

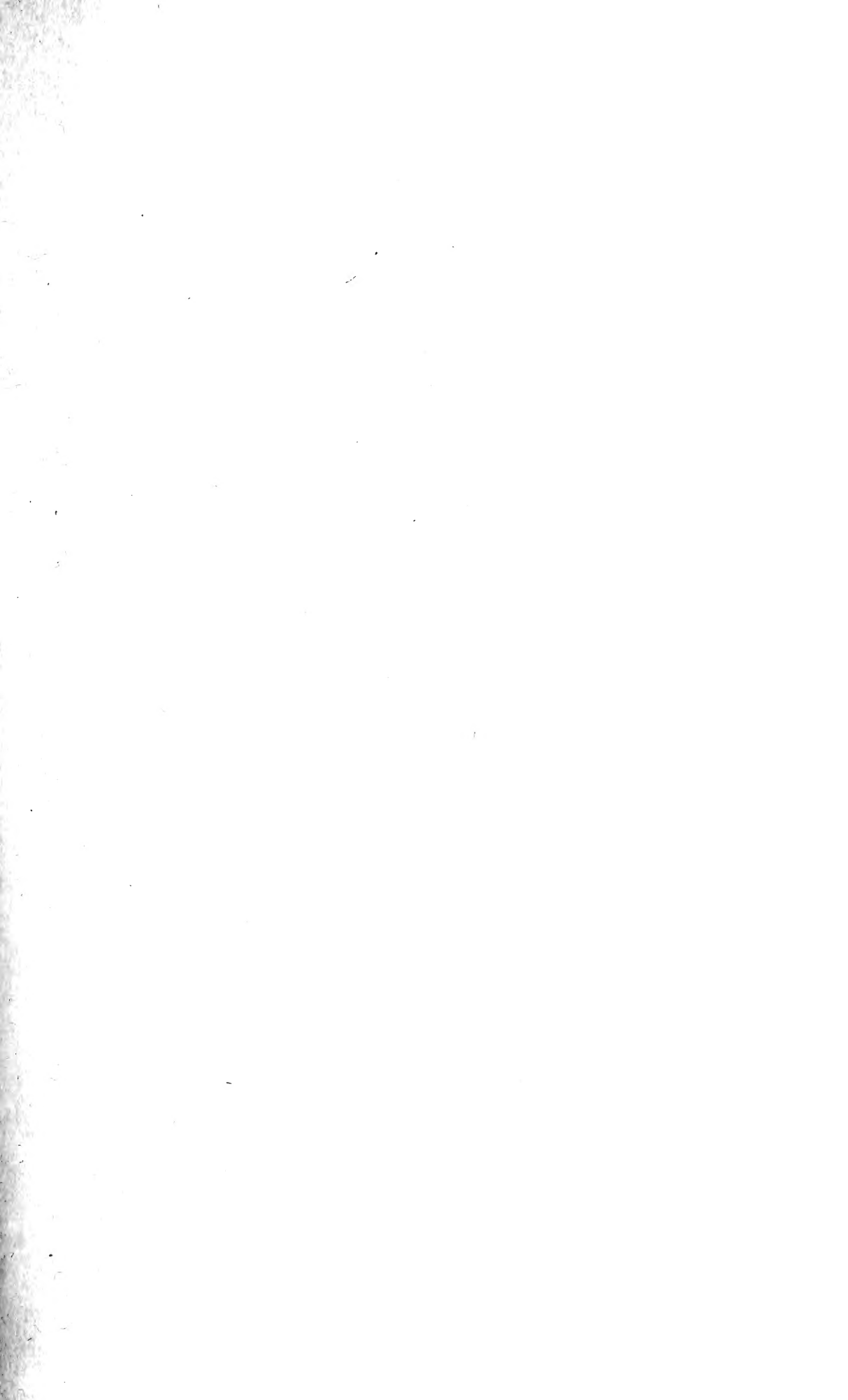


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HARVARD UNIVERSITY



Library of the
Museum of
Comparative Zoology



ANNUAL REPORT
OF
THE DIRECTOR
OF THE
MUSEUM OF COMPARATIVE ZOOLOGY
AT HARVARD COLLEGE
TO THE
PRESIDENT AND FELLOWS OF HARVARD COLLEGE
FOR
1911-1912.

CAMBRIDGE, U. S. A.:
PRINTED FOR THE MUSEUM.
1912.

REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE EASTERN TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM OCTOBER, 1904, TO MARCH, 1905, LIEUTENANT COMMANDER L. M. GARRETT, U. S. N., COMMANDING, PUBLISHED OR IN PREPARATION:—

- | | |
|---|---|
| <p>A. AGASSIZ. V.⁵ General Report on the Expedition.</p> <p>A. AGASSIZ. I.¹ Three Letters to Geo. M. Bowers, U. S. Fish Com.</p> <p>A. AGASSIZ and H. L. CLARK. The Echini.</p> <p>H. B. BIGELOW. XVI.¹⁶ The Medusae.</p> <p>H. B. BIGELOW. XXIII.²³ The Siphonophores.</p> <p>H. B. BIGELOW. XXVI.²⁶ The Ctenophores.</p> <p>R. P. BIGELOW. The Stomatopods.</p> <p>O. CARLGREN. The Actinaria.</p> <p>S. F. CLARKE. VIII.⁸ The Hydroids.</p> <p>W. R. COE. The Nemertean.</p> <p>L. J. COLE. XIX.¹⁹ The Pycnogonida.</p> <p>W. H. DALL. XIV.¹⁴ The Mollusks.</p> <p>C. R. EASTMAN. VII.⁷ The Sharks' Teeth.</p> <p>S. GARMAN. XII.¹² The Reptiles.</p> <p>H. J. HANSEN. The Cirripeds.</p> <p>H. J. HANSEN. XXVII.²⁷ The Schizopods.</p> <p>S. HENSHAW. The Insects.</p> <p>W. E. HOYLE. The Cephalopods.</p> <p>W. C. KENDALL and L. RADCLIFFE. XXV.²⁵ The Fishes.</p> <p>C. A. KOFOID. III.³ IX.⁹ XX.²⁰ The Protozoa.</p> <p>C. A. KOFOID and J. R. MICHENER. XXII.²² The Protozoa.</p> | <p>C. A. KOFOID and E. J. RIGDEN. XXIV.²⁴ The Protozoa.</p> <p>P. KRUMBACH. The Sagittae.</p> <p>R. VON LENDENFELD. XXI.²¹ The Siliceous Sponges.</p> <p>H. LÜDWIG. The Holothurians.</p> <p>H. LUDWIG. The Starfishes.</p> <p>H. LUDWIG. The Ophiurans.</p> <p>G. W. MÜLLER. The Ostracods.</p> <p>JOHN MURRAY and G. V. LEE. XVII.¹⁷ The Bottom Specimens.</p> <p>MARY J. RATHBUN. X.¹⁰ The Crustacea Decapoda.</p> <p>HARRIET RICHARDSON. II.² The Isopods.</p> <p>W. E. RITTER. IV.⁴ The Tunicates.</p> <p>ALICE ROBERTSON. The Bryozoa.</p> <p>B. L. ROBINSON. The Plants.</p> <p>G. O. SARS. The Copepods.</p> <p>F. E. SCHULZE. XI.¹¹ The Xenophyphoras.</p> <p>H. R. SIMROTH. The Pteropods and Heteropods.</p> <p>E. C. STARKS. XIII.¹³ Atelaxia.</p> <p>TH. STUDER. The Alcyonaria.</p> <p>JH. THIELE. XV.¹⁵ Bathysciadium.</p> <p>T. W. VAUGHAN. VI.⁶ The Corals.</p> <p>R. WOLTERECK. XVIII.¹⁸ The Amphipods.</p> <p>— The Annelids.</p> |
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¹ Bull. M. C. Z., Vol. XLVI., No. 4, April, 1905, 22 pp.

² Bull. M. C. Z., Vol. XLVI., No. 6, July, 1905, 4 pp., 1 pl.

³ Bull. M. C. Z., Vol. XLVI., No. 9, September, 1905, 5 pp., 1 pl.

⁴ Bull. M. C. Z., Vol. XLVI., No. 13, January, 1906, 22 pp., 3 pls.

⁵ Mem. M. C. Z., Vol. XXXIII., January, 1906, 90 pp., 96 pls.

⁶ Bull. M. C. Z., Vol. L., No. 3, August, 1906, 14 pp., 10 pls.

⁷ Bull. M. C. Z., Vol. L., No. 4, November, 1906, 26 pp., 4 pls.

⁸ Mem. M. C. Z., Vol. XXXV., No. 1, February, 1907, 20 pp., 15 pls.

⁹ Bull. M. C. Z., Vol. L., No. 6, February, 1907, 48 pp., 18 pls.

¹⁰ Mem. M. C. Z., Vol. XXXV., No. 2, August, 1907, 56 pp., 9 pls.

¹¹ Bull. M. C. Z., Vol. LI., No. 6, November, 1907, 22 pp., 1 pl.

¹² Bull. M. C. Z., Vol. LII., No. 1, June, 1908, 14 pp., 1 pl.

¹³ Bull. M. C. Z., Vol. LII., No. 2, July, 1908, 8 pp., 5 pls.

¹⁴ Bull. M. C. Z., Vol. XLIII., No. 6, October, 1908, 285 pp., 22 pls.

¹⁵ Bull. M. C. Z., Vol. LII., No. 5, October, 1908, 11 pp., 2 pls.

¹⁶ Mem. M. C. Z., Vol. XXXVII., February, 1909, 243 pp., 48 pls.

¹⁷ Mem. M. C. Z., Vol. XXXVIII., No. 1, June, 1909, 172 pp., 5 pls., 3 maps.

¹⁸ Bull. M. C. Z., Vol. LII., No. 9, June, 1909, 26 pp., 8 pls.

¹⁹ Bull. M. C. Z., Vol. LII., No. 11, August, 1909, 10 pp., 3 pls.

²⁰ Bull. M. C. Z., Vol. LII., No. 13, September, 1909, 48 pp., 4 pls.

²¹ Mem. M. C. Z., Vol. XLI., August, September, 1910, 323 pp., 56 pls.

²² Bull. M. C. Z., Vol. LIV., No. 7, August, 1911, 38 pp.

²³ Mem. M. C. Z., Vol. XXXVIII., No. 2, December, 1911, 232 pp., 32 pls.

²⁴ Bull. M. C. Z., Vol. LIV., No. 10, February, 1912, 16 pp., 2 pls.

²⁵ Mem. M. C. Z., Vol. XXXV., No. 3, April, 1912, 98 pp., 8 pls.

²⁶ Bull. M. C. Z., Vol. LIV., No. 12, April, 1912, 38 pp., 2 pls.

²⁷ Mem. M. C. Z., Vol. XXXV., No. 4, July, 1912, 124 pp., 12 pls.

ANNUAL REPORT

OF

THE DIRECTOR

OF THE

MUSEUM OF COMPARATIVE ZOOLOGY

AT HARVARD COLLEGE

TO THE

PRESIDENT AND FELLOWS OF HARVARD COLLEGE

FOR

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CAMBRIDGE, U. S. A.:
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LIBRARY
BIOLOGY
CAMBRIDGE

MUSEUM OF COMPARATIVE ZOOLOGY.

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HENRY P. WALCOTT. GEORGE L. GOODALE.
SAMUEL HENSHAW, *Director.* JOHN E. THAYER.

Committee on the Museum.

HENRY P. WALCOTT. GEORGE L. GOODALE.

