



HARVARD UNIVERSITY



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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**

**1915-1916.**

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**CAMBRIDGE, U. S. A.:**

**PRINTED FOR THE MUSEUM.**

**1916.**

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:—

- A. AGASSIZ. V.<sup>5</sup> General Report on the Expedition.
- A. AGASSIZ. I.<sup>1</sup> Three Letters to Geo. M. Bowers, U. S. Fish Com.
- A. AGASSIZ and H. L. CLARK. The Echini.
- H. B. BIGELOW. XVI.<sup>16</sup> The Medusae.
- H. B. BIGELOW. XXIII.<sup>23</sup> The Siphonophores.
- H. B. BIGELOW. XXVI.<sup>26</sup> The Ctenophores.
- R. P. BIGELOW. The Stomatopods.
- O. CARLGREN. The Actinaria.
- R. V. CHAMBERLIN. The Annelids.
- H. L. CLARK. The Holothurians.
- H. L. CLARK. The Starfishes.
- H. L. CLARK. The Ophiurans.
- S. F. CLARKE. VIII.<sup>8</sup> The Hydroids.
- W. R. COE. The Nemerteans.
- L. J. COLE. XIX.<sup>19</sup> The Pycnogonida.
- W. H. DALL. XIV.<sup>14</sup> The Mollusks.
- C. R. EASTMAN. VII.<sup>7</sup> The Sharks' Teeth.
- S. GARMAN. XII.<sup>12</sup> The Reptiles.
- H. J. HANSEN. The Cirripeds.
- H. J. HANSEN. XXVII.<sup>27</sup> The Schizopods.
- S. HENSHAW. The Insects.
- W. E. HOYLE. The Cephalopods.
- W. C. KENDALL and L. RADCLIFFE. XXV.<sup>25</sup> The Fishes.
- C. A. KOFOID. III.<sup>3</sup> IX.<sup>9</sup> XX.<sup>20</sup> The Protozoa.
- C. A. KOFOID and J. R. MICHENER. XXII.<sup>22</sup> The Protozoa.
- C. A. KOFOID and E. J. BIGDEN. XXIV.<sup>24</sup> The Protozoa.
- P. KRUMBACH. The Sagittae.
- R. VON LENDENFELD. XXI.<sup>21</sup> The Siliceous Sponges.
- R. VON LENDENFELD. XXIX.<sup>29</sup> Hexactinellida.
- G. W. MÜLLER. The Ostracods.
- JOHN MURRAY and G. V. LEE. XVII.<sup>17</sup> The Bottom Specimens.
- MARY J. RATHBUN. X.<sup>10</sup> The Crustacea Decapoda.
- HARRIET RICHARDSON. II.<sup>2</sup> The Isopods.
- W. E. RITTER. IV.<sup>4</sup> The Tunicates.
- B. L. ROBINSON. The Plants.
- G. O. SARS. The Copepods.
- F. E. SCHULZE. XI.<sup>11</sup> The Xenophyphoras.
- HARRIET R. SEARLE. XXVIII.<sup>28</sup> Isopods.
- H. R. SIMROTH. Pteropods, Heteropods.
- E. C. STARKS. XIII.<sup>13</sup> Atelaxia.
- TH. STUDER. The Alcyonaria.
- JH. THIELE. XV.<sup>15</sup> Bathysciadium.
- T. W. VAUGHAN. VI.<sup>6</sup> The Corals.
- R. WOLTERECK. XVIII.<sup>18</sup> The Amphipods.

<sup>1</sup> Bull. M. C. Z., Vol. XLVI., No. 4, April, 1905, 22 pp.

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

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

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

<sup>5</sup> Mem. M. C. Z., Vol. XXXIII., January, 1906, 90 pp., 96 pls.

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

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

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

<sup>9</sup> Bull. M. C. Z., Vol. L., No. 6, February, 1907, 48 pp., 13 pls.

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

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

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

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

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

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

<sup>16</sup> Mem. M. C. Z., Vol. XXXVII., February, 1909, 243 pp., 48 pls.

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

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

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

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

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

<sup>22</sup> Bull. M. C. Z., Vol. LIV., No. 7, August, 1911, 38 pp.

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

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

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

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

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

<sup>28</sup> Bull. M. C. Z., Vol. LVIII., No. 8, August, 1914, 14 pp.

<sup>29</sup> Mem. M. C. Z., Vol. XLII., June, 1915, 397 pp., 109 pls.

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# MUSEUM OF COMPARATIVE ZOOLOGY.

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## Faculty.

ABBOTT LAWRENCE LOWELL, *President.*  
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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## Officers.

SAMUEL HENSHAW . . . . *Director.*  
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-  
ans.*  
RALPH V. CHAMBERLIN . *Curator of Arachnids, Myriopods, and Worms.*  
JOHN C. PHILLIPS . . . . *Associate Curator of Birds.*  
NATHAN BANKS . . . . . *Curator of Insects.*  
GEORGE NELSON . . . . . *Preparator.*

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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.*  
ALEXANDER G. McADIE . *Professor of Meteorology.*  
WALLACE W. ATWOOD . . *Professor of Physiography.*  
LOUIS C. GRATON . . . . *Professor of Economic Geology.*  
JAY B. WOODWORTH . . . . *Associate Professor of Geology.*  
PERCY E. RAYMOND . . . . *Associate Professor of Palaeontology.*  
HERBERT W. RAND . . . . *Assistant Professor of Zoölogy.*  
CHARLES T. BRUES . . . . *Assistant Professor of Economic Entomology.*



# REPORT.

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TO THE PRESIDENT AND FELLOWS OF HARVARD COLLEGE: —

DURING the Academic year 1915–1916, most of the instruction in Zoölogy, Geology, and Geography offered in Harvard University and in Radcliffe College was given in the Laboratories and Lecture Rooms of the Museum.

In Zoölogy, twenty courses or half courses were taken by 377 students in Harvard University and eight courses or half courses were taken by 65 students in Radcliffe College.

In 1914–1915 these courses and students were: —

*Harvard*:— 20 courses, 472 students.

*Radcliffe*:— 10 courses, 164 students.

In Geology and Geography there were twenty-seven courses or half courses offered in Harvard University, and five courses in Radcliffe College. In Harvard University 515 students were enrolled and in Radcliffe College 49 students.

In 1914–1915 the courses and students completing the same were: —

*Harvard*:— 26 courses, 461 students.

*Radcliffe*:— 8 courses, 78 students.

Though less field-work than usual has been carried on personally by members of the Museum staff during the year, the generous assistance of interested friends has resulted in the addition of many valuable collections.

The ever-ready aid of Col. John E. Thayer enabled Mr. G. K. Noble to visit Newfoundland, and his three months' (June–September, 1915) work there, devoted chiefly to the avifauna, brought together a considerable series of bird skins, and a smaller series of mammals, and of land and fresh-water invertebrates. Mr. C. F. Batchelder, who has a large series of Newfoundland bird skins in his private collection, is coöperating with Messrs. Bangs and Noble in the preparation of an extensive report upon the birds of Newfoundland. Mr. Noble's work in Newfoundland was facilitated by the courtesy of the Game and Inland Fisheries

Board, who granted a special permit to collect a few specimens of birds rigidly protected by law.

Undeterred by the irksome monotony of an Arctic winter, Mr. W. S. Brooks visited the Falkland Islands, collecting there during 1915-1916 (October to February). He obtained more than 300 birds, many of especial interest and most of those peculiar to the islands, with the exception of the forms confined to the outer islands, which he was unable to reach. Mr. Brooks also collected a few fishes, and some insects and other invertebrates. These Falkland Island collections have been given to the Museum by Dr. John C. Phillips through whose liberal support Mr. Brooks's trip was undertaken.

By the generosity of Mrs. Ezra R. Thayer, Mrs. Charles G. Weld, and Dr. Thomas Barbour, the Museum was able to send Mr. J. L. Peters to Santo Domingo, where, during the spring of 1916, he secured more than 400 bird skins.

Mr. F. R. Wulsin spent the greater part of 1915 in British East Africa and Madagascar, conducting most successfully two expeditions wholly in the interest of the Museum. Large series of mammals, birds, and reptiles were obtained in both localities, those from the vicinity of Mt. Kenia and Lake Victoria supplementing the earlier African collections of Dr. W. L. Smith and Mr. Childs Frick. Mr. Wulsin's four months' (June-September, 1915), work in Madagascar, yielded 24 species of recent mammals, 121 species of birds, large series of reptiles and amphibians, and a considerable collection of insects. Especial mention should be made of three fine exhibition fossils contained in Mr. Wulsin's collections; these are a cranium of *Crocodylus robustus*, a right tibia of one of the giant aepyornid birds, and the skull of a species of Hippopotamus. All the expenses of these two expeditions were paid by Mr. Wulsin, to whose generosity the Museum is greatly indebted.

