

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

1882-83.

CAMBRIDGE:

UNIVERSITY PRESS: JOHN WILSON AND SON.

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FACULTY OF THE MUSEUM.

CHARLES W. ELIOT, *President.*

ALEXANDER AGASSIZ, *Curator.*

THEODORE LYMAN.

JOSIAH D. WHITNEY, *Secretary.*

GEORGE L. GOODALE.

OFFICERS.

ALEXANDER AGASSIZ *Curator.*
JOSIAH D. WHITNEY *Sturgis-Hooper Professor of Geology.*
HERMANN A. HAGEN *Professor of Entomology.*
NATHANIEL S. SHALER *Professor of Palæontology.*
WALTER FAXON *Assistant Professor of Zoölogy.*
E. L. MARK *Assistant Professor 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.*
M. E. WADSWORTH *Assistant in Lithology.*
J. W. FEWKES *Assistant in charge of Radiates.*
C. O. WHITMAN *Assistant in Zoölogy.*
PAULUS ROETTER *Artist.*
MISS F. M. SLACK *Librarian.*

REPORT.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE:—

I HAVE the pleasure of reporting that during the past year the latest addition to the Museum building has been completed. The transfer of the students to their new quarters has been effected, and the whole building is now occupied as originally planned. The rooms in this addition are devoted mainly to Laboratories, to the Library, Lecture-Room, and Curator's Room, only such space being reserved for exhibition as was necessary to connect the general exhibition-rooms with those of the main body of the building, hereafter to be erected.

Ten years wanting only a few weeks have passed since the care of the Museum devolved upon me. Some account is due here of the work done during that decade, and of the present state of the Museum as compared with its condition at the close of 1873. At that time, and indeed far earlier, from the very beginning of the institution, the general plan was sketched out in the mind of its founder. But the difficulties involved in the initiation of so large an undertaking prevented Professor Agassiz from developing his schemes. From want of rooms and of means for proper distribution, the immense accessions constantly accumulating upon his hands invaded, little by little, the space devoted to special objects. It became evident, at the time of his death, that nothing short of a radical rearrangement of the collections could bring out his plans and give them distinct expression. This rearrangement has been completed only within the past year, and no sign of the former confusion, due to a too rapid accumulation of material, is left.

At the close of 1873 the Museum building covered about 9,400 square feet of ground, and was filled to overflowing, from attic to basement, with the collections brought together by its first Director. The buildings and collections then represented an expenditure of about \$200,000. From that time to the past

Academic year the new buildings and collections represent an additional expenditure of more than \$500,000, in addition to the current expenditure. The ground covered by the additional building measures about 9,500 square feet. The resources at the disposal of the Director in 1873 came from the income of invested funds amounting to about \$185,000. At the present moment, these amount to over \$580,000. Ten years ago our departmental Library numbered some 5,000 volumes. Since that time it has increased to 16,000 volumes.

The temporary quarters provided for the instruction then given at the Museum afforded no facilities for the more accurate work now required in many branches of the Biological and Geological Departments. Although our present laboratories, still in their first year of service, are not equipped as I hope to see them, they afford even now ample facilities for instruction and investigation, as compared with those heretofore available at Cambridge.

The publications of the Museum, giving the results of investigations by specialists or by Assistants of the Museum, the materials for which have been drawn from our collections, have been rapidly issued. Volumes IV. to X. of the Bulletins, and Volumes IV. to IX. of the Memoirs, have been published during the last ten years.

Already, in 1853, the late Edward Forbes saw the importance of geographical displays as applied to the geological structure and products of the colonies of Great Britain, in connection with the Jermyn Street Museum of Practical Geology. He protested against the simple and single systematic arrangement, as not covering the ground necessary to make the Museum practically useful. He further dwelt on the fact, that a museum as such, not connected with an educational institution, was of very little use to the public beyond its value as a cyclopædia of reference.

We have attempted to build up an institution of that kind, and under our present conditions it is now possible to form some idea of the success of the Museum of Comparative Zoölogy, based as it is upon a plan essentially different from that of other like institutions. Our Exhibition Rooms, for instance, are comparatively small, each one devoted to a special subject, but so combined that, when taken together, they illustrate the animal kingdom as a whole in its general relations, and in its geographical and palæontological range and distribution. They are intended not only to

meet the wants of the public at large, and of beginners as well as of more advanced university students, but also to promote research by giving assistance to specialists and original investigators. Meanwhile, the work of the Museum proper should be in charge of Assistants whose duties are so arranged as to leave a good part of their time free for original research; the Museum as a whole forming an important branch of the Natural History Department of the University, with which its Assistants and Professors are intimately connected.

An enumeration of the contents and uses to which our space is devoted will give a better idea of our aims than a lengthy description.

EXHIBITION ROOMS.

Synoptic Room:—

Synopsis of the Animal Kingdom, living and fossil.

Five Systematic Rooms:—

Mammalia.

Birds.

Fishes.

Mollusca.

Radiates and Protozoa.

And their Galleries for the Systematic Collections of Reptiles, Insects, and Crustacea.

Seven Faunal Rooms and Galleries:—

North American.

South American.

African, including Madagascar.

Indian.

Australian.

* Europeo-Siberian.

* Atlantic.

* Pacific.

Four Rooms for the Palæontological Collections.

Two Rooms for the Palæozoic, one for the Mesozoic, and one for the Tertiary:—

* The Silurian and Devonian.

* The Carboniferous and Jura.

* The Cretaceous.

* The Tertiary.

* Not yet opened to the public.

The Work Rooms for the assistants of the Museum, and the Storage Rooms, which are also intended as work rooms of their special subjects, are distributed as follows, in addition to a large Receiving Room and a general workshop.

The Alcoholic Collections stored in the basement occupy : —

- Four Rooms devoted to Fishes.
- Two Rooms for Fishes and Reptiles.
- One Room for Birds and Mammals.
- One Room for Mollusca.
- One Room for Crustacea.
- One Room for the other Invertebrates.

The Entomological Department is to occupy eventually four gallery rooms of the first story.

The Work Rooms and Storage Rooms of the fifth story are filled by collections occupying : —

- Five Rooms devoted to Birds and Mammals ; three for skins and eggs, and two for skeletons.
- One Room for Crustacea.
- One Room for Mollusca.
- One Room for Fish and Reptile Skeletons.
- One Room for the Collection of dry Invertebrates (Corals, Echinoderms, Sponges, etc.).
- Two Rooms for Fossil Vertebrates exclusive of Fishes.