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WALTER FAXON *Curator of Crustacea and Mollusca.*
SAMUEL GARMAN *Curator of Reptiles, Amphibians, and
Fishes.*
WILLIAM BREWSTER *Curator of Birds.*
OUTRAM BANGS *Curator of Mammals and Associate
Curator of Birds.*
HUBERT L. CLARK *Curator of Echinoderms.*
HENRY B. BIGELOW *Curator of Coelenterates.*
ROBERT W. SAYLES *Curator of the Geological Collections.*
PERCY E. RAYMOND *Curator of Invertebrate Palaeontology.*
THOMAS BARBOUR *Associate Curator of Reptiles and Amphibi-
bians.*
FRANCES M. SLACK *Librarian Emerita.*
GEORGE NELSON *Preparator.*
WALTER R. ZAPPEY *Preparator.*

REGINALD A. DALY *Sturgis Hooper Professor of Geology.*
EDWARD L. MARK *Hersey Professor of Anatomy.*
GEORGE H. PARKER *Professor of Zoölogy.*
WILLIAM E. CASTLE *Professor of Zoölogy.*
WILLIAM M. WHEELER *Professor of Economic Entomology.*
ROBERT DE C. WARD *Professor of Climatology.*
JAY B. WOODWORTH *Associate Professor of Geology.*
HERBERT W. RAND *Assistant Professor of Zoölogy.*
PERCY E. RAYMOND *Assistant Professor of Palaeontology.*

Instructors and Assistants in the Laboratories of Zoölogy and Geology.

C. T. BRUES *Instructor in Economic Entomology.*
JONATHAN RISSER *Austin Teaching Fellow in Zoölogy.*
J. W. MAVOR *Austin Teaching Fellow in Zoölogy.*
D. H. WENRICH *Austin Teaching Fellow in Zoölogy.*
A. C. REDFIELD *Assistant in Zoölogy.*
EDWARD WIGGLESWORTH *Assistant in Geology.*
W. P. HAYNES *Assistant in Geology.*

REPORT.

TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE:—

DURING the Academic year 1911–1912 nineteen courses were given to two hundred and sixty-three students in Harvard University.

Two of these courses were given by the German Exchange Professor, Dr. Willy Kükenthal of Breslau, and were taken by one hundred and forty-one students.

The instruction in the other courses was given by Professors Mark, Parker, Wheeler, Castle, Rand, East, and Mr. Brues.

The Assistants in these courses were Messrs. C. T. Brues, D. W. Davis, T. R. Goethals, A. O. Gross, S. I. Kornhauser, Jonathan Risser, R. A. Spaeth, and P. W. Whiting.

The Virginia Barret Gibbs Scholarship was held by Mr. James W. Mavor. The income of the Humboldt Fund aided five students, three at the Bermuda Station for Research, and two at the Laboratory of the U. S. Bureau of Fisheries at Woods Hole.

The instruction in Radcliffe was given by Professors Mark and Rand, and Mr. D. W. Davis.

Five courses were given to thirty-four students.

The number of courses and of students in 1910–1911 was:—*Harvard*, twenty courses, two hundred and fifty-four students; *Radcliffe*, five courses, thirty-five students.

The instruction in the Department of Geology and Geography was given by Professors Rotch, Ward, Woodworth, Johnson, and Raymond and Dr. Lahee, assisted by Messrs. D. C. Barton, W. P. Haynes, E. G. Linsley, and Edward Wigglesworth. Dr. Lahee also served as Assistant to Professor Woodworth in one course.

Seventeen courses were taken by two hundred and sixty-eight students in Harvard University and three courses were taken by twenty-three students of Radcliffe College.

The income of the Josiah Dwight Whitney Scholarship Fund was used to aid two students in their geological and geographical work in the Rocky Mountain region.

In 1910–1911 the number of courses and of students was:—

Harvard, seventeen courses, three hundred and fifteen students; *Radcliffe*, six courses, twenty-one students.

The resignation of Prof. William M. Davis as Sturgis Hooper Professor of Geology will not, it is hoped, deprive his Museum associates of his wise and critical counsel, while Prof. Reginald A. Daly's appointment as Professor Davis's successor is an assurance that the high ideals of the Sturgis Hooper professorship will be maintained.

The title of the officers in charge of the collections was changed, by vote of the Museum faculty, from Assistant to Curator; following this change the Corporation appointed the former Curator of the Museum, Director.

Two additions have been made to the working staff of the Museum, namely, Dr. Percy E. Raymond as Curator of Invertebrate Palaeontology, and Dr. Thomas Barbour as Associate Curator of reptiles and amphibians. Dr. Raymond has also been appointed Assistant Professor of Palaeontology in the University. It is anticipated that Professor Raymond's appointments will be of mutual advantage. His previous service with the Carnegie Museum, Pittsburgh, and more recently with the Geological Survey of Canada, together with the resources of the collection and library of this Museum should attract students. Recent reports of the Museum give ample evidence of Dr. Barbour's interest in the work of the Museum.

On the 28th of May, 1912, Dr. William McM. Woodworth of the Museum staff died in Cambridge. Dr. Woodworth graduated from Harvard in 1888. Appointed in 1889 Assistant in microscopical anatomy in the University, he held various offices in the University and the Museum and served continuously from the date of his first appointment until his death. As a privileged Assistant, Dr. Woodworth accompanied Mr. Agassiz on most of his expeditions to the tropics, and thus enjoyed advantages unusual for a zoölogist. A skilled technician and an intelligent collector of books Dr. Woodworth, by his will, bequeathed to the Museum a number of zoölogical books and pamphlets, a collection of specimens, an especially valuable series of works relating to the South Seas, and also many desirable instruments.

Through the generosity of Mr. George R. Agassiz, fifty thousand dollars (\$50,000.—) has been added to the permanent funds, the income available for the general use of the Museum.

For monetary gifts applicable for the acquisition of desirable material or for the expenses attendant on collecting the same,

acknowledgement is due Miss A. A. Sprague, Mrs. Mary L. Russell, Mrs. Louis A. Shaw, and Messrs. Thomas Barbour, C. L. Hay, E. C. Lee, J. C. Phillips, and J. E. Thayer.

As in previous years, valuable specimens of mammals and birds have been added this year to the collections of the Museum, through the generosity of Mr. John E. Thayer. A number of Birds-of-Paradise, some of marked beauty, are among Mr. Thayer's gifts.

To Dr. J. C. Phillips the Museum is indebted for a large series of skulls, horns, and antlers of mammals, mostly game ungulates. Many of these were new to the Museum collections. Dr. Phillips has also presented very many skins of pheasants and ducks, both terms used in their widest significance, and many of the species of these two important groups of birds included in Dr. Phillips's gift were also not well represented in the collection. It is to Dr. Phillips's liberality that the Museum owes the services of its second Preparator. In addition to the above gifts Dr. Phillips was instrumental in securing for the Museum the Bryant-Palmer collection of Javan birds and mammals. This collection contains nearly one thousand skins of birds, more than one hundred of which were not represented previously in the collection of the Museum. The Bryant-Palmer accession contains also a few nests and eggs of birds and several hundred mammals, skins and skulls.

Mr. L. J. de G. de Milhau has been good enough to continue his gift of Icelandic birds, and to Dr. S. B. Wolbach the Museum owes several mammals, birds, reptiles, and arachnids obtained while he was attached to the expedition of the Liverpool School of Tropical Medicine to the Gambia in 1911.

Col. John Caswell has sent to the Museum a few mounted birds and a number of mounted heads of African ungulates. Some of the latter, the Giraffe, Rhinoceros, and Hippopotamus make a notable addition to the series of heads and horns on exhibition in the Divinity Avenue entrance hall.

There are many specimens of scientific interest among the skeletons, skulls, and casts of bones of vertebrates contained in the kind gift of Dr. R. T. Jackson.

The Museum is indebted to Messrs. J. H. Emerton and R. V. Chamberlin for the type specimens of new species of Araneida and of Myriopoda described by them.

From Dr. P. P. Calvert and Mr. E. B. Williamson the Museum has received a large number of Odonata; many of these are new to the collection and all are most desirable as representing especially rare forms or such as extend the distribution of the species as shown by the Museum collection.

To the U. S. Bureau of Fisheries the Museum is under obligations for two large series of marine invertebrates, both collected during cruises of the Albatross. One of these collections, the schizopods, obtained during the 1899-1900 and the 1904-1905 expeditions has been in the hands of Dr. H. J. Hansen of Copenhagen. His report forms number 4 of volume 35 of the Memoirs of the Museum. This collection was received in Cambridge in perfect condition and its value is very much enhanced by Dr. Hansen's careful and exact labeling. The labeling of similar collections is too frequently done in a purely mechanical way by inexperienced hands and is consequently without the authority that original material should have. The second accession, the gift of the Bureau, is the series of Hydromedusae, Scyphomedusae, siphonophores and ctenophores collected by the Albatross during 1904-1905 and 1906; the reports on the scientific results obtained from these collections have been prepared by Dr. Bigelow.

The Museum is also indebted to Miss H. E. Hooker, and to Messrs. W. L. Allen, Henry Hales, A. H. Higginson, and Harry W. Smith for additions to the collection of domestic animals, to Yale University, through Prof. Charles Schuchert, for a set of casts of a Pteranodon, and to Mrs. Walter Channing for some interesting birds.

The thanks of the Museum are due Messrs. Faxon, Brewster, Bangs, Bigelow, and Sayles for their interest in the collections entrusted to their care and also to Mr. Thomas Barbour who makes his first report as Associate Curator of reptiles and amphibians.

The Museum collections benefit each year from the visits of specialists. Two noteworthy instances during the year may be mentioned. Dr. Kükenthal studied critically a large part of the alcyonarian corals, and received as a loan for a detailed examination at his convenience a small series of foetal whales and sirenians. Dr. Carlos de la Torre has added very many rare and desirable Cuban species of vertebrates and invertebrates to the collection, and the Museum is especially indebted to him for a thorough and critical revision of a very large part of its Cuban land shells. Dr. de la Torre's exact knowledge of the Cuban Pulmonifera and his personal relations with earlier students of West Indian Mollusca enabled him to disentangle many doubtful points of identification and of nomenclature.

The collection of Araneida has been increased in size and improved scientifically by the voluntary work of Miss E. B. Bryant.

Field work carried on during the year has contributed a large amount of valuable material. This work may be briefly summarized:—

Mr. W. P. Haynes spent a week searching for fossil insects in the Carboniferous area in the vicinity of Pawtucket, R. I. A cursory examination of the material secured shows that plants, crustaceans, and some tracks, possibly amphibian, were collected; also a few fragmentary specimens that more careful study may prove to be the wings of insects. While in the Rocky Mountain region of Montana, Mr. Haynes also collected a large series of Cambrian, Devonian, and Carboniferous invertebrates. This collection was made mainly in the vicinity of Three Forks; it is as yet unstudied.

By the courtesy of the Hon. G. M. Bowers, U. S. Commissioner of Fisheries, the U. S. F. C. Schooner *Grampus* was placed at Dr. H. B. Bigelow's disposal during July and August. Accompanied by Messrs. W. W. Welsh and H. E. Metcalf as Assistants, Dr. Bigelow undertook a partial survey of the Gulf of Maine. Forty-six off-shore stations were occupied and a large number of interesting observations relative to temperatures, salinities, currents, and plankton were made; these will form the basis for a detailed report. With the coöperation of Prof. J. S. Kingsley, a week was devoted to trawling in Casco Bay and vicinity, but with this exception little attention was given to work with the trawl or dredge. The collections obtained by the *Grampus*, though rich in a few groups, were not large.

In two short trips, one to George's Bank and a second to eastern and northern Maine, Mr. W. F. Clapp secured enormous series of shells. The series from George's is estimated at 20,000 specimens and that from Maine at 50,000. Some of the species collected by Mr. Clapp are most desirable additions to the collection and very many of the others provide specimens for advantageous exchanges. Mr. Clapp's trip to George's was made on the trawler *Crest*, Captain Green, through the courtesy of the Bay State Fish Company.