During the summer of 1915, Mr. Henry R. Amory visited, in his schooner yacht the KIRRY A, the Azores and Canary Islands. Working among these islands and in the vicinity of Mogador, Morocco, Mr. Amory and his assistants collected a representative series of birds and a number of other animals. The expedition of the KIRRY A was supported wholly by Mr. Amory, who most kindly undertook it in the interest of the Museum of Comparative Zoölogy.

With the aid of a grant from the Frederick Sheldon Fund for Travelling Fellowships, Dr. W. M. Mann continued his post-

graduate studies in the Fiji Islands, collecting there for nine months, August, 1915–April, 1916. A part of the collections secured, including shells, arachnids, myriopods, insects, amphibians, and reptiles, often in large series, was received in July, 1916. These collections and the reports received from time to time from Dr. Mann showed that the value of his Fijian studies would be enhanced by similar work among the Solomon Islands. For this work, the Museum provided the necessary funds from its own resources, and the latest advice received from Dr. Mann (dated 18 June, 1916), indicates that a successful beginning has been made at Malaita and Tulagi.

Accepting the courteous invitation of Dr. A. G. Mayer, Director of the Department of Marine Biology of the Carnegie Institution of Washington, Dr. H. L. Clark enjoyed the facilities afforded by the temporary station of the Institution at Tobago. Echinoderms, the special object of Dr. Clark's search, were abundant, and nearly 2,000 specimens of 75 species were secured; many of these species are new to the collections, others are inadequately represented. The few days devoted to the collection of land animals yielded small series of reptiles, insects, myriopods, arachnids, and mollusks. A number of specimens of *Peripatus*, the most interesting of the land animals obtained, were brought to Cambridge alive.

Professor Raymond's field-work was limited to a single trip to the Catawba Valley, near Salem, Virginia, where a considerable number of invertebrate fossils of Ordovician age were secured.

For the services of Mr. G. K. Noble as a member of the Expedition to Peru, the Museum is indebted to the generosity of Prof. Theodore Lyman.

As in recent years, the Museum is indebted to Miss Elizabeth B. Bryant for her interest in and work upon the collection of Araneina. A similar service has been rendered by Mr. L. W. Swett, whose preliminary rearrangement of the Geometridae is progressing most satisfactorily.

Dr. G. M. Allen's duties for three days of each week have been along the same lines as those of recent years; these are the usual curatorial work of identification, labeling, and arrangement of the collection of mammals, fossil and recent. Dr. Allen has prepared for publication a catalogue of the type specimens of mammals contained in the Museum, a time-consuming research, as much of the type material of fifty years ago was not specifically labeled as such.

During the progress of this work, a few types of rodents, reported as missing from the collection of the United States National Museum (Bull. 62, U. S. N. M., 1909), were found. These types, received from the Smithsonian Institution many years ago, and catalogued as Museum specimens, have been returned to the National Museum.

The burden of the coöperative work undertaken in conjunction with the Boston Society of Natural History devolves at present almost entirely upon Mr. Bangs, as the transfer from the Society consists in large measure of mounted birds which require reidentification, and the selection of a typical series to be returned to the Society. This work somewhat delays the prompt record of current accessions. During the year, more than 5,500 skins, new accessions or accessions not previously entered, have been identified, arranged, and partly catalogued. The principal donors are Col. J. E. Thayer, Dr. J. C. Phillips, Hon. W. Cameron Forbes, Prof. Theodore Lyman, Prof. H. W. Smith and Messrs. Wulsin and Amory.

Dr. Thomas Barbour has been actively engaged upon the collection of reptiles and amphibians; he reports that an exceptionally large amount of new material has been received. Though the identification of these new accessions is not quite complete, the collection as a whole is in good condition and the card catalogue well up to date. As in previous years, West Indian specimens of great rarity have been presented by Prof. Carlos de la Torre, Señor V. J. Rodriguez, and Mr. C. T. Ramsden.

The work of Messrs. Garman and Chamberlin has varied but little from the usual routine involved in the care and rearrangement of the collections under their charge. Both have extensive monographs nearing completion.

Mr. W. F. Clapp has continued his work on the study collection of mollusks, completing the rearrangement of the Opisthobranchia and of two families of the Prosobranchiata. Current accessions have been in large part catalogued and incorporated in the collection, and many desirable exchanges have been effected. As the guest of Mr. Bryant Walker, Mr. Clapp visited Detroit, where, through Mr. Walker's liberality, he selected more than 2,500 specimens for the collection of the Museum. This gift of Mr. Walker includes many species either new or but poorly represented in the Museum series. A valuable series of 20 species from Lake Tanganyika is a gift of Dr. Thomas Barbour, and desirable exchanges have been carried on with Messrs. H. N. Lowe, W. N. Souther, and D. Thaanum.

Dr. Clark's Museum work comprised the rearrangement of the ophiurans and spatangoid Echini, and the description and illustration of the species to be included in the sixth part of the Memoir on the Hawaiian and other Pacific Echini.

Dr. H. B. Bigelow completed his report on the 1914-1915 cruises of the U. S. Bureau of Fisheries Schooner GRAMPUS, and catalogued and arranged the new accessions of coelenterates. Illness necessitated the absence of Dr. Bigelow from his Museum duties for five months.

Prof. P. E. Raymond's Museum work has been divided between the rearrangement of the trilobites in zoological sequence, and the selection and arrangement of a stratigraphic collection. The collection of trilobites is contained in 480 Museum trays, and of these, the specimens of 244 trays are identified and labeled. For the stratigraphic collection, a representative series of Palaeozoic species in 600 Museum trays has been arranged in stratigraphic order, and the beginning made for a similar collection from Mesozoic and Caenozoic formations. Eighty Museum trays of specimens from the Ordovician of central Pennsylvania have been given by Mr. R. M. Field, and a fine series of blastoids and nine Museum trays of Cambrian and Carboniferous fossils from Montana are the gift of Mr. T. H. Clark.

Miss Elvira Wood resumed her work on 1 December, 1915, and during the remainder of the year, she was engaged in revising the identification and the arrangement of the study series of Tertiary Gastropoda.

Mr. R. W. Sayles has continued in charge of the Geological Collections, and reports that nearly all the accessions belong to the division of economic geology. The largest and most valuable, a collection of 300 ores, chiefly from the Cripple Creek region of Colorado, is the gift of Mrs. August R. Meyer of Kansas City. Prof. E. C. Jeffrey's colored photomicrographs, (55 in number), illustrative of the origin of coal, make an effective and valuable exhibit.

Mr. George Nelson's services as Museum Preparator have been as varied and as skilful as usual; his dexterous treatment of valuable types of birds, which were prepared according to the methods in vogue seventy-five years ago, has been most successful. Mr. Nelson has also made a large number of negatives, principally for illustrations for publications of the Museum.

Since January, 1916, Mr. A. B. Fuller has been employed as Preparator, his time being occupied entirely in making over and mounting the skins of mammals and birds.

In addition to the specimens of recent birds, the Museum has received from the Boston Society of Natural History several mammalian types, the type of the fossil passerine bird, *Palaeospiza bella* J. A. Allen, and part of the typical material of *Dinornis* (*Palapteryx*) *major* Kneeland, one of the extinct gigantic birds of New Zealand.

The Museum is indebted to Dr. Thomas Barbour and Mr. R. W. Sayles for the acquisition of a fairly complete skeleton of a fossil horse *Mesohippus* sp.; and to Mr. Anton Schneider, the Manager of the Florida Amalgamated Phosphate Company, for some valuable mammalian and reptilian fossils.

The Museum is also indebted to Mr. W. B. Cabot for two exceptionally fine antlers of Cabot's Caribou; to Mr. T. H. Hays for antlers of the rare Schomburgk's Deer; to Messrs. L. A. Mowbray and G. W. Smith for reptiles from Turk's Island; to Prof. E. L. Mark for a collection of fishes from Bermuda; to Prof. Arlo Bates for some Egyptian insects; to Prof. W. M. Wheeler for series of Formicidae; to Mr. B. P. Clark for Sphingidae new to the Museum; to Mr. E. D. Harris for very large series of Cicindelidae; to Mr. J. H. Emerton for North American spiders; to the authorities of the South African Museum, the South Australian Museum, and the University of Iowa for collections of echinoderms retained in return for the identification of their collections; and to the U. S. Bureau of Fisheries and the Canadian Government for collections of marine invertebrates.

The Library contains 53,783 volumes, and 50,470 pamphlets; 1,149 volumes and 1,164 pamphlets have been added during the year.

The largest single gift to the Library, that of Dr. H. B. Bigelow, consists of 515 volumes, almost entirely standard works of travel. These books, bequeathed to Dr. Bigelow by the late Louis Cabot, though without direct bearing upon the work of the Museum, have a definite value as authoritative narratives of regions of prospective zoölogical exploration. A Merganser and a pair of Buffle-heads, two Audubon paintings, the generous gift of Col. John E. Thayer, show an interesting contrast between work executed in 1809 and in 1815.

