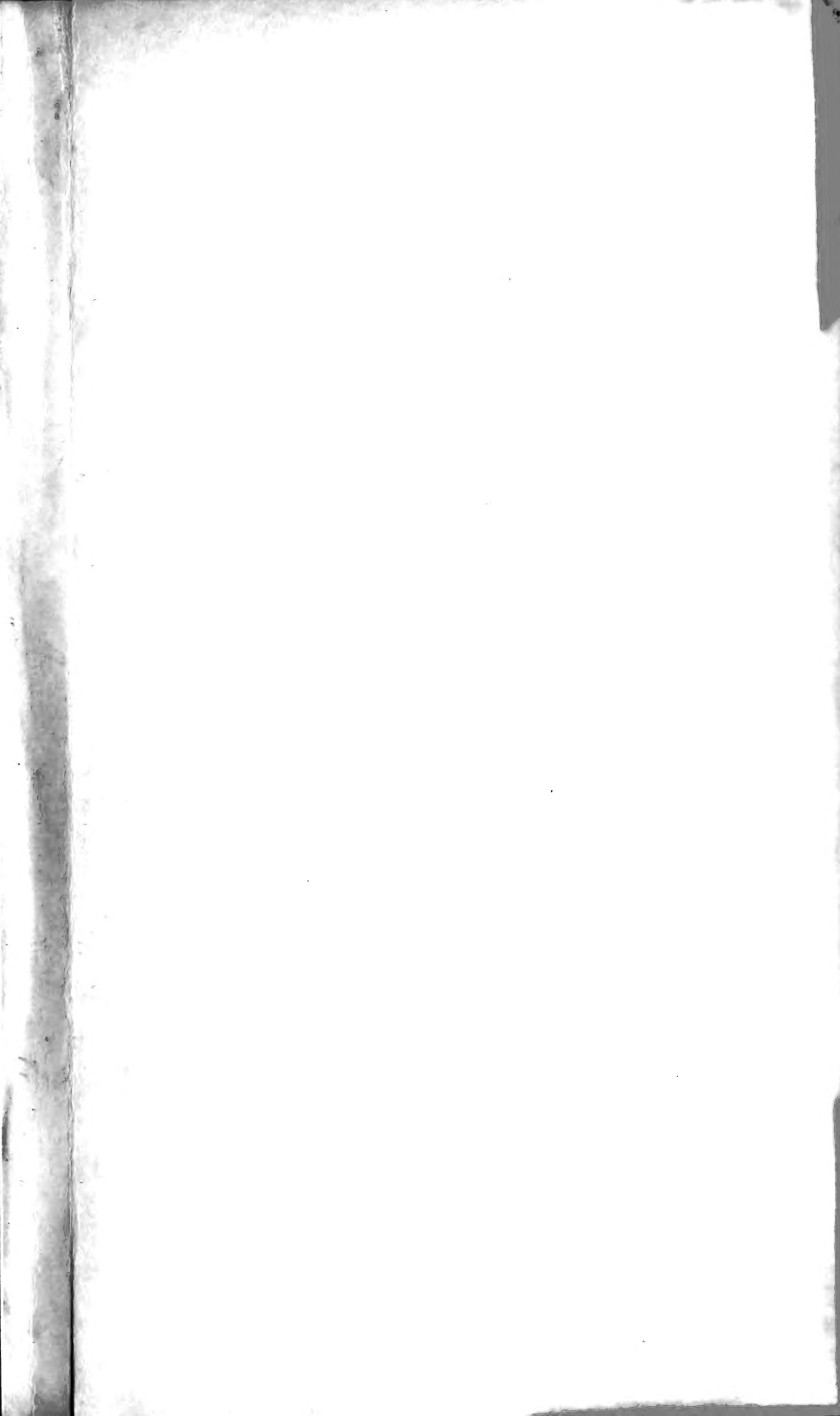


Walter Faxon.



ANNUAL REPORT

THE

INSTITUTE OF COMPARATIVE LINGUISTICS

AT HARVARD UNIVERSITY

FOR THE YEAR 1971

1971

MASSACHUSETTS

THE PRESIDENT AND FELLOWS OF HARVARD UNIVERSITY

1780 MASSACHUSETTS AVENUE, CAMBRIDGE, MASSACHUSETTS 02138

1971

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ANNUAL REPORT

OF THE

TRUSTEES

OF THE

MUSEUM OF COMPARATIVE ZOOLOGY,

AT HARVARD COLLEGE, IN CAMBRIDGE:

TOGETHER WITH

THE REPORT OF THE DIRECTOR

FOR

1871.

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BOSTON:

WRIGHT & POTTER, STATE PRINTERS

79 MILK STREET (CORNER OF FEDERAL).

1872.

Commonwealth of Massachusetts

To the Hon. Thomas H. ...

Sir:—The Trustees of the Museum have the honor to present to the Director of the Director, in the past year ... The paper marked [B] contains ... and committee for 1875.

Respectfully submitted,

M. B. ...

## Commonwealth of Massachusetts.

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BOSTON, April 1, 1872.

To the HON. HORACE H. COOLIDGE, *President of the Senate.*

SIR:—The Trustees of the Museum of Comparative Zoölogy have the honor to present to the Legislature the Annual Report of the Director, for the past year, marked [A].

The paper marked [B] contains a list of the Trustees, officers and committees for 1872.

Respectfully submitted, for the Trustees,

MARTIN BRIMMER, *Secretary.*

[A.]

## REPORT OF THE DIRECTOR

OF THE

## MUSEUM OF COMPARATIVE ZOÖLOGY,

FOR THE YEAR 1871.

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On the point of leaving Cambridge for an extensive journey, to explore the greatest depths of the Atlantic and Pacific Oceans, on both sides of the American Continents, I deem it my duty to state to this Board, what measures I propose to take for the management of the Museum during my absence.

Owing to the rapid increase of the institution, the management of its business affairs has become very laborious. For the last two years, Mr. T. G. Cary has taken chief charge of this part of the work, giving his whole time to it, with untiring and disinterested devotion. With your approbation, I propose to entrust it entirely to him during my absence; while Mr. A. Agassiz would advise on matters more especially concerning the scientific interests of the Museum.

With reference to the regular work of the different departments, I propose to transfer to the heads of each department the daily supervision I used to make personally of its progress, and I have prepared written directions for them all, to serve as a guide.

Mr. J. A. Allen is entrusted with the care of the Mammalia and Birds. He has been especially directed to put in order, for the purposes of the Museum, the collections he is now making in the Rocky Mountains, with Messrs. Bliss and Bennett. I have further directed him to dispose of our duplicates, by ex-



changes, to the best advantage of the collections under his care ; and further, to take the proper steps for the final exhibition of the Mammals and Birds in the new building.

As Dr. Steindachner will accompany me on the Deep Sea Dredging Expedition, Messrs. Bliss and Lockwood are charged with the care of the Reptiles and Fishes in his absence. I expect that they will together look to the safe-keeping of this most extensive and laborious department of the Museum. Mr. Bliss is more particularly directed to complete his examination of the collection of Fishes from the Himalaya Mountains, which we owe to the Rev. M. M. Carleton of Umbala, and also to prepare his monograph of the Ichthelidæ (Pomotis, Centrachus, &c.), for publication, while Mr. Lockwood is to arrange the Characines.

Mr. J. G. Anthony, with his two young assistants, will continue the arrangement and identification of the Shells, and especially attend to the critical identification of the specimens, and the preparation of collections for the use of the State Normal Schools, the Agricultural Colleges, and the Girls' High and Normal School in Boston. His long acquaintance with my aims in the Museum renders it superfluous that I should give him special instructions. The alcoholic collections of Mollusks will unfortunately remain for another year in their present state, as Mr. Blake, who lately had begun their arrangement, is to accompany me during the Deep Sea Dredging Expedition.