Dr. Thomas Barbour worked in western and central Cuba for about two months, January–March 1912; he secured a large number of new and little-known reptiles and amphibians as well as other interesting vertebrates and invertebrates. He received much kind assistance from Dr. Carlos de la Torre and Messrs. R. M. Grey, Victor Rodriguez, and Jesus Valdivia.

Dr. H. L. Clark, at the kind invitation of Dr. A. G. Mayer of the

Marine Biological Department of the Carnegie Institution, Washington, spent six weeks, February and March, 1912, at Montego Bay, Jamaica. While there he collected fifty-seven species of echinoderms, many of them in considerable series; he also preserved a large amount of material that will aid in tracing the history of the postlarval development of the brittle-stars.

With the kind assent of Mr. Clarence L. Hay, Mr. J. L. Peters accompanied the 1910-1911 Central American expedition of the Peabody Museum. Working in extreme southern Mexico along the border of British Honduras, Mr. Peters collected many desirable reptiles, birds, and mammals.

During the year Mr. George Nelson of the Museum staff made two trips to the Swan Islands, Caribbean Sea, spending about eight weeks collecting on the two islands. Mr. Nelson secured what is probably a complete series of reptiles, resident birds, and mammals, together with some of the more conspicuous terrestrial invertebrates.

Prof. Theodore Lyman left Cambridge late in May for a short trip to the Altai Mountains. He was accompanied by Mr. N. Hollister of the U. S. National Museum. Professor Lyman arranged that the scientific results of his trip should be shared by the U. S. National Museum and the Museum of Comparative Zoölogy. This Museum will receive the birds collected, the U. S. National Museum the mammals. After the publication of the reports, the material will be divided between the two Museums.

The reports of the Curators give the details of the work and of the additions received in the several departments during the year.

Mr. George Nelson's collecting trips to the Swan Islands have been mentioned already. His work at the Museum has been directed chiefly toward the improvement of the exhibition collections of vertebrates. He has mounted a number of recent reptiles, birds, and mammals, among the last a specimen of Père David's Milou Deer, *Elaphurus davidianus*; he has completed the remounting of the mammalian skeletons, with the exception of the largest specimens, and has also remounted many skeletons of birds. His time is not infrequently given up to photographic work, either for the illustration of Museum publications or in answer to the requests of scientific institutions and investigators.

Mr. W. R. Zappey has mounted a number of birds and mammals for exhibition; the more noteworthy of the latter are: — a male Impala, *Aepyceros melampus suava*, from Guaso Nyiro, British East Africa, a gift of Dr. William Lord Smith, and an East Tibetan

Serow, *Capricornis sumatrensis milne edwardsi*, shot by Mr. Zappey at Tachienlu, and a gift to the Museum from Mr. J. E. Thayer. Mr. Zappey has also accomplished in a most satisfactory way a large amount of taxidermic drudgery.

Since April, 1912, Mr. J. D. Sornborger has worked conscientiously upon the osteological specimens received in recent years.

As for several years, assistance in addition to the Museum staff has been employed, from time to time, for the care and development of the research collections. Dr. G. M. Allen, as in recent years, has worked for three days of each week upon the collection of mammals. He has completed a revision of the collection of skins; with the exception of a few recent accessions, the entire series is arranged and card catalogued. Dr. Allen has also begun the incorporation of the fossil Mammalia with the osteological specimens of recent forms. Two papers, the result of Dr. Allen's work on the collection are listed on p. 42, 43.

Mr. W. F. Clapp's work upon the Mollusca has been confined in large part to the North American Pulmonifera, and to such aid as he could give Dr. de la Torre in the revision of the Cuban land shells. Mr. Clapp's great success in collecting has been referred to.

Since October, 1911, Miss Elvira Wood has worked upon the collection of fossil crinoids. This collection, with the exception of the Camerata, has been rearranged according to the 1900 English translation of Zittel; the classification of Wachsmuth and Springer has been used for the Camerata. With the rearrangement, the work of identification, verification of previous identifications, and the relabeling of the specimens has been effected. Many specimens have been developed, and others repaired. All the types and figured specimens have been compared with the original descriptions and figures, and catalogued.

Three new cases have been built in the exhibition halls and the many new accessions to the research collections have necessitated additional cases for the collections of echinoderms, insects, and birds. In two of the new cases in the gallery devoted to the North American fauna, the invertebrates and lower vertebrates have been rearranged. The improved methods of mounting fishes for exhibition have been very marked during recent years. With due care these methods prove satisfactory for large and medium sized specimens, but have failed hitherto for small fishes. Recently, however, Mr. Nelson has mounted specimens of the Redside Darter, *Boleichthys fusiformis*, less than two inches in length,

which are in all respects masterly pieces of taxidermy, by far the finest mounted fishes in the Museum.

By purchase the Museum has acquired the W. G. Dietz collection of Microlepidoptera. This collection is rich in types, in series of specimens, and in specimens of recently described species new to the Museum. With the Chambers and Zeller material, the Dietz collection makes the Museum series of Palaearctic and Nearctic forms a large and important one.

The Library consists of 49,155 volumes, and 45,535 pamphlets; 1,136 volumes, and 1,093 pamphlets have been added during the year.

The publications for the year include seven numbers of the *Memoirs*, thirteen numbers of the *Bulletin*, and the *Annual Report*, a total of 1,229 (907 quarto, 322 octavo) pages, and 156 (133 quarto, 23 octavo) plates. One number of the *Bulletin* contains the Third annual report of the Harvard Seismographic Station, and four numbers contain Contributions from the Zoölogical Laboratory. Three numbers of the *Bulletin* and six numbers of the *Memoirs* contain Reports on the scientific results of the expeditions carried on under Mr. Agassiz's directions, and five numbers of the *Bulletin* and one number of the *Memoirs* represent work based upon Museum collections. A list of these publications is given on pages 42-44.

The Corporation has granted, as in recent years, the sum of \$350.— to assist in the publication of contributions from the Zoölogical and Geological Laboratories.

By vote of the Corporation, (13 November 1911), "the buildings of the Museum of Comparative Zoölogy" will be known hereafter as Agassiz Hall.

SAMUEL HENSHAW,
Director.

REPORT ON THE ZOÖLOGICAL LABORATORY.

BY E. L. MARK.

The Department of Zoölogy was favored during the past year by the presence of the German Exchange Professor selected for 1911-1912 — Doctor Willy Kükenthal, Professor of Zoölogy and Director of the Zoölogical Museum at the University of Breslau. His term of service fell in the first half-year, during which time he conducted, in German, one course for advanced students, and gave in English the lectures in the elementary course on general zoölogy. With this exception, and the changes due to alternation of certain courses in successive years, the courses in zoölogy were substantially the same as in 1910-1911.

The tables which follow show the number of students enrolled in the courses during 1911-1912 — the first for Harvard University, the second for Radcliffe College.

TABLE I.

Courses 1911-12	Graduate		Sen.	Jun.	Soph.	Fresh.	Spec.	Uncl.	Total
	A. & S.	Ap. Sci.							
Zoölogy 1	3		8	19	36	65	3	4	138
" 2	3		5	6	11	3	1		29
" 3	1		5	5	1	1		1	14
" 4	1		3	3	1	1		1	10
" 5 <i>b</i>	2	1	3		1			1	8
" 7 <i>a</i>	1	1							2
" 7 <i>b</i>	1	1							2
" 7 <i>c</i>			2						2*
" 7 <i>d</i>		5					1		6*
" 11	4	2	4	2	1	1			14
" 12	2	1		1					4
" 14 <i>a</i>	3	1	2	2	1			1	10
" 17	2								2
" 19	2		1						3
" 20 <i>a, b</i>	4								4
" 20 <i>c</i>	4								4
" 20 <i>d</i>		5							5
" 20 <i>f</i>		5							5*
" 20 <i>g</i>	1								1
Sums	34	22	33	38	52	71	5	8	263

* Including students enrolled in the summer courses.

TABLE II.

Courses 1911-12	Gr.	Sen.	Jun.	Soph.	Fresh.	Spec.	Total
Zoölogy 1		1	6	2	12	2	23
“ 2	1			2	2		5
“ 4			1			1	2
“ 5b	2					1	3
“ 14a						1	1
Sums	3	1	7	4	14	5	34

In Zoölogy 1 the laboratory work was supervised by Professor Parker, who also lectured once a week on subjects connected with that work. Professor Kükenthal lectured twice a week. The chief assistant was Mr. R. A. Spaeth, the sub-assistants Messrs. T. R. Goethals, A. O. Gross, J. Risser, and P. W. Whiting.

Zoölogy 2 was given by Professor Castle, and Zoölogy 3 by Assistant Professor Rand. The assistant in Zoölogy 3 was Mr. A. O. Gross.

The nature of both lectures and laboratory work in Zoölogy 4, under Professor Rand, was somewhat modified. The lectures, while dealing mainly with technique, included the general principles of animal histology, and in the laboratory such animals were selected for study as afforded good examples of the various kinds of tissues, rather than one animal suitable for the application of a variety of technical methods. The assistant was Mr. D. W. Davis.

Zoölogy 5b was given by Professor Mark who had as assistant Mr. S. I. Kornhauser.

The lectures in Zoölogy 7a and 7b were given by Professor Wheeler at the Museum of Comparative Zoölogy, the laboratory work, with the assistance of Mr. Brues, at the Bussey Institution.

Zoölogy 7c and 7d were given by Mr. Brues, the lectures of the latter course in Cambridge; all the rest of the work was done at Forest Hills.

Zoölogy and Botany 11 was given by Professor Castle and Assistant Professor East, and Zoölogy 12 by Professor Mark. Mr. S. I. Kornhauser had charge of the laboratory work in the latter course.

In Zoölogy 14a, given by Professor Parker, four students wrote theses; the others took laboratory work, and one of these in connection with the instructor prepared a paper for publication.

The laboratory work in Zoölogy 17 consisted in experimental investigations of regeneration in planarians. The course was conducted by Assistant Professor Rand.

The Radcliffe courses in Zoölogy 1 and Zoölogy 2 were conducted, both lectures and laboratory work, by Mr. D. W. Davis, who also assisted Professor Rand in the laboratory work of Zoölogy 4 in Radcliffe.

Professor Kükenthal's course on "Certain Aspects of the Comparative Morphology of Vertebrates" — Zoölogy 19 — was attended regularly by six students, three of whom were enrolled in the course. Some of the instructors in the department were also more or less regular attendants at his lectures, which covered a large range of interesting topics.

Nineteen students (nine registered in the Graduate School of Arts and Sciences, and ten in the Graduate School of Applied Science) were enrolled in courses of research, four each under supervision of Professors Mark and Parker, five each under Professors Wheeler and Castle, and one under Assistant Professor Rand.

Three of these, named below, completed the requirements for the degree of Doctor of Philosophy, which was conferred on them in June. The thesis of Alfred O. Gross was entitled: The reactions of arthropods to monochromatic lights of equal intensities, and that of Sidney I. Kornhauser: A comparative study of the chromosomes in the spermatogenesis of *Enchenopa binotata* (Say) and *Enchenopa (Campylenchia) Stål curvata* (Fabr.). The thesis of Donald W. Davis, entitled, Asexual multiplication and regeneration in *Sagartia luciae* Verrill, was approved, and Mr. Davis will come up later for his final examination. Mr. Samuel C. Palmer, whose thesis was mentioned in the last report, received the degree of Ph. D. at mid-year.

Three students were granted aid from the income of the Humboldt Fund to the amount of \$205.71 while carrying on work at the Bermuda Biological Station, and two to the amount of \$61.71 while working at Woods Hole.

The Bermuda Biological Station was open from June 24 till August 10. Of the four persons enrolled, three were connected with Harvard University.

In November Professor Kükenthal presented before the National Academy of Science, as guest at its meeting in New York City, a paper subsequently published as Contribution No. 230 from the Zoölogical Laboratory.