The publications of the year include one number of the *Memoirs*, completing volume 25, seventeen numbers of the *Bulletin*, and the *Annual Report*, a total of 1,217 (214 quarto, 1,003 octavo) pages and 97 (20 quarto, 77 octavo) plates.

Three numbers of the *Bulletin* were published in the *Geological*

series, one number was published as a Contribution from the Zoölogical Laboratory, and the one number of the Memoirs and thirteen numbers of the Bulletin contain reports on Museum collections or the results of field-work undertaken in the interest of the Museum.

The single Memoir issued this year, Catalogue of Recent Ophiurans: based on the collection of the Museum of Comparative Zoölogy, was published in recognition of the first quarto publication of the Museum. This publication, Ophiuridae and Astrophytidae by Theodore Lyman, contained a detailed taxonomic account of the Serpent-stars, and is today one of the Museum's permanent contributions to science.

To aid in the publication of Contributions from the Laboratories of zoölogy and geology, the Corporation granted the sum of \$300.

SAMUEL HENSHAW,  
*Director.*



## REPORT ON THE ZOÖLOGICAL LABORATORY.

BY E. L. MARK.

For the third time since the establishment of the system of Exchange professorships, the Zoölogical Department has received one of the appointees. During the second half of the past year, Prof. Maurice Caullery, of the Sorbonne, Paris, in his capacity as Exchange Professor, gave in French a course of lectures on The present state of the problem of evolution (Zoöl. 6), which was open to the public. Except as noted below, there were no other important changes in the courses given. The number of persons in each of the various college classes and groups of students who completed the several courses are given in tabular form for both Harvard University (Table I) and Radcliffe College (Table II).

TABLE I.

Courses 1915-1916	Graduates		Sen.	Jun.	Soph.	Fresh.	Uncl.	ocC.	Sp.	Trop. Med.	Total
	A. & S.	Ap. S.									
Zoölogy 1			7	34	59	65	8	2	2	4	181
" 2		2	4	5	3	1	6	4			25
" 3	6	1	4	14	7	5	4	2			43
" 4	2	1	3	6	3		1				16
" 5 <i>b</i>	4		4	1	1		2				12
" 6	1			2	3	6	1				13
" 7 <i>a</i>	8			1	1	1					11
" 7 <i>b</i>	8			1	1	1					11
" 7 <i>c</i>	1	1	1						+1		3+1
" 12	7										7
" 14 <i>a</i>	10+5	1	3	5	1+1						20+6
" 17	6+1	3		2							11+1
" 20 <i>a</i>	2										2
" 20 <i>b</i>	2										2
" 20 <i>c</i>	5			1							6
" 20 <i>d</i>		1									1
" 20 <i>e</i>	1			1	1						3
" 20 <i>f</i>		5									5
" 20 <i>g</i>	4						-				4
" Special				1							1
Sums	67+6	15	26	74	80+1	79	22	8	2+1	4	377+8

NOTE: Numbers in italics indicate students who attended the lectures, but were not enrolled in the course. To make the numbers directly comparable with those of previous years, these are not incorporated with the enrolled students.

TABLE II.

Courses 1915-1916	Gr.	Sen.	Jun.	Soph.	Fresh.	Uncl.	Spec.	Total
Zoölogy 1	1	2	5	17	14	3	1	43
" 3	3		1	4		1		9
" 4	1		2					3
" 5b	1		1			1		3
" 14a	2							2
" 17	1+1						+1	1+2
" 20c	2						1	3
" 20g	1							1
Sums	12+1	2	9	21	14	5	2+1	65+2

The enrollments in Zoölogy 1 and Zoölogy 3 exceeded the laboratory accommodations. The assistants in the several courses were:—Zoölogy 1, Harvard: chief-assistants, Messrs. H. G. Coar and A. C. Redfield; sub-assistants, Messrs. J. P. Baumberger, A. B. Dawson, H. R. Hunt, J. M. D. Olmsted, and A. C. Walton; Radcliffe: assistants, Messrs. D. E. Minnich and A. C. Walton. Zoölogy 3, Harvard: chief-assistant, Mr. H. R. Hunt; sub-assistants, Messrs. D. E. Minnich and J. M. D. Olmsted; Radcliffe: assistant, Mr. A. C. Walton. Zoölogy 4, Harvard: assistant, Mr. Hunt; Radcliffe: assistant, Mr. W. H. Cole. Zoölogy 5b and 12 in Harvard and Radcliffe: assistant, Mr. Selig Hecht.

The arrangement whereby the course known as Zoölogy and Botany 11 was given jointly by Professors Castle and East was discontinued. The Elementary course Genetics and Eugenics (Zoölogy 2) was transferred to the first half-year, and an advanced course by Professor Castle in Genetics (Zoölogy 10), intended primarily for graduate students specializing in Genetics, was announced, also to be given in the first half-year.

Of those enrolled in Zoölogy 14a and Zoölogy 17, thesis work was chosen by 12 and 4, respectively; the others chose laboratory work, which in some cases was combined with the same kind of work in one of the "20 courses."

The University extension course in Elementary Zoölogy was carried on by Professor Parker, assisted by Mr. D. E. Minnich, Saturday afternoons during the first half-year. Twenty-five persons attended the course.

In research courses the work done was counted as the equivalent of courses as follows: in Harvard, Zoölogy 20a and 20b, under

Professor Mark, six and a half courses; Zoölogy 20*c*, under Professor Parker, eight courses; Zoölogy 20*d*, under Professor Castle, one course; Zoölogy 20*e* and 20*g* under Professor Rand, five and a half courses; Zoölogy 20*f*, under Professors Wheeler and Brues, thirteen courses; in Radcliffe, Zoölogy 20*c*, under Professor Parker, four courses; Zoölogy 20*g*, under Professor Rand, one course. Courses 20*d* and 20*f* were carried on at the Bussey Institution.

The degree of Ph.D. was conferred in June on Harrison Randall Hunt, whose thesis was entitled Regenerative phenomena in the earth-worm after the removal of the anterior region of the digestive tube and of the nerve cord.

Seventeen persons, including the officers of the Station, were enrolled during the year at the Bermuda Biological Station. Six of these received aid from the Humboldt Fund aggregating \$337.13.

The Harvard Table at the Marine Biological Laboratory, Woods Hole, was occupied from the middle of June till the end of July by two graduate students taking the course in physiology. The Radcliffe Table was shared by a sophomore and a junior, who took the course in Zoölogy.

A Harvard graduate student and a Radcliffe special student occupied tables at the Laboratory of the U. S. Bureau of Fisheries, Woods Hole, during the summer.

The Zoölogical Club held twenty-six meetings, at which twenty-two original papers and sixteen reviews were presented. The average attendance was 21.3.

A list of the Contributions from the Zoölogical Laboratory and from the Bermuda Biological Station is given on p. 35-36; other papers by members of the Department are indicated under their names.

## REPORT OF THE STURGIS HOOPER PROFESSOR OF GEOLOGY.

BY REGINALD A. DALY.

Each year routine work as chairman of the Department of Geology and Geography consumes a larger proportion of the writer's time, so that opportunity for research, the first duty of the Sturgis Hooper Professor, is being seriously lessened. Instruction was given in courses Geology 4 and 20c, during the past year.

The winter months were largely engaged: on the completion and publication of a paper on the petrography of the Pacific Islands; on a general study of rock metamorphism, with special reference to a classification of metamorphic processes; and on the perfecting of a design for a thermograph, intended to facilitate accurate, rapid, and therefore economical, exploration of ocean depths.

Since 1901, when the writer conducted a course on Oceanography at this Museum, the problem of perfecting such an instrument and the extreme need of improving on the reversing-thermometer method now used in deep-sea investigation, have been in mind. After prolonged study of the various methods already employed or suggested for thermographic record, a general plan of construction for a photographic instrument was outlined and presented to Profs. P. W. Bridgman and H. N. Davis for criticism. With their approval, the problem was then turned over to Dr. Harry Clark, Instructor in Physics. With great care and thoroughness, he has succeeded in designing an instrument which bids fair to solve the difficult problem. To help in defraying the cost of Dr. Clark's honorarium, of drafting, and of manufacturing the first instrument, the National Academy of Sciences has voted the sum of one thousand dollars from the Bache Fund. To Prof. A. G. Webster of Clark University, consultant member of the Bache Fund committee, and to the Academy as a whole, special gratitude is due for such generous assistance and for interest in the investigation. The instrument is being constructed and it is hoped that it will be ready for practical testing by June 1, 1917.

The field-work of the year consisted of: studies of Maine syenites near Gardner, at Pleasant Mountain, and at Burnt Meadow Mountain; syenites and related rocks in Mt. Monadnock, Vt., and between Jefferson and Groveton, N. H.; the gabbro and "red-rock" bodies at Duluth and Pigeon Point, Minn., and at Bad River, Wisc.; and a study of certain points in the geology of the Adirondacks.

