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With the Compliments of

ALEXANDER AGASSIZ.

ANNUAL REPORT
OF
THE CURATOR
OF THE
MUSEUM OF COMPARATIVE ZOÖLOGY
AT HARVARD COLLEGE,
TO THE
PRESIDENT AND FELLOWS OF HARVARD COLLEGE,
FOR
1887-88.

CAMBRIDGE:

UNIVERSITY PRESS: JOHN WILSON AND SON.

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FACULTY OF THE MUSEUM.

CHARLES W. ELIOT, *President.*

ALEXANDER AGASSIZ, *Curator.*

GEORGE L. GOODALE.

JOSIAH D. WHITNEY, *Secretary.*

HENRY P. BOWDITCH.

OFFICERS.

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JOSIAH D. WHITNEY *Sturgis-Hooper Professor of Geology.*

HERMANN A. HAGEN *Professor of Entomology.*

NATHANIEL S. SHALER *Professor of Palæontology.*

E. L. MARK *Hersey Professor of Anatomy.*

W. M. DAVIS *Assistant Professor of Geography.*

J. ELIOT WOLFF *Instructor in Petrography.*

THADDEUS W. HARRIS *Instructor in Geology.*

G. HOWARD PARKER *Instructor in Zoölogy.*

WALTER FAXON *Assistant in Zoölogy.*

D. D. SLADE *Assistant in Osteology.*

SAMUEL GARMAN *Assistant in Herpetology and Ichthyology.*

J. WALTER FEWKES } *Assistant in charge of Invertebrates, and of the
Newport Marine Laboratory.*

WILLIAM BREWSTER *Assistant in Ornithology and Mammalogy.*

ALPHEUS HYATT *Assistant in Palæontology.*

MISS F. M. SLACK *Librarian.*

REPORT.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE :—

DURING the past year the following courses of instruction have been given at the Museum :—

A course in Biology, by Professor Farlow and Dr. Ayers.

A course in Zoölogy, by Dr. Ayers, who had charge of the general Biological Laboratory, assisted by Mr. G. H. Parker.

General Lectures on Zoölogy, by Professor Mark. A course in Microscopic Anatomy and a course of Embryology were also given by Professor Mark. In the Laboratory work he was assisted by Mr. G. H. Parker.

Professors J. D. Whitney, Shaler, and Davis, and Mr. J. E. Wolff, gave the usual courses in Geology, Palæontology, Physical Geography, and Petrography.

For the details of the courses of instruction, I would refer to the accompanying special Reports of the Professors and Instructors.

The Assistants of the Museum, Professors Hagen and Faxon, Dr. Slade, Mr. Garman, Mr. Brewster, Professor Hyatt and Dr. Fewkes, have all spent more or less time in supplying material and information to special students in their various departments. A number of students interested in Marine Invertebrates accompanied Dr. Fewkes on several dredging expeditions.

A number of additions have been made to the equipment of all our Laboratories.

Excellent progress has been made since the spring on the extensive addition to the Museum Building, now well under

way. Adjoining the Natural History Laboratories, ample accommodation will be provided for the necessary room required thoroughly to fit up the Geological and Geographical Departments. The funds necessary for this section of the University Museum have been advanced by the Corporation to the Museum. Both this section and the large addition to be devoted to the Botanical Department will be under cover before the cold weather.

Owing to the uncertainty of my movements during the past summer, I was unable to invite to the Newport Laboratory the class of students who usually avail themselves of its facilities. Messrs. Field, Eigerman, Woodworth, and Parker were, however, able to avail themselves of the Museum Tables at the United States Fish Commission Station at Wood's Holl. Professor Faxon occupied a Table at the Newport Laboratory for a time, devoting himself mainly to the Embryology of the *Marcrura*; my own time was also given to the same subject, and to the development of Pelagic Fishes. A considerable amount of material for study was supplied to the Museum from Newport.

I may mention Dr. Baur, Dr. Boas, Dr. Joubin, Messrs. Ridgway and Scudder, and Professor Giard, among the persons to whom material for study has been sent. A number of exchanges have also been made, which are mentioned in the special Reports of the Museum Assistants.

We have continued to send material from our American fossil Vertebrates to Professors Scott and Osborn. A number of specialists have, as usual, made use of our collections, and carried on their work for the time in the Museum building. I have been obliged to refuse a number of applications for material to be sent away from Cambridge. Applications specially in Entomology, Palæontology, and Conchology have become so frequent, that, if granted, the whole time of the Assistants in these Departments would be given to selecting and replacing the material requested for study, leaving them no time to carry on their regular work. As our staff is not large enough to meet this demand, we shall be obliged in the future to limit the export of our material to single specimens, and the larger collections will have to be studied at the Museum.

The principal accessions of the Museum have been exchanges with the Stockholm Museum and the British Museum. From

the Smithsonian, we have received a fine skeleton of the Great Auk, from Funk Islands, admirably mounted by Mr. Lucas, and a number of monkeys from Dr. H. J. Bigelow. But by far the most valuable accession is the first instalment of the Hume Collection of Indian Birds, selected for the Museum, in accordance with the request of Mr. Hume, by the officers of the British Museum. Professor Flower kindly allowed Dr. Sharp to select from the duplicates the set intended for us by Mr. Hume, and this first instalment has reached us in excellent condition.

I should also mention a most excellently preserved collection of Insects, mainly Lepidoptera, presented to us by the Messrs. Treat of Lawrence, Mass.

From Professor Ward, we have continued such purchases as were needed to fill gaps in our Exhibition Rooms.

Professors Osborn and Scott have returned to us a large part of the fossils sent them for study. Dr. Dobson has returned the Shrews sent him for examination; and the bulk of our collection of Annelids, a part of which had been sent to the late Professor Kefertein, has been returned to us by Professor Ehlers, carefully determined, and forms a most valuable addition to our typical collections. The Annelids from the Pourtalès dredgings off Florida have also been returned by Professor Ehlers, the types of his great work on the "Florida Annelids."

As will be seen from the Reports of the Assistants, the condition of the collections continues to improve, and a number of gaps in our Exhibition Rooms have also been filled.

I wish that I could also speak of some like progress in the arrangement of the Palæontological Exhibition Rooms. The system proposed for the collections is unique, and the result, I have no doubt, would be a most interesting addition to the rooms open to the public. A sum of at least fifteen thousand dollars would be required to complete the arrangement of the four rooms devoted to the Palæontological exhibit. At present the public can form no estimate of the value of our fossil collections, which are as yet barely accessible to the Assistant in charge.

The Museum is again indebted to Messrs. Brewster, Cabot, and Slade, for their interest in their respective departments. Messrs. Brooks and Jackson have also rendered valuable aid to Professor Hyatt in the arrangement of the Palæontological Collections. Professor Faxon has kindly continued in charge of our

collection of Crustacea, and has spent much time in the arrangement of the Crustacea for the Atlantic Faunal Collection.

The number of volumes added to the Library during the past year is somewhat larger than usual, being nearly 500 volumes, besides 1,700 parts of volumes and pamphlets. The increase is mainly due to a number of new exchanges, and to the filling of gaps in the series from several of the past Museum correspondents. Among the accessions to the Library, I may call attention to the purchase of Glover's original drawings, and to unpublished plates of Caverly, presented by Professor Keener. A number of institutions have received from us as complete sets of our publications as it was possible to supply, and to various Marine Zoölogical Laboratories full sets of our publications relating mainly to Invertebrates and Fishes were sent.

As will be seen by Appendix A, the publications of the Museum during the past academic year have been unusually numerous. We have published seven numbers of the *Bulletin*, and two volumes containing my General Report on the "Cruises of the Blake." One volume of the *Memoirs*, containing the Report of Professor Ernst Ehlers on the Deep-Sea Florida Annelids, has also been issued during the past year. The Museum is greatly indebted to Professor Ehlers for this exhaustive Monograph, based upon the collections of Pourtalès and of the "Blake." No less than sixty plates accompany the Memoir, and Professor Ehlers spared no pains in superintending their execution. The text was printed in German, and is a most creditable production, from the press of John Wilson and Son.

This volume of Professor Ehlers, and the two volumes of "Cruises of the Blake," had been in preparation a number of years.