In March Professor Parker read by invitation a paper entitled

"Sensory appropriation, as illustrated by the organs of taste in vertebrates" at the centennial celebration of the founding of the Philadelphia Academy of Natural Sciences, and in May he gave an address before the Biological Club of Trinity College, Hartford, on "The nature of the primitive nervous system."

The Zoölogical Club held twenty-four meetings, at which twenty-two original papers and fourteen reviews were presented.

PUBLICATIONS. AUGUST 1, 1911—JULY 31, 1912.

Contributions from the Zoölogical Laboratory.

224. MARK, E. L., and LONG, J. A.—Studies on early stages of development in rats and mice.—II. Die reifung der eier der maus. *Verhandl. VIII. Internat. zool. kongr. zu Graz, August, 1910*, Jena, 1912, p. 401–408.
225. MARK, E. L., and LONG, J. A.—Studies on early stages of development in rats and mice.—III. The living eggs of rats and mice, with a description of apparatus for obtaining and observing them. By J. A. Long. *Univ. of California publ. Zoöl.*, 23 February, 1912, vol. 9, p. 105–136, pl. 13–17.
226. PARKER, G. H., and PARSHLEY, H. M.—The reactions of earthworms to dry and to moist surfaces. *Journ. exp. zoöl.*, 20 November, 1911, vol. 11, p. 361–364.
227. DAY, E. C.—The effect of colored light on pigment-migration in the eye of the crayfish. *Bull. M. C. Z.*, December, 1911, vol. 53, p. 303–344.
228. CONGDON, E. D.—Effects of radium on living substance.—I. The influence of radiations of radium upon the embryonic growth of the pomace-fly *Drosophila ampelophila*, and upon the regeneration of the hydroid *Tubularia crocea*. *Bull. M. C. Z.*, February, 1912, vol. 53, p. 345–358.
229. CONGDON, E. D.—Effects of radium on living substance.—II. Comparison of the sensitiveness of different tissues in the dung-worm *Allolobophora foetida*, and in the crayfish *Cambarus affinis* to the beta rays of radium. *Bull. M. C. Z.*, February, 1912, vol. 53, p. 359–368.
230. KÜKENTHAL, W.—On the hair-like appendages in the frog *Astylosternus robustus* (Blgr.). *Bull. M. C. Z.*, February, 1912, vol. 53, p. 369–376, 5 pls.

Contributions from the Bermuda Biological Station for Research.

23. GROSS, A. O.—Observations on the yellow-billed tropic-bird (*Phaëthon americanus* Grant) at the Bermuda islands. *Auk*, January, 1912, vol. 29, p. 49-71, pl. 3-11.
24. SMALLWOOD, W. M.—*Polycerella zoobotryon*. *Proc. Amer. acad. arts and sci.*, March, 1912, vol. 47, p. 607-630.

Other Publications.

- MORGULIS, S.—Beiträge zur regenerationsphysiologie. VI. Mitteilung. Über das verhältnis des nervensystems zum regeneration. *Arch. f. ges. physiol.*, 16 January, 1912, bd. 143, p. 501-518, taf. 9, 10.
- Studien über Inanition in ihrer bedeutung für das wachstumsproblem. II. Experimente an *Triton cristatus*. *Arch. f. entwicklungsmechanik*, 30 July, 1912, bd. 34, p. 618-679.
- PARKER, G. H.—Mast's "Light and the behavior of organisms." *Journ. anim. behav.*, November-December, 1911, vol. 1, p. 461-464.
- Nervous and non-nervous responses of actinians. *Science*, 22 March, 1912, new ser., vol. 35, p. 461-462.
- Sound as a directing influence in the movements of fishes. *Bull. bureau fisheries*, Washington, 27 April, 1912, vol. 30, p. 97-104.
- PARKER, G. H., and PATTEN, B. M.—Intermittent and continuous lights of equal intensity as stimuli. *Proc. Soc. exp. biol. and med.*, 1912, vol. 9, p. 60-61.

REPORT OF THE STURGIS HOOPER PROFESSOR OF
GEOLOGY.

BY WILLIAM M. DAVIS.

My work for the past year may be reported under four heads:— A geographical pilgrimage from Ireland to Italy, service as visiting professor at the University of Paris, proof-reading of the book containing my lectures at Berlin, 1908–1909, and preparation of the Transcontinental Excursion of the American Geographical Society of New York.

The geographical pilgrimage began in southern Ireland, Aug. 1, and ended in northern Italy, Oct. 5, 1911. It was an outgrowth of the international excursion in northern Italy and southeastern France in the summer of 1908. We had the advantage of the expert service of Prof. G. A. J. Cole in southern Ireland, Dr. John E. Marr in Wales, Mr. Aubrey Strahan in southern England, Prof. Antoine Vacher in Brittany, Prof. Albert Demangeon in the Limousin, Prof. P. H. Glaugeaud in Auvergne, Dr. Fritz Nussbaum in the Jura and across the Alps, and Profs. Marinelli and Ricchieri in northern Italy. Our party included representatives from Ireland, Wales, Scotland, England, France, Germany, Norway, Switzerland, Austria, Italy, Servia, Japan, and the United States. Discussions in the field were frequently directed to criticisms of methods of presentation, as well as to studies of matters of fact. The experience was as profitable as it was pleasant.

My service as visiting professor at the University of Paris, where I was given the title of “professeur agrégé,” was the first under the new arrangement of direct relations between Harvard and France. My work began on Nov. 17 with a public address on the explanatory spirit in modern geography; all the following lectures, except one in the late winter on the Colorado Canyon, were given in “closed courses,” limited to persons enrolled as students at the Sorbonne; this arrangement was made partly because the presence of a non-scientific and changing public would have lessened the efficiency of instruction for professional students of geography; more because, as I had been asked to give the lectures in French, it seemed undesirable to exhibit the peculiarities of my style before an audience that might have been drawn as much by vague

curiosity as by scientific interest. The work included an elementary course, two lectures a week, on the systematic description of land forms, attended at the beginning by about 90 persons and at the end by about 40; an intermediate course, one lecture a fortnight, on the principles of geographic presentation, attended at first by about 40 persons and afterwards much reduced, partly because it did not enter into the scheme of work required of French students, partly because it was intended for observers or explorers rather than for teachers of the usual type; and a seminary of teachers and advanced students, once a fortnight, for the discussion of advanced problems, attended by from 15 to 30 members. The elementary lectures were supplemented by an hour of practical exercises each week, but the habitual silence of beginners at the Sorbonne — a silence that is regretted by local as well as by visiting professors — diminished the expected value of this effort. In February, four lectures were given on South Africa, as a part of the regional study of Africa which was a prescribed subject for the advanced students of geography in the winter of 1911–1912.

In March I had the pleasure of leading an interuniversity party of professors and students, numbering 33 in all, for a week in a district of much interest southeast of Paris. During the winter much attention was given, in coöperation with Mr. Robert Bacon, then American Ambassador to France, now Fellow of Harvard College, to the extension of our relations with French universities, which now seems to be assured by the establishment of the Harvard Foundation for that object. A Harvard Club of France was formed, again with the efficient aid of Mr. Bacon, a preliminary and the first regular meeting being held at his hospitable residence: I had the honor of being elected president of the Club. On leaving Paris in the middle of March, I visited the Universities of Dijon, Lyons, and Grenoble, and gave two lectures, one popular, one technical, at each institution. Much interest was expressed by the professors whom I then met, in the proposed broader relations of Harvard with French universities. After a fortnight in Italy and brief stops in Paris and London I reached Boston on April 25. A mid-winter episode deserves mention:—on account of being president of the Geological Society of America for the year 1911, I left Paris on December 16, arrived in New York, Dec. 23, presided over the meeting of the Society in Washington, Dec. 27–29, delivering an address on the "Relation of Geography to Geology" on the last evening of the meeting, sailed from New York, Dec. 30, and reached Paris in time for the seminary of January 6.

Proof-reading of "Die Erklärende Beschreibung der Landformen," which presents in expanded form the lectures given at Berlin in 1908-1909 consumed about a day a week for most of the winter. The interest which the European members of my international excursions of 1908 and 1911 expressed in an explanatory method of describing land forms, and the little acquaintance that they had with the systematic development of such a method, leads me to hope that a somewhat elaborate exposition of the method as I had developed it at Harvard during some twenty years past, and as I presented it at Berlin in 1908-1909, may be of value to readers on the other side of the Atlantic.

The Transcontinental Excursion of 1912 was organized in celebration of the sixtieth anniversary of the American Geographical Society of New York and of the occupancy of its new house. My work as director of the excursion began in the spring of 1911. Much correspondence was conducted during the past winter in Paris, and after my return home four months of continuous work were given to perfecting arrangements for transportation, receptions, and side trips. The excursion left New York in a special train, August 22, and returned there October 17, after a journey of about 13,000 miles. The party included forty-two round-trip European members from fifteen countries, and a varying attendance of Americans from all parts of the United States; the average membership on the train being about sixty-five. Although this journey took place after the period covered by this report, I may be permitted to record, in this last statement that I shall submit as Sturgis Hooper Professor, that the excursion was successfully accomplished and that its success fully justified the large amount of work that it involved.

Many considerations, all of which were carefully discussed with my colleagues, have led me to resign my position as Sturgis Hooper Professor of Geology at the end of the academic year, 1911-1912. Prominent among these was the wish to devote more time to writing, in the hope of thus addressing a larger audience than would be possible by lecturing. If this change of position involves some sacrifice on my part, the sacrifice is small in comparison to the great advantages that have come to me as the holder of a research professorship at Harvard during the past thirteen years.

PUBLICATIONS. AUGUST 1, 1911—JULY 31, 1912.

- L'esprit explicatif dans la géographie moderne. *Ann. de géogr.*, 1912, vol. 21, p. 1-19.
- La vallée de l'Armançon. 8^e excursion interuniversitaire (Mars, 1912). *Ann. de géogr.*, 1912, vol. 21, p. 312-322.
- Physical geography. *The American year book*, 1911, 1912, vol. 2, p. 598-599.
- Relation of geography to geology. *Bull. geol. soc. Amer.*, 1912, vol. 23, p. 93-124.
- The Colorado Front range, a study in physiographic presentation. *Ann. Assoc. Amer. geogr.*, 1912, vol. 1, p. 21-83, pl. 1-5.
- The American geographical society of New York. Guidebook for the Transcontinental excursion of 1912. Ginn and Co., Boston, 1912, 144 pp.
- Die erklärende beschreibung der landformen. Deutsch bearbeitet von Dr. A. Rühl. Teubner, Leipzig und Berlin, 1912, xviii, 565 pp., 212 figs., and 13 plates.
- Geographical factors in the development of South Africa. *Journ. race development*, 1911, vol. 2, p. 131-146.
- W. M. DAVIS and G. BRAUN.
Grundzüge der physiogeographie. Teubner, Leipzig, 1911, xii, 322 pp.
- H. F. REID, W. M. DAVIS, A. C. LAWSON, and F. L. RANSOME.
Proposed nomenclature of faults. Report of Committee on nomenclature of faults. *Geol. soc. Amer.*, May, 1912.

REPORT OF THE DEPARTMENT OF GEOLOGY AND GEOGRAPHY.

BY ROBERT DEC. WARD.