The remaining Palæontological Collections are crowded into four Work and Storage Rooms.

Two Work Rooms for the Geological and Lithological Department.

Four Rooms are devoted to the Library of the Museum, and one Room for the office of the Curator.

There are also : —

- A large general Lecture Room.
- Three Laboratories for Students in Biology.
- Three Laboratories for Students in Geology and Palæontology, with two smaller private rooms for the Instructors.

With the Biological Laboratories will be connected also a large Room for an Aquarium for both fresh-water and marine animals, and another room for a Vivarium, both of which are in the basement of the building.

This will give us, in all, seventeen rooms devoted to the exhibition of collections for the public ; ten work and storage rooms in the basement, for the Alcoholic Collections ; thirteen work and storage rooms for the dry Zoölogical Collections ; eight similar

rooms for the Palæontological and Geological Collections ; and thirteen rooms devoted to the Laboratories, Lecture Rooms, and Library connected with the instruction given at the Museum. The arrangement being such that whenever any Departments, as, for instance, the Geological and Geographical, or the Anatomical, or any other, outgrow their present quarters, room can be made for them, by extensions of the building, for a long time to come, without interfering with the plans which have been carried out thus far.

In adopting a small unit for the size of our rooms (30×40 ft.), we deliberately abandoned all attempts at Exhibition Rooms imposing from their size. We have aimed only to place before the public such portions of our collections as shall become instructive ; and in our storage and work rooms the appliances for storage aim at economy of space, and are intended, while they do not neglect the careful preservation of the Collections, to give to the Assistants and students the freest and quickest possible access to them.

During the past summer the following persons pursued their studies at my Newport laboratory : — Mr. Fewkes, one of the Museum Assistants, who devoted his time principally to embryological studies of Annelids, Messrs. Barnes and Tuttle of the Scientific School, and Miss E. A. Nunn, who devoted her time to the study of the earlier stages in the development of Brachyura. Prof. C. O. Whitman took up the study of the early stages of some of the many species of pelagic fish-eggs, so common at Newport ; and he is preparing in connection with me a preliminary report on his work, some of which is in continuation of investigations on the early stages of the bony fishes, begun nearly twenty years ago.

The course in Biology, given by Professors Farlow and Faxon, was attended by two Seniors, seventeen Juniors, four Sophomores, and one special student. Mr. G. W. Perkins assisted Professors Farlow and Faxon in the laboratory work of the course.

In Advanced Zoölogy, the course of Professor Faxon was followed throughout the year by thirteen Seniors, four Juniors, and one Student from the Scientific School.

During the past Academic year lectures in General Zoölogy were given by Dr. Mark to 104 students, of whom 39 were

Seniors, 34 Juniors, 25 Sophomores, 2 Freshmen, 2 Unmatriculated, and 2 Scientific Students.

In Dr. Mark's course on Embryology, the lectures were attended by three fourth-year students of the Lawrence Scientific School. The laboratory work was pursued by the three students attending the lectures, and by another who had previously attended the same course. The work consisted largely in the investigation of special topics proposed by the instructor at the beginning of the year.

These studies have resulted in the production of the following papers:—

1. On the Development of *Æcanthus niveus*, and its Parasite, *Teleas*. By Howard Ayers. Mem. Bost. Soc. Nat. Hist., Vol. III. No. 8.

2. On the Development of the Posterior Fissure of the Spinal Cord, and the Reduction of the Central Canal, in the Pig. By William Barnes.

3. Notes on the Development of Phryganidæ. By William Patten.

4. The Relation of the External Meatus, Tympanum, and Eustachian Tube to the First Visceral Cleft. By Albert H. Tuttle, of Boston.

The papers of Messrs. Barnes and Tuttle are in press in the Proceedings of the American Academy of Arts and Sciences.

Professor Shaler and Mr. W. M. Davis gave the usual courses, as follows:—

In Physical Geography, attended by sixty students. (Mr. Davis.)

In Elementary Geology, with, field-work, attended by one hundred and eighty-five students. (Prof. Shaler and Mr. Davis.)

A course in Advanced Geology, with field work, attended by twenty-five students. (Prof. Shaler and Mr. Davis.)

A course in Palæontology, attended by seven persons. (Prof. Shaler.)

Professor Whitney lectured twice a week on Applied Geology, throughout the year. He was assisted in this course by Dr. Wadsworth, who also gave a course of lectures on Advanced Lithology, and took charge of the instruction of a small class of special students in Microscopic Lithology.

Ayers, H.

Patten, W.

Barnes, W.

Tuttle, A. H.

About five hundred volumes have been added to the Library of the Museum during the past year.

A special list of the Museum publications during the last Academic year is given in Appendix A of this Report. They consist of four numbers of the *Memoirs*, and of fifteen numbers of the *Bulletin*. 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 other publications of the Professors and Assistants of the Museum are noted in the Reports of the different Departments.

The larger number of the publications of the Museum are devoted to Reports on the collections made by the "Blake." These consist of: —

A Report on the Stalked Crinoids collected by the "Blake" in the Caribbean, by Mr. P. H. Carpenter. *Bull. M. C. Z.*, X., No. 4. 16 pp. December, 1882.

A Preliminary Report on the Fishes of the "Blake," collected during the Summer of 1880, along the Atlantic Coast of the United States, by Prof. B. G. Goode and Dr. Tarlton H. Bean. *Bull. M. C. Z.*, X., No. 5. 37 pp. April, 1883.

A Report on the Ophiuridæ of the "Blake," by Theodore Lyman. *Bull. M. C. Z.*, X., No. 6. 50 pp. 8 plates. May, 1883.

A Preliminary Report on the Anthozoa, by Prof. A. E. Verrill. *Bull. M. C. Z.*, XI., No. 1. 72 pp. 8 plates. July, 1883.

A Report on the Isopods, by Oscar Harger. *Bull. M. C. Z.* XI., No. 4. 14 pp. 4 plates. September, 1883.

In connection with the explorations of the Gulf Stream by the Coast Survey, a Report on the Medusæ of the Bermudas, by J. Walter Fewkes. 10 pp. 1 plate.

Vol. X. No. 3 of the *Bulletin* contains a paper by Dr. Harrison Allen on the Ethmoid Bone in the Mammalia. 27 pp. 7 plates. November, 1882.

