Z. IX. No. 6; pp. 53. I have myself prepared the Bibliography of the Echinoderms. This was published in August, 1882. Bull. M. C. Z. X. No. 2, pp. 30, and I hope to finish the selection of the illustrations for the Echinoderms in time to issue the second part during this winter. Several of the plates of the aculephs and polyps are finished. I shall have the assistance of Dr. Fewkes in completing the preparation of this part. Professor A. S. Packard, Jr., has consented to take charge of the part relating to insects.

Other memoirs have also been prepared by the officers of the Museum and published elsewhere. They will be found mentioned in the reports of the special departments. I may mention specially the final Report on the Ophiuridæ of the "Challenger" expedition by Mr. Theodore Lyman, forming a part of Vol. IV. of the Zoölogical Results of the "Challenger." The preliminary Reports in the "Comptes Rendus" of some of the Crustacea collected by the "Blake" by Professor Alphonse Milne-Edwards; I

have myself published in the Proc. Am. Acad. XVII; pp. 271-302, 20 pl. July, 1882. Part III. of the Young Stages of Osseous Fishes.

The late Professor F. M. Balfour has published, in connection with Mr. Parker, in the Proceedings of the Royal Society, a preliminary account of the Embryology of *Lepidosteus* based upon the material sent him from our Museum. Professor Mackintosh has completed his examination of the large series of sections of spines of sea-urchins sent him by the Museum. His Report has been sent for publication in the Memoirs of the Royal Irish Academy of Dublin.

The arrangement of the new rooms which have become available for exhibition and for storage has made excellent progress. All the material temporarily stored in the exhibition rooms has at last been removed and distributed to its final position, so that we may now hope within reasonable time to open all our Zoölogical Exhibition Rooms to the public, even should they not exhibit all the specimens we expect to place in them.

The greater part of the gallery of the Systematic Collection of Mollusks has been arranged, and Messrs. Hamlin and Hyatt hope to finish the work on the Mollusks during the coming year. The Systematic Collection of Fishes is now on exhibition and comprises the typical forms of the recent bony fishes, of the Selachians and of the Ganoids. It only remains now to intercalate the blanks and many of the fossil forms to complete this room.

The Systematic Collection of Birds is undergoing its final arrangement. A large part of the faunal collections intended for the Indian and Australian rooms has been placed in their exhibition cases, so that these rooms also can probably be open to the public during the coming winter. Fair progress has likewise been made in the African faunal collection. The skeletons of the reptiles, fishes, birds, and mammals, have been placed in the storage rooms destined for their use. The workroom containing the corals, polyps, echinoderms and sponges has been partially occupied, and Mr. Fewkes has arranged in the Systematic Room of Radiates a selected collection of Alcyonoids.

Mr. Garman has continued the explorations made by him during the two previous years, and has brought together an enormous collection of mammalian remains, — one of the finest, indeed, ever brought from the West. The thanks of the Museum

are specially due to Dr. McGillicuddy of the Pine Ridge Indian Agency for the assistance he has given to Mr. Garman, and for his interest in his behalf.

Professor A. Lakes has continued to send fossil plants from Colorado to the Museum; they have as formerly been carefully identified by Professor Lesquereux.

The past winter Mr. Sternberg spent in Texas collecting fossil vertebrates from the permian. His collections have reached Cambridge safely; we are indebted to Major Henry of the 19th Cavalry, the Commander of Fort Sill, for the assistance he rendered to Mr. Sternberg while at work in his district. Later in the season Mr. Sternberg returned to Kansas, where he is still engaged in making collections for the Museum.

I have specially to thank the Secretary of War, the Hon. R. T. Lincoln, and the Secretary of the Treasury, the Hon. H. M. Teller, for the letters of introduction they were kind enough to send to Messrs. Sternberg and Garman for use in the Territories they explored.

Major Powell, the Director of the United States Geological Survey, kindly allowed the Museum the privilege of sending a collector under certain restrictions with the expedition sent by the survey in charge of Mr. C. D. Walcott to collect palæozoic fossils. It will of course be of great importance to the Museum, in view of our recent acquisitions, that we should have as full a representation as possible of the Western palæozoic fossils.