A list of the *Bulletins* and *Memoirs* now under way will be found appended to the List of Publications. They include an important memoir on the Genesis of the Arietidæ, by Professor Hyatt; a paper on the Lateral Line of Selachians, by Mr. S. Garman, based upon material left by the late Professor Agassiz; and the completion of the Report of Mr. Dall on the "Blake" Mollusks; as well as other contributions to Zoölogy, which have already been mentioned in former Reports.

To friends of the Harvard Annex we owe the plates which accompany Miss Mayo's *Bulletin*, and to Professor W. D. Alex-

ander I am indebted for copies of Maps relating to the reefs of the Sandwich Islands.

With each special Report which follows will be found a list of the publications of the Assistants of the Museum, of the publications based upon the materials of the institution, or of investigations carried on by the professors and students of the University in our Laboratories.

I hoped during the past winter to avail myself of the kind invitation of Professor G. Brown Goode, Acting U. S. Fish Commissioner, to join the "Albatross" at Panama, and run a line of dredgings and soundings from Panama to the Galapagos. Unfortunately, it was impossible for me to leave Cambridge, and in spite of the courtesy of Colonel M. Macdonald, U. S. Fish Commissioner, in delaying the "Albatross" at Panama, in hope that I might be able at the last moment to join her, I was obliged to abandon all idea of making the expedition. This was to me, of course, a great disappointment, as I had always hoped some time to be able to carry out such a line of dredgings as that run by the "Albatross," and to become as familiar with the deep sea fauna on the western side of the Isthmus as I was already with the eastern. Colonel Macdonald was, however, kind enough to promise me the collection of those orders of Echinoderms made by the "Albatross," to which I had paid most attention. And while these collections will not have the personal interest attached to those I made on the "Blake," I hope yet to be able to carry out for some groups of deep-sea Echinoderms the interesting comparisons which have been instituted on the riparian fauna of the two sides of the Isthmus of Panama.

The Museum is also specially indebted to Colonel Macdonald for the facilities enjoyed by students of the Museum at the Fish Commission Station at Wood's Holl. It is to be hoped that the government will continue there its present liberal policy towards all students of marine Zoölogy, and that the immense resources for obtaining material may be utilized by the students and investigators attached to the Natural History Laboratories of the country. A station of the greatest importance could thus readily be organized, by concerted action on the part of the Colleges of the country.

In the past fifteen years I have been in the habit of supplying deficiencies for such expenditures as seemed to me essential for

the rapid development of the institution. But it has now become evident that, while such a policy may have been useful in the early stages of the Museum, it has of late been rather a detriment to it than otherwise, as it was fast coming to be regarded as my personal establishment. The demands upon my time for the administration of its affairs have become so great, that I must retire from active duty to devote myself to scientific work which I have too long neglected for the sake of bringing the Museum to the point it has reached. It is high time that I should withdraw, and that a younger man, more in sympathy with the prevailing tendency of science in this country, should endeavor to develop the Museum by increasing the interest of the friends of the University in its behalf. The original plans have now been so far accomplished that there remain to complete the Oxford Street façade only one section and a half, and the southwest corner piece which is to meet the Peabody Museum wing.

During the past year the expenses which I have been accustomed to meet on account of the Museum have been so far reduced, that it will hereafter be possible for the Museum to live within its income. This will become practicable as soon as the indebtedness incurred for the Geological Laboratory and its equipment is paid off. Of course this will cut off expenses in many directions, — such as the purchase of collections, salaries for additional assistants, etc.; but these reductions need not interfere in the least with the efficiency of the Museum in the maintenance of its Laboratories, the care of its collections, or the liberal and regular amount of its publications. The Mineralogical Department and its collections would be admirably housed in the remaining section, and the corner piece could be devoted to such additional Laboratories and Lecture Rooms as come within the scope of the Natural History Department.

The attention of the Visiting Committee of the Overseers was called to the necessity of additional Laboratories for the Geological Department, in the hope that means might be raised to erect and equip the section of the building joining the Zoölogical and Palæontological Laboratories to the Botanical Laboratories. To avoid delay, the Corporation has advanced to the Museum the funds necessary for the erection of the shell of the connecting section. But a very considerable sum, not less than

thirty thousand dollars, will be needed to equip it, and make the building ready for occupancy. It will take a number of years to repay this sum from the regular income of the Museum. A further debt of fifteen thousand dollars has also been incurred to secure additional land for the Museum grounds.

ALEXANDER AGASSIZ.

CAMBRIDGE, October 1, 1888.

REPORT ON THE GEOLOGICAL DEPARTMENT.

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

IN this department a course of lectures (once a week, lasting through the College year) was delivered to teachers and others, the attendance averaging about twenty-five in number. The subject of this course was "Geographical Methods and Results," the history of American geographical discovery being made an especially prominent feature.

The article "United States," written for the *Encyclopædia Britannica*, has made its appearance in the twenty-third volume of that work, and is now being reprinted, and will make a volume of about 400 octavo pages. This article contains a very condensed review of the physical geography and geology of the United States, and also an historical and statistical *résumé* of the development of the mining interests of the country, which in the reprint now in press will, so far as is possible, be brought down to the end of the current year. This work is about half in type.

A volume of about 250 pages (16mo) has been published during the year, entitled, "Names and Places,—Studies of Geographical and Topographical Nomenclature." The principal object of this volume is to explain the origin and meaning of names given to prominent topographical and scenic features, and especially to show how these words are used in this country, and how our topographical nomenclature has been affected and enriched by the presence on our soil of various nationalities.

As in previous years, a considerable amount of time has been given to the preparation of definitions of words in geography, geology, lithology, mining, and metallurgy, for the *Century Dictionary*, these words having been defined in many cases with almost encyclopedic fulness.

Some field-work has been done, chiefly in New England, in continuation of the investigation of the surface geology and

glacial deposits of Northeastern North America, mentioned in the last Report. The north side of the Mont Blanc group has also been visited, for the purpose of getting a clearer idea of the present condition of the glaciers in that region, where the decrease in size of the masses of ice during the past forty years, common to the whole mountain system of Central Europe from the Pyrenees to the Caucasus, has excited great attention, not only as a matter of scenic interest, but as bearing on glacial theories in general. Some geological work was also done in Southwestern England, and a few of the mines of Devonshire were examined during a hasty trip through that interesting region.

REPORT

ON THE INSTRUCTION IN GEOLOGY, PALÆONTOLOGY, PHYSICAL GEOGRAPHY, AND PETROGRAPHY.

BY PROFESSORS N. S. SHALER AND W. M. DAVIS, AND MR. J. E. WOLFF.

DURING the Academic year 1887-88, the following courses of instruction were given in the Geological and Palæontological Laboratory, and in the field, by N. S. Shaler and his assistants.

1. N. H. 4. A course in Elementary Geology, by N. S. Shaler. Two lectures a week with certain required reading, attended by one hundred and fifty-six students.

2. N. H. 4 *a*. A course of Practical Geological Exercises in the Laboratory and in the field, by Mr. T. W. Harris, designed especially for those who intend in subsequent years to continue the study of Geology and Palæontology; attended by fifty-five students.

3. N. H. 8. A course of Advanced Geology, by N. S. Shaler, W. M. Davis, J. E. Wolff, and T. W. Harris; two lectures a week, together with assigned field-work, which was supervised by Professor Davis and Mr. Wolff. In the winter season the field-work was replaced by the study of models and geological maps, and reports on selected geological areas. Students in this course are required to prepare each two theses on assigned subjects. Only those who have previously passed a satisfactory examination in Elementary Geology are permitted to attend. Thirty-five persons received this instruction.

4. N. H. 14. A course on Palæontology, by N. S. Shaler; two lectures a week, together with laboratory work and assigned theses, attended by twenty-eight students.

5. N. H. 15. A course in Advanced Palæontology, consisting of laboratory and thesis work upon the geological history of selected groups of animals. Attended by four students.

6. N. H. 16. A course in field-work, designed to afford special training in the processes of geological surveying, by N. S. Shaler, W. M. Davis, J. E. Wolff, and T. W. Harris. Attended by seventeen students.

7. N. H. 17. A course in Historical Geology, designed to train students in the determination of geological horizons. Attended by five students.

During the winter season the students in advanced classes attended regular evening meetings designed to serve the purpose accomplished by the Seminaria of the German Universities.