Of the seventh volume, the first of the Geological Series, three numbers have been published: —

No. 8, a short paper by Prof. Lesquereux, On some Permian Fossil Plants from Colorado. 4 pp. October, 1882.

Nos. 9 and 10, by Mr. W. M. Davis: On the Triassic Traps and Sandstones of the Eastern United States. 59 pp. 3 plates.

On the Lower Helderberg Limestones east of the Catskills. 20 pp. 2 plates. January, 1883.

Professor Whitney has published the third and concluding part of the Climatic Changes, Vol. VII. No. 2, Part III. Mem. M. C. Z., pp. 265-394. October, 1882.

I have myself published the following: —

A short paper entitled, A Chapter in the History of the Gulf Stream. Bull. M. C. Z., XI., No. 2. 5 pp.

The First Part of a Memoir on the Porpitiidæ and Velellidæ of the Gulf Stream. Mem. M. C. Z., Vol. VIII. No. 2. 16 pp. 12 plates.

Selections from Embryological Monographs, containing the Echinodermata. Vol. IX. No. 2, Mem. M. C. Z. 45 pp. 10 plates. July, 1882.

The First Part of the Report on the Echini of the "Blake." Vol. X. No. 1, Mem. M. C. Z. 126 pp. 32 plates. September, 1883.

I have in addition published in the Memoirs of the American Academy, June, 1883, Vol. X., a paper on the Tortugas and the Florida Reefs, 27 pp., 8 maps, 4 plates, from observations made while on the "Blake," and while engaged in studying the surface fauna of the Gulf Stream under the auspices of the Coast Survey.

The last volume of the Transactions of the Royal Society of London, contains a memoir by the late Prof. F. M. Balfour and Mr. W. N. Parker, on the structure and development of Lepidosteus, based upon material sent them from the Museum.

Some progress has been made in the arrangement of the Exhibition Rooms. The Indian, the African, and the Australian faunal collections are now accessible to the public, although they yet are far from complete. The Systematic Collection of Birds has undergone a final arrangement, and the storage rooms devoted to the Radiates, the collections of fish and reptile skeletons, and the Crustacea, are now filled with their respective collections.

Mr. Garman has continued the explorations made by him in previous years in the West, and he and his assistants have sent us valuable additions to our collections of Mammalian and Reptilian fossil remains. We have specially to thank the Secretary of War, the Hon. R. T. Lincoln, and the Secretary of the Interior, the Hon. H. M. Teller, for the letters of introduction they kindly sent for the use of Mr. Garman while in the Territories.

The principal collections purchased were received from Prof. H. A. Ward of Rochester, and Mr. E. Häberlein, who sent us a second collection of Solenhofen fossils. An extensive collection of fossil fishes for the Lower Carboniferous, brought together by Mr. Thomas Stock of Edinburgh, has also been purchased for the Museum.

I hope during the coming winter to be able to move the collections of fossils now stored in the attic to their final storage rooms, and to make a beginning in the arrangement of the Palæontological Collections intended for exhibition.

ALEXANDER AGASSIZ, *Curator.*

CAMBRIDGE, October 1, 1883.

REPORT ON THE GEOLOGICAL DEPARTMENT.

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

DURING the year 1882-83 instruction was given in this department of the Museum as follows. The Sturgis-Hooper Professor lectured twice a week on Applied Geology throughout the year; that portion of the course relating to building-materials, however, was as usual given by Dr. Wadsworth. The audience consisted of one candidate for the degree of S. D., one special student, and several members of the Senior Class in the College. Dr. Wadsworth gave also a course of thirty lectures on Advanced Modern Lithology, to an audience of eight persons, teachers and special students in that branch. There were also four special students in Practical Microscopic Lithology. Two of the last-mentioned students worked for a portion of the year only; the others devoted the whole of the year, and nearly all their time, to this work, and one of them was engaged in the examination of a region to which he was specially assigned with a view to the publication of his results.

The Sturgis-Hooper Professor spent a small portion of the summer in the field in New Hampshire, Vermont, and New York, making observations preparatory to work to be done in the future, bearing on important points in the geology of this country. Dr. Wadsworth continued his work on the geology of the coast of New England north of Boston. Several localities were visited by the Sturgis-Hooper Professor and Dr. Wadsworth together, for the purpose of investigating points of importance connected with work now in process of publication.

The collections in the lithological department have been considerably enlarged by material collected in the course of the field-work mentioned above. The most important addition, however, was that of the rock specimens and microscopic slides purchased of Mr. Diller of the Assos Expedition, the same being the

materials used by him in the preparation of his thesis entitled "Contributions to the Geology of the Troad." The rock specimens are 600 in number; the slides, 547. A collection of 100 thin sections of typical rocks has been arranged, and descriptions of them written out for the use of students of lithology.

The third part of the "Climatic Changes of Later Geological Times" was issued just after the publication of the last Annual Report of the Museum. That completes the seventh volume of the Memoirs. Most of the time of the Sturgis-Hooper Professor has been given to the preparation and putting into type of a paper entitled "The Azoic System and its Subdivisions." This paper is one of considerable length, and will complete the first volume of the Geological Series of the Bulletin. It is the joint work of Dr. Wadsworth and the Sturgis-Hooper Professor, and contains a pretty exhaustive and critical review of nearly all that has been published in this country with reference to the older crystalline rocks. This paper is not quite all in type, but can soon be completed and issued.

Dr. Wadsworth has also continued the preparation of his work on the Cordilleras rocks, intended to form the eleventh volume of the Memoirs of the Museum. The first portion of this might already have been issued, had not unaccountable delay in the engraving of the plates taken place. He has also published numerous shorter contributions to geology and lithology, the number of these being between fifty and sixty. Most of these are to be found in the Proceedings of the Boston Natural History Society, the American Journal of Science, or in the weekly publication entitled "Science." The titles of several of these are annexed, in order that their scope may be understood.

1. Meteoric and Terrestrial Rocks. *Science*, I. 127.
2. Keweenaw Point Geology. *Ibid.*, 248.
3. St. David's Rocks and Universal Law. *Ibid.*, 541.
4. The Microscopic Evidence of a Lost Continent. *Ibid.*, 590.
5. Ocean Water and Bottoms. *Ibid.*, II. 41.
6. The Argillite and Conglomerate of the Boston Basin. *Bost. Proc. Soc. Nat. Hist.*, XXII. 130.
7. Some Instances of Atmospheric Action on Sandstone. *Ibid.*, 202.
8. The Bishoptonville and Waterville Meteorites. *Am. Jour. Sci.*, (3,) XXXI. 32.