Mr. Fewkes was sent by the Museum to examine the Bermudas, in hopes of finding it a suitable and accessible locality for studying the surface Fauna of the Gulf Stream. He is preparing a report of his expedition for the Bulletin.

Dr. Hagen spent the greater part of the summer on the line of the Northern Pacific Railroad making an entomological survey for the Northern Pacific Transcontinental Company. He collected during his trip a large number of insects from localities as yet little visited by naturalists.

Large accessions for the faunal collections have been purchased from Professor Ward. In addition to these purchases, we have also received in exchange or as gifts a number of collections mentioned in the special Reports.

During the past year the accessions to our invertebrate palæontological collections have been most important. The Museum

has purchased from Mr. E. Haerberlein a large collection of Solenhofen fossils, the duplicate of a collection purchased some time ago from him by the British Museum; though, of course, it did not contain its greatest treasure, the Archeopteryx. But by far the most valuable accession we have received during the past year is the collection of Silurian fossils of Bohemia, brought together by the late J. M. von Schary, which has been purchased from his heirs. This collection is of the greatest value to American palæontologists, as it will give us the means of comparing the types of the great collections which have formed the basis of the works of Barrande and of Hall. Some idea of the magnitude of this collection may be formed from the fact that it contains over 100,000 specimens; of these probably two thirds of the collection, no less than 1231 species, representing 157 genera, are identified.

The whole collection was packed by Professor Hamlin, who was sent out from the Museum on purpose to secure it. To Professor Poshepny we are under the greatest obligation for his services in carrying out the negotiations which ended in the purchase of this prize. The Schary collection, taken in connection with the collections brought together from American localities, now makes our collection of palæozoic fossil invertebrates one of the finest in existence.

Among the collections purchased in Europe, I may also mention a fine collection of green-sand fossils from Cambridge; a collection of fossil fishes from the upper Cretaceous of the Lebanon, Syria; and a good collection of Devonian fishes from Cromarty, Scotland, with a few specimens from the Mountain Limestone of Armagh, Ireland.

REPORT ON THE GEOLOGICAL DEPARTMENT.

BY JOSIAH D. WHITNEY, *Sturgis-Hooper Professor.*

THE geological department of the Museum has gone on, during the year 1881-82, very much as in former ones, although the number of special students has been small. Instruction was given in geology and lithology to two candidates for the higher degrees, their work in the field and laboratory having been supervised by the Professor and the Assistant, Dr. Wadsworth.

The latter has continued his connection with the Museum, a considerable part of his time having been occupied by the preparation of a subject card catalogue of papers and works in lithology, intended for the use of students in this department. Nearly every lithological paper and work of value can now be found either in the University Library, or in that of the Sturgis-Hooper Professor or his Assistant.

The collections in lithology have been considerably increased during the past year. During the summer Dr. Wadsworth made a geological excursion to Cape Breton, Nova Scotia, and New Brunswick, and was thus enabled to add a considerable number of specimens, not only of rocks, but of substances illustrative of the economical geology of that region. He also has collected in continuation of work previously done with the object of throwing light on the geology of this vicinity. A valuable lot of building-stones was given by Mr. J. E. Wolff. Doctors Faxon and Fewkes also presented specimens of rocks collected by them during summer-vacation visits to Bermuda and Maine. A number of meteorites have been added by purchase. An arrangement has been made with Mr. J. S. Diller, Geologist to the Assos Expedition, with the consent of the Director of that work, by which the rocks collected in the course of that survey, and the thin sections prepared to be used in their description, shall be turned over to our collection when the same are no longer required for use by the Geologist of the Expedition.

Professor Huntington has continued the preparation of micro-

scopic sections of the rocks in the collection, and the number of these now available for use by students of lithology now exceeds two thousand.

The Sturgis-Hooper Professor published in April the second part of the "Climatic Changes of Later Geological Times," and in October the third and final portion of that work. This completes the seventh volume of the *Memoirs of the Museum*. He also published in the *Bulletin of Harvard University* a "List of American Authors in Geology and Palæontology."

The following papers have been published during the current year in the lithological department: —

BY DR. WADSWORTH.