## REPORT OF THE DEPARTMENT OF GEOLOGY AND GEOGRAPHY.

BY REGINALD A. DALY.

During the year, the permanent staff of the Department was unchanged, but it was arranged that Professor Graton should henceforth serve on a full-time basis as a member of this Department primarily, his formal transfer from the Mining Department being voted by the Corporation. This means that for the first time economic geology is represented in the Harvard faculty by a full professorship entirely devoted to this important general field, though, of course, Prof. H. L. Smyth has long represented the interests of the mining geology of iron ores. The rapid increase in the number of students seeking advanced degrees in economic geology has immediately shown the wisdom of the Corporation in developing the Departmental activities on a side which has been too long neglected.

The assistants appointed for the year were: Drs. W. P. Haynes, and Sidney Powers, and Messrs. L. B. R. Briggs, Jr., T. H. Clark, D. H. McLaughlin, and Thorndike Saville.

The total number of enrollments in the different courses at Harvard, including summer field-courses, was 515 as against 482 in 1914-1915; the corresponding total for Radcliffe courses was 49, as against 78 in 1914-1915. The numbers enrolled in the individual courses during 1915-1916 were as follows:

	Harvard	Radcliffe		Harvard	Radcliffe
Geology 4	127	17	Palaeontology 3		1
“ 5	39	10	“ 20		3
“ 8	5		Geography 1 (formerly Geol. 1)	136	5
“ 10	9		“ 2 ( “ 2)	12	
“ 12	5		“ 6 ( “ 6)	50	4
“ 16	10		“ 15 ( “ 15)	15	
“ 18	3		“ 20a( “ 20a)	9	
“ 20b	3		Meteorology 1	34	13
“ 20c	2		“ 2	6	
“ 20e	2		“ 3	2	
“ S6	28		“ 4	2	
“ S20	1		“ 6	1	
Palaeontology 1	5		“ 20	3	
“ 2	1		“ 20a	1	

As in 1914–1915, important assistance to our research work was given by the Sheldon Fund Committee, who appropriated \$700. to defray the expenses of Mr. D. H. McLaughlin, incurred during the summer's field-study of mining districts in California, Montana, Arizona, and other western states. An unexpended balance of \$600., returned to the Shaler Fund by Prof. W. M. Davis, was granted to Dr. W. G. Foye to defray expenses connected with the completion of an important memoir resulting from his field-work in the Fiji Islands, a study made possible also by the Sheldon Fund, as noted in last year's report.

The income of the Whitney Fund was divided between Mr. R. F. Webb and Mr. Roderick Peattie, who pursued field-courses during the summer.

The Visiting Committee has given very great stimulus and encouragement. One of its members, Dr. W. S. Bigelow, gave \$100. as the nucleus of a fund for defraying the travelling expenses of geologists and geographers from other centres, who may be invited to give special lectures to our students. The first was given by Dr. N. L. Bowen of the Geophysical Laboratory at Washington, with effect so good that this fund is manifestly one of the most useful among those at the disposal of the Department. Members of the Committee generously subscribed the sum of \$300. to cover the cost of much needed map cases and \$130. toward the salary of a Departmental secretary. Though working on a half-time basis for a few months, the stenographer employed has been of notable value. This experiment by the Committee has proved, if proof were needed, that true economy of administration demands the appointment of a full-time Departmental secretary by the Corporation. The Committee has also underwritten the deficit, about \$300., incurred in connection with the Summer course.

Recognizing the importance of the final establishment of a full-time professorship of economic geology, Mr. G. B. Leighton, chairman of the Visiting Committee, at once laid before it the need of additional equipment. A fund of \$3,000. a year, to be kept up for five years, was speedily raised by subscriptions from Messrs. R. L. Agassiz, A. C. Burrage, W. H. Coolidge, W. E. C. Eustis, H. Jennings, S. Jennings, G. B. Leighton, R. A. F. Penrose, and Raphael Pumpelly, and from Profs. H. L. Smyth and J. E. Wolff. These friends of Harvard have thus shown in a practical way their conviction that economic geology should have a prominent place in the scientific work of the University.



Mr. R. L. Agassiz gave a first-class petrographic microscope for use in research on problems in economic geology. In the same generous spirit, Mr. Leighton deposited another microscope. With the loan of other instruments from the Department of Mineralogy and Petrography, a more temporary meeting of Professor Graton's need of equipment in microscopes was arranged.

Mr. R. W. Sayles's highly appreciated annual gifts consist not only of service without stipend but also of numerous gifts of valuable material.

Similarly Mr. Edward Wigglesworth gives his services without remuneration as Curator of the Gardner Collection of Photographs, and as Assistant in Geology 8. His report on the Gardner Collection is summarized as follows:

	Photographs	Slides
Accessions since last report	349	1,113
Unidentified views	150	0
Duplicates	116	0
Broken	0	2
Last accession number	7,854	9,439
Number now in collection	7,743	9,439
Card catalogued	0	9,000

The more important additions to the collection are: (1) Professor Daly's slides (nearly 300), from The International Boundary Survey, Canadian Pacific Railway Line, Montana, Mexico, and the Hawaiian Islands. (2) Various geographical slides, (approximately 100), obtained by Professor Atwood for use in his courses. (3) 250 palaeontological slides for Professor Raymond's work in Geology 5. (4) 50 meteorological slides. The petroleum and Scottish slides mentioned in last year's report are now catalogued and entered in the above table. A set of 97 slides, the gift of the Australian Commonwealth, has recently been received but has not yet been catalogued.

A Committee of the Division of Geology made a thorough revision and improvement of the Divisional pamphlet. In the course of this work, it was decided to rename all the geographical courses, in the interests of a more systematic and telling statement of the Departmental offerings.

Prof. J. B. Woodworth conducted the following courses at

Harvard: Geology 5 (in part), Geology 8, Geology 12, Geology 16, a new half-course on the Geology of North America, and Geology 20e. At Radcliffe he conducted Geology 4 and 5. Independently of departmental courses, Professor Woodworth guided Mr. Wigglesworth's investigation of the geology of Martha's Vineyard.

The work of the Harvard Seismographic Station was maintained throughout the year, and the annual report for the year 1915 was prepared.

Professor Woodworth's time for research has been devoted to the re-survey of the geology of Cape Cod and the Elizabeth Islands, Nantucket, Martha's Vineyard, No Man's Land, and Block Island, for the U. S. Geological Survey. A report on the geology of the Cretaceous, Tertiary, Pleistocene, and Recent formations of the region is in preparation. Mr. Gilbert Hart, a student registered in Geology S20, assisted in the field-work on Cape Cod from June 15th to about September 10th.

Mr. Saville has been conducting experiments upon the nature of coloring matter in water. The results embody a new theory founded upon the colloidal phenomena observed.

Professor Raymond conducted the courses, Palaeontology 1, 2, 3, and 20, and gave one lecture each week in Geology 5. Students working in Palaeontology 20 prepared the following papers: Mr. Richard M. Field: A preliminary paper on the origin and classification of intraformational conglomerates and breccias. Mr. T. H. Clark: New blastoids and brachiopods from the Rocky Mountains. Mr. John Tothill: On the origin of insects, with a special discussion of their possible descent from trilobites. The last of these papers, though having its inception in this course, was largely worked out at the Bussey Institution. The following papers, finished in Palaeontology 20 in previous years, were published this year: Dr. Donald C. Barton, A revision of the Cheirurinae with notes on their evolution. Washington Univ. Studies, 1916, **3**, p. 101-152; Dr. W. P. Haynes, The fauna of the upper Devonian in Montana. Pt. 2, The stratigraphy and the Brachiopoda. Annals Carnegie Museum, 1916, **10**, p. 13-54, pl. 3-8.

During the spring recess, Professor Raymond accompanied a party of students on a visit to the Miocene deposits at Yorktown, and other places of geological interest in Virginia.

The more refined methods of work in stratigraphy have shown with increasing force during the last few years the necessity for a careful study of sediments, not only in themselves, but in relation to the enclosed fossils. In an endeavor to make a beginning on

work of this kind, Professor Raymond has had many thin sections of sedimentary rocks prepared as the nucleus of a collection to illustrate the various phenomena of sedimentation.

The following were added to the palaeontological collections during the year: by donation, a collection of Rhizopoda formerly belonging to Professor Charles H. Wing, given by Mrs. Wing through Prof. C. H. White, and three drawers of specimens of limestone and fossils from Bermuda, given by Dr. W. P. Haynes; by purchase, fourteen drawers of rocks and fossils from the Pearse collection, and seven specimens of graptolites from Frederick Braun.

In Economic Geology, Professor Graton gave Geology 10, Geology 18, and Geology 20*b*. In Geology 10, the general course on Ore deposits, the plan of giving laboratory work as a required part of the instruction, proved successful and will be continued. No regular summer course was offered, but two graduate students devoted the entire summer to field-work under Professor Graton's direction.