REPORT ON PALÆONTOLOGY.

BY PROF. N. S. SHALER.

THE following courses of instruction in Geology and Palæontology were given by myself and my associate, Mr. W. M. Davis, in the Academic year 1882-83.

1. (N. H. 1.) A Course on Physical Geography and Meteorology, attended by sixty students. This course was given by Mr. Davis.

2. (N. H. 4.) A Course in Elementary Geology, with optional field-work, attended by one hundred and eighty-five students. By N. S. Shaler and Mr. Davis.

3. (N. H. 8.) A Course in Advanced Geology, open only to those who have taken N. H. 4, attended by twenty-five students. In this course the lectures were given by N. S. Shaler, and the field-work, which is required from all students, was given by Mr. Davis.

4. (N. H. 14.) A Course in Palæontology, with study of specimens in the Museum cabinets, attended by seven persons. Given by N. S. Shaler.

5. (N. H. 16.) A course in advanced field-work, designed to fit students for practical geological surveying, attended by one student.

During the winter two sets of special meetings for discussion, one in the department of Geology and one in that of Palæontology, were held;—the former under the joint direction of Messrs. Shaler and Davis, the latter under the direction of Mr. Shaler. These meetings were well attended, and proved very useful parts of the instruction.

My absence during the preceding Academic year resulted in a great diminution in the numbers of students in the course in Elementary Geology; this accounts for the great reduction in numbers in the higher courses, which are fed from the men who take that course. In the Academic year 1883-84, the higher courses will be well attended. N. H. 8 (Advanced Geology) will have

fifty students ; N. H. 14 (Palæontology), ten students ; N. H. 15 (Historic Geology), four students ; N. H. 16 (Field-work), eight students.

The students in the higher courses necessarily demand much labor on the part of the instructors. There is great need of an additional instructor in this department, who should have charge of the students' cabinet, and take a share in the field instruction, especially in the courses in Palæontology.

A considerable part of the time of the instructors in this department has been given to the study of the geological ground accessible for the purpose of field teaching. This is a necessary work, and one demanding much labor. From its results it appears that within fifty miles of Boston ground may be selected which will illustrate many important problems in the practical study of Geology. Nine students have been provided with summer work in the field. Two of these are engaged on the Northern Trans-continental Survey ; three are studying classic localities in Europe ; the others are at work at various points in this country. At present, this summer teaching is only given to those who have pursued the preliminary work in the College Classes.

I have published the following papers during the past Academic year : —

Vol. V. Reports of Kentucky Geological Survey. N. S. S. and assistants.

On the Knees of *Taxodium distichum*. Memoirs Kentucky Geological Survey.

On the original Connection of the Eastern and Western Coal-fields of the Ohio Valley. Memoirs Kentucky Geological Survey.

On the Age of the Caves in Lee County, Virginia. Memoirs Kentucky Geological Survey.

On the Floods of the Ohio Valley. Atlantic Monthly.

On the Improvement of the Pasture Lands of the Western Plains. Science.

The papers published by Mr. W. M. Davis, during the past year, exclusive of two in the Museum Bulletin, are : —

1. Glacial Erosion. Proc. Bost. Soc. Nat. Hist., XXII., 1882, pp. 19-58.

2. Brief Notice of Observations on the Triassic Trap Rocks of Massachusetts, Connecticut, and New Jersey. Amer. Journ. Sci., XXIV., 1882, pp. 345-349.

3. The Structural Value of the Trap Ridges of the Connecticut Valley. Proc. Bost. Soc. Nat. Hist., XXII., 1882, pp. 116-124.
4. The Deflective Effect of the Earth's Rotation. Van Nostrand's Engineering Magazine, XXVIII., 1883, pp. 297, 298.
5. An early Statement of the Deflective Effect of the Earth's Rotation. Science, I. 98.
6. The Origin of Cross Valleys. Science, I. 325.

REPORT ON MAMMALS AND BIRDS.

 BY J. A. ALLEN.

As the collections of Mammals and Birds for exhibition approach completeness, there is naturally a falling off in the number of specimens annually received, in consequence of the difficulty of getting the remaining desiderata. The additions during the last year are accordingly less numerous than for several years past. Of Mammals added, the stuffed specimens number thirty-three, and include, among the more noteworthy pieces, a fine musk-ox, and two Alaskan walruses, one an adult male, the other a very young example. The mounted specimens are eight in number, and include a killer-whale (*Orca*), and an Australian, a Chinaman, and a Sioux Indian. The other additions to the Mammals include a collection of eighteen skins (twelve species) and thirty-four skulls (fifteen species), from Orizaba, Mexico. The fin-backed whale (*Balaenoptera musculus*), reported as procured in 1880 in the Report for 1879-80, is now mounted in the Systematic Room of Mammals, and forms a striking piece.

The additions to the collection of Birds embrace two hundred and seventy-five mounted specimens, one hundred and seventy-five skins, fifteen mounted skeletons, and a few skulls and sterna. Of the skins, one hundred are from Mexico, forty from California, and seventeen from the Island of Luzon, — the latter the gift of Mrs. Greenough. Mr. A. L. Babcock, of Sherborn, Mass., has presented eighteen skins and a few sterna.

The mounted material, both skins and skeletons, for the Systematic and Faunal Rooms, is now all on exhibition, except that for the European, Atlantic, and Pacific Rooms (not yet ready for use), and the Mammals are labelled. The preparation of the labels for the Birds has begun. There are still some species of both Mammals and Birds lacking to complete the South American

Room, a larger number still to finish the Indian Room, while one third or more of the desiderata for the African Room are yet to be added.

The collection of Fossil Mammals has been largely increased through Mr. Garman's highly successful explorations in the West, but the material has thus far been too slightly examined to admit of a detailed report.

The following papers have been published by Mr. J. A. Allen during the past year:—

1. On Trinominal Nomenclature. "Zoölogist," March, 1883.
2. Note on Increase in Size northward among North American Birds. Bulletin Nutt. Orn. Club, Vol. VIII. pp. 80-83.
3. Hybridity in Birds. "Ibis," April, 1883.
4. List of Birds observed in the Vicinity of Colorado Springs, Colorado. (Jointly with William Brewster.) Bulletin Nutt. Orn. Club, Vol. VIII. pp. 151-161, 189-198.