1. Some Points relating to the Geological Exploration of the Fortieth Parallel. *Proc. Bost. Soc. Nat. Hist.*, 1881, XXI. 243-274.

2. On the Relation of the Quincy Granite to the Primordial Argillite of Braintree, Mass. *Ibid.*, pp. 274-277; *Harvard Univ. Bull.*, 1882, II. 360.

3. On the Trachyte of Marblehead Neck, Mass. *Proc. Bost. Soc. Nat. Hist.*, 1881, XXI. 288-294; *Harvard Univ. Bull.*, 1881, II. 267.

4. On the Lithological Character of the Palæolithic Implements of the Valley of the Delaware. *Proc. Bost. Soc. Nat. Hist.*, 1881, XXI. 146, 147.

5. Notes in Geology and Lithology. Including

(a) The Marblehead Diabase.

(b) Picotite found in the Groundmass and Feldspar of Basalt.

(c) Zircon-Syenite from Marblehead, Mass.

(d) The Stoneham Limestone.

(f) On the Relations of the so-called Felsite to the Conglomerate on Central Avenue, Milton, Mass. *Harvard Univ. Bull.*, 1882, II. 359, 360, *etc.*; *Proc. Bost. Soc. Nat. Hist.*, 1881-82, XXI. 306, 314, 315, *etc.*

BY JOHN ELIOT WOLFF, Assistant in Geology in the College, and Candidate for the Degree of Ph.D.

6. The Great Dike at Hough's Neck, Quincy, Mass. *Bull. Mus. Comp. Zoöl.*, 1882, VII. 231-242.

A considerable amount of other material in lithology and geology has been partially prepared for publication, and will probably be completed and placed in the hands of the printer during the coming year.

REPORT ON THE INSTRUCTION GIVEN BY PROFESSOR
FAXON, DR. MARK, AND MR. W. M. DAVIS.

THE course in Biology, given by Professors Farlow and Faxon, was attended by thirty-two students, five of whom were Seniors, sixteen Juniors, six Sophomores, and five students in the Lawrence Scientific School. In the laboratory work of this course they had the assistance of Mr. C. H. Morss. The course in Advanced Zoölogy by Professor Faxon was followed throughout the year by thirteen students (eleven Seniors and two members of the Lawrence Scientific School), two of whom supplemented their study in Cambridge by several weeks' work in Mr. Agassiz's laboratory at Newport, R. I.

The course in general Zoölogy, by Dr. E. L. Mark, was pursued by fifty-four students; of whom eight were Seniors, twelve Juniors, twenty-six Sophomores, and two Freshmen. Four were students in the Lawrence Scientific School, and two were unmatriculated. The course in Embryology, also by Dr. Mark, was followed by three persons, one of whom was a candidate for the degree⁴ A. M., and the two others were students of the Lawrence Scientific School. The lectures were also regularly attended by three other persons during portions of the year: a candidate for the degree of Sc.D., a special student in Entomology², and a student of the Bussey Institution³.

On account of the absence of Professor Shaler, the electives in Palæontology and Historic Geology were not given this year. For the same reason, the classes in General and Advanced Geology were put in charge of Mr. W. M. Davis, instructor in the department. The work done was as follows:—

In Physical Geography and Meteorology. Lectures three times a week, on the same plan as in previous years, to a class of sixty-three undergraduates, and three students of the Scientific School.

In Geology. Lectures three times a week, based on Dana's Manual

1. *Essays on Geol. 71-12*
2. *Principles of Geol. 1-3*
3. *Rudolf's Geol. 1-3*

4. *Morss's Geol.*
5. *Barnes*
6. *Pal.*

of Geology, to a class of sixty-seven undergraduates and two members of the Scientific School. Voluntary excursions to points of interest in the neighborhood of Cambridge and Boston were made on several Saturday afternoons during the fall and spring.

In Advanced Geology. Lectures twice a week, fall and spring, three times a week through the winter, based on Lyell's "Principles of Geology," to a class of seventeen undergraduates and one Scientific student. Weekly excursions were made during the fall and spring to quarries and ledges in Somerville and Brighton, under the direction of the instructor and Mr. J. E. Wolff, assistant in Geology.