Dr. Hagen has presented to me so comprehensive a plan of the arrangement he proposes to carry out in the management of his department, that I need only say here, that I have referred him to his own report of last year for instructions. But the class of Insects is so numerous, and our stores already so extensive, that, in order to accelerate the final exhibition of the whole, I have appointed Mr. Boll and a young pupil of Dr. Hagen, to help him in the work. Mr. Boll is especially directed to put up all the insects requiring a new setting, and to prepare the way for extensive exchanges by eliminating the duplicates from the collection proper, and, in the most suitable seasons, gathering additional material for this purpose. As this work advances, Dr. Hagen is instructed to prepare entomological collections for the Normal Schools, on the same basis as those already in progress for the shells.

I have great pleasure in adding that Mr. Louis Cabot is successfully working up the larval conditions of the Neuroptera.

The Annelids of the Museum are in the hands of Prof. Ehlers, in Erlangen, for identification; and Dr. W. Stimpson, of Chicago, proposes to take charge of the Crustacea.

In the absence of Mr. Lyman, who is now in Europe, and of Count Pourtalès, who goes with me on the Deep Sea Dredging Expedition, to take especial charge of the dredging operations, Mr. Alex. Agassiz will have the sole charge of all the Radiates; but as Messrs. Lyman and Pourtalès have prepared in advance, for exchange, sets of duplicates from the collections lately in their hands, no disadvantage is likely to accrue to the Museum from the suspension of their work. Mr. Alex. Agassiz will be chiefly engaged with the final revision of the Echini. The Sponges are now completely identified, thanks to the revision made of them by Prof. Oscar Schmidt.

Dr. Maack is charged with the final arrangement of the Fossil Vertebrates. But he is first expected to work up the collection he has brought home from the Darien Expedition, under command of Captain Selfridge, and to complete his report upon the same. Meanwhile, I expect Dr. Maack to superintend the casting of new and characteristic fossils which I have selected to be multiplied by Mr. Kappeler for our exchanges. Mr. Kappeler is so completely master of his art that I expect to render a signal service to our science, by having him make casts of the most remarkable fossils described by American palæontologists, and by procuring casts of unique specimens from the Old World, in exchange for specimens thus far only known from American deposits, a direct comparison of which is often an absolute necessity for accurate identification.

Mr. Perry will continue the arrangement and identification of the tertiary fossils, with the aid of two young assistants, who have already had considerable practice in this kind of work. The investigations Mr. Perry has made, this summer, of the tertiary deposits of the Southern States have furnished him the means of a more accurate comparison of the American formations of these recent periods in the earth's history with those of Europe, from which I expect much benefit to our collection. Besides this, Mr. Perry is devoting special attention to the fos-

sils of the primordial era. It is intended to put aside a set of fossils for the Normal Schools.

Mr. St. John has undertaken the arrangement of the Carboniferous Fossils, and made a beginning with the fossil fishes of that formation, of which he has brought to the Museum the finest collection I have ever seen.

Mr. Lesquereux has so far completed the arrangement and identification of the Fossil Plants, that this part of our collection only awaits the finishing of the new building, and of the cases in which they are to be put up, to be made accessible to the public.

We now lack only a monographer of the secondary fossils, to complete the arrangement of our palæontological collections.

Mr. Bicknell continues to make microscopic sections of Sea Urchins, spines, shells, teeth and the like, alternating with the arrangement of the Foraminifera and other minute shells, of which large supplies are among our miscellaneous collections. The appointment of Mr. Bicknell as assistant to the Museum has been considered important, as collections of preparations such as he makes are too much neglected in most Museums.

Professor Wilder has been intrusted with the task of putting up a special collection of anatomical preparations to illustrate the structure and economy of our domesticated animals, with a view to complementing the instruction in our agricultural colleges. Prof. H. A. Ward is to prepare a series of skeletons of all the breeds of horses, cattle, sheep, pigs, &c., &c., for this purpose, a large number of which are already completed in his hands, and will shortly be exhibited in the Museum.

The preparation of the last number of our illustrated catalogue, and the facility with which valuable specimens, received in a fresh state, may be reproduced for future publication, with all their characteristics, have satisfied me of the great advantage we enjoy over other Museums in having an artist constantly engaged in this work. Mr. Roetter has been chiefly occupied, during last summer, with the drawing of fish embryos, with a view of helping those engaged in fish-breeding; and he has nearly completed the plates for the forthcoming number of the illustrated catalogue of our Echini, prepared by Mr. A. Agassiz.

Mr. Konopicky has drawn the plates for Mr. Cabot's Neuroptera, and is now engaged with those of Mr. Hyatt's Embryology of Ammonites.

Miss Slack, our librarian, is performing her duties with the most praiseworthy diligence.

Professor Shaler is now chiefly occupied with teaching our under-graduates; and, in order to render his instruction more practical and impressive, every possible effort is now making to prepare suitable collections for the lecture room, for the use of the professor, as well as for the purposes of the students, of which Professor Shaler will have charge. All the heads of the different department are instructed to assist Professor Shaler in the preparation and systematic arrangement of these collections, and at the same time to prepare materials for distribution among the Normal Schools. Besides this, Mr. Shaler continues to take part in the work of the Museum, and is at present devoting his attention to the Silurian Fossils.

The friends of science will, no doubt, be pleased to learn that the Museum of Comparative Zoölogy has made arrangements, by which Dr. Wm. Stimpson may be able to begin making another collection of those specimens upon which he had bestowed special attention during his untiring and successful devotion to zoölogy.

The most valuable additions to the Museum, during the past year, have been the collection of Devonian Fossils, bought of Dr. L. Schultze, and the large collection of marine animals of Mauritius, presented by the Hon. Nicholas Pike, U. S. Consul at Port Louis; not to speak of the numerous exchanges mentioned below in the special reports of the heads of the departments.

Thanks to the liberality of the legislature, and of the citizens of Boston, our institution has been put upon a footing of rapid growth and improvement. Its corps of workers is efficient and devoted. Our relations with other scientific bodies in different parts of the world are all we could desire. Our exchanges are rapidly increasing and improving, and we are missing few opportunities of making valuable purchases. If its present rate of expenditure could be made permanent, in a few years the Museum may have no superior, perhaps no equal.

With this I submit the special reports of my fellow workers as part of my own.

(Signed),

LS. AGASSIZ.

*Report on the Mammals and Birds*, by J. A. ALLEN.

During the past year little has been done on the collections of Mammals and Birds, beyond caring for their preservation, owing to my absence from the Museum, on a collecting tour to the Rocky Mountains. Early in the year, hermetically closing tin boxes were provided for the entire collection of unmounted skins of both birds and mammals, excepting a few of the larger specimens of the latter, for which tight wooden boxes were prepared. The skins were immediately removed, from the insecure cases in which they had been previously stored, to these insect-proof boxes. They were thoroughly fumigated as they were removed, and have since remained undisturbed. The alcoholic collections were also examined and properly cared for during the early part of the year, so that they still remain in good condition.

In respect to the additions to these departments, the year has been an important one. Dr. G. A. Maack, an assistant in the palæontological department, made, while attached as naturalist to Commander Selfridge's Darien expedition, valuable collections of birds and mammals, which, through the kindness of the Hon. G. W. Robeson, Secretary of the Navy, have become the property of the Museum. These collections number several hundred specimens, and contain many of great value.

A collection of Florida birds and mammals, numbering nearly 1,500 specimens, has been purchased of Mr. C. J. Maynard. This collection supplies many deficiencies in the reserve collection, and furnishes many duplicates of Florida forms for exchange.

The Museum has also received a collection of beautifully prepared skins of European birds, numbering 47 species, and nearly 100 specimens, from Dr. H. Dohrn, of Stettin, Prussia, and from the same gentleman, a choice collection of eggs, numbering over one hundred specimens, and representing 38 European species.