During the summer of 1888, twenty-three students, twelve of whom had been previously trained in the classes of the University, received systematic instruction in field-work. Fifteen of these persons were included in the Summer School of Elementary Geology, which was taught in Cambridge, in Rhode Island, Southern Connecticut, and the Catskills, by the officers of the department. Eight of these students received instruction in an Advanced Summer School of Geology, under the direction of N. S. Shaler.

The Summer School of Geology was in charge of Professor Davis during its two weeks' stay at Meriden, Conn., and Catskill, N. Y.

During the year, the following papers of a scientific nature have been published by N. S. Shaler:—

1. Caverns and Cavern Life. *Scribner's Magazine*, Vol. II., No. 5, October, 1887, pp. 449-472.
2. Origin of the Divisions between the Layers of Stratified Rocks. (Published by Permission of the Director of the United States Geological Survey.) *Proceedings of the Boston Society of Natural History*, December 7, 1887, pp. 408-419.
3. Animal Agency in Soil Making. *The Popular Science Monthly*, Vol. XXXII., No. 4, February, 1888, pp. 484-487.
4. On the Study of Nature. *The Popular Science News and Boston Journal of Chemistry*, Vol. XXII., No. 3, March, 1888, p. 34, and No. 5, April, 1888, pp. 49, 50.
5. The Law of Fashion. *The Atlantic Monthly*, Vol. LXI., No. 365, March, 1888, pp. 386-398.
6. The Crenitic Hypothesis and Mountain Building. *Science*, Vol. XI., No. 280, June 15, 1888, pp. 280, 281.
7. Rivers and Valleys. *Scribner's Magazine*, Vol. IV., No. 2, August, 1888, pp. 131-155.

The course in Physical Geography and Meteorology (N. H. 1) was given to fifty students. During the absence of Professor Davis in the second term, the lectures were given by Mr. T. W. Harris. Laboratory work, chiefly on weather charts and geographic models, together with frequent oral and written exercises, occupied one of the three weekly appointments.

The advanced course in Physical Geography (N. H. 20) was taken by one student, and remained in charge of Professor Davis throughout the year. The work was chiefly an investigation of the physical geography of New Jersey, as illustrated by the colored maps of that State. A brief excursion was made in Northern New Jersey in the spring.

During the winter, Professor Davis delivered ten lectures on the Physical Geography of the United States before the Teachers' School of Science, in Boston; these were illustrated by a series of thirty large models, or relief maps, designed to represent typical geographic forms, and prepared especially for use in class teaching.

The course in Petrography has been pursued by eight regular students throughout the year. Instruction and assistance was occasionally given to others engaged in geological work. A paper by Dr. Wm. H. Hobbs, "On the Petrographical Character of a Dike of Diabase in the Boston Basin," was published during the year in the Museum Bulletin.

The Laboratory equipment has been increased by a large Fuess reflecting goniometer, three new microscopes, and minor articles, as well as by the addition of new specimens and slides to the rock collections.

The spare time of the instructor during the summer and winter was taken up by the field and office work, in connection with a final report on the Geology of Hoosac Mountain and the adjoining region, which, it is hoped, will be ready for publication the coming winter. These investigations have also been extended to other parts of the Green Mountains.

REPORT ON THE INSTRUCTION IN BIOLOGY.

BY PROFESSORS FARLOW AND MARK, AND DR. AYERS.

DURING the year 1887-88, Nat. Hist. 2 was taken by fifty-four students: six Seniors, nine Juniors, sixteen Sophomores, thirteen Freshmen, seven specials, one Divinity, and two Scientific students. Of these six did not take the final examination. The course was conducted as in the previous year, Mr. Parker assisting in the laboratory work.

In Nat. Hist. 13, there were three students: two Graduates, and one Senior. The work was of the same nature as in 1886-87.

There were six students in Nat. Hist. 9: four Graduates, and two Seniors. One of the Graduates was compelled to give up the course without completing his work. Of the others, one has finished the work laid out, but will at present publish only a preliminary account of his results, in order that he may incorporate in his final paper the results of more extended comparisons; a second finished his investigation, and his paper may be expected during the coming winter. The three remaining students propose to continue their investigations during the year 1888-89.

The material used in instruction has been rearranged, and more conveniently labelled. All the paper diagrams not previously so mounted—some five hundred in number—have been mounted on cloth for their better preservation.

The bi-weekly evening meetings begun in 1886-87, for the discussion of zoölogical topics, were continued during the year.

The instruction in the zoölogical courses intrusted to Dr. Ayers during the year 1887-88 was similar to that given the preceding year. The objects of the two courses (Nat. Hist. 5, and Nat. Hist. 6) being to lay the foundations, by actual dissection and thorough study of chosen types of animals, for a broad knowledge of the morphology of the animal kingdom.

The students in Nat. Hist. 6 spent the first half-year on types from Cartilaginous and Bony Fishes and Birds. In the second half-year, the Cat and Man, as representatives of the Mammalia, occupied their attention. The lectures in this half were confined to the osteology and myology, and the more interesting and important structural relations, of the group of Primates.

The plan of work followed in the zoölogical half of the biological course was essentially that of progressing from the simpler to the more complex forms, instead of beginning with the vertebrate, about which everybody knows something, and thence to the unknown forms. Although the latter plan has been lately reverted to by such eminent authority as Professor Huxley, and that after a thorough trial of the former method, it was thought advisable, considering the preparation of the class, to adhere to the more difficult though more scientific method of work, and it is believed that the results fully warrant this choice.

Twenty-seven students completed courses of Nat. Hist. 5 the past year, six of them passing the examinations in Nat. Hist. 6.

As a result of studies, yet incomplete, of the vascular system of the interesting *Chlamydoselachus anguineus*, Gar., a paper has been prepared by Dr. Ayers for publication in the Bulletin, entitled "On the Morphology of the Carotids."

The course in Nat. Hist. 5 was conducted by Dr. Ayers and Dr. Farlow on the same plan as in previous years, and was attended by twenty-seven students, not including a few who did not do all the required work. By a special arrangement for the year 1887-88, the second course in cryptogamic botany, Nat. Hist. 23, was under the charge of Mr. Roland Thaxter, and was attended by four students. The course for original investigation in cryptogamic botany, Nat. Hist. 12, was taken by four Graduates, of whom two had been in attendance the previous year. A paper by Mr. K. Miyabe, on the Development of *Macrosporium parasiticum*, is now in press, and will appear probably in November. During the year the paper by Mr. Roland Thaxter on the *Entomophthoræ* of the United States, including work done by him in Nat. Hist. 12, was published in the Memoirs of the Boston Society of Natural History.

REPORT ON OSTEOLOGY.

 BY D. D. SLADE.

THE several Mammals which had been preserved in alcohol, and sent to Professor Ward to be prepared as skeletons, as stated in my last Report, have been returned and distributed.

No other additions to the collection of articulated and disarticulated skeletons have been made. It remains in excellent order, and has been consulted as in former years by naturalists and students.

Occasional specimens from neighboring and distant regions have been sent for identification, and answers returned.

Instruction in this department has been given during the past academic year by means of lectures and laboratory work. The course has been attended by four undergraduates, those in former years having been special or advanced students. The attendance upon lectures and the laboratory work has been very satisfactory.

During the year, the following papers have been published by the Assistant in this department.

On Certain Vacuities or Deficiencies in the Crania of Mammals. Bulletin of the Museum of Comparative Zoölogy, Vol. XIII., No. 8, March 26, 1888.

Notes on the Boundaries of the Four Bones composing the Occipital Segment of the Mammalian Cranium. Science, Vol. XI., No. 274, p. 218.

The Wild Turkey in Massachusetts. The Auk, Vol. V., No. 2.

REPORT ON THE MAMMALS AND BIRDS.

 BY WILLIAM BREWSTER.

THE collection of Mounted Mammals has been increased by the following specimens, all supplied by Ward :—

Brachytarsomys albicauda, Madagascar.

Rhinolophus capensis, Cape Good Hope.

Mus dolichurus, “ “

Artibeus perspicillatus, South America.

“ *planirostris*, “ “

Sorex murinus, India.

Haplocerus montanus, Montana.

Cystophora cristata, Newfoundland.