REPORT ON THE REPTILES AND FISHES.

BY SAMUEL GARMAN.

THE greatest additions to the collections of Reptiles and Fishes have been of Fossils. During a four months' expedition to the Tertiary, Cretaceous, and Jurassic formations of the West, the amount of material secured was quite large, while the discoveries made will occupy the parties left in the field for a year or more. From the Tertiary the receipts are principally mammalian remains, found under circumstances which afforded additional evidence of similarity in the modes of forming bone basins in the Pliocene, and bone licks or pockets in the Quaternary. The fishes from the Tertiary are in the main Clupeoids and Percoids; the reptiles, Turtles and Saurians. A much greater variety of fishes was obtained in the Cretaceous. Prominent among them are such genera as have been named *Portheus*, *Ichthyodectes*, *Erisichthe*, and various *Berycidae*. Sauria, such as have been described under the names of *Liodon*, *Platecarpus*, *Clidastes*, etc., were plentiful. Six or seven species of Selachia, and various Pterodactyls and Birds, are also represented. From the Jurassic we have a number of the Dinosaurian Sauropoda, Ornithopoda, Stegosauria, and the like,—the most bulky and by far the heaviest of the accessions. On arrival, the majority of the fossils were found to be in good condition.

The largest single addition of recent species was a lot of thirty-five, purchased from the Linnæa Naturhistorisches Institut. Donations have been received from the Bergen Museum, Dr. C. O. Whitman, W. S. Bryant, J. A. Jeffries, N. Vickary, Dr. G. E. Manigault, Dr. B. G. Wilder, J. Ritchie, Jr., and George R. Allaman. Dr. Whitman presented some rare species from Japan. Professor Goode and Dr. Bean have identified and returned the fishes of the latest "Blake" Expeditions. A couple of shipments

of living turtles, lizards, and snakes were made to the Zoölogical Society of London.

In the Exhibition Rooms the principal work done has been in changing alcohol and labels, and in replacing poor specimens by better ones. A fine lot of mounted skeletons of fishes were prepared from alcoholic specimens for the Systematic Room. Changes in alcohol on account of coloration have been numerous, but the necessity has been proportionally much less than heretofore. For the Asiatic and the African Exhibition Rooms, the greater portion of the Reptiles and Batrachians have been mounted on tablets and placed on the shelves. The alcoholic Reptilia and Batrachia in storage have been moved to the room they are permanently to occupy, and are now being arranged. In the Skeleton Room, the material has been sorted, labelled, arranged, and — for the present — freed from insects.

The publications relating to the department include the following: —

On a Species of *Pseudis* from the Rio Arassuahy, Brazil.

On certain Reptiles from Brazil and Florida.

Introduction to the Reptiles and Batrachians of North America.

Synopses and Descriptions of the North American Ophidia.

A Systematic List and Synonymy of the Serpents of North America.

REPORT OF THE ENTOMOLOGICAL DEPARTMENT.

BY H. A. HAGEN.

THE additions to the collection have been important, belonging mostly to the biology of insects. Prof. F. G. Schaupp, of Brooklyn, N. Y., presented to the Museum his whole collection of the previous stages of U. S. Coleoptera, together with the types and dissections figured and published in the Bulletin of the Brooklyn Entomological Society. Mr. S. H. Scudder presented a large lot of the previous stages of the U. S. Lepidoptera. Mr. J. A. Lintner, of Albany, N. Y., presented previous stages of U. S. Sphingidæ wanting in the collection. Prof. J. H. Comstock, of Ithaca, N. Y., presented a large lot of the types of the U. S. Coccidæ. A large lot of Cave Articulata from Prof. N. S. Shaler's Survey of Kentucky were sent to the Museum by Prof. A. S. Packard, Jr. Mr. S. Henshaw, Miss Cora A. Clark, Mr. Charles V. Riley, and Rev. A. E. Eaton, of England, presented valuable specimens. A full set of all stages of *Cosmosoma omphale*, prepared by Mr. Witfield, Florida, who is the first American to prepare biological specimens of American Lepidoptera for sale, was given by the Assistant.

The Library has been enlarged by some rare and costly works on Lepidoptera, by some rare older books, and by a large number of pamphlets and periodicals, by the Assistant.

The collection has been remarkably free from pests.

The numerous additions to the biological collection during the last years made a new arrangement unavoidable. Till now, 108 boxes are finished,—the Lepidoptera to the end of the Bombycidæ, and the Coleoptera to the end of Hydrophilidæ. Both proved to be three times larger than before. The work had to be postponed for the want of cabinets.

A large amount of spreading and setting insects was done by the lady assistant.

The following gentlemen have received materials for their publications from the Museum collection : —

Rev. A. E. Eaton, Croydon, England, for his Monograph of Ephemera, of which 55 plates in quarto (advance sheets) are finished.

Mr. E. Simon, Paris, France, the Arthogastra of the collection, which have been returned determined. Publication in preparation.

Count Keyserling, Glogau, Silesia, the North American Spiders. Partly returned and published.

Dr. S. Meinert, Copenhagen, Denmark, all Myriopoda. Not yet returned.

Prof. H. J. Comstock, Ithaca, N. Y., Coccidæ. Published.

Prof. H. Osborn, Ames, Iowa, Aphidæ. Published.

Mr. S. Henshaw, the large collection of Coleoptera from Washington Territory. In way of publication.

The Assistant has published the Atropina family of a Monograph of the Psoridæ; the Papilio and Pieris of Washington Territory; a larger paper on the Colias of the United States; besides a number of smaller papers in American and European serials.

A number of special students have worked in the department from Ludington, Mich., Montreal, New York, Brooklyn, one during three months, the others several weeks.

Visitors to the department, students comparing the collection for determination, requests by letter for scientific information, and letters asking bibliographic questions, were as frequent as usual.