Valuable and extensive additions to these departments have also resulted from the expedition sent out to the Rocky Mountains, the past year, by the Museum. The expedition left Cambridge in April, and was in the field nearly nine months. Collections were made at intervals from the Missouri River to the

Great Salt Lake Basin, but principally at the following points: Leavenworth, Topeka, and Fort Hays, Kansas; Denver and Park County, Colorado Territory; Cheyenne, and Carbon County, Wyoming Territory; and the north-eastern part of the Great Salt Lake Valley. The results of this expedition may be briefly stated, as follows:—Altogether, about 1,700 skins were collected, 1,500 of which were of birds, and the remaining 200 of mammals, besides many skeletons and skulls, and specimens in alcohol. The collection of mammals, includes 8 elk, 12 black-tailed deer (*Cervus macrotis*), 1 white-tailed deer (*Cervus leucurus*), 25 prong-horned antelopes, 11 big-horns, or Rocky Mountain sheep, and 23 buffalo. In each case both sexes and the young are represented, and the specimens are about equally divided between skins and skeletons. In addition to these were obtained 35 skulls of antelope, 18 skulls of buffalo, and a fine series of skulls of elk and black-tailed deer. Among the smaller species are nearly 50 specimens of the little chief hare (*Lagomys princeps*), and about 30 specimens of *Cynomys*, or prairie dogs, divided about equally, between *C. ludovicianus* and *C. Gunnisonii*. Many of these specimens are already in the hands of able preparators; the preparation of the skeletons, which are to be retained by the Museum, having been undertaken by Prof. H. A. Ward, of Rochester, N. Y., while Mr. S. Jillson is engaged in mounting the skins of the larger mammals, many of which were sent to him fresh. The collection of birds contains extensive series of most of the species characteristic of the Great Plains, and the central region of the Rocky Mountains, including, not unfrequently, from twenty to forty of a species, and representing the first or nestling, and the autumnal plumages, as well as that of the breeding season.

Mr. Richard Bliss, of the Museum, accompanied the expedition for several months as ichthyologist, and Mr. C. W. Bennett was engaged as taxidermist. To both of these gentlemen the expedition is greatly indebted for its success, and especially to Mr. Bennett, whose zeal and activity were untiring. The Museum is under great obligations to Major-General John Pope, Commander of the Department of the Missouri, for important aid rendered to the expedition, and for the kindly interest with which he favored its work; to Dr. W. E. Webb, of Topeka, Kansas, for many substantial favors; and to the Hon. W. N.

Byers, of Denver, Colorado. It also gives me pleasure to acknowledge the indebtedness of the expedition, for valuable assistance, to Capt. Samuel Obersheim, Acting Commander of the Military Post at Fort Hays; to Colonel Morris, Major Robinson, Captain Sturgeon, and Lieut. F. W. Baldwin, of the same post, and to Colonel E. Morrow and Lieut. Chase, of Fort Fred. Steele, Wyoming Territory, for many favors. Acknowledgments are also due to the American Merchants' Express Company, and to Wells, Fargo & Co., who have kindly forwarded our specimens at greatly reduced rates; to the Union Pacific Railroad Company, and to the Kansas, and the Denver Pacific Railroad Companies, for passes for the members of the expedition over their respective roads, and for the free transportation of specimens and baggage. The Hannibal and St. Joseph, the Chicago, Burlington and Quincy, and the Michigan Central Railroad Companies have also presented the expedition with passes. The cordiality with which all these favors in behalf of science were rendered, made their reception the more gratifying.

Other collections received during the year, and deserving particular mention, are the fine suite of 15 Hawaiian skulls, presented by Dr. Robert Wood, of Honolulu; the skeleton of a young "fin-back" whale, presented by Mr. James H. Blake; the skeleton of a Holstein bull, presented by Mr. W. W. Chenery, of Belmont; and the skeleton of a manatus, received from Dr. Krauss.

In addition to the skeletons sent by the Rocky Mountain expedition to Prof. Ward, a large number of others have been forwarded to this gentleman for preparation, a considerable part of which are to be mounted. Among these last, are several skeletons of domesticated cattle and horses, representing different breeds; six species of *Pinnipedes*; several specimens of *Alces*, including a specimen from Europe, and many smaller animals.

The subjoined schedules exhibit more fully the additions that have been made to these departments since the last report:—

*Mammals, by Donation.*

ATWOOD, Hon. N. E., Provincetown, Mass. Skeleton of a young Sperm whale.

BICKNELL, EDWIN (Assistant in the Museum). About 100 specimens of white mice, in various stages of development.

BLAKE, JAMES H. (Student in the M. C. Z.) Skeleton of a young Fin-backed whale (*Balænoptera*).

BUEHLER, CHAS., Fort Fred. Steele, Wyoming Territory. Skull of a Grizzly bear.

CHENERY, W. W., Belmont, Mass. Skeleton of a thorough-bred Holstein bull.

DARIEN EXPEDITION, Capt. T. O. SELFRIDGE, Commander. 15 specimens, 10 species, in alcohol; 9 specimens, 6 species, skins; several skulls and skeletons, collected by Dr. G. A. Maack, naturalist of the expedition.

PIKE, NICHOLAS, U. S. Consul in Mauritius. 2 species of Pteropus; several skulls, and other small mammals, from the Island of Mauritius.

PHILIPS, Capt. C. O., Deerfield, Mass. Skeleton of a fox, and skull of a young calf.

WOOD, Dr. ROB'T, Honolulu, S. I. 15 Hawaiian skulls.

*By Exchange.*

DOHRN, Dr. H., Stettin, Prussia. 3 specimens, 3 species.

KRAUSS, Dr. Skeleton of a *Manatus*, and other specimens.

*From the Rocky Mountain Expedition.*

Two hundred skins, 30 species; 60 skeletons, 14 species; 240 skulls, 25 species; 20 specimens in alcohol, 6 species.

*By Purchase.*

Forty specimens, 12 species, skins; several skulls of walrus, Cetaceans, and other species, from various localities.

*Birds, by Donation.*

DARIEN EXPEDITION, Capt. T. O. SELFRIDGE, Commander. 184 skins, 75 species; 75 specimens in alcohol, 42 species, and several skulls, collected by Dr. G. A. Maack.

SCOTT, W. D. 37 skins of New England birds, 15 species.

*By Exchange.*

DOHRN, Dr. H., Stettin, Prussia. 100 skins of European birds, 51 species; 103 eggs of European birds, 38 species.



*From the Rocky Mountain Expedition.*

Fifteen hundred skins, 200 species; 100 specimens in alcohol, 30 species; 33 nests and 160 eggs, 20 species; several lots of young birds in alcohol, and a number of skulls.

*By Purchase.*

Forty-three skins, 21 species; 34 specimens in alcohol, 15 species, from Dallas, Texas; 74 skins, 7 species, from Massachusetts; 1,430 skins, about 100 species, chiefly from Florida.

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*Report of DR. G. A. MAACK.*

At the close of my last report, November, 1870, I expressed the hope that it might be possible for me, in the position of Geologist and Naturalist of the U. S. Darien Exploring Expedition, to which I was appointed at that time, to do, besides my official work for the United States Government, some good work for our Museum. At present, when everything I have collected has arrived at Cambridge in good condition, I am happy to be able to report that my hope has been wholly fulfilled. Thirty cases filled with geological, palæontological and lithological specimens from the Isthmus of Panama, Darien and Chocó, collected on the Atlantic side as well as on the Pacific, have been the result for our Museum, as the Hon. Secretary of State has given permission to unite all the collections with those of the Museum.

It may be allowed to me to return here publicly our heartiest thanks to the Hon. Secretary of the Navy for this contribution to our collections.

In giving some outlines of them, I may say, first, that I labelled all the various specimens with the greatest care, to be sure of what occurs on the Atlantic slope and what on the Pacific slope. This careful labelling is nowhere so necessary as on the Isthmus, where the continental mass of Central America contracts to its greatest narrowness, and where the influence of the climatic differences between the two ocean-shores, as well as that of the different geological and botanical characters of this region upon the development of animal life, can be studied better than at any other place, after having ascertained carefully the *habitat* of the species.

The collections from the Atlantic side have been made :—

- 1st. At Carthagena and its neighborhood.
- 2d. At Turbo, a village on the Gulf of Darien, and its vicinity, for several miles.
- 3d. Along the Atrato River and in the interior of that region.
- 4th. At Aspinwall and along the Panama Railroad.