Because of the unusual opportunities offered, most of the research in Economic Geology continues to focus on problems connected with the secondary enrichment investigation. Dr. Joseph Murdoch's thesis, Microscopical determination of the opaque minerals, is published as a textbook and has already found a wide distribution. Mr. D. H. McLaughlin, candidate for the doctor's degree, has, under direction, continued laboratory and summer field-work relating to the occurrence and significance of the mineral bornite. Mr. A. Wandtke is expected to submit results of his work in Alaska during last summer on ore occurrence in the Nikolai greenstone as one of two theses for the doctor's degree. Mr. E. H. Perry, though having fulfilled residence requirements for the doctor's degree, spent the winter and spring months in the laboratory and part of the summer in the field in continuation of his research on rock alteration accompanying ore deposition.

With the aid of advanced students, reports based on microscopic study of rocks and ores were made for important mining companies in Alaska, Siberia, Peru, and Transvaal, as well as in various parts of this country. It appears that actual, practical problems of this kind appeal greatly to the students' interest and are, of course, of unequalled value for purposes of instruction.

During the year Prof. W. W. Atwood conducted at Harvard the courses, Geography 1, 2, 6, 16 and 20*a*; and at Radcliffe, the courses Geography 1 and 6.

Assisted by Prof. F. H. Lahee of the Massachusetts Institute of

Technology and by Dr. W. P. Haynes of Wellesley College, Professor Atwood gave the summer course, S6, taken by 28 men. The work was done in southwestern Colorado in the region of the San Juan Mountains. It is a pleasure to note that most of the men of that party, who are now in residence at Harvard, are registered for additional work in this Department. Some of them are proving to be of valuable assistance in connection with laboratory work in elementary courses.

Professor Atwood has continued his research studies on the physiography of the San Juan Mountains, under the auspices of the U. S. Geological Survey, and has given special attention to the geology associated with the defective reservoirs in that district. Under his direction, research work has been carried on by graduate students on the Lower St. Lawrence Valley, the mountain ranges of Montana, and also in the study of the glacial geology of Boston and vicinity.

Mr. Roderick Peattie has selected, with approval, for his Ph.D. thesis, an investigation on The geographic factors in the settlement and life of the Lower St. Lawrence Valley, and is conducting his researches under the direction of Professor Atwood.

Professor Ward gave the following courses, Meteorology 1, 2, 3, 4 and 20. At the request of Dr. R. P. Strong, Professor Ward gave, for the first time, a series of lectures on Tropical Climatology to the students in the School of Tropical Medicine. In the research course, (Meteorology 20), Mr. C. C. Chu made a study of floods and flood forecasts, in preparation for work which he expects to do when he returns to China; Mr. S. P. Robinson investigated the climatology of the Hawaiian Islands with special reference to the cultivation of cotton in those islands, and Mr. L. B. R. Briggs, Jr., made a study of the cyclonic distribution of rainfall in the United States. During the winter, Professor Ward completed a paper on the thunderstorms of the United States as climatic phenomena, which was presented before the Second Pan-American Scientific Congress, and one on the prevailing winds of the United States, which was read at the winter meeting of the Association of American Geographers. A paper on the tornadoes of the United States is ready for publication. The summer was spent in further work on a book on the climatology of the United States.

The work of the Blue Hill Observatory, directed by Professor McAdie, is described in the Report of the President.

## REPORT OF THE MAMMALS.

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BY OUTRAM BANGS.

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The principal collections received during the year were those made and presented by Mr. F. R. Wulsin from Madagascar and British East Africa; these collections include about 300 specimens. Other of the larger collections, are: about 175 specimens from Alaska and Eastern Siberia, the gift of Col. J. E. Thayer and Prof. Theodore Lyman, collected by Messrs. Joseph Dixon and W. S. Brooks; 26 specimens collected in Newfoundland by Mr. G. K. Noble and presented by Col. J. E. Thayer; about 80 specimens from Mt. Whitney, collected by Dr. G. M. Allen, presented by Prof. Theodore Lyman; 20 specimens from Borneo collected and presented by Prof. H. W. Smith; 150 bats from Santo Domingo collected by Mr. J. L. Peters, and presented by Mrs. Ezra R. Thayer, Mrs. C. G. Weld, and Dr. Thomas Barbour; a large collection of Cuban bats presented by Dr. Carlos de la Torre; extensive series of skeletons and other osteological specimens, including cotypes of the Gorilla; also fossils (Eser Collection) have been presented by the Boston Society of Natural History. Single specimens or small series of specimens have been received from Messrs. H. R. Amory, Thomas Barbour, W. W. Barbour, J. H. Blake, Wendell Blanchard, W. B. Cabot, W. E. Castle, H. L. Clark, Walter Deane, Walter Faxon, R. T. Fisher, A. B. Fuller, T. H. Hays, George Nelson, J. L. Peters, J. C. Phillips, C. T. Ramsden, J. B. Rorer, H. W. Smith, Carlos de la Torre, and Francis Watts; also from Andover Academy, the Florida Amalgamated Phosphate Company, and Lexington Park.

Exchanges have been made with the Carnegie Museum and the American Museum of Natural History.

Material for study has been loaned to the U. S. National Museum; the U. S. Biological Survey; the American Museum of Natural History; and the Museum of Vertebrate Zoölogy, University of California.

## REPORT ON THE BIRDS.

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BY WILLIAM BREWSTER.

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The Museum has acquired during the year about 5,500 birds, representing upwards of 200 species or subspecies new to its collection, besides many others of exceptional rarity or interest. Mr. Bangs has attended to the identification, labeling, etc. of this fresh material with his accustomed promptness and efficiency. Much of it comes from far distant lands, not as yet thoroughly exploited by ornithologists. Mr. F. R. Wulsin, collecting in Madagascar, in the summer of 1915, sent from there 1,065 skins, besides an almost equal number obtained by him in British East Africa, together with a few from Uganda; to Hon. W. Cameron Forbes we are indebted for 245 specimens (representing 30 species not before possessed by the Museum) collected by him personally, with the help of two assistants, in Uruguay and Brazil, during January and February, 1915; to Mr. H. R. Amory for 176 skins obtained by him in the Azores and Canary Islands and at Mogador, Morocco; to Prof. H. W. Smith for 307 birds from Sarawak, Borneo; to Dr. J. C. Phillips for 337 birds of exceptional interest collected at the Falkland Islands, by Mr. W. S. Brooks, between October, 1915 and February, 1916; to Mrs. Ezra R. Thayer, Mrs. C. G. Weld and Dr. Thomas Barbour, for 409 specimens secured in Santo Domingo during the spring of 1916, by Mr. J. L. Peters. That Col. John E. Thayer's devotion to the interests of the Museum has in no wise abated is abundantly shown by the continued munificence of his gifts. Those of recent date and previously unacknowledged include 221 birds taken in the Bahamas by Mr. C. J. Maynard in the spring of 1915, 46 obtained there by the same collector in 1884, and six rare Petrels from South Georgia Island. To Col. J. E. Thayer and Dr. Theodore Lyman jointly we are under obligation for the final instalment numbering 365 skins of Alaskan birds collected by Messrs. W. S. Brooks and Joseph Dixon, in 1913-1914.

More than 1,000 skins of Neotropical birds have been purchased.

Bird skins in small series or singly have been contributed by Messrs. Outram Bangs, William Brewster, W. S. Brooks, Walter Faxon, A. B. Fuller, Charles W. Johnson, J. C. Lee, W. M. Mann, G. K. Noble, J. L. Peters, J. C. Phillips, C. T. Ramsden, Carlos de la Torre, C. W. Townsend, and the Peabody Academy of Science.

Eleven "record" birds — a Booby Gannet, a Black-necked Stilt, a Black Vulture, a Gyrfalcon, a Western Horned Owl, a Burrowing Owl, a Chuck-will's-widow, a Fish Crow, a Lark Bunting, a Bohemian Waxwing, and a Caerulean Warbler — of especial interest because taken in New England and of more or less rare occurrence there, have been given to the Boston Society of Natural History.

By exchange we have received from the American Museum of Natural History, 38 Central and South American birds; from Mr. E. A. Armstrong, 39 Japanese birds and 17 more from Japan and Formosa. Forty-seven skins have been sent in exchange to Mr. Armstrong and 26 have been given to Col. J. E. Thayer.

For purposes of scientific investigation 216 birds have been loaned to Mr. Robert Ridgway, 53 to Dr. C. W. Richmond, 9 to the U. S. National Museum, 2 to Mr. F. M. Chapman, 32 to Mr. Ralph Hoffmann, 29 to Mr. Joseph Grinnell, 4 to the Brooklyn Institute, 1 to Mr. W. E. Clyde Todd.



## REPORT ON THE REPTILES AND AMPHIBIANS.

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BY THOMAS BARBOUR.