During the May recess, Messrs. Davis and Wolff, with five students, visited an interesting region between the Hudson River and Catskill Mountains, near the town of Catskill, N. Y. A short account of part of the results of the trip was published under the title of "The Little Mountains East of the Catskills" in *Appalachia*, Vol. III. A fuller description of the work done will be published in the Bulletin of the Museum.

Papers in addition to the two above named were prepared by Mr. Davis on the "Classification of Lake Basins" and on "Glacial Erosion;" the first published, the second in press in the Proceedings of the Boston Society of Natural History; and by Mr. Wolff on the Building and Paving Stones used in Boston (a report made to the U. S. Census), and on "The Great Dike at Hough's Neck, Quincy, Mass.," published in the Museum Bulletin. Mention may also be made of some geological work continued for the past three summers on Mt. Desert by a party of undergraduates, many of whom were, or had been, students in this department. Mr. Davis spent part of two vacations in their camp. An account of their results, with a geological map of the island, is now in preparation.

REPORT ON MAMMALS AND BIRDS.

BY J. A. ALLEN.

MAMMALS. — The additions during the year include forty-five mounted specimens, ten skins, fourteen mounted skeletons, seven disarticulated skeletons, and ten skulls. Among the mounted specimens are a fine male gorilla, a young chimpanzee, female and young orang, an Indian tapir, a Sumatran rhinoceros, a giant armadillo, several sloths, and various monkeys. The mounted skeletons include a gorilla and an orang.

The fossil mammals collected during the season of 1881, by Mr. Garman in Wyoming and by Mr. Sternberg in Kansas, came to hand too late to receive satisfactory mention in the report for that year. The Wyoming collection embraced very fine skulls of two species of large-horned perissodactyles, besides additional material of much value pertaining to many of the species represented in Mr. Garman's first collection from the same region, noticed in the Report for 1879-80. Mr. Sternberg's collection contained nearly perfect skulls of three species of rhinoceros, lower jaws of adult and young examples of a mastodon of the genus *Tetralophodon*, together with remains of horse, camel, deer, rodents, and carnivores, — the two last-named groups being each represented by several species. These gentlemen have successfully continued their explorations during the past season, but their collections have not yet reached the Museum.

BIRDS. — Four hundred species of mounted birds have been added to the collection by purchase, and over one hundred have been mounted from skins previously in the collection, making an aggregate addition of over six hundred specimens to the exhibition series. About six hundred and fifty skins have been received. These include about two hundred from Queensland, representing one hundred and eighteen species, and thirty-one from Western Asia, both collections added by exchange; two

hundred from Southern Mexico (one hundred and thirteen species), purchased, and one hundred and fifty from Colorado. The Museum is indebted to Captain Charles Bendire for a small lot from Washington Territory. There have been added to the Osteological series thirty mounted and ten unmounted skeletons. Among the former are four very fine moa skeletons, representing three species, obtained through Professor Ward.

Owing to my illness during a large part of the year, little work has been done on the collections of mammals and birds. Recently, however, the material for the faunal collections has been placed in the exhibition rooms, and the Indian and African rooms will soon be added to those open to the public. Three fourths to seven eighths of the species ordered for the faunal collections have been received, toward the completion of which we are still receiving frequent instalments.

The publication of a "Preliminary List of Works and Papers relating to the Mammalian Orders Cete and Sirenia" was begun early in the year in the Bulletin of the U. S. Geological Survey of the Territories (Vol. VI., pp. 399-562), but inability on the part of the author to revise the proof-sheets necessitated the suspension of the printing at the end of the first third of the paper.

REPORT ON THE REPTILES AND FISHES.

BY SAMUEL GARMAN.