Several important changes have taken place during the year 1911-1912. Professor Davis's absence, as Exchange Professor at the Sorbonne, necessitated the bracketing of his courses. At the end of the year, Professor Davis resigned his position as Sturgis Hooper Professor of Geology. He began his service at Harvard as Assistant in the year 1876-1877. He was Instructor from 1878 to 1885; Assistant Professor of Physical Geography from 1885 to 1890; Professor of Physical Geography from 1890 to 1899, and has been Sturgis Hooper Professor of Geology since 1899. In Professor Davis's withdrawal the Department loses its senior member, a valued and effective teacher, whose work in geology, meteorology, and especially in physiography has contributed greatly to the advancement of these sciences. The Department has suffered a severe loss in the death, on April 7, 1912, of Professor A. Lawrence Rotch. As Professor of Meteorology, Professor Rotch had been a member of the Department since 1908, in which year he placed the splendid equipment of his Blue Hill Observatory at the service of the Department by offering an advanced course in meteorological research ("Geology 20f") to competent students. By this affiliation the Department was able to offer unequalled opportunities to its advanced students in meteorology. Professor Rotch's death has thus made a very serious break in the instruction which we have lately been able to give. It is not out of place to add that Professor Rotch was Harvard's first Professor of Meteorology; that he served in this professorship without pay, and that he left to the University, the Blue Hill Observatory with an endowment of \$50,000.

The appointment of Professor Reginald A. Daly, as Sturgis Hooper Professor of Geology, brings to the Department a well-known geologist, of high scientific standing, who will in every way contribute to its development and influence.

Professor Percy E. Raymond's appointment, as Assistant Professor of Palaeontology, has greatly strengthened the Department. Instruction in palaeontology was resumed in the second half-year.

Professor Raymond will give part of his time to teaching, and part to work in the Museum of Comparative Zoölogy. During the year 1911-1912 he gave one advanced course in palaeontology.

Assistant Professor Johnson was absent on leave during the second half-year, and at the end of the year resigned to accept an Associate Professorship of Physiography at Columbia University.

The Department is indebted to the family of Mr. Edward Wigglesworth for the gift of a Wiechert seismographic clock, which was installed in the station this spring. Mr. Sayles presented a collection of beach pebbles, bored by a lithodomous mollusc, from Coronado Beach, San Diego, Calif. Mr. Philip S. Durfee deposited a collection of preglacial, or interglacial, decayed rock specimens found by him beneath the Pleistocene glacial drift south of Forest Hills Square in the Metropolitan district.

The Student Palaeontological Collection has received the following donations: — Two Cambrian trilobites from Dr. C. D. Walcott, 2 Cambrian trilobites from Mr. W. P. Haynes, 24 recent shells and 33 fossils from Mr. Joseph Murdoch, and 5 Cambrian trilobites from Mr. Hayward. Dr. John M. Clarke gave a set of the palaeontological memoirs of the New York State Museum.

Seventeen courses and half-courses in Geology and Geography were elected by 268 students in Harvard University, as against 315 in the previous year. Three half-courses offered in Radcliffe College were taken by 23 students, as against 21 in 1910-11. Messrs. F. H. Lahee, W. P. Haynes, D. C. Barton, Edward Wigglesworth, and E. G. Linsley were Assistants during the year.

The state of the Gardner Collection of photographs and lantern slides on July 1, 1912, is shown in the accompanying table:—

State of Collection, July 1, 1912.	Photographs.	Slides	Negatives.
Accessions since last report	836	419	1
Unidentified views	150	0	155
Duplicates	116	0	0
Broken	0	4	0
Condemned	0	0	0
Last accession number	7305	6867	0
Number now in collection	7194	7167 ¹	840
Card catalogued	0	7167	0

Mr. Edward Wigglesworth, the Curator of the Collection, continues to give much time to the selection and purchase of suitable

¹ Includes 300 meteorological slides numbered in advance.

views, and to the maintenance of the Collection. The most important additions were the following:—Professor J. B. Woodworth's South American views (slides); Professor D. W. Johnson's Atlantic Coast views (photographs and slides), and Mr. Wigglesworth's Montana views (photographs and slides).

The Josiah Dwight Whitney Scholarships were awarded as follows:—\$100 to Wilbur G. Foye, 1 G., a student in the Rocky Mountain summer course in Geology ("Geology S5"); \$100, and the excess of the income over \$200, to Winthrop P. Haynes, 2 G., for geological and geographical studies in the Rocky Mountain region under the direction of Professor J. B. Woodworth ("Geology S20").

Two students took the research course in Meteorology given by Professor Rotch in the first half-year, and one of these students continued his work into the second half-year. The death of Professor Rotch necessitated the completion of the investigation under the general direction of Professor Ward.

In Meteorology and Climatology Professor Ward's courses were given as in previous years. The removal of the instruments from the roof platform to Room 43 has resulted in a more effective use of these instruments. More attention is now paid to the study of current weather conditions, and to their explanation. In the advanced course ("Geology 20e") C. F. Brooks, 1 G., has constructed a new chart of the mean annual depth of snowfall in the United States, and has also made a critical study of the snowfall records of the United States. E. G. Linsley, 1 G., has studied and mapped the cyclonic distribution of rainfall in California. A paper on "The cyclonic distribution of rainfall in the United States" prepared by W. G. Reed in this course in 1910–1911, has been published (*Monthly weather review*, Oct., 1911, vol. 39, p. 1609–1615, 11 charts).

Associate Professor J. B. Woodworth gave courses 4, 5, 8, 16, and directed the research work of three students in 20c.

Research work in Course 20c was undertaken by Mr. Haynes in seismology. He perfected a graphic system of locating epicenters by means of Lambert's projection superposed on Mercator Charts of the world, in the manner proposed by Professor Woodworth about three years ago. Mr. Sedgwick Smith continued his work upon the geology of the Madison Range and Valley in southwestern Montana. Mr. D. C. Barton reviewed the literature and geological maps bearing upon the circumstances attending groups of normal faults in mountain-built zones.

Professor Woodworth completed the manuscript of his report on the Shaler Memorial Expedition to Brazil and Chile; directed the field work of Mr. Haynes in the search for fossils in the Carboniferous region about Providence, R. I., and carried on the work of the Seismographic Station during the year.

In the summer of 1911 Professor Woodworth conducted a field course in geology in Montana after which he visited southern California, the Grand Cañon in Arizona, and the Winding Stairs Mountains in eastern Oklahoma. At Telihinah, in this last region, he studied the striated stones and boulders in the Caney shales, a report on which was presented to the Geological Society of America in December, 1911.

The storage facilities and the means for the work of the seismographic station and for the preparation of geological reports have been increased.

Assistant Professor D. W. Johnson gave his courses during the first half-year, and during the second half-year was on leave of absence for the continuation of his study of shorelines in connection with the Second Shaler Memorial Expedition.

Assistant Professor Raymond reports that four students took the advanced course in Palaeontology ("Geology 20d") as a whole course in the second half-year.

Dr. F. H. Lahee reports that Geology 12 was conducted according to the plan adopted the year before. The students spent the first month in class work at Pondville, under the immediate supervision of the Instructor. During the rest of the first half-year each student worked on a small area (five or six square miles). A written report on this area was required at the end of the term. During the spring the students were given long, narrow, north-and-south strips across the Boston Basin, thus enabling them to gain a fair idea of the structure of the entire Basin. Each student conducted the class and the Instructor through his area once in the season. Through the generosity of Mr. R. W. Sayles, Dr. Lahee was able to spend the summer of 1911 in field work in northern New Hampshire. An area of about 250 square miles was studied. The course, Geology 4, was given by Dr. Lahee in Radcliffe College. Dr. Lahee also served as Assistant in Geology 5, under Professor Woodworth.

Mr. W. P. Haynes was Assistant in Geology 4, and gave Geology 5 in Radcliffe College.

PUBLICATIONS. AUGUST 1, 1911—JULY 31, 1912.

LAHEE, F. H.

Crescentic fracture of glacial origin. *Amer. journ. sci.*, January, 1912, ser. 4, vol. 33, p. 41-44.

Relations of the degree of metamorphism to geological structure and to acid igneous intrusion in the Narragansett Basin, Rhode Island. *Amer. journ. sci.*, 1912, ser. 4, vol. 33: March, p. 249-262; April, p. 354-372; May, p. 447-469.

RAYMOND, P. E.

Notes on parallelism among the Asaphidae. *Proc. and trans. Roy. soc. Canada*, 1912, ser. 3, vol. 5, sec. 4, p. 111-120, pls. 1-3.

ROTCH, A. L.

Aerial engineering. *Science*, 12 January, 1912, new ser., vol. 35, p. 41-48.

WARD, R. DEC.

Climate and coffee in Brazil. *Journ. geogr.*, September, 1911, vol. 10, p. 16-17.

A visit to the Brazilian coffee country. *Nat. geogr. mag.*, October, 1911, vol. 22, p. 908-931.

[Review of Hann's *Handbuch der klimatologie*. Ed. 3]. *Journ. geogr.*, November, 1911, vol. 10, p. 103.

[Review of Observations and investigations made at the Blue Hill observatory * * * in 1906, 1907, and 1908]. *Science*, 15 December, 1911, new ser., vol. 34, p. 846-848.

The meteorological interest of a voyage to Brazil. *Journ. geogr.*, January, 1912, vol. 10, p. 152-159.

The value of non-instrumental weather observations. *Pop. sci. monthly*, February, 1912, vol. 80, p. 129-137.

Abbott Lawrence Rotch. *Science*, 24 May, 1912, new ser., vol. 35, p. 808-811. *Harvard graduates' mag.*, June 1912, vol. 20, p. 592-597.

Meteorology and climatology. *The American year book for 1911*, 1912, vol. 2, p. 593-596.

Current notes on climatology and reviews. *Bull. Amer. geogr. soc.*, throughout the year.

WOODWORTH, J. B.

Seismological notes. *Bull. Seismological soc. America*, December, 1911, vol. 1, p. 179, 182, 186.

The Harvard seismographic station. *Ann. rept. Curator M. C. Z.*, December, 1911, p. 24-26.

Harvard seismographic station. Third annual report for the year, 1 August 1910 — 31 July, 1911. *Bull. M. C. Z.*, February, 1912, vol. 55, p. 1-24.

[Note on Dr. Galdino Negri's Velocidad de propagacion de las ondas sismicas]. *Bull. Seismological soc. America*, March, 1912, vol. 2, p. 101.

Dynamical and structural geology. *The American year book for* 1911, 1912, vol. 2, p. 581-584.

REPORT OF THE MAMMALS.

BY OUTRAM BANGS.

The more notable additions to the collection are:— 900 specimens from Java collected by Drs. Owen Bryant and William Palmer and presented by Drs. J. C. Phillips, Thomas Barbour, and Mr. J. E. Thayer, which, with the species already in the collection, give the Museum a nearly complete representation of Javanese mammals; 375 skulls and horns principally of game mammals and including many species not previously represented in the collection, the type of *Felis improcera* Phillips, and a series of Pronghorns from Lower California, the gift of Dr. J. C. Phillips; eighty skins and skulls from the Mackenzie Delta collected by Mr. H. H. Jones and forty skins and skulls from Pinte Mountains, California, presented by Mr. J. E. Thayer; sixty Cuban bats, including four species new to the collection, collected and presented by Dr. Thomas Barbour; about one hundred skulls, including some rare forms, given by Dr. R. T. Jackson; portions of a Cuban *Megalonyx*, the gift of Prof. Carlos de la Torre; a series of *Capromys thoracatus* collected on Swan Island by Mr. George Nelson and a small, but rather interesting series of mammals collected in extreme southern Mexico along the border of British Honduras by Mr. J. L. Peters.

Single specimens or small series have been received from Drs. Thomas Barbour, Allen Cleghorn, Manton Copeland, W. C. Farabee, J. C. Phillips, the late W. McM. Woodworth, and from Messrs. Samuel Henshaw, W. M. Mann, John Murdoch Jr., J. R. T. Mulholland, J. E. Thayer, and W. R. Zappey.

A grey seal and six mammals from Madagascar were purchased.

PUBLICATIONS. AUGUST 1, 1911—JULY 31, 1912.

JOHN E. THAYER and OUTRAM BANGS.

A new race of great blue heron from Espiritu Santo Island, Lower California. *Proc. N. E. zool. club*, 23 February, 1912, vol. 4, p. 83-84.