The following papers have been published by Dr. H. A. Hagen during the past year : —

1. *Jahresbericht fur 1882*, A. Dohrn and V. Caras. Neuroptera, Pseudoneuroptera.
 2. *Stett. Ent. Zeit.*, pp. 225-332. Monographie der Psorinæ, Zweite Familie Atropina, mit histor. Anhang ueber die Todtenahr.
 3. *Nature*, XXVII. 173. Invertebrate Casts.
 4. *Ibid.*, XXVIII. 244. The Mealy Odorous Spot in Lepidoptera.
- Entom. Monthl. Mag.*, London, Vols. XIX., XX.
5. The Tarsal and Antennal Characters of Psocidæ, p. 12.
 6. A Marine Caddis-fly, p. 235.
 7. Simulium feeding on Chrysalids, p. 254.
 8. Insects from the East Coast of Greenland, p. 42.

Proceed. Boston Soc. Nat. Hist., Vols. XXI., XXII.

9. List of Papers by T. W. Harris, not mentioned in the Harris Correspondence, p. 150.
10. On *Papilio Machaon*, p. 105.
11. On *Pieris*, p. 134.
12. On the Genus *Colias*, pp. 150-178.

Boston Zoöl. Soc., Vol. II.

13. Notes on the American Badger, p. 29.

Papilio, New York, Vols. II., III.

14. *Stretch Bombycidæ*, p. 188.
15. On *Papilio Machaon* and its N. Am. Representatives, p. 149.
16. Necessary Restitution of the Names given by T. W. Harris to two N. Amer. *Sphingidæ*, p. 61.

Canadian Entomologist, Vols. XIV., XV.

17. The oldest Figures of N. Amer. Insects, p. 11.
18. Experiments with Yeast in destroying Insects, p. 39.
19. *P. podalirius* has Priority, p. 180.
20. Insects injurious to Fruit, by W. Saunders, XV., p. 117.
21. *Trypeta Cerasi*, p. 159.

REPORT ON THE CRUSTACEA.

BY WALTER FAXON.

SINCE last year's report valuable accessions to the collection have come by gift from Dr. H. A. Hagen, Prof. W. Kovalevsky, Dr. C. O. Whitman, Prof. L. A. Lee, Prof. R. Ramsay Wright, Mr. C. L. Herrick, Prof. A. S. Packard, Jr., and Mr. P. R. Uhler. Of these a collection of *Astaci*, comprising all the known species from Siberia and Amurland, presented by Prof. W. Kovalevsky, deserves especial notice. Exchanges have been made with the U. S. National Museum, Boston Society of Natural History, Peabody Academy of Science, and the Illinois State Laboratory of Natural History.

Professor Baird being desirous of sending a collection of United States Crayfishes to the London Fisheries Exposition, I identified for the National Museum a set made up from the material in both Museums, containing nearly every species described from this country.

For the loan of valuable material during the year I have to thank the Director of the U. S. National Museum, the Council of the Academy of Natural Sciences of Philadelphia, Mr. P. R. Uhler of Baltimore, Prof. A. S. Packard, Jr. of Providence, the Curators of the Boston Society of Natural History, and the Peabody Academy of Science, Salem, Prof. L. A. Lee of Brunswick, Me., Prof. S. A. Clarke of Williamstown, Mass., Prof. O. P. Hay of Irvington, Ind., and Prof. S. I. Smith of New Haven.

A portion of the "Blake" collections is still in the hands of Prof. A. Milne-Edwards, of Paris, and Prof. S. I. Smith, of New Haven. In his "Recueil de Figures de Crustacés nouveaux ou peu connus," 1^{er} livr., Paris, April, 1883, the former has published figures of twenty-six of the remarkable species from these collections.

REPORT ON THE CONCHOLOGICAL AND PALÆONTOLOGICAL DEPARTMENTS.

BY CHARLES E. HAMLIN.

Two valuable additions to the Fossil Invertebrata of the Museum have been made during the year, the first being a second purchase from Ernst Häberlein of Pappenheim, Bavaria, consisting in part of species from the Lithographic Slate of Solenhofen, and partly of species from the beds of Kelheim, on the Danube. Besides the Invertebrata, this collection includes many fine fossil Fishes. The second is a collection of Gasteropoda, Lamellibranchiata, and Brachiopoda, chiefly the last, from the Bridgewater Limestone and other strata of Tasmania. To these are added admirably preserved Gasteropoda and Lamellibranchiata from the later Tertiary of Cape Schank, Victoria, S. E. Australia. The whole collection is in excellent condition, and is of especial interest as containing the first representatives of the palæontology of Australia and Tasmania that have come into the possession of the Museum, for which all have been expressly collected during several years past by Lieut. C. E. Beddome. In addition to the fossils, he has, after long and careful search, gathered and forwarded a collection of all papers and maps which have been published upon the geology of Tasmania, with the exception, as he states, of two papers no longer to be procured. The specimens and publications are received in exchange for recent shells.

The selection, identification, and mounting of recent and fossil Lamellibranchiata for exhibition have been completed, and the prepared series have been arranged, filling the cases of the Shell Room Gallery.

A partial suite of shells, 77 species, 206 specimens of generic types, has been prepared and delivered to the East Boston High School.

Several lots of shells have been named, for Oberlin College, Ohio, and for the private collections of H. K. Morrell, of Gardiner, Me., James N. Bishop, of Plainville, Conn., and Mrs. Wells, of Cambridge.

Considerable work has been done in the transfer and care of the collection of Fossil Plants, and in storing and labelling collections of Vertebrate Fossils as they have been received.

Some weeks have been occupied in naming and describing several small collections of fossil shells from Mount Lebanon, Syria, with a view to publication.

The exchanges of the year have been as follows:—

From Lieut. C. E. Beddome of Hobart, Tasmania, have been received 279 species, 1400 specimens, of recent marine shells of Tasmania.

From Count Emil Kornis, of Buda-Pesth, a lot of Hungarian Helices.

To Mr. O. N. Fearon have been sent, in return for Fossil Fishes from the Coal Measures of East Liverpool, Ohio, 57 species, 157 specimens, of recent Gasteropod shells.

To Mr. H. K. Morrell, of Gardiner, Me., and to Prof. L. A. Lee, of Bowdoin College, small lots of shells in exchange for other shells.

REPORT ON THE RADIATES.

BY J. WALTER FEWKES.

DURING the past year the whole collection of dry Corals and Sponges, together with the dry Starfishes and Echinoids, have been arranged in a room on the fifth floor in the new part of the Museum. The large collection of deep-sea bottoms, mostly those collected on the different "Blake" Expeditions, have been transferred to the same room. With these a collection of coral rocks and sands has also been placed.