ABOUT one third of the year has been devoted to field work in some of the Western Territories, in continuation of the explorations of the past years. Four species of snakes and as many of lizards, with many valuable duplicates, make up the total number of recent species obtained. Among the fossils there are a number of Pythonomorph Saurians and some fishes from the upper Cretaceous and lower Eocene, and a few turtles from the Miocene. The mollusks and birds are represented to some extent, but the bulk of the fossil collection belongs to the mammals. Of the latter, there are mice and other rodents, pigs, deer, and camels. A considerable number of individuals belonging to several species of horses were collected from the lower Eocene to the upper Pliocene inclusive. The more recent of these were found in such situations as to suggest the cause of extinction to have been a very severe winter, much more extensive and severe than those that occasionally, at long periods, are met with in the same section of country in modern times. If a winter so severe as to sweep away the cattle and horses were to visit the region, it would leave their remains crowded together in cañons, gullies, ravines, and other sheltered places in the Bad Lands, very much as the Pliocene mammals are found. As if from freezing, the shafts of the larger bones are generally splintered. From the lower Miocene, or Brontotherium beds, only such things were taken as would supplement the collections made in 1880 and 1881. If it had been desirable to duplicate to any extent, enough was discovered to have made the collection three times as large. As it is, sufficient material was brought away to represent five genera of the Brontotheridae. A complete skull of a species of Megacerops forms one of the largest and heaviest specimens. The genus Rhinoceros is represented by several species from the Miocene and Pliocene. A discovery

of considerable importance was an entire specimen of a gigantic Edentate, allied to *Megatherium*, in what appeared to be the Pliocene. This specimen we were fortunate enough to dig out, pack, and ship in good shape. Mastodons and elephants were found in various localities. One of the latter had tusks more than six feet two inches in length, and more than nine inches in diameter at eighteen inches from the head. Among the undetermined specimens there is a large number of skulls, jaws, and teeth. Thirty-two cases were shipped, and arrangements were made by which others, left on account of haste, are being secured for the Museum, and forwarded as rapidly as possible.

In the Museum, the main work of the year has been directed toward the improvement of the exhibition and of the condition of the collection in the storage rooms. The systematic collection of Fishes and Selachians has been entirely rearranged. Various Sauria and Batrachia, in addition to those previously reported, have been mounted in alcohol, and, experiment suggesting better methods, it is found expedient from time to time to improve on the results of the first attempts in this direction. Specimens of *Piratinga*, *Platystoma*, *Boa*, *Jacare*, and *Hatteria* have been taken from the alcohol and prepared as skeletons. Some stuffed reptiles of the larger genera have been purchased, and a fine *Ptychemys concinna* was secured by exchange. The purchases include lots from New Zealand, Australia, and Palestine. One of the most valuable acquisitions is a fine series of *Hatteria* or *Sphenodon*. Donations have been received from Prof. S. A. Forbes, Prof. F. W. Putnam, Prof. W. A. Forbes, F. W. Cragin, N. Vickary, F. A. Bell, James Hill, Mr. Rollins, and others. The additions to the collections are distributed as follows: Four species of Selachians, fifty-two of fishes, ten of Batrachians, twenty-three of Ophidians, fifteen of Saurians, and six of Chelonians. A selection of seventy-seven species of fishes and reptiles was sent to the Boston Society of Natural History, and others to Mr. W. A. Forbes, and the Zoölogical Society of London.

REPORT ON THE CONCHOLOGICAL AND PALÆONTOLOGICAL DEPARTMENTS.

BY CHARLES E. HAMLIN.

SINCE the last annual report a very important addition has been made to the collections of Fossil Invertebrata by the acquisition of the great collection of Bohemian Fossils of Primordial, Lower Silurian and Upper Silurian age, made by the late J. M. von Schary, of Prague, and purchased from his heirs. The specimens, which are of the finest quality and in perfect condition, number more than one hundred thousand (100,000), and represent one hundred and fifty-seven, (157) genera and twelve hundred and thirty-one (1231) determined species, besides many species still undetermined.

A collection of fossils from the beds of Lithographic Slate at Solenhofen in the district of Pappenheim, Bavaria, has been bought and received from Ernst Haeberlein of Pappenheim. It is made up in about equal proportions of Vertebrata and Invertebrata.

The work of selecting, determining, and mounting recent and fossil Lamellibranchiata for exhibition, begun previously to the last report, was interrupted by my departure to Europe on business connected with the Schary collection. It has been resumed since my return, and will soon be completed.