The collections from the Pacific side have been made :—

- 1st. At Panama.
- 2d. In the Gulf of St. Miguel and up the Tuyra River.
- 3d. In the Cupica Bay and across that region along the Napipi River.

The zoölogical collection contains, of Mammals, several monkeys representing two species of the Genera *Cebus* Erxl. and *Hapall*, Ill, which are preserved in alcohol; a dozen bats; some specimens of squirrel, and of aguti (*Dasyprocta Aguti* L.); several skulls of the Water-hog (*Hydrochærus*, L.); two specimens of the Ant-eater (*Myrmecophaga jubata*, L.); specimens of the Opossum (*Didelphys*, L.), and of the Sloth (*Bradypus pallidus* Wagn); several skulls of the Pecari (*Dicotyles torquatus*, Cuv.), and of the Manati (*Manatus Americanus* Cuv.)

The birds of the Isthmus are represented very well in my collection, which contains a good many skins, as well as alcoholic specimens; especially a very fine specimen of *Trogon resplendens*. This most beautiful bird, found only near the volcanoes of Mexico, in the Altos of Guatemala, and near the volcano of Chiriqui, is worthy noticing.

The collection of Reptiles is likewise very well represented by many specimens of turtles, of lizards, of iguanodons, by one Alligator-skeleton, by many snakes, and by various species of frogs.

The collection of Fishes contains several species from the Atlantic side, and some from the Pacific side.

The Invertebrata are represented by a large number of beetles, of locusts, of butterflies, of spiders, of crabs, of centipedes and millipedes, of Mollusca and of Radiata.

This would be a general statement of the zoölogical collection

which I brought back from the Isthmus, and the material of which has been given to the different Curators of the Museum.

My geological and palæontological collection is very rich in good and characteristic specimens of the various rocks which occur on the Atlantic and on the Pacific, and which form the constituent parts of the dividing ridge between the two oceans. I made geological surveys at three different parts of the Isthmus, namely: 1st, between Aspinwall and Panama (Province of Panama); 2d, between the Gulf of Urabá, or Darien del Norte, and the Gulf of St. Miguel, or Darien del Sur (Province of Darien); 3d, between the Napipi River and Cupica Bay (Province of Chocó); and collected as much material as possible, in order to obtain a clear insight into the geological structure of these regions. It was important for me, in this respect, to determine the existence of several coal-beds on the Atlantic, near the Gulf of Urabá, and to discover various tertiary deposits, full of fossil-shells, up the Tuyra River, on the Gulf of St. Miguel on the Pacific Ocean.

The principal results which I have gained by this geological examination of the Isthmus are the following:—

1st. The Cordillera de los Andes changes its general character in the Province of Chocó; while it strikes through the whole of South America in a meridian direction, its general bearing there is in the direction of the parallels. This strike is preserved through the whole Isthmus, causing its curved form and the sudden contraction of the continental mass.

2d. The height of the Isthmus mountains is much less than that of the South American Cordilleras, and decreases especially between Panama and Aspinwall, where the whole orographical character of the Isthmus undergoes a great change. The mountainous system in the Province of Chocó, near Limon Bay, and the internal part of Cupica Bay, has a geological character different from that of the Tuyra, and of the Chucunaque regions, in the Province of Darien; and this mountainous system differs again, by its parallel arrangement, as well as by its petrographical composition, from that between Panamá and Aspinwall. Consequently the whole Isthmus consists of three systems differing from one another.

3d. The Isthmus-Cordillera does not possess, in general,

table-lands of so large an extent as those which are frequently encountered in the South American Cordillera, as well as in Central America. This is a very important fact, if we bear in mind that these high table-lands on the western coast alone make it possible for a white man to work with endurance in the tropics, and to cultivate with success all those natural products which create tropical commerce. This orographical fact, properly understood and applied, is the key to an explanation of a great many things in the past history of South America, of the Isthmus and of Central America.

4th. We possess palæontological proofs, preserved in the tertiary strata of the Tuyra River on the Pacific slope, on the one hand, and in the tertiary deposits from Empire Station to Monkey Hill, along the Panama Railroad on the Atlantic slope, on the other hand, which show us that at least two channels,—one between the Gulf of St. Miguel and the Gulf of Urabá, the other between Panama and Aspinwall,—existed up to the later tertiary period, by which both oceans mingled their waters. This fact is important for an understanding of the geographical distribution of the present botanical and animal life.

5th. The upheaval of the Pacific Cordillera belongs to the later eruptive period, and its rocks belong to the petrographical families of the trachyte and the basalt; while the San Blas Cordillera, of the Atlantic slope, belongs to an older geological period, and is composed of the older crystalline rocks,—granite, syenite and diorite. The northern Atlantic slope was consequently already upheaved and in a state of tranquillity when the waters of the South Sea still covered the whole area which forms at present the Pacific slope. If after this we take into account the constant disintegrating effect of the north-eastern trade-wind, saturated with the moisture of the Caribbean Sea, we shall understand how it was possible that the rocks of the Atlantic slope could be so greatly decomposed, and could furnish afterwards the material of a fertile soil which had the power to produce a most gorgeous vegetation.

I have given, so far, the positive results which have been gained up to the present time for the Museum by the expedition. But I can add that I have also gained for our Museum, during this journey, several friends residing on the Isthmus, as well as in

Nicaragua, in Costa Rica, in San Salvador, in Guatemala and in Peru, who have promised me their ready assistance for the future in promoting the interests of the Museum.

After my return in July, 1871, I was engaged in preparing my report on the Geology and Natural History of the Isthmus of Panama, Darien and Chocó, for the United States Government.

After this work was done I devoted most of my time to examining and putting in order the osteological collection of the Museum, which work makes more and more progress daily, but will still occupy me for a long time, because the material, which has been collecting for years, is very great, and has been augmented during the last year by several presents from friends of the Museum. I use this opportunity to return our best thanks to Professor Krauss of Stuttgart, who sent us a fine manati skeleton; to Mr. J. A. Allen, who presented to the Museum a large number of mammalia skeletons, collected during his late exploration in the West along the Pacific Railroad; to Dr. Robert W. Wood, who presented fifteen well-preserved Hawaiian skulls; to George J. Nickerson, Esq., of New Bedford, from whom we received several good skulls of *Porcus babyroussa Klein*, one skull of a young walrus and one skull of a whale-killer, caught on the coast of California; and to Mr. J. Boll for some turtle-skeletons from Texas.

In regard to fossil Vertebrates, a great deal of progress has been made in adding a collection of exact casts from rare original specimens, which have been described and published. It has been the good fortune of the Museum to gain the services of Mr. Kappeler, an artist of great ability in this department. Moulds of several skulls of *Mastodon giganteus* belonging to the collection of Professor J. Wyman have already been made, and are ready for making casts. Another series of moulds and casts have been made from various typical fossils belonging to the Smithsonian Institution. I return, in the name of the Museum, our thanks to Professor Wyman and to the Smithsonian Institution for the liberality with which these fossils have been lent to us.

The collection of fossil Vertebrates has been increased by:—

- 1st. A set of Fossil Mammalia from France, presented by E. LARTET.
- 2d. Several Fossil Mammalia from Texas, presented by J. BOLL.
- 3d. Various Bones of a Fossil Bird, and of a Fossil Turtle, from Mauritius, presented by N. PIKE, Esq., U. S. Consul at Port Louis.
- 4th. A number of Fish-Teeth from the phosphate beds, Charleston, S. C., presented by the U. S. Coast Survey.
- 5th. Several Fish-Teeth from Gay Head, Martha's Vineyard, presented by B. LUCE, Esq.
- 6th. A large series of Fossil Vertebrates from the Red Crag of England, presented by H. C. QUIMBY, Esq.
- 7th. A large number of fine fish-specimens from the Harz Mountains and from Bohemia, presented by Professor VON COTTA of Freiberg.
- 8th. A number of Fish-remains from the tertiary shales of Green River, Wyoming Territory, collected and presented by Mr. J. A. ALLEN.

I return, in the name of the Museum, our thanks to all these different gentlemen.