We have also received thirteen monkeys, eleven of species not as yet determined, the gift of Dr. H. J. Bigelow, of Boston ; the remaining two, belonging to the genus *Chrysothrix*, presented by Captain Josiah W. Cook. These monkeys came alive, in fine condition, and they should make particularly good specimens. They are now in Ward's hands for mounting.

In the last Report, I called attention to the unsatisfactory state of the alcoholic collection of Mammals. Mr. Garman has been since kind enough to superintend the rearrangement of this collection. The work has been done most thoroughly, and the collection is now in perfect order, so that any specimen which it contains can be found and examined without loss of time.

By far the most important addition to the Bird collection during this year, or indeed for several years past, is that of about six hundred and fifty skins of Indian birds, received during the summer from the British Museum. These specimens are all from the famous Hume Collection ; they form only a first instalment of the full set which will eventually come into our possession.

Besides supplying many species not previously represented in our Museum, they possess, for scientific use, an unusual value, from the fact that they have been carefully worked over and named by the highest authorities on Indian ornithology.

Of mounted birds, we have added during the year about twenty-five specimens, representing seventeen species, eight of which are forms peculiar to Lower California.

The Assistant has published the following papers and notes in 'The Auk':—

"Descriptions of supposed New Birds from Lower California, Sonora and Chihuahua, Mexico, and the Bahamas."

"The Prairie Horned Lark (*Otocoris alpestris praticola*) on the Coast of Massachusetts."

"On Three apparently new Sub-species of Mexican Birds."

"Notes on the Birds of Fort Klamath, Oregon. By Dr. J. C. Merrill, U. S. A. With Remarks on Certain Species, by William Brewster."

"*Quiscalus quiscula aglæus* at Charleston, South Carolina."

In "The Ornithologist and Oölogist":—

"An Unusual Nest of the Parula Warbler."

"Nest and Eggs of the Mountain Solitary Vireo."

REPORT ON THE REPTILES AND FISHES.

BY SAMUEL GARMAN.

So far as the routine work in these departments is concerned, the story is much the same as in former years. The changes and the renewals of alcohol have been continued. They have been accompanied by withdrawal of useless material, by selection and mounting of types for Exhibition Rooms soon to be opened, or to replace inferior representatives already on the shelves in others, by preparation for exchanges, and by identifications and arrangement to facilitate examination and study. Not a little time has been spent on the storage collections of other departments. Among identifications, a large number of the South American Siluridæ, of the American Gobiidæ, and of the West Indian Reptiles and Batrachians, have been included. The Museum is indebted to Messrs. F. S. Chaffee, John Gorell, F. T. Hubbard, L. W. S. Kimball, A. P. Morse, James Reed, E. A. Samuels, James Saunders, G. H. Whittier, W. W. Woodworth, and Miss Ruth Hoppin, for invoices of specimens in this department.

The largest additions to the collections were secured by exchange: a collection of Fishes from the Museum of Stockholm, through Dr. F. A. Smitt, and another from the British Museum, through Dr. G. A. Boulenger, containing Old World Batrachians and Reptiles and Deep-sea Fishes. Other additions were received from Professors O. C. Marsh, C. J. Maynard, E. L. Mark, and D. S. Jordan.

By purchase from Professor Maynard, the Museum obtained a desirable lot of West Indian Reptiles and Batrachians.

Series of Reptiles and Batrachians from the West Indies were sent in exchange to the Museum of Stockholm and to the British Museum. A smaller lot of Reptiles was forwarded to Professor Marsh, and a collection of Fishes was sent Professor Maynard.

The publications based upon the collections of the Museum were an article on the American species of Gobiidæ, and another on the South American species of the Siluridæ, by Mr. and Mrs. C. H. Eigenmann, in the Proceedings of the California Academy of Science.

The following were published by the writer in the Museum Bulletin : —

“The Rattle of the Rattlesnake.”

In the Proceedings of the American Philosophical Society : —

“The Reptiles and Batrachians of Grand Cayman.”

“West Indian Reptiles in the Museum of Comparative Zoölogy.”

In the Proceedings of the Essex Institute : —

“On West Indian Teiidæ in the Museum of Comparative Zoölogy.”

“West Indian Batrachia in the Museum of Comparative Zoölogy.”

“On West Indian Geckonidæ and Anguidæ.”

“Reptiles and Batrachians from Texas and Mexico.”

“On West Indian Iguanidæ.”

“On West Indian Scincidæ.”

“Reptiles and Batrachians from the Caymans and the Bahamas.”

“*Rhinomuræna quæsitæ*, an Eel from the Marshall Islands.”

In Vol. III. of the Standard Natural History : —

“List of some of the Important Publications on the Tunicates.”

“List of some of the Important Publications on the Fishes.”

“List of some of the Important Publications on the Reptiles and Batrachians.”

REPORT ON THE ENTOMOLOGICAL DEPARTMENT.

 BY DR. H. A. HAGEN.

THE most important addition to the collection was the generous present of the collection of North American Insects brought together by Mr. J. H. Treat and his brother, Mr. J. O. Treat, in Lawrence, Mass. By far the largest part, the Lepidoptera, were in beautiful condition, many of them raised, and contained a number of types from Mr. Grote and Mr. Sanborn. Among the species of the other orders some were very valuable: — a number of Mexican Diptera by the Baron Osten-Sacken, named by him; an Ascalaphus from Jamaica Plains, the first known to have been found near Boston, by Mr. J. G. Jack; a large lot of Neuroptera and Pseudoneuroptera, some Odonata nymphæ skins of prominent interest, by Mr. H. Edward, New York; some Odonata from Florida, by Mr. Beutenmüller, New York; a lot of Lepidoptera from Sikkim, India, by Mr. Elwes, London, Eng.; a white ants' nest from Paramaribo, Surinam, by Mr. H. Sawyer, United States Consul, through Mr. Babcock; Neuroptera collected in New Hampshire, by Mr. L. Cabot; biological specimens and a copy of the Standard Zoölogy, by Mr. S. Henshaw; biological specimens of plants infested, by Mr. Seymour; additions to Le Conte's collection, by Dr. G. H. Horn; a splendid set of West African Termitina, by Mr. V. Fric, Prag, Bohemia; from the same were bought specimens of *Glossina morsitans*, the famous Tsetset Fly, new to the Museum.

The Library has received a number of additions. A very careful revision and new arrangement of the Library has just been completed. Nine volumes of the original drawings by T. Glover were bought.

Mr. F. Woodworth, a special student here, has arranged and determined the Homoptera of the collection. A part of his studies is published in "Psyche." Mr. J. G. Jack has continued

his biological studies. Dr. G. H. Horn has just published the Termitophile Larva of *Glyptus sculptilis*, from the Museum collection of Mr. F. Blanchard, Lowell, Mass.; Lieutenant Casey, Newport, R. I., and S. Henshaw, have studied the Le Conte collection; Mr. L. Cabot has finished his memoir on the early stages of the Cordulina, and it is in the hands of the lithographer. The Assistant has arranged some parts of the collection, and incorporated some of the later additions. A number of students have, as usual, studied the type collections in the Museum.

The large monograph of the Ephemeriðæ, by Rev. A. E. Eaton, is finished, and fills the whole of the third volume of the Transactions of the Linnæan Society, London, pp. 352, pl. 65. There are not many pages where the Museum collection has not given help, and many figures on the plates are made of material communicated by the Museum. Dr. G. Czwalina has from material from the Museum published in the Deutsche Entomol. Zeitschr., 1888, Vol. XXXII. pp. 338-354, pl. 2, "Die Forcipes der Staphyliniden Gattung Lathrobium" (only just arrived). Mr. Beutenmüller has published in the Entomologica Americana, 1888, from Museum material, "New Species of North American Tineidæ," nearly a monograph of the genus Aorolophus.

In consequence of the large additions, some parts need an entirely new arrangement;—the North American Lepidoptera, the Ephemeriðæ, the Termitidæ, and the early stages of the Odonata.

The Assistant has published the following papers during the past academic year:—

"An unknown or forgotten Illustration of North American Sphingidæ." Entomologica Americana, Vol. III., 1887, pp. 173-175.

"The Larva of *Ptinus latro* Fabr." Ibid., p. 232.

"On the Genus *Sympetrum* Newm." Ibid., Vol. IV., 1888, pp. 31-34.