In consequence of my absence and the pressure of other work, conchological exchanges have this year been almost wholly suspended. The large stock of Achatinellæ from the Pease collection has been sent for study to Wm. D. Hartman, M.D., of West Chester, Penn., who is engaged in monographic work upon that obscure genus.

REPORT OF THE ENTOMOLOGICAL DEPARTMENT.

BY H. A. HAGEN.

THE additions to the collection consist of some types of Lord Walsingham's *N. A. Tineina* presented by Mr. V. T. Chambers of Covington, Ky., and the large collection of insects presented by the Northern Pacific Railroad Transcontinental Survey. As the insects have been collected in one of the districts of the United States, not previously visited by entomologists, Washington Territory east of the Cascade Mountains and north of the Columbia River, — they are of importance, and fill large gaps in the collections of North American insects in the Museum.

A large number of insects have been spread, and the rearrangement of the large collection of Odonata has nearly been finished.

Facilities for examining parts of the collection have been granted to specialists and students. Professor H. Osborn of Ames, Iowa, worked here three months, and several ladies have studied *N. A. Lepidoptera*. The assistant has lectured on general entomology to five students and one lady.

The following gentlemen have received materials for their publications from the Museum collection: Rev. A. E. Eton, Croydon, England, on the *Ephemerina*. A part of his results are published in the *Entom. Monthly Magazine*, London. The work will be published by the Royal Society, London, with a large number of plates in 4to.

Dr. Vayssière, Montpellier, has published the remarkable nymph of *Bætisca obesa*, similar to *Prosopistoma*, in his monograph of the early stages of *Ephemerina* in *Ann. Sc. Nat. Paris* from specimens of our collection.

Count Keyserling has published in *Wien. Zoöl. Bot. Ges.* number II. on American Spiders, based partly upon specimens of the collection.

As usual, correspondence with North American entomologists has occupied a considerable part of the time of the Assistant.

The Assistant has published the first part of a monograph of the Psocina in the *Stett. Ent. Zeit.* with two plates drawn by himself. The description of the fossil species in amber was made after the specimens in the collection of Mr. Kuenon, Königsburg, Prussia. The second part (Fossil Atropina) is nearly ready for publication.

A description of the North American species with anatomical details is published in *Psyche*.

A paper on the color and the pattern of insects is published in the *Proceedings of the American Academy of Arts and Science*.

A number of smaller publications have been given in different serials (*Nature*, *Ent. M. Mag.*, *Zoöl. Anzeiger*, *Stett. E. Zeit.*, *Canad. Entomol.*, *Psyche*, *Proc. Boston Soc. N. H.*)

The Library has received a number of very important additions ; a number of smaller books, pamphlets, and continuations of serials has been presented by the Assistant.

A revision of the Catalogue and of the Library has been undertaken. The collection of the works of T. W. Harris and Asa Fitch is now quite complete.

The Assistant was engaged during the greater part of the summer in an economic survey of Washington Territory for the Northern Pacific Railroad Transcontinental Survey.

REPORT ON THE CRUSTACEA.

BY WALTER FAXON.

SINCE the last annual report, as much of my time as was not demanded by other duties has been employed in arranging and cataloguing the Crustacea of the "Blake" Expeditions of 1877-78 and 1878-79, together with other collections comprising many type specimens. Much of the value of the carcinological material in this Museum comes from the large number of authors' types contained therein. I have therefore thought it advisable, pending the revision and determination of the whole collection, to select such "type" collections, and carefully number and catalogue the specimens, thus ensuring them against loss of labels and at the same time rendering them easy of access for comparison. Among the collections embracing types or specimens equally authoritative, from being labelled by the describers of the species, may be mentioned:—Astacidæ from Georgia, described by John Le Conte in 1855; Crustacea from the Wilkes United States Exploring Expedition, named by Dana; types of Stimpson's species from the east and west coasts of the United States, and from the United States North Pacific Exploring Expedition; types of the species described by Ordway in his monograph of the genus *Calinectes*; Hagen, in Monograph of North American Astacidæ; Packard, Phyllopoda; Faxon, Crustacea of Lake Titicaca; freshwater Crustacea from the United States, described by S. I. Smith and O. Harger; Birge's species of North American Cladocera; Cymothoids described by Schiödte and Meinert; deep-sea Crustacea of the "Bache," "Hassler" and "Blake" Expeditions, described by A. Milne Edwards, S. I. Smith, and E. B. Wilson (Pycnogonida).