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*Report on Conchology by JOHN G. ANTHONY.*

Early in the year my time was mainly devoted to a revision of the genus *Helix* as restricted and bounded by Lamarck and the writers of his day. The authors of that time had much curtailed and improved the Linnæan arrangement previously in use, but the genus *Helix* still contained many species not properly belonging therein until Albers commenced his labors among the terrestrial Mollusks, his works far exceeding in accuracy those of his predecessors. I have carefully followed Albers in the arrangement which I have completed of our 1,500 species in this interesting genus, and trust that our very large number and range of species has enabled me to do this with perfect satisfaction. Nearly all the divisions made by him are well represented in our collection, and the completion of this very desirable work enables me to record another great and additional step towards a complete catalogue of our Mollusca, which we have long been desirous of seeing completed, and of which the *Naiadæ* and *Melaniadæ*, with a few of the minor groups, alone remain unarranged.

Two lady assistants have, as usual, been occupied in cleaning and mounting the specimens, and their labors in this way have been very satisfactory. During the current year some 2,000 tablets, mounted with 5,500 specimens, have been added to the collection; our present number of mounted tablets being considerably over 30,000, and the number of specimens thus mounted exceeds 80,000.

These labors, however important, have not been allowed to engross all my time and attention, or to interfere with the increase and improvement of the collection in other respects. Our exchanges have been steadily kept up, and some of the most interesting species we have ever received have come to us during the current year.

Among these, I recur with peculiar pleasure to one species which happened to be among my earliest acquisitions in 1825, but which has since persistently eluded all attempts to procure additional specimens, until we received during the present year, shortly after our last report, quite a number of specimens.

The number of specimens received since our last report, has not been as great as in many former years; but we now aim at greater discrimination, and only desire those which will be of immediate service, either by supplying the many deficiencies in our collection directly, or indirectly by furnishing us with available duplicates, which need only a second exchange to add to our species. Nearly every exchange made during the year has therefore been a special one, and thereby all useless duplicates have been in a great measure avoided.

Among the valuable contributions thus received, we desire to note a most interesting series of specimens received from Mr. Gates of the U. S. Navy, consisting of about 500 species, very largely from Tahiti and the Fejee Islands; which, on faunal considerations as well as the great beauty and perfection of the specimens, were very desirable to us.

Our Pacific Coast Shells have also been considerably enriched by a fine collection purchased from Dr. J. G. Cooper, of about 400 species, carefully named and well preserved. These, with our previous possessions from that quarter, and some which are promised from another source, will render our fauna of that region very complete and satisfactory.

Our East Indian fauna, hitherto very complete, has been fur-

ther enriched by a valuable contribution from Rev. Mr. Fairbank, who has added about 50 new species from that interesting portion of the world, and from localities hitherto unrepresented with us.

Dr. Maack brought home a large number of highly interesting shells, obtained on both sides of the Isthmus of Darien, but principally at Panama, on the western side, and at Carthagena on this side. They are the more interesting, as those from Carthagena show some forms which have generally hitherto been credited to the African coast, and not before known to exist at any intermediate point.

I cannot here omit to allude to the very valuable, though small collection of marine forms, received of J. Gwyn Jeffreys, Esq., who paid us a visit in September, for the purpose of examining and comparing our deep-sea dredgings with those brought to light by the British expeditions for the same purpose, of which Mr. Jeffreys is one of the most zealous operators. Only 33 species were thus received. Mr. J. subsequently paid a visit to Chicago, shortly previous to the great fire, and minutely examined our specimens in Mr. Stimpson's hands there, taking home with him many species for better comparison with the European dredgings. Our other specimens in Chicago all perished in the ruins of the Chicago Museum by the great fire.

From Santo Domingo we have a small but interesting series of land shells, received through Mr. Charles Wright, who accompanied the American commissioners to that portion of Hayti. It is to be regretted that the scientific men who went on that occasion could not have penetrated further into the island, and brought away larger and more complete representations of its fauna.

Mr. Geale, who has hitherto contributed largely and very acceptably to our collection, has again laid us under obligations, by sending us two fine lots of handsome and rare forms, thereby supplying some of our desiderata and filling many a hiatus which has long troubled us.

Since my last report, the collection of shells formerly belonging to the Harvard Natural History Society which had for some time previously been in the Museum building, has been placed in my hands, and found to be a considerable addition to our resources. It has enabled us to furnish in return a large number



of suitable specimens for teaching the scientific class, organized in our Museum from students in Harvard University, as well as to add some good species to our own general collection.

Dr. H. Dohrn has also given us another proof of his kindness, by contributing a choice and valuable selection of species, besides making us a most acceptable visit, inspecting carefully our collection, and revising in some cases our imperfect determinations of species.

From many others of our tried friends, we have received during the present year additional proofs of their kindness, which we are duly grateful for, and most heartily thank them. Among these we cannot but mention Dr. Cox, Nicholas Pike, Esq., and the Museum at Bordeaux.

From every source we have received 34 packages, 2,494 species and 20,566 specimens since our last report.

Our consignments during the same period have been 23 packages, 1,965 species and 8,007 specimens.

Comparatively little has been done in my department, during the year, in the way of determining species, as up to the last of the year we were without the books needed to carry our determinations beyond the point to which they had already attained. But just previous to closing this Report, our library has been greatly enriched by receiving a handsomely bound copy of Reeve's Iconography, in 17 volumes. This valuable work I have long desired the use of, in vain, and no time will be lost in availing myself of its important aid during the coming season, to reduce the number of our undetermined species.

One other important work which I have been called upon to do during the year, remains to be noticed; viz., that of furnishing the normal schools of the State with generic types of shells, carefully selected, for the instruction of the scholars, to which we hope to add in due time such specimens as we can furnish illustrative of the species found in New England particularly, as well to some extent with the species from foreign as well as domestic localities. I have commenced this arrangement with the normal school in West Newton Street, Boston, under the management of Mr. Hunt, and, in order to make this more useful to that institution, have required him to detail a few of his best scholars to come at stated times for many weeks in order to learn the proper method of handling and mounting shells, and

this work has been done by them very neatly and satisfactorily. Upwards of 200 generic types illustrated by a large number of species, have been thus prepared and mounted ready for delivery whenever the cases are ready to receive them.

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*Report on the Articulates, by Dr. HAGEN.*

The additions to this department during the past year have been numerous and valuable:—

*By Donation.*

1. From the Rev. M. M. CARLETON, in the East Indies, insects, in alcohol, collected in the Himalaya Mountains; mostly Coleoptera, Orthoptera and Hemiptera, 15 jars.

2. From the same, insects and spiders, in alcohol; also collected in the Himalaya Mountains, 30 jars.

3. From Dr. MAACK, insects, in alcohol, collected at Cartagena, New Granada, by the Darien Expedition, Orthoptera, caterpillars and larvæ, and spiders, 7 jars.

4. From Prof. F. SANBORN, fleas, in alcohol.

5. From Mr. EMERTON, the larva of *Myrmelion innotatum*, in alcohol.

6. From Mr. W. HOLDEN, a lot of insects, of different orders, collected in California and Ohio.

7. From Mr. ROLAND THAXTER, a large lot of *Att. Promethea*, living cocoons.

8. From Dr. MAACK, a valuable lot of insects, dry and in alcohol, collected by the Darien Expedition, in different localities.

9. From Mr. F. D. GREEN, *Danais Archippus*, caterpillars and chrysalids, living.

10. From Mr. W. HOLDEN, a rich lot of insects, collected in San José, California, and various other localities.

11. From Baron OSTEN-SACKEN, additions to the collection of American galls, previously presented by him to the Museum.

12. From Messrs. WM. MORRISON and M. M. CARLETON, a lot of insects, spiders and centipedes, in alcohol, from Koolloo, in the Himalaya Mountains.

13. From Mr. ULKE, 15 North American Micro-lepidoptera, in very fine condition.

14. From Mr. E. L. LAYARD, butterflies, 95 species, and Coleoptera, 62 species, from the Cape of Good Hope, comprising, in all,

325 specimens. This collection was received some time since, but was not until now deposited in the proper department.