"The Coccoidæ in the Museum of Comparative Zoölogy." Canadian Entomologist, 1887, Vol. XIX. p. 60.

"Stray Notes on Myrmeleonidæ. Part III. Genus *Macaranda*." Ibid., 209-217.

"Stray Notes on Myrmeleonidæ. Part IV. Genus *Brachynemurus* Hag." Ibid., Vol. XX., 1888, pp. 34-38, 57-60, 72-74, 93-97.

"Stray Notes on Myrmeleonidæ. Part V. Genus *Dendroleon* and *Myrmecoleon*." Ibid.

“New Hemerobidæ.” Proc. Bost. Soc. Nat. Hist., Vol. XXIII., 1888.

“Unsere gegenwärtige Kenntniss der Ephemeriden.” Stettiner Entomol. Zeitung, 1888, Vol. XLIX. pp. 1–12.

The following three papers should have been given in my last Report:—

“Ueber Neurobasis und Vestalis.” Verhandl. K. K. Zool. Botan. Gesell. Wien, 1887, pp. 647, 648.

“Ueber *Plethus cursitans* Hag.” Ibid., pp. 643, 644; one plate. (A new genus from Ceylon, the smallest Phryganid known.)

“Illustrations of North American Entomology, by Townsend Glover.” Stettiner Entomol. Zeitung, 1887, Vol. XLVIII. pp. 139–142.

REPORT ON THE INVERTEBRATA.

BY J. WALTER FEWKES.

DURING the past year much time has been occupied in the examination of the additional collections lately placed under my charge. I have especially devoted myself to the Mollusca, and have become more familiar with the material in the collection.

A new collection of wax models, illustrating the embryology of common types, has been added to those already on exhibition in the gallery of the Synoptic Room.

As in former years, the Crustacea have been in charge of Dr. Faxon, who has put illustrative genera on exhibition in the Atlantic and Europæo-Siberian rooms. He has also sent material for special research to Prof. A. Giard and to Prof. J. E. V. Boas.

A series of Mollusks has been added to the Australian Room.

By far the larger part of my Museum work has been on the Atlantic and Pacific Rooms, preparing a varied collection, illustrating these faunæ, and a good beginning has been made as far as the Sponges, Medusæ, Corals, Echinoderms, and Mollusks are concerned.

We have received from Professor Ward, of Rochester, a few Australian Bryozoa, and a beautiful new siliceous sponge of the genus *Rosella*, taken in shallow water near Monterey, California, has been added to our collections.

The types of the Invertebrata under my charge have been used by several specialists; one or two special students of the University have also consulted them. As in past years, some time has been taken up in the identification of specimens brought to me for that purpose.

One or two students have applied for instruction in the department under my charge, and there were several applicants to make up a dredging party on the coast of New England, as in former years.

The Assistant, by the advice of the Curator, has undertaken new duties as Secretary of the Boston Society of Natural History, which renders it necessary for him to spend a portion of his time in Boston.

The months of July, August, and September, through the generosity of Mr. A. Hemenway, were spent in Europe, studying the arrangement and methods of research in Zoölogical Stations and Museums abroad.

The Assistant has pushed forward a report on his observations of the Invertebrata of California, collected during a trip to the Pacific Coast. The plates for this report, including a colored lithograph, are prepared for the printer, and the text is ready for the press.

The following papers have been published during the past year:—

1. On Certain Medusæ from New England. Studies from the Newport Marine Laboratory, No. XIX. Bull. Mus. Comp. Zoöl., Vol. XIII., No. 6.

2. On the Development of the Calcareous Plates of Asterias. Studies from the Newport Marine Laboratory, No. XX. Bull. Mus. Comp. Zoöl., Vol. XIII., No. 9.

3. A New Mode of Life among Medusæ. Proc. Bost. Soc. Nat. Hist. Vol. XXIII., pp. 389–395.

4. A Hydroid Parasitic on a Fish. Nature, Vol. XXXVI., No. 939.

5. Are there Deep-sea Medusæ? Amer. Jour. Arts and Sci., Ser. 3, Vol. XXXV., No. 206, pp. 166–179.

6. On a New Physophore, Plæophysa, and its Relationships to other Siphonophores. Ann. Mag. Nat. Hist., May, 1888.

7. Seaside Study on the Coast of California. American Naturalist February, 1888.

8. The Sucker on the Fin of Pterotrachæa. Zoologischer Anzeiger, Vol. XI., No. 271.

9. On the Origin of the Present Form of the Bermudas. Proc. Bost. Soc. Nat. Hist., Vol. XXIII.

10. Final Report on the Invertebrata of the Greely Expedition. Contains Reports on Medusæ, Echinodermata, Worms, and Mollusca.

11. Bibliography of Hydrozoa, Actinozoa, Coral Islands, and Echinodermata, for "The Standard Natural History."

12. On a New Parasite of Amphiura. Proc. Bost. Soc. Nat. Hist., Vol. XXIV. pp. 31–34.

13. A Parasite troublesome to a Brittle-Star. *Nature*, Vol. XXXVII., No. 941.

14. On Arctic Characters of the Surface Fauna of the Bay of Fundy, and the Connection with a Theory of the Distribution of Floating Marine Life. *American Naturalist*, July, 1888.

15. A New Marine Larva and its Affinities. *Microscope*, June, 1888.

16. The Assistant has also edited the last Part of Volume XXIII. of the *Proceedings of the Boston Society of Natural History*.

REPORT ON PALÆONTOLOGY.

BY ALPHEUS HYATT.

THE work this year has been mainly directed to the preliminary labelling of the newer collections, and the arrangement, concentration, and labelling of the older collections, with the view of bringing together all the fossils of the same genera and species within the same period. A large amount of material has been handled and arranged. All the collections not thoroughly reviewed last year have been looked over, the labelling revised, and the specimens distributed. The contents of the trays, to the number of twenty-five hundred, have been put in safe condition for storage, and correctly labelled outside.

The department is indebted to Mr. R. T. Jackson for personally attending to the details of the work of reviewing collections, etc., and thus enabling the Assistant to expend his time upon the final arrangement of some collections which were in a sufficiently advanced stage of preparation to make such work profitable. He has also spent more or less time upon special work in connection with his researches upon the *Ostreadæ*. The department has also received considerable assistance from Mr. Henry Brooks, and he has also been engaged in studying the intimate structure of the siphuncle in the shells of *Nautiloids*.

The Assistant has finished the preliminary arrangement of the *Trilobites* of the Schary collection. All the different collections of *Trilobites* belonging to the Taconic faunæ have been brought together, and incorporated into one collection. The species have been identified throughout, with the exception of some from the St. John's group, and a few trays of miscellaneous rough material from the same. This part of the collection needs, therefore, only a small amount of work by a specialist, in order to be completely finished with regard to the naming, and also the final work of labelling each specimen, or tray.

He has also finished the Belemnoids and Sepioids in a similar way, and these collections are practically completed. Specimens have also been picked out for exhibition in the Systematic and Geological collections, and the Belemnoids and Sepioids have been mounted.

He has also done considerable work upon the Jurassic and Cretaceous Ammonoids, and these are rapidly approaching completion.

Mr. Jackson has brought together and arranged the Cretaceous and Tertiary Ostreadæ, and incidentally done a large amount of work of a preliminary kind upon the general collection of Lamellibranchs, especially upon the Jurassic forms. He has also reviewed and placed in safe condition the specimens of the Green collection, which consists of exceedingly delicate decalcified fossils that require very careful storage. The entire collection of Tertiary Gasteropoda has been reviewed and concentrated, and the outside labels revised and corrected. He has also reviewed the collection of Echinoderms, revising and correcting the outside labels, and cleaning a part of the specimens.

Mr. Henry Brooks has arranged and concentrated a portion of the Anticosti collection, by culling out the worthless material, and has finished the arrangement of the Gebhard collection, which was begun last year. He has also worked over and distributed the Keeping collection of Jurassic, Cretaceous, and Tertiary fossils from England, the Tawney collection, consisting of a few trays of Cretaceous fossils from England, and the collection mentioned below as turned into the department by Dr. Hagen.

Cigar boxes have been found very convenient for the storage of certain kinds of fossils. A large number have been used in place of paper trays wherever they are more convenient, as in the storage of duplicates; and they will not only effect a saving of expense, but will also save a large amount of room.