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The year has been an eventful one with respect to the large amount of valuable material which has been received.

The work of identifying the recent accessions has fallen somewhat behind, but nevertheless, the condition of the collection remains good. No specimens of lizards or snakes have been shelved among the study series without first having been entered in the card file. The value of this card catalogue is becoming increasingly evident.

The most important among the accessions are:— the Wulsin Madagascar collection, a report upon which has been prepared; Mr. W. M. Mann's large collection from Fiji; Mr. H. S. Blair of the United Fruit Co., some important reptiles from Zent, Costa Rica, including a new *Lathrogecko*, described by Mr. G. K. Noble; the Florida Amalgamated Phosphate Co., through Mr. Anton Schneider some bones of the recently described *Tomistoma americana* Sellards; Mr. Louis A. Mowbray and the Hon. G. Whitfield Smith, Commissioner of Turks Island, new and important West Indian Reptiles.

Prof. Carlos de la Torre, Mr. C. T. Ramsden and Señor V. J. Rodriguez have, as in former years, added many rarities, until our Cuban collection is practically complete and very rich in large series of rarities. Some valuable material, including several desirable cotypes, has been bought by the Curator from Rosenberg, Brimley, and other sources, notably Maynard's recent Bahaman collections.

Exchanges on an unusually extensive scale have been effected with the Australian Museum, British Museum, University of Michigan Museum, U. S. National Museum, Museum of Princeton University, South African Museum, and Carnegie Museum of Pittsburgh.

Material loaned to Dr. Leonhard Stejneger, Dr. L. E. Griffin, Dr. A. G. Ruthven, and Mr. E. R. Dunn has been returned safely.

Special thanks are due to Dr. G. A. Boulenger for the loan of one of the Gundlach and Peters specimens of the rare *Anolis cyano-pleurus*.

## REPORT ON THE FISHES.

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BY SAMUEL GARMAN.

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The most important donation of the year is a representative series of about seventy fishes of Bermuda, the gift of the Bermuda Biological Station for Research. The specimens were well selected and arrived in excellent condition. The usual routine labor has been devoted to care of materials, to a large number of identifications, to general improvements, and to dissections, drawings, notes, and other preparations for publications.

## REPORT ON THE ENTOMOLOGICAL DEPARTMENT.

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Acceptable additions to the Entomological Collections have been received from Miss E. B. Bryant, Messrs. H. R. Amory, H. A. Ballou, B. P. Clark, Walter Deane, W. G. Farlow, J. W. Green, E. D. Harris, A. P. Morse, H. M. Parshley, L. W. Swett, Roland Thaxter, W. M. Wheeler, and F. R. Wulsin.

The Cicindelidae, Mr. Harris's gift, Mr. Wulsin's collection from Madagascar, and Professor Wheeler's Formicidae deserve special mention.

Mr. L. W. Swett has made considerable progress with the preliminary rearrangement of the Geometridae, and through his generosity and interest many desirable species have been added to the collection. He has also prepared a number of specimens for study and published descriptions of several new species the types of which are in the collection.

The addition of Sphingidae new to the collection, the gift of Mr. B. P. Clark, has led to the rearrangement of the entire series in the Museum.

The routine work includes the cataloguing and labeling of several hundred types of Coleoptera, Diptera, and Lepidoptera.

## REPORT OF THE MYRIOPODS AND ARACHNIDS.

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BY RALPH V. CHAMBERLIN.

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During the year, additions to the collections of chilopods and diplopods have been received from Miss E. B. Bryant and from Messrs. J. W. Bailey, C. T. Brues, H. L. Clark, A. J. Cook, J. J. Davis, J. H. Emerton, H. W. Henshaw, W. A. Hilton, J. D. Mitchell, E. W. Nelson, W. R. Walton, W. M. Wheeler and C. B. Williams.

Accessions to the collection of arachnids were received from Miss E. B. Bryant, Miss M. L. Moles, and Messrs. C. T. Brues, S. C. Chamberlin, H. L. Clark, J. H. Emerton, and W. A. Hilton.

A specimen of a new species of land turbellarian from the Philippines was sent in by Dr. C. F. Baker. Specimens of nine species of Chaetognatha were received from the collections of the U. S. Bureau of Fisheries.

The first months of the year were devoted chiefly to the work of cataloguing. The catalogue of the chilopods and diplopods was completed so far as concerns identified material. The catalogue of the annelids was revised and brought nearly up to date, and the collection was largely rearranged. Other routine work included the study of a number of collections of myriopods and arachnids sent for identification. A report on the chilopods of St. Paul Island, Alaska, was prepared for the U. S. Bureau of Biological Survey. Most of the time from December to June was devoted to work on the annelids of the Albatross expeditions of 1891, 1899-1900, and 1904-1905.

## REPORT ON THE ECHINODERMS.

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BY HUBERT LYMAN CLARK.

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The work of the year has been about equally divided between the collections of Echini and ophiurans. The rearrangement of the spatangoid Echini has been completed; the unidentified material has been determined, a few as yet undescribed forms have been critically studied and the pedicellariae of all the genera and most of the species have been microscopically examined. This work has been done for the sixth and last portion of the report on Hawaiian and other Pacific Echini.

The entire collection of ophiurans has been rearranged to conform with the catalogue published (Mem. M. C. Z., 35, no. 4). All type material has been conspicuously designated in both the collection and the card catalogue. The work has involved the rewriting of many cards and labels, but has added greatly to the practical usefulness of the collection.

During March and April, I was granted leave of absence for a trip to Tobago, B. W. I., as one of a party sent out by the Carnegie Institution of Washington. We were located for five weeks near the extensive coral area known as Buccoo Reef. This proved a very rich ground for echinoderms and 75 species were collected, of which about one fourth are new to the Museum. Nearly two thousand specimens were gathered, including good series of a number of species hitherto only meagrely represented in the collection. This material has all been sorted and mostly identified, but has not yet been incorporated with the catalogued series.

During the year, important collections for study have been received from the University of Iowa, the South African Museum at Cape Town, and the South Australian Museum at Adelaide; duplicate series from these are to be retained. A small exchange with the Marine Biological Laboratory, Woods Hole, Mass. has given us some desirable brittle-stars, and very welcome gifts of starfishes, brittle-stars, and sea-urchins have been received from Mr. John W. Mills, and the Bermuda Biological Station for Research.

## REPORT ON THE COELENTERATES.

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BY HENRY B. BIGELOW.

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The most important accessions received during the year are the duplicate set of Medusae, ctenophores, and siphonophores collected by the GRAMPUS in 1915; the duplicate set of Medusae and ctenophores collected by the U. S. Revenue Cutter SENECA in the region of the Grand Banks of Newfoundland in 1914; and a series of Medusae and siphonophores obtained during the oceanographic explorations of the Canadian Government in 1914 in the Gulf of St. Laurence and off Nova Scotia, presented by Dr. A. G. Huntsman. Medusae from Tobago Island, West Indies, have been presented by Drs. A. G. Mayer and H. L. Clark. The Museum is also indebted to Dr. J. P. McMurrich for Medusae from Vancouver Island.

The card catalogue of stony corals, has been continued; it now includes 107 species, but the greater part of the collection still remains to be worked over.

I was absent from the Museum from October, 1915 until March, 1916. Since then, my principal work has been the preparation of the report on the oceanographic cruises of the GRAMPUS in 1914 and 1915, and the preparation of a report on the Medusae and siphonophores collected by the BACHE in 1914.

## REPORT ON INVERTEBRATE PALAEOLOGY.

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BY PERCY E. RAYMOND.

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During the year, the rearrangement of the collection of trilobites was advanced by bringing the material into zoölogical order, and by the distribution of a quantity of unsorted specimens to their proper places in the series. The *Odontopleuridae* and the *Lichadidae* were newly identified and relabeled, and a study made of the genera of each family. An extensive revision of the *Lichadidae* was completed for publication, and a shorter paper on the *Odontopleuridae* has already been printed. Considerable time was devoted to the finishing of the report on the Ordovician of the Baltic Provinces, and to the labeling and identification of various miscellaneous collections of fossils other than trilobites. The collection of trilobites occupies 480 Museum trays, and the contents of 244 of them have been identified and relabeled since the writer has been Curator. The principal families still to be arranged are the *Phacopidae*, 80 trays, *Proetidae*, 30 trays, *Olenidae*, 40 trays, and *Goldiidae*, 20 trays.

A new feature has been the gathering together and the rearranging of a large amount of material to form a stratigraphic collection. This work required a great deal of sorting, labeling, and shifting of specimens among the four rooms, not only to obtain the specimens, but to make room for the collection. The result has been the assemblage of quite a representative series of Palaeozoic fossils, occupying 600 Museum trays and arranged in stratigraphic order. This collection consists mainly of material taken from the Whitney, Hyatt, Walcott, Burr, Perry, Hartt, and Jackson collections, supplemented by material from the general collection and various lots obtained by the Curator. A beginning was made on the arrangement of a similar collection from the Mesozoic and Caenozoic formations, but in these lines the Museum needs much more American material.