OUTRAM BANGS.

The Florida song sparrow. *Proc. N. E. zool. club*, 5 June, 1912, vol. 4, p. 85-87.

A new subspecies of the ruffed grouse. *Auk*, July, 1912, vol. 29, p. 378-379.

REPORT ON THE BIRDS.

BY WILLIAM BREWSTER.

By gift the Museum has acquired upwards of sixteen hundred birds. Mr. John E. Thayer has individually contributed two hundred and forty-six of these and Dr. John C. Phillips two hundred and twenty-seven. Through the efforts of these gentlemen almost one thousand more specimens — collected in Java by Dr. Owen Bryant and Dr. William Palmer and representing no less than one hundred and seven species and subspecies new to our collection, have been obtained. Mrs. Walter Channing has kindly placed at our disposal an interesting little collection made, half a century ago, by her father, the late Henry D. Morse of Boston. Mr. Bangs has selected from it seventy-one specimens among which are representatives of three species which we did not before possess — besides an Esquimaux Curlew and an Ivory-billed Woodpecker. The remaining seventy-three skins have been sent, at Mrs. Channing's request, to Mr. Arthur C. Bent for the Museum of the Bristol County Academy of Sciences. For gifts of single birds or of small series of specimens we are indebted to Messrs. L. A. Baer, Outram Bangs, Thomas Barbour, H. B. Bigelow, W. A. Carriker, E. A. Codman, Walter Faxon, F. A. Fenger, Roger S. Hardy, Samuel Henshaw, L. J. de G. de Milhau, Mason Mitchell, Stanley W. Smith, A. M. Tozzer, S. B. Wolbach, and W. R. Zappey. One of the two birds contributed by Mr. Henshaw is a young Saw-whet Owl in first plumage found dead near the Museum, 10 July, 1911. Another specimen possessing similar local interest is an adult male Barrow's Golden-eye given us by Mr. S. W. Smith and shot by him at South Orleans, Massachusetts, on 1 December, 1911.

One hundred birds taken in the neighborhood of Pavik, Finmark, have been obtained by purchase and fifty-seven were collected for the Museum on Swan Island in the Caribbean Sea by Mr. George Nelson.

Exchanges have been made with the U. S. National Museum and with Mr. H. K. Coale. Upwards of one thousand skins have been

loaned for study and comparison to Messrs. Robert Ridgway, E. W. Nelson, F. M. Chapman, H. C. Oberholser and other ornithologists.

Mr. Bangs has continued his work on the collection with characteristic energy, intelligence, and good judgment. It is difficult to speak in terms of too high praise of the value of the service which he is thus rendering the Museum.

PUBLICATIONS. AUGUST 1, 1911-JULY 31, 1912.

In memoriam: Henry Augustus Purdie. *Auk*, January, 1912, vol. 29, p. 1-15, portrait.

Notes on the flight of gulls. *Auk*, January, 1912, vol. 29, p. 85-92.

Squirrels in Cambridge. *Harvard graduates' magazine*, March, 1912, vol. 20, p. 442-448.

Notes on whip-poor-wills and owls. By Frank Bolles. With a foreword by William Brewster. *Auk*, April, 1912, vol. 29, p. 150-159. (Foreword, p. 150-151).

REPORT ON THE REPTILES, AMPHIBIANS, AND FISHES.

BY SAMUEL GARMAN.

Important additions have been made to the collections in these departments by the American Museum of New York, the New York Zoölogical Society, Drs. Thomas Barbour, W. S. Bigelow, H. L. Clark, Bashford Dean, Carlos de la Torre, Messrs. W. F. Clapp, E. N. Fischer, C. L. Hay, W. M. Mann, George Nelson, J. L. Peters, and H. J. Thayer.

Particular efforts have been made to determine the unidentified accumulations of many previous years with the purpose of making the duplicates serviceable for exchanges and the entire collections more available. The additions to the catalogues have been numerous. Dr. de la Torre's material is very important and will call for a special report.

PUBLICATION. AUGUST 1, 1911-JULY 31, 1912.

The Chismopnea (Chimaeroids). *Memoirs M. C. Z.*, September, 1911, vol. 40, p. 79-102.

REPORT ON THE REPTILES AND AMPHIBIANS.

BY THOMAS BARBOUR.

The collections have increased very considerably during the year. Advantageous exchanges with the American Museum of Natural History, the Leyden Museum, the Natural History Museum of Basel, the U. S. National Museum, the British Museum of Natural History, and with Mr. Julius Hurter, Sr., have added many genera and species which were previously unrepresented. Acknowledgements are due to Prof. W. M. Wheeler for Amphibia from Central America; Mr. C. T. Brues, Amphibia Salientia from Jamaica; Dr. H. L. Clark, reptiles from Montego Bay; Mr. George Nelson, reptiles from Swan Island in the Caribbean Sea; Prof. H. W. Smith, many interesting reptiles and amphibians from Sarawak, Borneo; Mr. J. L. Peters, reptiles and amphibians from the Rio Hondo district in British Honduras and Quintana Roo, Mexico; and to Rev. George Schwab, for many valuable reptiles and amphibians from western Africa. Some interesting reptiles have been received from the New York Zoölogical Society through Mr. R. L. Ditmars. Mr. William Brewster, and Prof. E. L. Mark have also made gifts to the collection. Much unidentified material was sent to Dr. A. G. Ruthven for study and a part has been returned carefully identified. Many rare forms previously unrepresented in the collection have been obtained by purchase.

From the middle of January to the middle of March, I collected in western and central Cuba, and was unusually fortunate in securing new and little known species. Mr. R. M. Grey, Dr. C. de la Torre, Messrs. Jesus Valdivia, and Victor Rodriguez all contributed specimens of rare Cuban reptiles, and for these thanks are due.

PUBLICATIONS. AUGUST 1, 1911—JULY 31, 1912.

- [Translation of Van Kampen's Zoogeography of the East Indian Archipelago]. *Amer. nat.*, September, 1911, vol. 45, p. 537-560.
- The smallest Polyodon. *Biol. bulletin*, September, 1911, vol. 21, p. 207-214, 3 plates.
- A new race of chameleons from British East Africa. *Proc. Biol. soc. Washington*, 31 October 1911, vol. 24, p. 219-220.

REPORT ON THE ENTOMOLOGICAL DEPARTMENT.

For acceptable gifts to the collection of the Department the Museum has to thank Miss Elizabeth B. Bryant, Messrs. Outram Bangs, H. B. Bigelow, P. P. Calvert, R. V. Chamberlin, Walter Deane, J. H. Emerton, W. G. Farlow, D. B. Fay, Adalbert Fenyès, W. H. Fox, Harrison Garman, Morgan Hebard, R. T. Jackson, Robert Matheson, A. P. Morse, F. W. Putnam, Douglas Stewart, L. W. Swett, Roland Thaxter, W. M. Wheeler, and E. B. Williamson.

The collection of spiders has benefited, as in recent years, from the work of Mr. J. H. Emerton and Miss E. B. Bryant; Messrs. H. C. Fall and Charles Schaeffer have rearranged some of the Coleoptera, and similar work upon the Geometridae has been done by Mr. L. W. Swett.

A revisional rearrangement of portions of the Diptera, Coleoptera, Hemiptera, Orthoptera, and Odonata has been carried out, and a very large part of the Dietz collection of Microlepidoptera has been incorporated with the Museum Collection.

REPORT ON THE CRUSTACEA AND MOLLUSCA.

BY WALTER FAXON.

The Museum is under obligations to the following persons for gifts of Crustacea during the past year: Dr. Thomas Barbour, crayfishes from Franklin and St. Lawrence counties, N. Y., isopods from Jamaica, including types of a new species, *Cubaris jamaicensis* Richardson, and a small but interesting collection from Cuba; Mr. W. F. Clapp, Crustacea from Sanibel Island, Fla., a pycnogonid dredged off Plymouth, Mass., terrestrial isopods from High Pines, Duxbury, Mass., and pagurids dredged on the George's Bank; the Rev. S. O. Dexter, a specimen of *Cambarus immunis spinirostris* Faxon, taken in Walden Pond, Concord, Mass.; Walter Faxon, crayfishes collected in Concord, Pittsfield, Lanesboro, and Great Barrington, Mass., also mounted microscopical preparations of crustacean larvae from Newport, R. I.; George Nelson, a small collection of Decapoda from Swan Island in the Caribbean Sea; Mr. J. L. Peters, a crayfish collected at Quintana Roo in southern Mexico; Dr. J. C. Phillips has been so good as to procure by the aid of one of his collectors a fine series of *Cambarus affinis* from ponds in Peabody, Essex Co., Mass.; Dr. Carlos de la Torre y Huerta has kindly presented to the Museum some interesting species from Cuba; the United States National Museum has enriched the collection of Astacidae by the presentation of some 100 specimens; Mr. W. M. Wheeler has contributed isopods from California and Arizona.

By purchase from W. F. H. Rosenberg of London a collection of Crustacea from Ceram and Goram has been secured, and from J. Gabriel a small lot from Australia.

The Schizopoda collected during the "Albatross" Expeditions of 1899-1900 and 1904-1905 have been worked up by Dr. H. J. Hansen and published in the Memoirs of this Museum, Vol. XXXV, No. 4, with 12 copper plates. The collection has been returned to Cambridge, a set retained from the duplicates for this Museum, the rest, including the types of the eight new species, to be deposited in the United States National Museum.

Five species, including twenty-nine specimens of Cuban Crustacea have been given to the United States National Museum.

Mr. W. F. Clapp reports that the most important work done on the Mollusca during the last year was the revision of the Cuban land shells by Dr. Carlos de la Torre. Mr. Clapp spent a week dredging on the west side of George's Bank; a note on work done and a list of the shells secured appeared in the *Nautilus*, Vol. XXV, No. 9, p. 104-106. Mr. Clapp also made a rapid journey through eastern and northern Maine in order to acquire some of the species especially needed to complete the New England collection.

All the undetermined Unionidae in the Museum,— nearly 2,000 lots have been identified and distributed. It is due to the kind assistance rendered by Mr. L. S. Frierson and Mr. Bryant Walker that this work has been successfully completed.

Four thousand lots of North American Pulmonata in the general collection have been studied, and the nomenclature revised. Much assistance in this work was given by Mrs. N. A. Clapp. Four collections have been given to individuals or to schools for the benefit of those who lack the advantages of a large Museum collection for comparison of specimens.

The most important additions to the collection of Mollusca have come from Messrs. W. F. Clapp, E. H. and D. Blaney, R. C. Rush, H. B. Bigelow, H. L. Clark, A. E. Wight, H. B. Baker, George H. Clapp, R. Thomas, J. Gabriel, Outram Bangs, and the Rev. W. H. Fluck.

REPORT ON THE ECHINODERMS.

BY HUBERT LYMAN CLARK.

A large part of the year has been given to the labeling and cataloguing of the holothurians. The completed catalogue shows fewer than three hundred species in the collection but twenty-two of these are represented by the holotypes and there are nearly a hundred others of which we have cotypes. The very great addition to the collection of Echini necessitated a large amount of labeling and cataloguing, and some changes in the storage of that section were also found advisable.

Dr. R. T. Jackson's remarkable collection of recent Echini, received last year, contains 120 species, many of them represented by hundreds of specimens, most of which have been critically studied. There are more than 27,000 specimens, hundreds of them being variants selected as showing some special peculiarity. Some of these are very choice, notably those which show a 4-rayed or 6-rayed symmetry instead of the parts being in five as usual. The value of the collection is further enhanced by the large number of specimens which are figured in Dr. Jackson's monograph. Several species were new to our collection and one of these is represented by the holotype. Gifts were received from Messrs. George P. Farran, W. F. Clapp, Dwight Blaney, and George Nelson. A small but very valuable lot of echinoderms from the Kermadec Islands and a collection from Victoria were purchased. Important exchanges were carried through with the National Museum, Washington, the Australian Museum, Sydney, and the Musée Zoologique de l'Académie Imperiale des Sciences, St. Petersburg, which added one genus and fifteen species to the collections.