Dr. Hill of Princeton spent a few weeks at Cambridge in preparing the bones of a fine skeleton of *Myiodon* for exhibition.

A small collection of fossil Insects, Myriapods, and some miscellaneous specimens, have been received from Dr. Hagen. They were mostly from Mazon Creek. A small collection of fossil plants from the Coal Measures at Springhill, Nova Scotia, has been presented by Mr. Henry Swift.

The following papers have been published by Messrs Hyatt, Jackson, and Brooks:—

Values in Classification of the Stages of Growth and Decline, with Propositions for a new Nomenclature. *Science*, Vol. XI., No. 260, and *Proc. Bost. Soc. Nat. Hist.*, Vol. XXIII., 1888. By Alpheus Hyatt.

Evolution of Faunas in the Lower Lias. *Proc. Bost. Soc. Nat. Hist.*, Vol. XXIII., 1888. By Alpheus Hyatt.

Catching Fixed Forms of Animal Life on Transparent Media for Study. *Science*, Vol. XI., No. 275, p. 230. By R. T. Jackson.

The Development of the Oyster, with Remarks on Allied Genera. *Proc. Bost. Soc. Nat. Hist.*, Vol. XXIII., 1888, pp. 531–557, including four plates. By R. T. Jackson.

Cultivation of Native Ferns. *Garden and Forest*, Vol. I., Nos. 27, 28, 29, 30. By R. T. Jackson.

Methods of Labelling Trees and Plants. *Trans. Mass. Hort. Soc.*, 1888, Part I. By R. T. Jackson.

Preliminary Remarks on the Structure of the Siphon and Funnel of *Nautilus Pompilius*. By Henry Brooks. *Proc. Bost. Soc. Nat. Hist.*, Vol. XXIII., 1888, 2 plates.

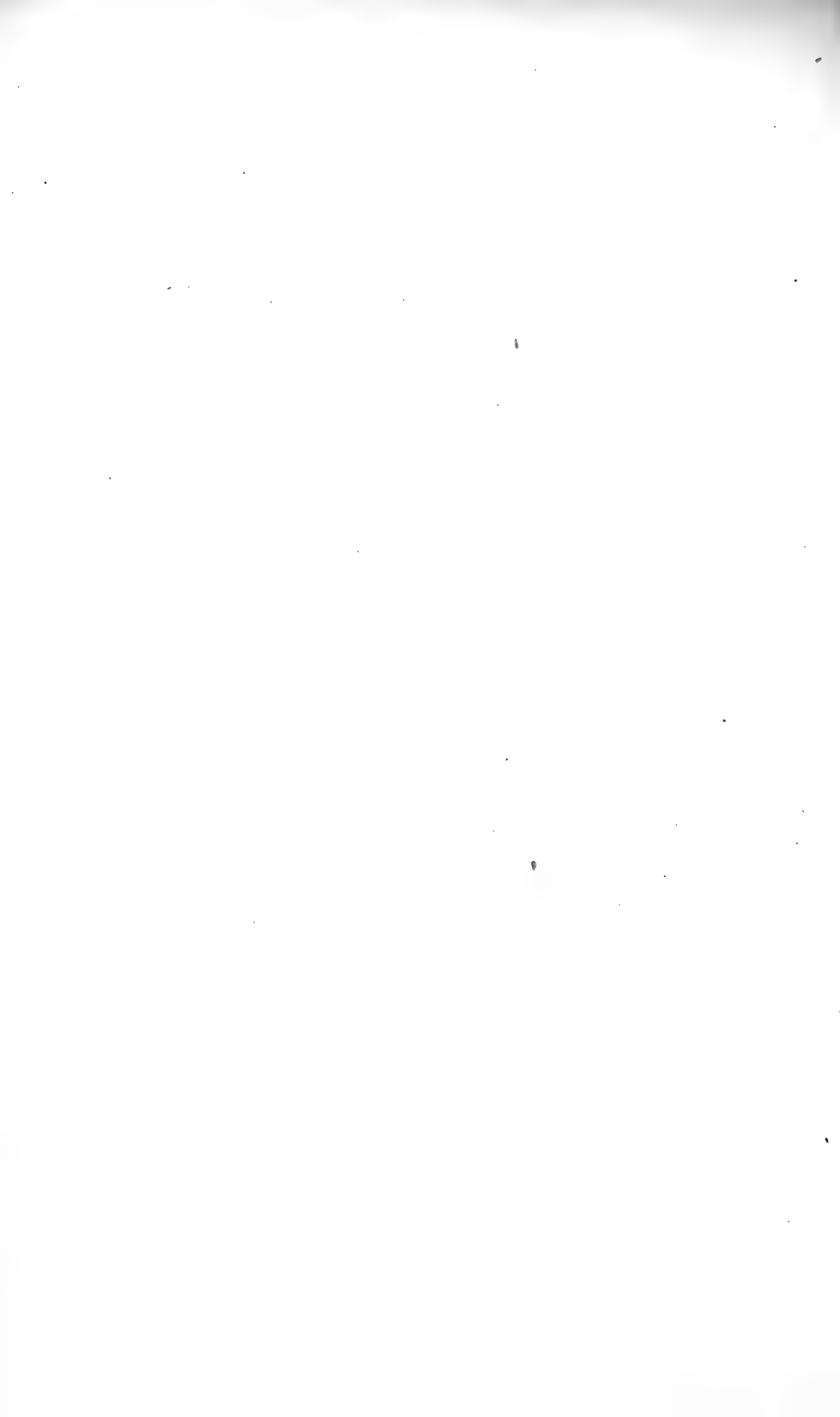
REPORT ON THE LIBRARY.

BY MISS F. M. SLACK.

DURING the year ending September 1, 1888, the Library has been increased by 481 volumes, 1,607 parts, and 121 pamphlets:—

	VOLUMES.	PARTS.	PAMPHLETS.
Gift	29	36	10
Exchange	141	613	91
Purchase	50	149	5
A. Agassiz	79	809	15
Binding Parts	182		
	<hr/> 481	<hr/> 1607	<hr/> 121

The number of volumes now in the Library (exclusive of pamphlets and the Whitney Library) is 17,903. There are 11,564 pamphlets bound in 1,528 volumes, making the total number of volumes 19,431.



[A.]

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

FOR THE ACADEMIC YEAR 1887-88.

Of the Bulletin.

Vol. XIII.

- No. 6. The EYES in SCORPIONS. By G. H. PARKER. pp. 36. 4 Plates. December, 1887. 75c.
- No. 7. Studies from the Newport Marine Laboratory. — XIX. On certain MEDUSÆ from New England. By J. W. FEWKES. pp. 32. 6 Plates. February, 1888. \$1.00.
- No. 8. On certain Vacuities or Deficiencies in the CRANIA of MAMMALS. By D. D. SLADE. pp. 6. 2 Plates. March, 1888. 25c.
- No. 9. The Superior Incisors and Canine TEETH of SHEEP. By FLORENCE MAYO. pp. 12. 2 Plates. June, 1888. 25c.
- No. 10. The RATTLE of the RATTLESNAKE. By S. GARMAN. pp. 10. 2 Plates. August, 1888. 18c.

Vols. XIV., XV.

A Contribution to American THALASSOGRAPHY. THREE CRUISES of the United States and Geodetic Survey Steamer "Blake," in the GULF OF MEXICO, in the CARIBBEAN SEA, and along the ATLANTIC COAST of the UNITED STATES, from 1877 to 1880. By ALEXANDER AGASSIZ. 2 vols., pp. xxii, 314, and (6), 220. Maps and Woodcuts. [April,] 1888. For sale by Houghton, Mifflin, & Co.

Vol. XVI. [Geological Series, Vol. II.].

- No. 1. On the Petrographical Characters of a DIKE of DIABASE in the BOSTON BASIN. By W. H. HOBBS. pp. 12. 1 Plate. March, 1888.

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

Vol. XVII.

- No. 1. Studies from the Newport Marine Laboratory. -- XX. On the Development of the Calcareous Plates of ASTERIAS. By J. W. FEWKES. pp. 56. 5 Plates. July, 1888.

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

Of the Memoirs.