15. From Mr. S. A. TOOTHAKER, living Colorado potato-beetles.

16. From Mr. R. HOWELL, specimens of *Sphenophorus*, destructive in Nichols, Tioga Co., New York.

17. From Mr. TROUVELOT, a lot of living caterpillars, from New England silk-worms; also silk of *Att. Polyphemus*, and eggs of that species.

18. From Messrs. J. A. ALLEN and R. BLISS, a lot of butterflies, collected in Kansas and Colorado, nearly 400 specimens. Also Coleoptera, Orthoptera and Parasites, in alcohol.

19. From Prof. N. S. SHALER, a lot of insects, in alcohol, collected during his trip to Virginia, in different localities; in all, 2,489 specimens, of which 1,395 are beetles; other insects, 1,095.

20. From Rev. M. M. CARLETON, insects, in alcohol, collected at Koolloo, in the Himalaya Mountains, 2 jars.

21. From Mr. J. SHUTE, Woburn Mass., 2 boxes of insects, from China, and biological specimens from Massachusetts.

22. From Mr. B. P. MANN, insects, collected in Brazil, and some biological specimens. Also white ants, from California.

23. From Mr. EDWARD BURGESS, 3 species of wood lice, from Massachusetts.

24. From Mr. J. A. ALLEN, several jars of insects, in alcohol, collected in Utah.

25. From Dr. T. HILL, insects, in alcohol, collected in Utah, 2 jars.

26. From Mr. N. PIKE (U. S. Consul), a rich lot of insects, dry and in alcohol, collected in the Island of Mauritius.

27. From Dr. H. DOHRN, Stettin, insects, from Elmina, Africa, 70 species, Goliath *Druryi*, *Polyphemus*.

28. From Baron OSTEN-SAKEN, a lot of insects, in copal (gum animé), partly determined by Dr. Staol, of Stockholm, Sweden.

29. From Mr. F. SANBORN, 2 American species of *Boreus*, living.

30. From Rev. M. M. CARLETON, a very large collection of butterflies and other insects, dry and in alcohol, from the Himalaya Mountains, about 10,000 specimens.

31. From Mr. J. A. ALLEN, insects and fresh-water crabs, from Nebraska.

32. From Prof. L. AGASSIZ, butterflies, from St. Thomas, West Indies.

*By Exchange.*

33. From Prof. KAUP, of Darmstadt, a lot of Coleoptera.
34. From the Imperial Museum, in Vienna, a series of 180 genera and species of European Diptera, types of Mr. Schiner.
35. From Dr. SCHLEISH, of Stettin, Germany, a lot of European Tineina, in very fine condition.
36. From Mr. C. A. DOHRN, of Stettin, 278 species of European Coleoptera, all new to the collection, some of them first-class varieties.
37. From Mr. WEHNKE, of Hamburg, 212 species of European Coleoptera, all new to the collection.

*By Purchase.*

38. From Mr. J. BOLL, Lepidoptera, raised in Europe, from cocoons collected in Dallas, Texas, and valuable biological specimens.
39. From Prof. MENGE, in Danzig, Prussia, a collection of spiders, from Prussia, types to his work, in alcohol, 60 species of both sexes, 250 specimens in all.
40. From Mr. BRISCHKE, Danzig, a biological collection of about 180 species, in very fine condition.
41. From Prof. ZELLER, in Stettin, a rich lot of European Microlepidoptera, all new to the collection, and in very fine order.
42. From Prof. LOEW, in Guben, Saxony, a rich lot of European and American Diptera, types of his works, and genus types. Also, a complete series of his works on Diptera.

*Deposited.*

43. By Baron OSTEN-SACKEN. His entire collection of North American Diptera, with the published types.

*Crustacea and Worms.*

44. From Dr. MAACK, Crustacea and worms, collected by the Darien Expedition, in different localities.
45. From Mr. W. HOLDEN, Crustacea, in alcohol, collected in his trip from California to the Isthmus of Panama.
46. From Rev. M. M. CARLETON, Crustacea and Myriapoda, from Northern India, 15 jars.
47. From Prof. SHALER, fresh-water crabs, collected in Virginia.
48. From Prof. ESMARCK, of Christiania, Sweden, Crustacea, from Europe, in alcohol.
49. From Mr. RAMON M. FURNES, Havana, 14 Crustacea, from Cuba, dry, mounted for exhibition.

50. From Mr. PIKE, U. S. Consul at Mauritius, a very rich lot of Crustacea, dry, from Mauritius.

51. From Mr. J. A. ALLEN, a very valuable lot of *Astacus Gambali*, and other Crustacea, from Colorado and Utah.

52. From Mr. J. SHUTE, Woburn, Mass., fresh-water crabs, from South Carolina, in alcohol.

The additions to the Museum have been placed in secure boxes, and carefully labelled. The newly received additions occupied a large portion of the working year. The Texan Lepidoptera purchased from Mr. Boll were carefully revised, a collection for the Faunal department made, the duplicates introduced in the United States collection, and in the general collection, and a full set of all species sent to Prof. Zeller, of Stettin, for a scientific monograph. All new or doubtful species of the Rhopalocera were sent to Mr. W. A. Edwards, of Coalburgh, West Virginia, now so successfully occupied with a Monograph of the United States Lepidoptera. The Hemiptera from Dallas, Texas, have been in the same manner revised, and a full set sent to the well-known American monographer, Mr. P. R. Uhler, of Baltimore. The same work has been done with the greater part of the Texan Coleoptera, and a set sent to Prof. C. A. Dohrn, in Stettin.

The scientific arrangement of the collection of Curculionidæ presented by Mrs. A. Hemenway is progressing. This work, including a careful labelling of every species, takes time for its completion, especially as a part of the collection is still in the hands of European monographers.

The biological collection is progressing. The additions partly purchased, partly presented, and partly raised by myself, have been unusually rich. The collection from Mr. Brischke of Danzig, is arranged, and fills, alone, nearly the whole of one cabinet. The plan adopted by Professor Agassiz could be carried out in several boxes containing the whole history of an insect. The history of *Calosamia Prometheus* alone, fills a box, showing every stage of the insect from the egg, and the young caterpillar, to its perfection as the imago, with a full series of caterpillars in intermediate and full-grown stages, the chrysalis and cocoon of both sexes, the cast skins and the structure of the cocoon; also, the enemies of the caterpillars in the various

stages, and the abnormal forms of cocoons spun by diseased caterpillars.

Equally complete, as far as possible, is the series of the other American silkworms: *S. cecropia*, *S. columbia*, *A. Polyphemus*, *A. luna*. The series of the latter species is very instructive, showing the difference in cocoon and imago produced from specimens raised in Europe, upon food different from that of the Texan specimen. Other cases, arranged after the same principle, contain American galls with their producers and enemies. There are also more or less complete series of other species of insects. Such collections of course grow slowly, because the materials come to hand only occasionally. Many of these are raised by myself.

A new arrangement of several parts of the collection of Neuroptera has been completed, viz.: the Ephemera, the Psorina, the Myrmelionina, the Ascalaphina, and in part the Termitina. The latter family, without doubt the most complete collection now existing, has lately been enriched by interesting Brazilian specimens, presented by Dr. Fritz Müller of Itajahy, Brazil.

The collection of European Lepidoptera, consisting throughout of first-class specimens, is considerably increased, chiefly in Micro-lepidoptera, by the specimens from Professor Zeller, Dr. Schleich and others. Before this, the collection contained about one-thirtieth of the known species; it has now about two-fifths, in excellent and typically-determined specimens. Generally, it is difficult, without heavy expenses, to form a collection of three-fourths of the published species of any given order; and to go beyond this involves extraordinary expense. Considering these facts, our collection is very well advanced.

The collection of European Coleoptera is unusually complete, chiefly through the liberality of Professor C. A. Dohrn of Stettin. The Museum catalogue was sent to him to show our desiderata; consequently the whole lot presented by him is new to our collection, and consists, for the most part, of type-species of rather difficult genera, many of them first-class varieties even in Europe. This lot contains Micros, and rare insects in very fine condition.