Field-work was confined to a single short trip. In May, after a visit to Yorktown with students, I spent three days in the Catawba Valley, near Salem, Virginia. Thanks to the guidance



and assistance of Prof. S. L. Powell of Roanoke College, I was able to collect more than a barrel of good Ordovician fossils in this short time.

The following accessions, other than those mentioned above, have been received:—

By donation: 80 Museum trays of fossils and geological specimens from the Ordovician of central Pennsylvania, representing the collecting from that region for two seasons, from Mr. R. M. Field; 9 Museum trays of Cambrian and Carboniferous fossils from Montana, and a unique collection of blastoids from Old Baldy and Cherry Creek, Montana, from Mr. T. H. Clark; a cast of the type of *Megalaspis beckeri* Slocum, from Dr. E. O. Ulrich; 4 slabs with *Olenellus*, from the Curator.

By purchase: 42 specimens of invertebrate fossils from Mr. Frederick Braun; 7 specimens from Ward's Natural Science Establishment.

## REPORT ON THE GEOLOGICAL COLLECTION.

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BY ROBERT W. SAYLES.

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During the past year, almost all the accessions pertain to economic geology. By purchase, specimens of copper ore from Mansfeld, Germany; native iron from Greenland; platinum ore from Westphalia, Germany; 5 specimens of uranium ores from Colorado; 3 specimens of uranium ore from Australia. Mrs. August R. Meyer of Kansas City has very kindly given a splendid collection of about 300 specimens of ores from the Cripple Creek region of Colorado. This collection contains about 40 valuable and interesting specimens of cerargyrite and other silver chlorides; about 50 of argentiferous galena; 20 rich, free, and roasted gold ores; 10 native silver specimens; one ruby silver specimen; 10 cerussite specimens; over 50 miscellaneous gold and silver ores; and a large number of furnace products. At least 150 of the specimens of the Meyer collection can be placed on exhibition to advantage. Prof. E. C. Jeffrey has given a unique collection of 55 colored photomicrographs, illustrating the origin of coal according to the results of his researches. The photographs show the microscopic structure of coals in various parts of the earth and from nearly every geological age in which coal has been formed. In addition to the photographs of coals, there are a number of photo-micrographs of oil shales which show an origin similar to that of the coals. The Mineralogical Department has given a large cube of granite from North Carolina for the building stone exhibit.

To the collections in the room devoted to Dynamical and Structural Geology, there have been added specimens of lava from Lassens Peak, the gift of Mr. W. G. Reed, Jr. A manganese nodule dredged from the Pacific Ocean by the ALBATROSS has been placed on exhibition. Thanks are due to Professors Palache and Raymond and to Dr. C. L. Whittle for specimens. Some large specimens of slate exhibiting folding were collected at Crow Point, Hingham, and at Squantum. Several large descriptive placards have been placed in the spaces under the windows.

The average number of visitors to the collections open to the Public for the nine months, August, 1915–April, 1916, as noted by the Watchman, was more than 81,000; the largest number, (August, 1915), was 16,411, the smallest, (February, 1916), 4,943.

REPORT ON THE LIBRARY.

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During the Museum year from August 1, 1915, to July 31, 1916, inclusive, 1,149 volumes, 1,203 parts of volumes, and 1,164 pamphlets have been added to the Library.

The total number of volumes in the Library is 53,783, the total number of pamphlets is 50,470.

Six hundred and eighty-seven volumes have been bound; two thousand pamphlets have been separately bound.

Col. J. E. Thayer's gift of two paintings of J. J. Audubon and Dr. H. B. Bigelow's gift of several hundred volumes are acknowledged in the Report of the Director, p. 8.

## PUBLICATIONS

FOR THE YEAR 1915-1916

(1 AUGUST, 1915-31 JULY, 1916).

MUSEUM OF COMPARATIVE ZOÖLOGY.

## BULLETIN:—

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

No. 4. Harvard seismographic station. Sixth annual report including records, 1 January-31 December, 1914. By J. B. Woodworth. pp. 30. September, 1915.

Vol. LVI. (Geological series, Vol. X. Shaler Memorial series, No. 2, 3).

No. 3. Expedition to the Baltic provinces of Russia and Scandinavia. Part 1.—The correlation of the Ordovician strata of the Baltic basin with those of eastern North America. By Percy E. Raymond. pp. 110. 8 Plates. July, 1916.

No. 4. Expedition to the Baltic provinces of Russia and Scandinavia, 1914.

Part. 2.—The Silurian and High Ordovician strata of Esthonia, Russia, and their faunas. Part. 3.—An interpretation of the Silurian section of Gotland. By W. H. Twenhofel. pp. 68. 5 Plates. July, 1916.

Vol. LIX.

No. 4. Exploration of the coast water between Nova Scotia and Chesapeake Bay, July and August, 1913, by the U. S. Fisheries Schooner *Grampus*. Oceanography and plankton. By Henry B. Bigelow. pp. 212. 2 Plates. September, 1915

No. 5. Notes on birds from East Siberia and Arctic Alaska. By W. Sprague Brooks. pp. 54. September, 1915.

No. 6. A revision of the lizards of the genus *Ameiva*. By Thomas Barbour and G. Kingsley Noble. pp. 66. October, 1915.

No. 7. Two new genera of myrmicine ants from Brazil. By William Morton Wheeler. pp. 12. November, 1915.

No. 8. New chilopods from Mexico and the West Indies. By Ralph V. Chamberlin. pp. 49. 5 Plates. November, 1915.

Vol. LX.

No. 1. New and old Silurian trilobites from southeastern Wisconsin, with notes on the genera of the *Illaenidae*. By Percy E. Raymond. pp. 42. 4 Plates. January, 1916.

No. 2. The Australian ants of the genus *Onychomyrmex*. By William Morton Wheeler. pp. 12. 2 Plates. January, 1916.

- No. 3. The spermatogenesis of *Phrynotettix magnus*, with special reference to synapsis and the individuality of the chromosomes. By D. H. Wenrich. pp. 82. 10 Plates. February, 1916.
- No. 4. A revision of the lizards of the genus *Cyclura*. By Thomas Barbour and G. K. Noble. pp. 28. 15 Plates. February, 1916.
- No. 5. The ants of the Phillips expedition to Palestine during 1914. By W. M. Wheeler and W. M. Mann. pp. 10. February, 1916.
- No. 6. Results of the Yale Peruvian expedition of 1911. The Arachnida. By Ralph V. Chamberlin. pp. 126. 25 Plates. March, 1916.
- No. 7. A collection of birds from the Cayman Islands. By Outram Bangs. pp. 20. March, 1916.
- No. 8. Ants collected in Trinidad by Professor Roland Thaxter, Mr. F. W. Ulrich, and others. By William Morton Wheeler. pp. 10. March, 1916.
- No. 9. Bats of the genus *Corynorhinus*. By Glover M. Allen. pp. 26. 1 Plate. April, 1916.

## MEMOIRS:—

Vol. XXV.

- No. 4. Catalogue of recent ophiurans: based on the collection of the Museum of Comparative Zoölogy. By Hubert Lyman Clark. pp. 214. 20 Plates. December, 1915.

## REPORT:—

1914-1915. pp. 46. December, 1915.

## ZOOLOGICAL LABORATORY.

## CONTRIBUTIONS:—

262. REDFIELD, E. S. P.—The grasping organ of *Dendrocoelum lacteum*. *Journ. animal behav.*, September-October, 1915, 5, p. 375-380.
263. AREY, L. B.—Do movements occur in the visual cells and retinal pigments of man? *Science*, 24 December, 1915, n. s., 42, p. 915-916.
264. MAVOR, J. W.—On the development of the coral *Agaricia fragilis* Dana. *Proc. Amer. acad. arts & sci.*, December, 1915, 51, p. 483-512, 6 pls.
265. AREY, L. B.—The occurrence and the significance of photo-mechanical changes in the vertebrate retina — an historical survey. *Journ. comp. neurol.*, 15 December, 1915, 25, p. 535-554.
266. WENRICH, D. H.—See *supra*. *Bull.* 60, no. 3.
267. CROZIER, W. J.—Ionic antagonism in sensory stimulation. *Amer. journ. physiol.*, 1 January, 1916, 39, p. 297-302.
268. CROZIER, W. J.—Regarding the existence of the 'common chemical sense' in vertebrates. *Journ. comp. neurol.*, 15 February, 1916, 26, p. 1-8.