In February and March I worked for six weeks at Montego Bay, Jamaica, by the kind invitation of Dr. A. G. Mayer, Director of the Marine Biological Department of the Carnegie Institution, Washington. Special attention was given to the postlarval development of brittle-stars and a large amount of material was gathered which will make possible the solution of some problems in the history of that group. In connection with this work more

than 1,500 echinoderms representing 57 species, were collected and have been added to the Museum series.

As the card catalogue of echinoderms is now complete, including all the accessions of the year, it may be of interest to record the figures.

	Genera.	Species.	Specimens.
Crinoids	31	120	1588
Asteroids	104	457	11575
Ophiuroids	107	741	20234
Echini	122	422	42724
Holothurians	57	293	4052
Totals	421	2033	80173

PUBLICATIONS. AUGUST 1, 1911—JULY 31, 1912.

The purpose and some principles of systematic zoölogy. *Pop. sci. monthly*, September, 1911, vol. 79, p. 261-271.

Fossil holothurians. *Science*, 16 February, 1912, new ser., vol. 35, p. 274-278.

Biotypes and phylogeny. *Amer. nat.*, March, 1912, vol. 46, p. 139-150.

Notes on the Laysan finch. *Auk*, April, 1912, vol. 39, p. 166-168.

[Review of Jackson's Phylogeny of the Echini]. *Science*, 28 June, 1912, new ser., vol. 35, p. 986-993.

Hawaiian and other Pacific Echini. The Pedinidae, Phymosomatidae, Stomopneustidae, Echinidae, Temnopleuridae, Strongylocentrotidae, and Echinometridae. *Mem. M. C. Z.*, June, 1912, vol. 34, p. 205-383, pl. 90-121.

REPORT ON THE COELENTERATES.

BY HENRY B. BIGELOW.

The most important accession received during the past year is the duplicate series of Hydromedusae, Scyphomedusae, and siphonophores collected by the U. S. F. C. S. "Albatross" in Bering Sea and the northwestern Pacific in 1906 and presented by the United States Bureau of Fisheries. This collection contains seventy-one species, and covers a region previously unrepresented in the Museum collections. The duplicate series of ctenophores collected by the "Albatross" in the Eastern Tropical Pacific, 1904-1905, was likewise presented by the Bureau of Fisheries. Other accessions are series of ctenophores from the Santa Barbara Channel, gift of Mr. G. R. Agassiz, and of the Scyphomedusa *Charybdea*, collected in Jamaica by Dr. H. L. Clark.

During the year the ctenophores have been catalogued, this task finishing the rearrangement and reidentification of the pelagic coelenterates; the card catalogue lists 277 species, about 9,000 specimens.

A large collection of Scyphomedusae has been loaned for study by the United States National Museum.

During the year I have been occupied with the reports on the "Albatross" Eastern Pacific ctenophores, and "Albatross" Northwestern Pacific Medusae and siphonophores.

Apparatus for testing the salinity of sea water has been installed, and the samples of sea water collected last summer off the coast of New England titrated by Mohr's method.

From July 8th until August 31st, I was in charge of the U. S. Fisheries Schooner "Grampus" on an oceanographic cruise in the Gulf of Maine, accompanied by Messrs. W. W. Welsh and H. E. Metcalf as assistants. The object of the cruise was to make a survey of the temperatures, salinities, currents, and plankton of the waters north of a line from Cape Cod to Cape Sable. The equipment included six Negretti and Zambra reversing deep-sea thermometers, a Sigsbee and a stop-cock water-bottle, an Ekman current-meter, the closing-net described in last year's report, and an ample supply of qualitative and "Hensen" quantitative nets,

as well as beam trawls. For hoisting purposes a gasoline winch, used on the "Grampus" in 1908, was installed, while a small hand-winch, with wire rope $\frac{1}{8}$ in. in diameter, was provided for the oceanographic observations.

The field of work included Massachusetts Bay, off-shore stations abreast of Cape Ann and Cape Cod; the coastal waters and off-shore banks along the coast of Maine, the Bay of Fundy, and a line from Cape Elizabeth to Seal Island, Nova Scotia. A week was spent trawling in Casco Bay and vicinity in coöperation with Professor J. S. Kingsley. Forty-six off-shore stations were occupied, at which 130 tows were made with the various nets, besides a large number of hauls in different harbors. Qualitative hauls were made at sixteen stations, the closing net used at ten. The trawl or dredge was used at fourteen stations, chiefly near Casco Bay. Serial temperatures were taken at thirty-nine stations, bottom and serial water samples at thirty-seven, while thirty-eight current measurements were made. Surface temperatures were recorded hourly, while at sea; and surface densities taken with the hydrometer at almost every station. The color of the sea was recorded by the Forel scale; and measurements of transparency were frequently made with the ordinary transparency disc.

While the vessel was working in Casco Bay, I was able to test the salinities of the water samples collected up to that time, at the Harpswell Laboratory.

The collections are especially rich in copepods and Sagittae; and they give a fair knowledge both qualitative and quantitative of both the micro- and macroplankton of the Gulf of Maine, at the time of the visit almost a virgin field. The oceanographic data were planned to afford a general survey of the region.

Especially noteworthy among the observations is the discovery that the low surface temperatures of the Bay of Fundy and of the northwest coasts of Nova Scotia are the result of vertical circulation due to strong tides, and do not indicate the direct influence of an Arctic current as has generally been supposed. A similar phenomenon is also to be seen southeast of Cape Cod, near George's Bank.

PUBLICATIONS. AUGUST 1, 1911—JULY 31, 1912.

Biscayan plankton, collected during a cruise of H. M. S. 'Research' during 1900. The Siphonophora. *Trans. Linn. soc. London. Zool.*, June [= December], 1911, vol. 10, p. 337-358, pl. 28.

Reports on the scientific results of the expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., commanding. XXIII. The Siphonophorae. *Mem. M. C. Z.*, December, 1911, vol. 38, p. 173-401, 32 pls.

Reports on the scientific results of the expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N. commanding. The Ctenophores. *Bull. M. C. Z.*, April, 1912, vol. 54, p. 367-404, 2 pls.

REPORT ON INVERTEBRATE PALAEONTOLOGY.

BY PERCY E. RAYMOND.

The time since joining the staff in February has been largely occupied in assembling, arranging, identifying, and relabeling the collection of trilobites. The families Asaphidae and Cheiruridae have been completed. A part of the time was spent in research, and two brief papers, one of them in collaboration with a graduate student, Mr. D. C. Barton, have been prepared for publication. A revision of the chapter on trilobites for the new edition of the translation of Zittel's Palaeontology was also prepared.

Two additions have been made to the collections. An ammonite from the Cretaceous of France was given by the Peabody Museum, and three echinoids and an ammonite from Cuba presented by Dr. Carlos de la Torre.

PUBLICATION. FEBRUARY 1-JULY 31, 1912.

Notes on parallelism among the Asaphidae. *Proc. and Trans. Roy. soc. Canada*, 1912, ser. 3, vol. 5, sect. 4, p. 111-120, pl. 1-3.

REPORT ON THE GEOLOGICAL COLLECTION.

BY ROBERT W. SAYLES.

During the past year, six more transparencies have been added to the window space separating the room devoted to Dynamical and Structural Geology from the hall. The full set of twelve transparencies illustrating some of the principal phases of water action on the earth is now complete. The subjects chosen are as follows:— Vesuvius in eruption; Fuji, Japan, quiescent; Cleopatra Terrace, Yellowstone National Park; Waunanga Geyser in New Zealand in action; Luray Cave, Virginia; Adelsburg Cave, Austria; Grand Canyon of the Colorado River, Arizona; Yellowstone Canyon, Yellowstone National Park; Lake Louise, Canadian Rockies; Gorner Grat Glacier and Monte Rosa, Switzerland; Coast of England near Land's End; Coast of Capri, Italy.

The north room is to be devoted to Economic Geology; it has been fitted with three large wall cases and two large central cases, and is ready for exhibits.

REPORT ON THE LIBRARY.

During the year from August 1, 1911, to July 31, 1912, inclusive, 1,136 volumes, 2,003 parts of volumes, and 1,093 pamphlets have been added to the Library.

The total number of volumes in the Library is 49,155, the total number of pamphlets is 45,535.

Four hundred and ninety-four volumes have been bound.

PUBLICATIONS
OF THE
MUSEUM OF COMPARATIVE ZOÖLOGY
FOR THE YEAR 1911-1912.

BULLETIN:—

Vol. LIII.

- No. 6. The effect of colored light on pigment-migration in the eye of the crayfish. By Edward C. Day. pp. 42. 5 Plates. December, 1911.
- No. 7. Effects of radium on living substance. 1. The influence of radiations of radium upon the embryonic growth of the pomace-fly *Drosophila ampelophila*, and upon the regeneration of the hydroid *Tubularia crocea*. By E. D. Congdon. pp. 14. February, 1912.
- No. 8. Effects of radium on living substance. 2. Comparison of the sensitiveness of different tissues in the dung-worm *Allolobophora foetida*, and in the crayfish *Cambarus affinis*, to the beta rays of radium. By E. D. Congdon. pp. 10. February, 1912.
- No. 9. On the hair-like appendages in the frog *Astylosternus robustus* (Blgr.). By Willy Kükenthal. pp. 8. 5 Plates. February, 1912.

Vol. LIV.

- No. 7. Reports on the scientific results of the expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., Commanding. XXII. New genera and species of dinoflagellates. By Charles Atwood Kofoid and Josephine Rigden Michener. pp. 38. August, 1911.
- No. 8. A new species of *Peripatus* from Grenada, with observations on other species of the genus. By Charles T. Brues. pp. 16. 2 Plates. August, 1911.
- No. 9. Bats from British East Africa. By Glover M. Allen. pp. 14. December, 1911.
- No. 10. Reports on the scientific results of the expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., commanding. XXIV. A peculiar form of schizogony in *Gonyaulax*. By Charles Atwood Kofoid and E. Josephine Rigden. pp. 16. 2 Plates. February, 1912.
- No. 11. Two new species of *Ascodipteron*. By Frederick Muir. pp. 18. 3 Plates. April, 1912.

No. 12. Reports on the scientific results of the expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., commanding. XXVI. The Ctenophores. By Henry B. Bigelow. pp. 38. 2 Plates. April, 1912.

No. 13. The Geophiloidea of the southeastern states. By Ralph V. Chamberlin. pp. 32. 3 Plates. April, 1912.

No. 14. New African rodents. By Glover M. Allen. pp. 12. April, 1912.

Vol. LV. (Geological Series, Vol. IX.).

No. 1. Harvard Seismographic Station. Third annual report for the year, 1 August, 1910—31 July, 1911. By J. B. Woodworth. pp. 24. February, 1912.

MEMOIRS:—

Vol. XXVII.

No. 4. Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico (1877-78), in the Caribbean Sea (1878-79), and along the Atlantic coast of the United States (1880), by the U. S. Coast Survey Steamer "Blake," Lieut.-Com. C. D. Sigsbee, U. S. N., and Commander J. R. Bartlett, U. S. N., commanding. XLV. Die Comatuliden. Von Cl. Hartlaub. pp. 217. 18 Plates. April, 1912.

Vol. XXXIV.

No. 4. Hawaiian and other Pacific Echini. The Pedinidae, Phymosomatidae, Stomopneustidae, Echinidae, Temnopleuridae, Strongylocentrotidae, and Echinometridae. By Hubert Lyman Clark. pp. 179. 32 Plates. June, 1912.

Vol. XXXV.