The order of Diptera, before very defective, has unexpectedly received a great accession. The whole collection of North American Diptera deposited by the Baron Osten-Sacken, is well

known for its typical value, and is unrivalled in America. The Diptera received from Professor Loew, comprise chiefly genustypes, and a number of types of his American Diptera,—a real treasure to the Museum.

The collection of New England insects, I am sorry to say, is one of the weakest parts of the whole, particularly as the specimens are more or less badly set. Professor Agassiz, considering this defect as one of the most important, invited Mr. J. Boll, an experienced collector, to come to Cambridge; during the autumn, Mr. Boll collected in and around Cambridge several thousand specimens. Some Micro-Lepidoptera have been raised, and a great number are stored in rooms arranged for the purpose, to be raised in the spring. It seems beyond doubt, that the superior manner in which Mr. Boll arranges the specimens will soon render the Museum of Comparative Zoölogy, a pattern for every entomologist. The winter will be employed by Mr. Boll in spreading and setting in a new manner the whole collection of Lepidoptera, which will give it a twofold value, and allow a scientific study and determination of specimens, which hitherto, and particularly in the Heterocera, has been an impossible undertaking.

Concerning the general state of the entomological collection, the work goes on in a steady, but necessarily a slow manner, according to the plan adopted by Professor Agassiz. The principal object of this plan is to keep safe all specimens acquired by the Museum; the second, to arrange them scientifically; and the third, to work them up as standard types. The first has been done throughout, a labor of great extent, as every specimen has to be labelled. The second is done for a small part: for three-fourths of the Lepidoptera, for one-third of the Coleoptera, and for some parts of the Neuroptera. The third is yet to be done. Considering that an experienced worker may be able to finish thoroughly one species a day, or, if he is well acquainted with his material, perhaps two species; considering further, that some families alone, consist of more than 10,000 species, it is evident how slowly such a work must advance if carefully done. The Berlin Museum, the Museum at Vienna, the British Museum, and the Museum of the Jardin des Plantes, have been working for seventy years, and nowhere is the task finished. Such a work is not to be bought for any money in the world;

it is the result of the labor of years by the most experienced and most faithful students.

The collection of Crustacea was revised by Dr. William Stimpson, just before the great calamity in Chicago, and arrangements were made to improve this interesting order, by his valuable aid. The numerous additions are still stored until he has leisure to use them scientifically.

The collection of spiders has been gone through, and determined generally by Mr. Emerson, and in some parts by Mr. Holden.

The new room to which this department has been transferred is considerably more spacious, and more convenient for work. It will now be possible to have the aid of more workers, and to give convenient working-places to more students.

Mr. Hubbard has been partly occupied with the family of the Longicorns, and Mr. Austin with the family of Tenebrions. The monograph of the immature stages of the Gomphina, by Mr. Louis Cabot, is in print, the first part having been already published. The monographs of the Arachnidæ will be ready very soon.

Exchanges are made with several entomologists in the United States and in Europe, and parts of the collections sent out to monographers have been returned determined. In the same manner the Passalini by Dr. Kaup in Darmstadt, the Cordulina by the Baron de Selys-Longchamps in Liège, Belgium, and some others, are to be returned from time to time.

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*Report of N. S. SHALER, Assistant in charge of instruction.*

During the last year my whole time has been given to instruction, except some work in the field. The arrangement which has been made with the University, whereby the instruction in Zoölogy and Palæontology, in all its departments, except the Bussey School, is given at the Museum, has much increased the number of students. During the year, ninety-seven (97) persons have received practical instruction in this department. This number does not include those who have merely attended lectures, but only those who have been taught in the laboratory room in a practical way.



All these students have been taught the outlines of Zoölogy, by the study of typical forms from the most important groups of animals. Those who were fitted for more advanced study, have been put in the way of making special investigations.

Instruction in my department in microscopy, under the superintendence of Mr. Tuttle, has also been provided for beginners and for advanced students. This teaching extends over one-half of the year, and enables the student to become master of the practical detail of microscopic work, so far as is required in all ordinary investigations.

A course of elementary instruction in the study of insects has been given by Mr. Edward Burgess, who has acted as college instructor in this branch.

The following courses of lectures have been given as a part of the above-mentioned instruction:—

A course of about one hundred lectures on Zoölogy, by Mr. Shaler.

A course of lectures on Palæontology, by Mr. Shaler.

A course of Readings, with commentary, intended as an introduction to the history of modern Zoölogical opinions, by Mr. Shaler.

A course of lectures on the use of the Microscope, by Mr. Tuttle.

A course on Entomology, by Mr. Burgess.

I am also indebted to Dr. Hagen, Dr. Maack, and Mr. A. R. Crandall, for assistance given to particular students in the prosecution of especial parts of their work.

During the summer an excursion of two months duration was made, from Cambridge to the James River, in Virginia. Students in the Zoölogical department were allowed to join this expedition, in which opportunities were afforded for becoming familiar with palæontological and zoölogical work, as conducted in the field.

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*Report of J. B. PERRY, on the Palæontological Collection.*

The earlier portion of the year was mainly devoted to the re-organization of the Museum library. Attention to this interrupted, of course, my more special work, viz., the systematic arrangement of the Tertiary Gasteropods.

During the spring, however, considerable labor was devoted to them. Several groups were carefully mounted on tablets, all the specimens accompanied by labels having been closely compared with original descriptions or with the earliest figures, such as bore no names but belonged to described species having been critically identified, and such as belonged to undescribed species put into a condition to be named or described at leisure. The remaining Tertiary Gasteropods are also, to a large extent, ready, as fast as they can be revised with discrimination, to be mounted and placed on exhibition. In many parts of this labor I received valuable assistance from Miss Annie Cutler.

The fossil Corals have likewise received some attention. Many have been cleaned and numbered, while increased preparation has been made for the mounting of the whole collection on tablets. In this work, and in various other ways, I have been aided by Miss Atkinson.

The course of instruction on the Geology of Massachusetts, began during the preceding autumn, was duly completed in the winter term, extending to thirty-six lectures.

The vast palæontological stores of the Museum having been intrusted to my care by the Director, it was found convenient to divide them, at the start, into three portions, all of the Palæozoic age going into the first, those of the Secondary or Mesozoic age, into the second, and those of the Tertiary or Cainozoic age, into the third, each portion being destined for a separate room. Accordingly, it has been the aim, as separations have been made, to convey, with a few slight exceptions, all the Tertiary animal remains to the Cainozoic or Recent room, all the Secondary to the Mesozoic, and all the older to the Palæozoic. The Tertiary fossils being, in numerical proportion, predominantly Mollusca, occupy a room in connection with the recent Mollusca, for convenience of comparison.

In addition to this separation of fossils, according to age, subdivisions have been attempted in each room. For instance, the Palæozoic remains are primarily divided into three general sections, accordingly as they belong: 1st, to the Taconic; 2d, to the Silurian; and 3d, to the Devonian, Carboniferous or Permian; the exact time of demarcation between the latter formations not being as yet clearly defined. The Museum fossils, however, belonging to the later Palæozoic times have been

already, for the sake of convenience provisionally separated into sub-divisions, answering in a general way to the three above-named eras. So the aim has been to separate the Secondary material into two distinctly recognized parts; 1st, the Triassic, and 2d, the Jurassic and Cretaceous, the line of division between the two last-named eras being by no means yet exactly drawn. Still, in this instance also, for the sake of convenience, as the work has gone on, the Jurassic and Cretaceous fossils have been, for the most part, provisionally separated into two sections.

A further step in the work of arrangement has been attempted; viz., the disposition of all the material in each of these horizontal sections, according to zoölogical relations. To take a single case as an illustration: having separated the fossils of the lower Silurian age from those of the upper Silurian, I aimed to arrange them according to orders, beginning with Polyps, and proceeding upward by regular gradations to the highest forms represented in this portion of the collection. I did the same with the Taconic fossils, and with the upper Silurian. A similar work is in progress, and has been carried forward to a very considerable extent on the fossils of each of the other great geological eras.