Among the noteworthy additions to the collection, during the year, are fine specimens of *Astacopsis serratus* Haswell and Pali-

nurus tumidus Kirk, from Australia, purchased of H. A. Ward, of Rochester, N. Y.

The Report on the Crustacea of the "Blake" Expeditions of 1877-78 and 1878-79, by A. Milne Edwards (the first instalment of which appeared in the Bulletin of the Museum, Vol. VIII. No. 1), has been continued in Annales des Sciences Naturelles, 6th ser. Vol. XI. Eight new genera and nineteen new species are recorded. Many species from the "Bache," "Hassler" and "Blake" dredgings are described for the first time in the same writer's great work on the Stalk-eyed Crustacea of Mexico (Recherches Zoologiques pour servir à l'Histoire de la Faune de l'Amérique Centrale et du Mexique, 5e Partie, Tome I.). In another paper he gives the general results reached through the study of the "Blake" Crustacea. The first part of S. I. Smith's Report on the Crustacea of the "Blake" Expedition of 1880, along the east coast of the United States, comprising the Decapods of the collection, was published in June in the Bulletin of the Museum, Vol. X., No. 1, with sixteen plates. Five new genera and twenty new species are described. From this collection a set comprising 25 species and 252 specimens has been made up for the U. S. National Museum, Washington, another set of 12 species, 91 specimens, for Yale College Museum. In return a series of 33 species, 351 specimens, dredged by the United States Fish Commission off the coast of New England, 1877-81, has been received from the National Museum. These are named by Smith.

During the year a second contribution to the monograph of the Cymothoidæ, by Schiödte and Meinert of Copenhagen, based in part upon material sent from this Museum, has been published in Naturhistorisk Tidsskrift, 3d series, Vol. XIII.

REPORT ON THE RADIATES.

BY J. WALTER FEWKES.

DURING the past year the collection of corals formerly stored in the attic has been placed in cases in their final storage room in the new part of the Museum. The systematic collection of Alcyonoids on exhibition has been mounted and rearranged. Representatives of the more important genera of West Indian and South American corals have been placed on exhibition in the South American faunal room.

The "Blake" Alcyonoids have been examined and sent for identification to Professor Verrill, who will write the final report of this group. A small number of Bermuda corals and hydroids has been added to the general collection.

The Museum published during the year the following papers, which I had prepared for the Bulletin: "Explorations of the Surface Fauna of the Gulf Stream, under the auspices of the United States Coast Survey. By A. Agassiz. I. Notes on Acalephs from the Tortugas, with a Description of New Genera and Species." 7 plates. Bull. Mus. Comp. Zoöl., Vol. IX., No. 7; and "On the Acalephæ of the East Coast of New England." 1 pl. Ibid. Vol. IX., No. 7. In addition, I have written for the American Naturalist (Feb. 1882) a paper entitled "The Siphonophores. IV. Anatomy and Development of Diphyes," and for the American Journal (Feb. 1882) "A Cercaria with Caudal Setæ."

REPORT ON THE LIBRARY.

BY MISS F. M. SLACK.

DURING the year ending September 1, 1882, the Library has been increased by 779 volumes, 1055 parts, and 523 pamphlets.

	VOLUMES.	PARTS.	PAMPHLETS.
Gift	51	86	72
Exchange	114	375	82
Purchase	270	468	40
A. Agassiz	39	122	328
Museum Publications		4	1
Binding parts and pamphlets	305		
	779	1055	523

The whole number of volumes now in the Library of the Museum (exclusive of pamphlets) is 15,526.

[A.]

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

FOR THE ACADEMIC YEAR 1881-1882.

Of the Bulletin.

Vol. VI., Part II., completing the volume, being :—

- No. 12. Maturation, Fecundation, and Segmentation of *LIMAX CAMPESTRIS* Binney. By E. L. MARK. pp. 453. 5 plates. October, 1881. \$7.50.