No. 3. Reports on the scientific results of the expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N. commanding. XXV. The shore fishes. By William C. Kendall and Lewis Radcliffe. pp. 98. 8 Plates. April, 1912.

No. 4. Reports on the scientific results of the expedition to the Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., commanding. XVI. Reports on the scientific results of the expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., commanding. XXVII. The Schizopoda. By H. J. Hansen. pp. 124. 12 Plates. July, 1912.

Vol. XXXVIII.

No. 2. Reports on the scientific results of the expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from October, 1904, to March, 1905, Lieut. Commander L. M. Garrett, U. S. N., commanding. XXIII. The Siphonophorae. By Henry B. Bigelow. pp. 231. 32 plates. December, 1911.

MEMOIRS:—

Vol. XXXIX.

No. 2. Reports on the scientific results of the expedition to the Tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., commanding. XV. Echini. Echinonæus and Micropetalon. By A. M. Westergren. pp. 34. 31 Plates. August, 1911.

Vol. XL.

No. 3. The Chismopnea (Chimaeroids). By Samuel Garman. pp. 24. September, 1911.

REPORT:—

1910-1911. pp. 40. 1 Plate. December, 1911.

INVESTED FUNDS OF THE MUSEUM.

IN THE HANDS OF THE TREASURER OF HARVARD COLLEGE.

Gray Fund	\$50,000.00
Permanent Fund	117,469.34
Humboldt Fund	7,927.27
Sturgis Hooper Fund	107,206.88
Agassiz Memorial Fund	297,933.10
Teachers and Pupils Fund	7,594.01
Virginia Barret Gibbs Fund	5,989.47
Willard Peele Hunnewell Memorial Fund	5,105.49
Maria Whitney Fund	6,073.66
Alexander Agassiz Fund	99,500.00
Alexander Agassiz Expedition Fund	86,086.26
George Russell Agassiz Fund	50,000.00
Maria Whitney and James Lyman Whitney Fund	59.61
	\$840,945.09

The payments on account of the Museum are made by the Bursar of Harvard College, on vouchers approved by the Director. The accounts are annually examined by a committee of the Overseers. The only funds the income of which is restricted, the Gray, the Humboldt, the Whitney, and the Alexander Agassiz Expedition 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.

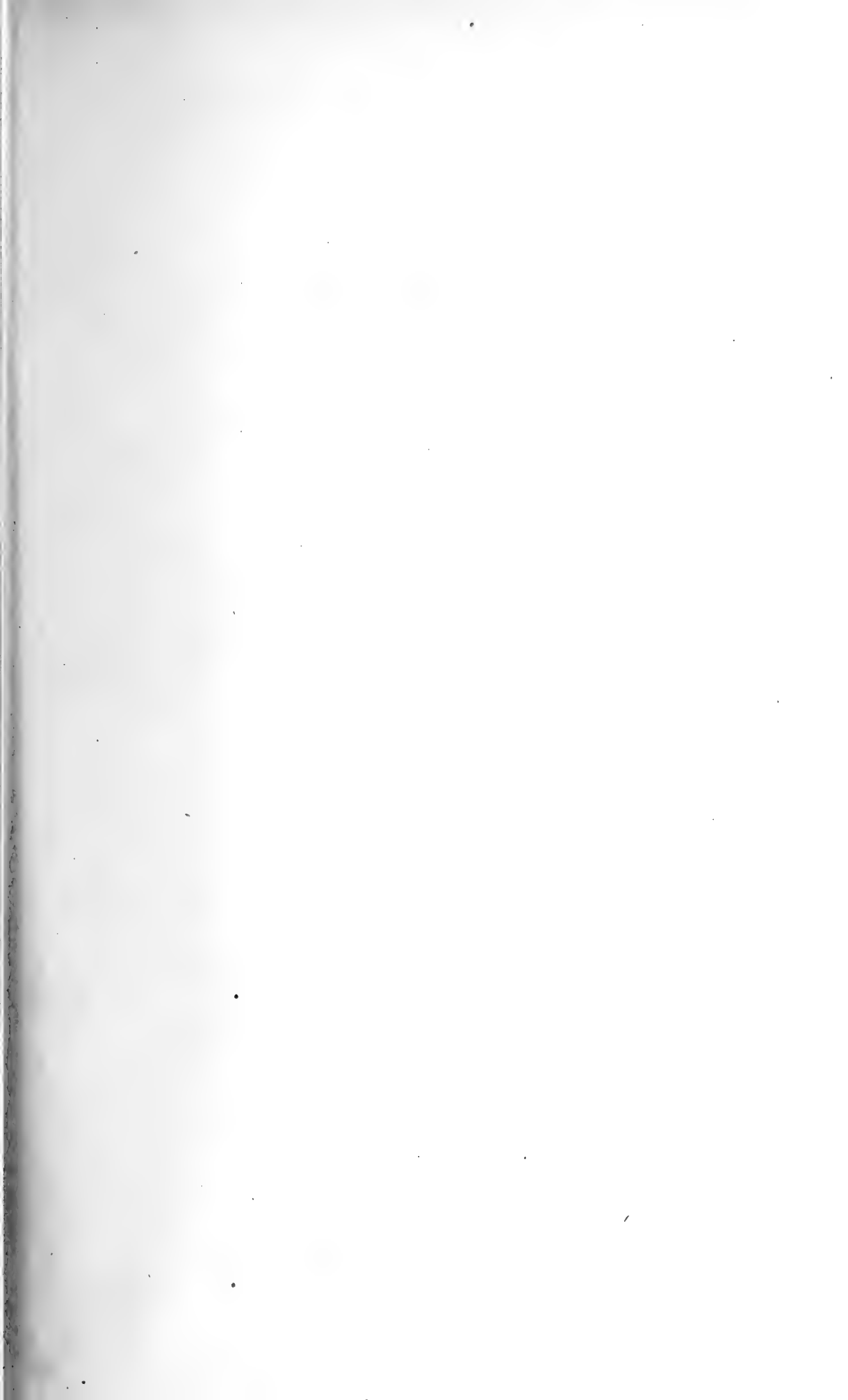
The income of the Humboldt Fund (about \$300.) can be applied for the benefit of one or more students of Natural History, either at the Museum, the United States Fish Commission Station at Woods Hole, the Stations at Bermuda, or the Tortugas.

The income of the Whitney Funds can be applied for the care (binding) and increase of the Whitney Library.

The Alexander Agassiz Expedition Fund was bequeathed by Alexander Agassiz for the publication of reports on collections brought together by the expeditions with which he was connected.

The income of the Virginia Barret Gibbs Scholarship Fund, of the value of \$250., is assigned annually with the approval of the Faculty of the Museum, on the recommendation of the Professors of Zoölogy and of Comparative Anatomy in Harvard University, "in supporting or assisting to support one or more students who may have shown decided talents in Zoölogy, and preferably in the direction of Marine Zoölogy."

Applications for the tables reserved for advanced students at the Woods Hole Station should be made to the Faculty of the Museum before the 1st of May. Applicants should state their qualifications, and indicate the course of study they intend to pursue.





The following Publications of the Museum of Comparative Zoölogy
are in preparation:—

LOUIS CABOT. Immature State of the Odonata, Part IV.

E. L. MARK. Studies on Lepidosteus, continued.

“ On Arachnactis.

A. AGASSIZ and C. O. WHITMAN. Pelagic Fishes. Part II., with 14 Plates.

H. L. CLARK. The “Albatross” Hawaiian Echini.

S. GARMAN. The Plagiostomes.

Reports on the Results of Dredging Operations in 1877, 1878, 1879, and 1880, in charge
of ALEXANDER AGASSIZ, by the U. S. Coast Survey Steamer “Blake,” as follows:—

A. MILNE EDWARDS and E. L. BOUVIER. The Crustacea of the “Blake.”

A. E. VERRILL. The Alcyonaria of the “Blake.”

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer
“Albatross,” Lieutenant Commander Z. L. TANNER, U. S. N., Commanding, in
charge of ALEXANDER AGASSIZ, as follows:—

K. BRANDT. The Sagittae.

“ The Thalassicolae.

O CARLGREN. The Actinarians.

W. R. COE. The Nemertean.

REINHARD DOHRN. The Eyes of
Deep-Sea Crustacea.

H. J. HANSEN. The Cirripeds.

“ The Schizopods.

HAROLD HEATH. Solenogaster.

W. A. HERDMAN. The Ascidians.

S. J. HICKSON. The Antipathids.

E. L. MARK. Branchiocerianthus.

JOHN MURRAY. The Bottom Specimens.

P. SCHIEMENZ. The Pteropods and
Heteropods.

THEO. STUDER. The Alcyonarians.

— The Salpidae and Doliolidae.

H. B. WARD. The Sipunculids.

— The Annelids.

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of
ALEXANDER AGASSIZ, on the U. S. Fish Commission Steamer “Albatross,” from
August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Com-
manding, as follows:—

H. L. CLARK. The Holothurians.

— The Volcanic Rocks.

— The Coralliferous Limestones.

J. M. FLINT. The Foraminifera and
Radiolaria.

S. HENSHAW. The Insects.

R. VON LENDENFELD. The Silice-
ous Sponges.

H. LUDWIG. The Starfishes and Ophi-
urans.

G. W. MÜLLER. The Ostracods.

MARY J. RATHBUN. The Crustacea
Decapoda.

RICHARD RATHBUN. The Hydro-
corallidae.

G. O. SARS. The Copepods.

L. STEJNEGER. The Reptiles.

C. H. TOWNSEND. The Mammals,
Birds, and Fishes.

T. W. VAUGHAN. The Corals, Recent
and Fossil.

— The Annelids.

PUBLICATIONS
OF THE
MUSEUM OF COMPARATIVE ZOOLOGY
AT HARVARD COLLEGE.

There have been published of the BULLETIN Vols. I. to LII.; of the MEMOIRS, Vols. I. to XXIV., and also Vols. XXVI. to XXIX., XXXI. to XXXIV., XXXVII., XXXVIII., and XLI.

Vols. LIII. to LVII. of the BULLETIN, and Vols. XXV., XXX., XXXV., XXXVI., XXXIX., XL., XLII. to XLVIII. of the MEMOIRS, are now in course of publication.

The BULLETIN and MEMOIRS are devoted to the publication of original work by the Professors and Assistants of the Museum, of investigations carried on by students and others in the different Laboratories of Natural History, and of work by specialists based upon the Museum Collections and Explorations.

The following publications are in preparation:—

Reports on the Results of Dredging Operations from 1877 to 1880, in charge of Alexander Agassiz, by the U. S. Coast Survey Steamer "Blake," Lieut. Commander C. D. Sigsbee, U. S. N., and Commander J. R. Bartlett, U. S. N., Commanding.

Reports on the Results of the Expedition of 1891 of the U. S. Fish Commission Steamer "Albatross," Lieut. Commander Z. L. Tanner, U. S. N., Commanding, in charge of Alexander Agassiz.

Reports on the Scientific Results of the Expedition to the Tropical Pacific, in charge of Alexander Agassiz, on the U. S. Fish Commission Steamer "Albatross," from August, 1899, to March, 1900, Commander Jefferson F. Moser, U. S. N., Commanding.

Reports on the Scientific Results of the Expedition to the Eastern Tropical Pacific, in charge of Alexander Agassiz, on the U. S. Fish Commission Steamer "Albatross," from October, 1904, to April, 1905, Lieut. Commander L. M. Garrett, U. S. N., Commanding.

Contributions from the Zoölogical Laboratory, Professor E. L. Mark, Director.
Contributions from the Geological Laboratory.

These publications are issued in numbers at irregular intervals; one volume of the Bulletin (8vo) and half a volume of the Memoirs (4to) usually appear annually. Each number of the Bulletin and of the Memoirs is sold separately. A price list of the publications of the Museum will be sent on application to the Director of the Museum of Comparative Zoölogy, Cambridge, Mass.