The large collection of "Blake" Sponges identified by Schmidt, containing many types, has been divided. The dried specimens have been placed in the new room with the general collection of dried Sponges, while the alcoholic portion has been removed to the cellar.

The dried specimens of deep-sea Corals identified by Mr. Pourtalès have been placed with the general collection. My room in the new part of the Museum now contains, with the sea-bottoms, coral rocks, and a few corallines, most of the dried specimens of Sponges, Hydroids, Corals, and Echinoderms; while a room in the cellar of the old part will be devoted to alcoholic specimens of the same groups.

The rich collection of living Crinoids from the "Blake" Expeditions have been identified and added to the alcoholic Echinoderms. A list of localities from which specimens of these animals were taken has been published in a Museum Bulletin of the past year, supplemental to Mr. P. Herbert Carpenter's Report on the "Blake" Crinoids. Specimens of the different species mentioned in this list have been sent to several Museums. A representative collection of living Crinoids has been placed on exhibition in the South American Faunal Room, and in the general Exhibition Collection of Echinoderms.

Among the additions of the year are a number of specimens of Corals, identified by Professor Verrill, which have been received from the United States Fish Commission. The Museum at Bergen has sent a small identified collection of Radiates from the west coast of Norway.

An unidentified collection of "Blake" Worms and Bryozoa, a few specimens of pelagic Tunicata, with many deep-sea Alcyonoids, duplicates of the collection sent last year to Professor Verrill for identification, have been temporarily removed to the room now occupied by Mr. Agassiz.

The Museum published during the year the following papers, which had been prepared by me for the Bulletin:—

Explorations of the Surface Fauna of the Gulf Stream, under the Auspices of the United States Coast Survey, by A. Agassiz. — IV. On a Few Medusæ from the Bermudas. By J. Walter Fewkes. pp. 11, folded plate. Bull. Mus. Comp. Zoöl., Vol. XI. No. 3.

List of Additional Stations of Stalked Crinoids collected by the "Blake." Prepared by J. Walter Fewkes. pp. 2. Bull. Mus. Comp. Zoöl., Vol. X. No. 4. (Supplement.)

REPORT ON THE LIBRARY.

BY MISS F. M. SLACK.

DURING the year ending September 1, 1883, the Library has been increased by 576 volumes, 941 parts, and 651 pamphlets.

The whole number of volumes now in the Library of the Museum (exclusive of pamphlets) is 16,102.

[A.]

PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOOLOGY

FOR THE ACADEMIC YEAR 1882-83.

Of the Bulletin.

Vol. VII.

- No. 8. On some Specimens of Permian FOSSIL PLANTS from Colorado. By LEO LESQUEREUX. 4 pp. October, 1882. 3 c.
- No. 9. On the Relations of the TRIASSIC TRAPS and SANDSTONES of the Eastern United States. By WILLIAM MORRIS DAVIS. 59 pp. 3 Plates. January, 1883. 75 c.
- No. 10. The Folded Helderberg LIMESTONES east of the Catskills. By WILLIAM MORRIS DAVIS. 20 pp. 2 Plates. January, 1883. 25 c.
- No. 11. The AZOIC SYSTEM and its Subdivisions. By J. D. WHITNEY and M. E. WORDSWORTH, completing the volume (in press).

Vol. IX. completing the volume:—

- No. 3. On a Revision of the ETHMOID BONE in the MAMMALIA. By HARRISON ALLEN. 27 pp. 7 Plates. November, 1882. 75 c.
- No. 4. 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. 16 pp. December, 1882. 15 c.
- No. 5. Reports on the Results of DREDGING by the U. S. C. S. Steamer "Blake."—XIX. Report on the Fishes. [East Coast of the U. S.] By G. BROWN GOODE and TARLETON H. BEAN. 37 pp. April, 1883. 30 c.
- No. 6. Reports on the Results of DREDGING by the U. S. C. S. Steamer "Blake."—XX. Report on the OPHIUROIDEA. By THEODORE LYMAN. 50 pp. 8 Plates. May, 1888. \$1.00.

Vol. XI.

- No. 1. Reports on the Results of DREDGING by the U. S. C. S. Steamer "Blake."—XXI. Report on the ANTHOZOA and on some Additional Species dredged by the "Blake" in 1878-79, and by the U. S. Fish Commission Steamer "Fish Hawk" in 1880-82. By A. E. VERRILL. 72 pp. 8 Plates. July, 1883. \$1.25.
- No. 2. Reports on the Results of DREDGING in the U. S. C. S. Steamer "Blake."—XXII. A Chapter in the History of the GULF STREAM. By ALEXANDER AGASSIZ. 5 pp. May, 1883. 5 c.
- No. 3. Exploration of the SURFACE FAUNA of the GULF STREAM, under the Auspices of the U. S. Coast Survey. By ALEXANDER AGASSIZ.—IV. On a few MEDUSÆ from the Bermudas. By J. WALTER FEWKES. 10 pp. 1 folding Plate. August, 1883. 20 c.

No. 4. Report on the Results of DREDGING by the U. S. C. S. Steamer "Blake."—XXIII. Report on the ISOPODA. By OSCAR HARGER. 13 pp. 4 Plates. September, 1883. 40 c.

Nos. 5 & 6. Supplement to the "Blake" CEPHALOPODS. By A. E. VERRILL. With 6 Plates. In press.

No. 8. Supplement to Vol. V. of N. A. TERRESTRIAL MOLLUSKS. By W. G. BINNEY. 2 Plates. In press.

(Vol XI. to be continued).

Of the Memoirs.

Vol. VII., completing the volume.

No. 2. The Climatic Changes of Later Geological Times. Part III. pp. 265-394. October, 1882. For sale. Apply to Prof. J. D. Whitney.

Vol. VIII., completing the volume.

No. 2. Exploration of the SURFACE FAUNA of the GULF STREAM under the Auspices of the U. S. Coast Survey. By ALEXANDER AGASSIZ.—III. Part I. The PORPITIDÆ and VELELLIDÆ. By ALEXANDER AGASSIZ. 16 pp. 12 Plates. \$1.50.

No. 3. North American Reptiles. 200 pp. 9 Plates. By SAMUEL GARMAN, in Connection with the Kentucky Geological Survey, N. S. SHALER, Director. (In press.)

Vol. IX.