In order to aid the memory, and to serve other purposes, these materials have been, so far as circumstances would allow, arranged in each room in regular sequence—the succession of life in time being, in a measure, represented under relations of space. For instance, in the Palæozoic room, one may start from the Taconic, in a remote corner, and pass to the lower Silurian, the upper Silurian, the Devonian, the Carboniferous and the Permian, advancing from lower to higher, by successive steps. Nor is this all: a like ascending sequence may be already observed in the arrangement of zoölogical orders, and even of many minor divisions of the orders. The same thing is true of the arrangement in the Mesozoic and Tertiary rooms.

The material set apart for exchange is also receiving its share of attention.

The statements which have been made may serve to give some general impression of the work attempted, and already in many respects well advanced. Indeed, it has been carried out, in some instances, more minutely than indicated. Of course, the

zoölogical arrangement of the fossils has been pushed in many sections of the work to genera and species.

I should add that I have been efficiently assisted, in a portion of the general work of preliminary arrangement, particularly of the fossils of the later Palæozoic times, by Mr. St. John, who is to devote himself especially to the identification and arrangement of these fossils, with a view to the more exact determination of the several horizons to which they belong, and of other kindred points.

In carrying out the plan which has already been noticed at some length, I have perhaps taken more than usual pains to make a complete separation of the Tertiary fossils from all the others in the Museum. Having previously brought together nearly all the Tertiary Gasteropods, I have recently made an especial effort that no Corals nor Acephala might be left out; consequently, I have now nearly all the Tertiary invertebrata, not only brought together, but, for the most part, arranged zoölogically, not merely according to orders, but according to genera and species as well. From indications furnished by the investigations thus far made on these fossil forms, it seems probable that the Tertiary formations will naturally fall into five general periods, consisting, on an average, of two or three well marked subdivisions or horizons.

While various groups of the Lamellibranchiates of the Tertiary have been worked up to about the same point, the oysters on the whole, are the most advanced. They have been examined with great care; there has been a thorough verification of the names of all such as have labels; those remaining, without accompanying names, have been for the most part identified, so far as the means have been at my disposal; so that the Tertiary oysters, as a group, promise to be soon ready for the exhibition room. In this part of my work I have found constant occasion for Miss Sarah Cutler's intelligent and careful handiwork.

With a view to supplying deficiencies, but especially to investigating more thoroughly and intelligently, not only the Museum collection of Tertiary Shells, but of the American Tertiaries generally, extensive explorations of the Tertiary strata of the southern Atlantic and Gulf States were made last summer. Tertiary Fossils were gathered at various points, and occasionally some belonging to the Cretaceous and other ages. As soon

as they are identified, specimens which are needed are mounted, and intercalated in the permanent collections of the Museum, and those remaining are set aside for exchanges and other kindred purposes.

It should be added that Mr. Bicknell has been engaged at intervals on the microscopic forms contained in the Tertiary sands and clays, which have been gradually brought together, as the work on the Museum collections has gone forward. He will continue, as he has leisure, to work up these clays and sands, some of which are very rich in minute Foraminifera, and other organic forms, and promise a rich store of material for the microscopist.

During the past year the Museum has secured the fossil collection of Dr. L. Schultze, illustrative of the Devonian formations of Europe. This addition, which is very full, and perhaps unique as a representation of the European Devonian, brings the Museum collection of this era much nearer completeness, and greatly enhances its value, by furnishing permanent and authentic means for comparison.

The Museum is indebted to the Darien Expedition for a collection of Tertiary Fossils from Central America, made by Dr. G. A. Maack, Geologist and Naturalist of the Expedition, who has been recently engaged upon them with a view to his report.

The Allegany Expedition, the expenses of which were borne by Professor Shaler and the Museum, has brought in a large number of fossils, principally of the Silurian and Devonian ages. Mr. Shaler passed his vacation in collecting, having gone out with a number of students on a geological excursion, which extended through New York, Pennsylvania, Maryland and Virginia into Kentucky and Tennessee. Mr. A. R. Crandall, who was connected with the expedition, spent about six months in collecting, and is now busily engaged in identifying the specimens and bringing the collection into order.

The following list indicates the addition made to the department of Palæontology during the year:—

AGASSIZ, Prof. L. Drift specimens from the Valley of the Connecticut.

ALLEGHANY EXPEDITION. Sixty (60) boxes of fossils from the States of New York, Pennsylvania, Maryland, Virginia, Kentucky and Tennessee.

BOLL, Mr. J. Twelve hundred and sixty (1,260) specimens, principally Cretaceous, from Texas. By purchase.

BROWN, Mr. J. C. J. Seventy-five (75) Tertiary Shark-teeth from South Carolina. In exchange.

DARIEN EXPEDITION. Tertiary Shells and Lignite from Central America. Gift.

FULLER, Mr. L. A. Ninety (90) specimens representing (23) species from the Coal Measures of Alton and Springfield, Illinois. Gift.

GOULD, Mr. (of the Harvard Scientific School). A Silurian Orthocerate from Minnesota. Gift.

HOPKINS, Dr. F. V. A lot of Tertiary and Cretaceous Fossils from Louisiana and Texas. In exchange.

HURLBURT, Mr. W. D. One hundred and fifty (150) Silurian specimens, and casts of two (2) Silurian Trilobites from Minnesota. Gift.

MILLS, Mr. CHARLES H. A box of Nobular Granite from Greensborough, Vermont. Gift.

ORDWAY, Mr. ALBERT. Thirty (30) specimens of Devonian Plants from Virginia. Gift.

PERRY, Mr. J. B. Twenty-three (23) boxes of Tertiary Fossils from Virginia, North and South Carolina, Georgia, Alabama, and Mississippi. Also, Cretaceous specimens from North Carolina; Silurian specimens from Missouri; Carboniferous specimens from Indiana and Illinois; Silurian and Devonian specimens from Ohio and Michigan; Taconic specimens from New York; Taconic and Carboniferous specimens from Massachusetts.

QUIMBY, Dr. H. C. A lot of Crag Fossils, representing all the great branches of the animal kingdom, from Suffolk County, England. Gift.

SCHULTZE, Dr. L. A unique collection of European Devonian specimens. By purchase.

SPILLMAN, Dr. W. A lot of Eocene Fossils from Mississippi. Gift.

WILTSE, Mr. CHAUNCEY. Two (2) Ammonites (*Scaphites*) from Nebraska. Gift.

WINSLOW, Dr. J. C. About three hundred (300) Carboniferous specimens from Danville, Illinois. In exchange.

## [ B. ]

TRUSTEES OF THE MUSEUM OF COMPARATIVE ZÖÖLOGY,  
1872.

THE GOVERNOR OF THE COMMONWEALTH,  
WILLIAM B. WASHBURN.

THE LIEUTENANT-GOVERNOR,  
JOSEPH TUCKER.

THE PRESIDENT OF THE SENATE,  
HORACE H. COOLIDGE.

THE SPEAKER OF THE HOUSE,  
JOHN E. SANFORD.

THE SECRETARY OF THE BOARD OF EDUCATION,  
JOSEPH WHITE,

THE CHIEF JUSTICE OF THE SUPREME JUDICIAL COURT,  
REUBEN A. CHAPMAN.

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LOUIS AGASSIZ.

THEODORE LYMAN.

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NATHANIEL THAYER.  
SAMUEL HOOPER.  
JAMES LAWRENCE.

CHARLES W. FREELAND.  
SAMUEL ELIOT.  
MARTIN BRIMMER.

OFFICERS OF THE MUSEUM OF COMPARATIVE ZÖÖLOGY FOR  
1872.

His Excellency WILLIAM B. WASHBURN, Governor of the Commonwealth  
*President.*

CHARLES W. FREELAND, *Treasurer.*

MARTIN BRIMMER, *Secretary.*

LOUIS AGASSIZ, *Director.*

SAMUEL HOOPER, JOSEPH WHITE, NATHANIEL THAYER, JAMES LAWRENCE, *Committee on Finance.*

LOUIS AGASSIZ, SAMUEL ELIOT, CHARLES W. FREELAND, *Committee on the Museum.*