Vol. XV., containing,

Reports on the Results of DREDGING by the U. S. C. S. Steamer "Blake." —
XXXI. Report on the ANNELIDS. By ERNST EHLERS. pp. vi, 335. 60 Plates.
October, 1887.

In preparation : —

Vol. XIV.

No. 2. Studies from the Newport Marine Laboratory. — XVI. Development
of OSSEOUS FISHES. Part II. By ALEXANDER AGASSIZ and C. O.
WHITMAN. With 20 Plates.

Vol. XVI.

No. 3. The Genesis of the ARIETIDÆ. By ALPHEUS HYATT.

Also preparing : —

Illustrations of North American Marine Invertebrates, from Drawings by Burkhardt, Sonrel, and A. Agassiz, prepared under the direction of L. Agassiz. Selections from Embryological Monographs, compiled by A. Agassiz, W. Faxon, and E. L. Mark (discontinued for the present). Papers by E. L. Mark, on the Development of *Lepidosteus* and of *Arachnactis*; by A. Hyatt, on Cephalopods; by M. E. Wadsworth; and on Fossil Mammals, by Scott and Osborne.

Reports on the Dredging Operations for 1877, 1878, 1879, and 1880, in charge of Alexander Agassiz, by the U. S. Coast Survey Steamer "Blake." H. B. Brady (*Foraminifera*), P. H. Carpenter (*Comatulæ*), W. H. Dall (*Mollusks of the Gulf of Mexico and the Caribbean Sea*), G. B. Goode and T. H. Bean (*East Coast Fishes and Fishes of the Gulf of Mexico and the Caribbean Sea*), A. E. Verrill and W. H. Dall (*East Coast Mollusks*), A. A. Hubrecht (*Nemerteans*), A. Milne-Edwards (*Crustacea*), and A. E. Verrill (*Alcyonaria*).

[B.]

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY.

ANNUAL REPORT of the Trustees, together with a Report of the Director for *1859, *1860, *1861, 1862, 1863, 1864, 1865, *1866, 1867, 1868, *1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877-78, 1878-79, 1879-80, 1880-81, 1881-82, *1882-83, 1883-84, 1884-85, 1885-86, 1886-87, 1887-88.

BULLETIN. Vol. I., April, 1863 — November, 1869, contains the following papers: —

- No. 1. List of the FISHES sent by the Museum to different Institutions, in exchange for other Specimens, with Annotations. By F. W. PUTNAM. pp. 16. April, 1863. 15c.
- No. 2. List of the ECHINODERMS. By ALEXANDER AGASSIZ. pp. 12. August, 1863. 10c.
- No. 3. List of the POLYPS and CORALS. By A. E. VERRILL. pp. 32. January, 1864. 20c.
- No. 4. List of BRACHIOPODS from the Island of Anticosti. By N. S. SHALER. pp. 10. June, 1865. 10c.
- No. 5. The FOSSIL CEPHALOPODS of the Museum of Comparative Zoölogy. By ALPHEUS HYATT. pp. 32. December, 1867. 20c.
- No. 6. Contributions to the FAUNA of the Gulf Stream at Great Depths. By L. F. DE POURTALÈS. pp. 18. December, 1867. 10c.
- No. 7. Do. Second Series. pp. 22. December 10, 1868. 15c.
- No. 8. Catalogue of the MAMMALS of Massachusetts. By J. A. ALLEN. pp. 110. October, 1869. 75c.
- No. 9. Preliminary Report on the ECHINI and STARFISHES dredged in deep water between Cuba and the Florida Reef, by L. F. de Pourtalès. Prepared by ALEXANDER AGASSIZ. pp. 56. October, 1869. 40c.
- No. 10. Preliminary Report on the OPHIURIDÆ and ASTROPHYTIDÆ dredged by L. F. de Pourtalès. Prepared by THEODORE LYMAN. pp. 46. November, 1869. 35c.
- No. 11. List of the CRINOIDS obtained on the Coasts of Florida and Cuba, in 1867, 1868, 1869. By L. F. DE POURTALÈS. pp. 4. November, 1869. 5c.
- No. 12. List of HOLOTHURIDÆ dredged by L. F. DE POURTALÈS. pp. 3. November, 1869. 5c.
- No. 13. Report upon the DEEP-SEA DREDGINGS during the Third Cruise of the U. S. Coast Survey Steamer "Bibb." By LOUIS AGASSIZ. pp. 24. November 16, 1869. 15c.

Vol. II., August, 1870 — April, 1871, contains: —

- * No. 1. On the EARED SEALS. By J. A. ALLEN. With an Account of the HABITS of the NORTHERN FUR SEAL. By CHARLES BRYANT. pp. 108. 6 Woodcuts and 3 Plates. August, 1870. \$1.00. Plates destroyed by fire.
- * No. 2. Preliminary Report on the CRUSTACEA dredged by L. F. de Pourtalès. Prepared by WILLIAM STIMPSON. Part I. pp. 52. December, 1870. 50c.
- * No. 3. On the MAMMALS and WINTER BIRDS of East Florida. By J. A. ALLEN. pp. 290. 5 Plates. April, 1871. \$3.25.
- No. 4. Directions for DREDGING. Drawn up by L. F. DE POURTALÈS. pp. 4. 5c.
- No. 5. Appendix to Preliminary Report on ECHINI. By ALEXANDER AGASSIZ. pp. 3. April, 1871. 5c.

* Out of print.

Vol. III., May, 1871 — July, 1876, contains:—

- * No. 1. BRACHIOPODS of the Straits of Florida. By W. H. DALL. pp. 45. 2 Plates. May, 1871. 85c.
- * No. 2. Application of PHOTOGRAPHY to Illustrations of Natural History. pp. 2. 2 Plates. November, 1871. 25c. Plates destroyed by fire.
- No. 3. A Letter concerning DEEP-SEA DREDGING addressed to Professor Peirce. By LOUIS AGASSIZ. pp. 5. December, 1871. 5c.
- * No. 4. Preliminary Notice of a few Species of ECHINI. By ALEXANDER AGASSIZ. pp. 4. January, 1872. 5c.
- * No. 5. FOSSIL CEPHALOPODS of the Museum. Embryology. By A. HYATT. pp. 53. 4 Plates. June, 1872. \$1.25.
- No. 6. ORNITHOLOGICAL RECONNAISSANCE of Kansas, Colorado, Wyoming, and Utah. By J. A. ALLEN. pp. 71. July, 1872. 50c.
- * No. 7. Interim Report on the HYDROIDS collected by L. F. de Pourtalès. By GEORGE J. ALLMAN. pp. 2. January, 1873. 5c.
- * No. 8. The ECHINI collected by the Hassler Expedition. By ALEXANDER AGASSIZ. pp. 4. January, 1873. 5c.
- No. 9. Catalogue of the TERRESTRIAL AIR-BREATHING MOLLUSKS of N. America. By W. G. BINNEY. pp. 30. 1 Plate. October, 1873. 50c.
- No. 10. OPHIURIDÆ and ASTROPHYTIDÆ, Old and New. By THEODORE LYMAN. pp. 51. 7 Plates. February, 1874. \$1.75.
- † No. 11. Exploration of LAKE TITICACA, by Alexander Agassiz and S. W. Garman. I. FISHES and REPTILES. By S. W. GARMAN. pp. 6. 1 Plate. November, 1875. 20c.
- † No. 12. Exploration of LAKE TITICACA. II. Notice of the PALÆOZOIC FOSSILS. By ORVILLE A. DERBY, M.S. With Notes by ALEXANDER AGASSIZ. pp. 8. March, 1876. 10c.
- † No. 13. Recent CORALS from Tilibiche, Peru. By ALEXANDER AGASSIZ and L. F. DE POURTALÈS. pp. 4. 1 Plate. March, 1876. 15c.
- † No. 14. The Development of SALPA. By WM. K. BROOKS. pp. 58. 34 cuts. March, 1876. 75c.
- † No. 15. Exploration of LAKE TITICACA. III. List of MAMMALS and BIRDS. By J. A. ALLEN. With Field Notes by S. W. GARMAN. pp. 11. July, 1876. 10c.
- † No. 16. Exploration of LAKE TITICACA. IV. CRUSTACEA. By WALTER FAXON. With 37 cuts. pp. 15. July, 1876. 15c.