No. 2. Selections from Embryological Monographs, compiled by ALEXANDER AGASSIZ, WALTER FAXON, and E. L. MARK.—II. ECHINODERMATA. By ALEXANDER AGASSIZ. 45 pp. 15 Plates. July, 1883. \$3.00.

(Vol. IX. to be continued.)

Vol. X.

No. 1. Reports on the Results of DREDGING by the U. S. C. S. Steamer "Blake."—XXIV. Part I. Report on the ECHINI. By ALEXANDER AGASSIZ. 126 pp. 32 Plates. September, 1883. \$7.00.

(Vol X. to be continued.)

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. Papers by Prof. E. EHLERS on the Annelids of the Straits of Florida dredged by Messrs. POURTALÈS and AGASSIZ; in Connection with the Geological Survey of Kentucky, by Prof. N. S. SHALER on the Brachiopoda of the Ohio Valley; by A. HYATT, on Cephalopods; by W. G. Binney on N. A. Mollusca; by E. L. MARK on the Development of Arachnactis; by M. E. WADSWORTH; by J. W. FEWKES, on the Embryology of Annelids; and by A. AGASSIZ and C. O. WHITMAN, on the Embryology of Bony Fishes.

In Connection with Professor J. D. WHITNEY, the Water Birds of the United States. By BAIRD, BREWER and RIDGWAY.

Reports on the Dredging Operations in Charge of ALEXANDER AGASSIZ, by the U. S. Coast Survey Steamer "Blake," for 1877, 1878, 1879, and 1880. H. B. BRADY (Foraminifera), P. H. CARPENTER (Crinoidea), 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), C. E. HAMLIN (East Coast Mollusks), A. A. HUBRECHT (Nemerteans), A. MILNE-EDWARDS (Crustacea), J. MURRAY (Sea Bottoms), E. PERRIER (Starfishes), A. E. VERRILL (Alcyonaria), and H. THEEL (Holothuroidea).

[B.]

INVESTED FUNDS OF THE MUSEUM.

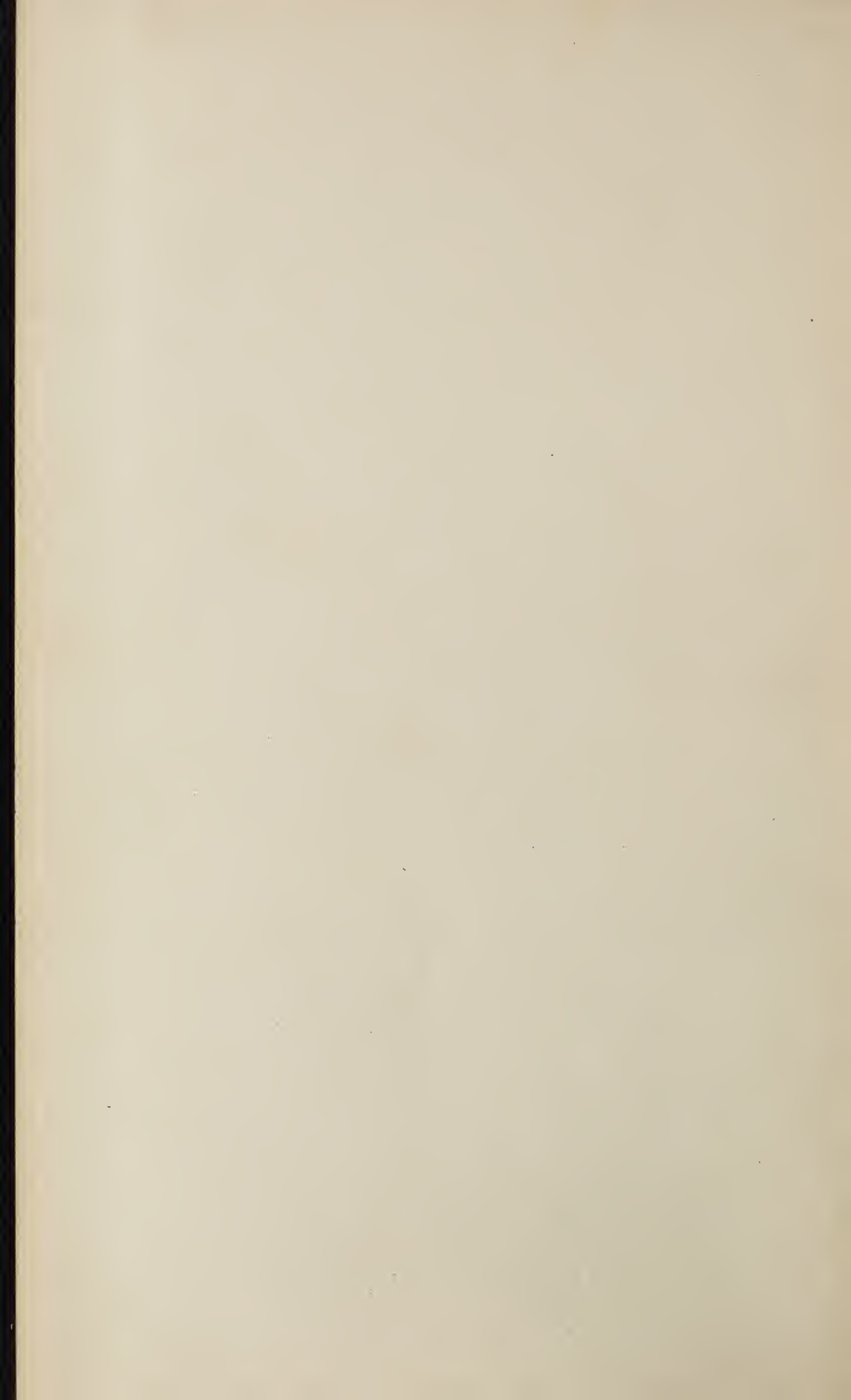
IN THE HANDS OF THE TREASURER OF HARVARD COLLEGE, SEPT. 1, 1883.

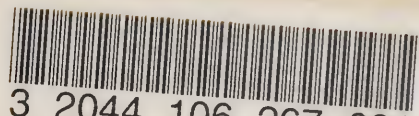
Sturgis-Hooper Fund	\$100,000.00
Gray Fund	50,000.00
Agassiz Memorial Fund	297,933.10
Teachers & Pupils' Fund	7,594.01
Permanent Fund	117,469.34
Humboldt Fund	7,740.66
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	\$580,737.11

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.





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