Vol. VII. (Geological Series, Vol. I.).

- No. 6. Report on the recent additions of FOSSIL PLANTS to the Museum Collections. By L. LESQUEREUX. pp. 6. October, 1881. 5 c.
 No. 7. The great DIKE at HOUGH'S NECK, Quincy, Mass. By J. E. WOLFF. pp. 12. July, 1882. 10 c.

(Vol. VII. *to be continued*).

Vol. IX., completing the volume :—

- No. 2. Reports on the Results of DREDGING by the U. S. C. S. Steamer "Blake." XV. Preliminary Report on the MOLLUSCA. By W. H. DALL. pp. 112. December, 1881. \$1.00.
 No. 4. Report on the Results of DREDGING by the U. S. C. S. Steamer "Blake." XVI. Preliminary Report on the COMATULÆ. By P. H. CARPENTER. pp. 20. 1 Plate. October, 1881. 20 c.
 No. 5. Observations on the Species of the Genus *PARTULA* Fér., with a Bibliographical Catalogue of all the Species. By W. D. HARTMAN. pp. 26. 2 double Plates. December, 1881. 50 c.
 No. 6. BIBLIOGRAPHY to accompany "Selections from Embryological Monographs" compiled by A. AGASSIZ, W. FAXON, and E. L. MARK. I. CRUSTACEA. By W. FAXON. pp. 54. March, 1882. 50 c.
 No. 7. Explorations of the SURFACE FAUNA of the GULF STREAM under the Auspices of the U. S. Coast Survey. By A. AGASSIZ. I. Notes on ACALEPHES from the TORTUGAS, with a Description of new Genera and Species. By J. W. FEWKES. pp. 40. 7 Plates (3 double). April, 1882. \$1.25.
 No. 8. On the ACALEPHÆ of the East COAST of NEW ENGLAND. By J. W. FEWKES. pp. 20. 1 double Plate. April, 1882. 30 c.

Vol. X.

- No. 1. Reports on the Results of DREDGING by the U. S. C. S. Steamer "Blake." XVII. Report on the CRUSTACEA. Part I. DECAPODA. By S. I. SMITH. pp. 108. 16 Plates. June, 1882. \$2.50.
- No. 2. BIBLIOGRAPHY to accompany "Selections from Embryological Monographs," compiled by A. AGASSIZ, W. FAXON, and E. L. MARK. II. ECHINODERMATA. pp. 26. By A. AGASSIZ. August, 1882. 25 c.
- No. 3. Reports on the Results of DREDGING by the U. S. C. S. Steamer "Blake." XVIII. The STALKED CRINOIDS of the Caribbean Sea. By P. H. Carpenter. (Is in press.)

Of the Memoirs.

Vol. VII.:

- No 2. The Climatic Changes of Later Geological Times. Part II. containing pp. 121-264. Part III., completing the volume, is in press.

Vol. IX.

- No. 1. "SELECTIONS from EMBRYOLOGICAL MONOGRAPHS," compiled by A. AGASSIZ, W. FAXON, and E. L. MARK. I. CRUSTACEA. By W. FAXON. 28 pp. 14 Pl. \$3.00.

[B.]

INVESTED FUNDS OF THE MUSEUM.

IN THE HANDS OF THE TREASURER OF HARVARD COLLEGE, SEPT. 1, 1881.

Sturgis-Hooper Fund	\$100,000.00
Gray "	50,000 00
Agassiz Memorial "	297,933.10
Teachers & Pupils' Fund	7,594.01
Permanent "	117,469.34
Humboldt "	7,740.66
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	\$580,737.11

The payments on account of the Museum are made by the Bursar of Harvard College on vouchers approved by the Curator. The accounts are annually examined by a committee of the Museum Faculty. The only funds the income of which is restricted, the Gray and the Humboldt funds, are annually charged in an analysis of the accounts with vouchers to the payment of which the income is applicable.

The income of the Gray fund can be applied to the purchase and maintenance of collections, but not for salaries.

The income of the Humboldt fund can be applied for the benefit of one or more students of Natural History.