Vol. IV., July, 1878, contains:—

The TERRESTRIAL AIR-BREATHING MOLLUSCA of the United States and Adjacent Territories of North America. By W. G. BINNEY. Vol. V. pp. 449. 104 Plates, 312 Cuts. July, 1878. \$7.50.

Volume V., April, 1878 — December, 1879, contains:—

- No. 1. Letter No. 1 to C. P. Patterson, Supt. U. S. Coast Survey, on the DREDGING OPERATIONS of the U. S. C. S. Str. "Blake." By A. AGASSIZ. pp. 9. April, 1878. 10c.
- * No. 2. On the Presence of DEMODEX FOLLICULORUM in the Skin of the Ox. By W. FAXON. pp. 7. 1 Plate. May, 1878. 15c.
- * No. 3. The RICHMOND BOULDER TRAINS. By E. R. BENTON. pp. 26. 2 Maps. May, 1878. 45c.
- * No. 4. Description of a New Species of CORBICULA, with Notes on other Species of the Corbiculadæ Family. By TEMPLE PRIME. pp. 4. 1 Plate. July, 1878. 12c.
- * No. 5. Notes on the Anatomy of CORBICULADÆ (Mollusca) and a Translation from the Danish of an Article on the Anatomy of Cyclas by Jacobsen. By TEMPLE PRIME. pp. 8. 1 Plate. July, 1878. 20c.
- No. 6. Letter No. 2 to C. P. Patterson, Supt. U. S. Coast Survey, on the DREDGING OPERATIONS of the U. S. C. S. Str. "Blake." By A. AGASSIZ. With Preliminary Report on the Mollusca of the Expedition. By W. H. DALL. pp. 10. 2 Plates. July, 1878. 20c.
- No. 7. OPHIURIDÆ and ASTROPHYTIDÆ of the "Challenger" Expedition. By T. LYMAN. Part I. pp. 104. 10 Plates. July, 1878. \$1.50.

* Out of print.

† Nos. 11-14, also 15-16, are not sold separately.

- No. 8. Reports on the DREDGING OPERATIONS of the U. S. C. S. Str. "Blake." I. Description of SOUNDING MACHINE, Water-Bottle, and Detacher. By Lieut.-Commander C. D. SIGSBEE, U. S. N. pp. 11. 5 Plates. December, 1878. 60c.
- No. 9. Reports on the DREDGING OPERATIONS of the U. S. C. S. Str. "Blake." II. ECHINI, by A. AGASSIZ. CORALS and CRINOIDS, by L. F. DE POURTALES. OPHIURANS, by T. LYMAN. pp. 58. 10 Plates. December, 1878. \$1.50.
- No. 10. Reports on the DREDGING OPERATIONS of the U. S. C. S. Str. "Blake." III. Report on HYDROIDA. By S. F. CLARKE. pp. 14. 5 Plates. January, 1879. 65c.
- No. 11. On some Young Stages in the Development of HIPPA, PORCELLANA, and PINNIXA. By W. FAXON. pp. 16. 5 Plates. April, 1879. 66c.
- No. 12. Reports on the DREDGING OPERATIONS of the U. S. C. S. Str. "Blake." IV. Preliminary Report on the WORMS. By Prof. ERNST EHLERS of Göttingen. pp. 6. June, 1879. 5c.
- No. 13. On the Classification of ROCKS. By M. E. WADSWORTH. pp. 13. June, 1879. 15c.
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Vol. XIV. contains: —

- No. 1. Studies from the Newport Marine Laboratory. XVI. Development of OSSEOUS FISHES. I. Pelagic Stages of YOUNG FISHES. By ALEXANDER AGASSIZ and C. O. WHITMAN. 56 pp. 19 Plates. September, 1885. \$3.50.

- No. 2. Studies from the Newport Marine Laboratory. XVI. Development of OSSEOUS FISHES. II. By ALEXANDER AGASSIZ and C. O. WHITMAN. With 20 Plates. (Preparing.)

Vol. XV. contains : —

Reports on the Results of DREDGING by the U. S. Coast Survey Steamer "Blake." XXXI. Report on the ANNELIDS. By ERNST EHLERS. pp. vi, 335. 60 Plates. October, 1887. \$12.50.

Vol. XVI. contains : —

No. 1. Notes on the TAXODIUM DISTICHUM, or BALD CYPRESS. By N. S. SHALER. pp. 16. June, 1887.

No. 2. On the Original CONNECTION of the Eastern and Western COAL FIELDS OF THE OHIO VALLEY. By N. S. SHALER. pp. 12. June, 1887.

For Nos. 1 and 2, apply to Prof. N. S. SHALER.

No. 3. The Genesis of the ARIETIDÆ. By ALPHEUS HYATT. (Preparing.)

(Vol. XVI. to be continued.)

In preparation : —

Illustrations of North American MARINE INVERTEBRATES, from drawings by BURKHARDT, SONREL, and A. AGASSIZ, prepared under the Direction of L. AGASSIZ. Selections from EMBRYOLOGICAL MONOGRAPHS, compiled by A. AGASSIZ, W. FAXON, and E. L. MARK (discontinued for the present). Papers, by E. L. MARK, on the Development of LEPIDOSTEUS and of ARACHNACTIS; by M. B. WADSWORTH; and by SCOTT and OSBORNE, on FOSSIL MAMMALS.

Reports on the DREDGING Operations for 1877, 1878, 1879, and 1880, in Charge of ALEXANDER AGASSIZ, by the U. S. C. S. Steamer "Blake." H. B. BRADY (FORAMINIFERA), P. H. CARPENTER (COMATULÆ), W. H. DALL (MOLLUSKS of the Gulf of Mexico and the Caribbean Sea), G. B. GOODE and T. H. BEAN (East Coast FISHES, and FISHES of the Gulf of Mexico and the Caribbean Sea), A. E. VERRILL and W. H. DALL (East Coast MOLLUSKS), A. A. HUBRECHT (NEMERTEANS), A. MILNE-EDWARDS (CRUSTACEA), and A. E. VERRILL (ALCYONARIA).

In the Preface to the Zoologischer Jahresbericht for 1886, the publications of the Museum of Comparative Zoölogy are mentioned as among the periodicals given to irregular ways. While it is true, that, for the sake of keeping together the successive parts of an extended monograph, two or three volumes of the Memoirs and of the Bulletins of the Museum are frequently in the course of publication, yet care has always been taken to show on the title page of the completed volume the years which it covers.

The Museum publications are not periodicals issued at fixed periods, — they must of necessity appear at irregular intervals, — but each number of the Memoirs and of the Bulletins is issued with a separate cover, showing the month of its publication and indicating plainly its relation to any volume of the series. Each number is distributed as soon as it comes from the binder to the various scientific societies and specialists on the exchange list of the Museum. The author's copies do not differ in any way from those distributed by the Museum, and are sent out at the same time.

The practice of the Museum in regard to its publications does not differ from that of the most carefully edited scientific periodicals. In addition to the indications of dates of publication to be found on the title pages of completed volumes, and on the covers of the separate numbers of the Memoirs and of the Bulletins, the Museum has issued from time to time in its Annual Report a "List of Publications," giving the date of publication of each number of the Memoirs and Bulletins.

It is hardly necessary to state that the Zoölogical Station at Naples, which edits the Zoologischer Jahresbericht, has always received from the Museum the material necessary for the dates of publication of the Museum Memoirs and Bulletins. It may not be out of place to mention that the quarto publications of the Zoölogical Station at Naples are issued and dated upon the same plan which Dr. Mayer finds so undesirable in an American publication.

[C.]

INVESTED FUNDS OF THE MUSEUM.

IN THE HANDS OF THE TREASURER OF HARVARD COLLEGE, SEPT. 1. 1887.

Sturgis-Hooper Fund	\$100,000.00
Gray Fund	50,000.00
Agassiz Memorial Fund	297,933.10
Teachers and Pupils Fund	7,594.01
Permanent Fund	117,469.34
Humboldt Fund	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, either at the Museum, the Newport Marine Laboratory, or the United States Fish Commission Station at Wood's Holl.

Applications for the two Tables reserved for advanced students at the Newport Marine Laboratory, and for the Table at the Wood's Holl Station, should be made to the Curator of the Museum before the 1st of May. Applicants should state their qualifications, and indicate the course of study they intend to pursue.





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