269. MAJOR, J. W.—On the life-history of *Ceratomyxa acadensis*, a new species of Myxosporidia from the eastern coast of Canada. *Proc. Amer. acad. arts & sci.*, April, 1916, **51**, p. 549-578, 3 pls.
270. CROZIER, W. J.—Cell penetration by acids. *Journ. biol. chem.*, 1916, **24**, p. 255-279.
271. CROZIER, W. J.—The rhythmic pulsation of the cloaca of holothurians. *Journ. exper. zool.*, 1916, **20**, p. 297-356.
272. AREY, L. B.—The movements in the visual cells and retinal pigment of the lower vertebrates. *Journ. comp. neurol.*, 15 April, 1916, **26**, p. 121-202, 5 pls.
273. REDFIELD, A. C.—The coördination of chromatophores by Hormones. *Science*, 21 April, 1916, n. s., **43**, p. 580-581.
274. Robertson, W. R. B.—Chromosome studies. 1. Taxonomic relationships shown in the chromosomes of Tettigidae and Acrididae: V-shaped chromosomes and their significance in Acrididae, Locustidae, and Gryllidae: chromosomes and variation. *Journ. morphol.*, 20 June, 1916, **27**, p. 179-331, 26 pls.
275. HECHT, S.—Form and growth in fishes. *Journ. morphol.*, 20 June, 1916, **27**, p. 379-400.
276. AREY, L. B.—The function of the efferent fibers of the optic nerve of fishes. *Journ. comp. neurol.*, 15 June, 1916, **26**, p. 213-246, 2 pls.

#### BERMUDA BIOLOGICAL STATION FOR RESEARCH.

##### CONTRIBUTIONS:—

38. See *supra*, *Contrib. Zool. Lab.*, **264**.
39. CROZIER, W. J.—On cell penetration by acids. *Science*, 19 November, 1915, n. s., **42**, p. 735-736.
40. See *supra*, *Contrib. Zool. Lab.*, **268**.
41. See *supra*, *Contrib. Zool. Lab.*, **270**.
42. HECHT, S.—The water current produced by *Ascidia atra* Lesueur. *Journ. exper. zool.*, 1916, **20**, p. 429-434.
43. See *supra*, *Contrib. Zool. Lab.*, **271**.
44. CROZIER, W. J.—Some indicators from animal tissues. *Journ. biol. chem.*, 1916, **24**, p. 443-445.
45. GALLOWAY, T. W. and WELCH, P. S.—Studies on a phosphorescent Bermudian annelid, *Odontosyllis enopla* Verrill. Cambridge, 1916, 26 pp., 5 pls. (Reprinted from *Trans. Amer. microsc. soc.*, January, 1911, **30**, p. 13-40, 5 pls.).

## ALLEN, G. M.

A third species of *Chilonycteris* from Cuba. *Proc. N. E. zoöl. club*, 8 February, 1916, **6**, p. 1-7.

See also p. 35. *Bull.* **60**, no. 9.

## BANGS, OUTRAM.

Notes on dichromatic herons and hawks. *Auk*, October, 1915, **32**, p. 481-484.

The smaller mockingbird of the northern Bahamas. *Proc. N. E. zoöl. club*, 29 March, 1916, **6**, p. 23.

A collection of birds from Saghalin Island. [With J. E. Thayer]. *Auk*, January, 1916, **33**, p. 43-48.

Regular breeding of Alice's thrush in Arctic East Siberia. [With J. E. Thayer]. *Auk*, July, 1916, **33**, p. 327-328.

See also p. 35. *Bull.* **60**, no. 7.

## BARBOUR, THOMAS.

A note on two interesting New Jersey amphibians. *Copeia*, 24 January, 1916, no. 26.

Some remarks upon Matthew's "Climate and evolution." With supplemental note by W. D. Matthew. *Ann. N. Y. acad. sci.*, 25 January, 1916, **27**, p. 1-15.

The reptiles and amphibians of the Isle of Pines. *Ann. Carnegie mus.*, January, 1916, **10**, p. 297-308, pl. 28.

A new *Tantilla* from Mexico. *Proc. Biol. soc. Washington*, 6 June, 1916, **29**, p. 93-94.

New amphibians and a new reptile from Sarawak. [With G. K. Noble]. *Proc. N. E. zoöl. club*, 8 March, 1916, **6**, p. 19-22, pl. 2.

A new *Anolis* from Cuba. [With C. T. Ramsden]. *Proc. Biol. soc. Washington*, 25 January, 1916, **29**, p. 19-20.

See also p. 34, 35. *Bull.* **59**, no. 6; **60**, no. 4.

## BIGELOW, H. B.

*Eperetmus*, a new genus of Trachomedusae. *Proc. U. S. nat. mus.*, 31 August, 1915, **49**, p. 399-404, pl. 59.

See also p. 34. *Bull.* **59**, no. 4.

## BREWSTER, WILLIAM.

Bartow's Golden-eye at Wareham, Mass. *Auk*, April, 1916, **33**, p. 197.

## CHAMBERLIN, R. V.

Two new Texan Parajuli. *Psyche*, April, 1916, **23**, p. 33-36.

See also p. 34, 35. *Bull.* **59**, no. 8; **60**, no. 6.

## CLARK, H. L.

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obtained by the F. I. S. "Endeavour" on the coasts of Queensland, New South Wales, Tasmania, Victoria, South Australia, and western Australia. *Biol. results, "Endeavour,"* 1909-14, 2 June, 1916, **4**, p. 1-123, pl. 1-44.

[Reviews of Roman's American civilization and the negro]. *Boston transcript*, 14 June, 1916, pt. 3, p. 4. *Science*, 16 June, 1916, n. s., **43**, p. 855-856.

See also p. 35. *Mem.* **25**, no. 4.

DALY, R. A.

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Problems of the Pacific islands. *Amer. journ. sci.*, February, 1916, ser. 4, **41**, p. 153-186, 1 pl.

Homocline and monocline. *Bull. Geol. soc. Amer.*, March, 1916, **27**, p. 89-92.

Petrography of the Pacific islands. *Bull. Geol. soc. Amer.*, June, 1916, **27**, p. 325-344.

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Report on the Zoölogical laboratory. *Ann. rept. M. C. Z.*, 1914-1915, December, 1915, p. 10-13.

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Nervous transmission in sea-anemones. [Abstract]. *Proc. Nat. acad. sci.*, July, 1916, **2**, p. 437-438.

The responses of the tentacles of sea-anemones. [Abstract]. *Proc. Nat. acad. sci.*, July, 1916, **2**, p. 438-440.

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PHILLIPS, J. C.

Two problems in the migration of water fowl. *Auk*, January, 1916, **33**, p. 22-27.

Barn owl in Massachusetts. *Auk*, January, 1916, **33**, p. 77.

Display of the purple finch. *Auk*, January, 1916, **33**, p. 77.



## RAYMOND, P. E.

Revision of the Canadian species of "Agelacrinites." *Ottawa nat.*, August-September, 1915, **29**, p. 53-62, pl. 1.

The genera of the Odontopleuridae. *Ottawa nat.*, February, 1916, **29**, p. 135-139.

The Pelecypoda of the Chazy formation. *Ann. Carnegie mus.*, July, 1916, **10**, p. 325-343, pl. 29, 30.

See also p. 34. *Bull.* **56**, no. 3; **60**, no. 1.

## SAYLES, R. W.

Banded glacial slates of Permocarboniferous age, showing possible seasonal variations in deposition. *Proc. Nat. acad. sci.*, March, 1916, **2**, p. 167-170.

## WARD, R. DEC.

Climatic subdivisions of the United States. *Bull. Amer. geogr. soc.*, September, 1915, **47**, p. 672-680.

The weather factor in the great war. *Journ. geogr.*, **14**, November, 1915, p. 71-76; June, 1916, p. 373-384.

Some aspects of immigration to the United States in relation to the future American race. *Eugenics rev.*, January, 1916, **7**, p. 263-282.

Immigration and the war. *Scientific month.*, May, 1916, **2**, p. 438-452.

War, immigration, eugenics. Third report of the Committee on immigration, American genetic association. [With A. E. Cance, Irving Fisher, and P. F. Hall]. *Journ. of heredity*, June, 1916, **7**, p. 243-248.

Meteorology and climatology. *Amer. year book* for 1915, 1916, p. 599-601.

Notes on climatology and reviews. *Bull. Amer. geogr. soc.*, and *Geogr. rev.*, throughout the year.

Notes and reviews. *Journ. geogr.*

## WHEELER, W. M.

See p. 34, 35. *Bull.* **59**, no. 7; **60**, no. 2, 5, 8.

## WOODWORTH, J. B.

Record of the Seismographic Station, Department of Geology and Geography, Harvard University. Earthquake records from No. 476 to No. 557 at the end of May, 1916.

Dynamical and structural geology. *Amer. year book* for 1915, 1916, p. 591-593.

The Geological section of the University Museum. *Harvard alumni bull.*, 9 February, 1916, **18**, p. 350-354.

See also p. 34. *Bull.* **55**, no. 4.

## 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 . . . . .	8,379.69
Sturgis Hooper Fund . . . . .	107,534.41
Agassiz Memorial Fund . . . . .	297,933.10
Teachers and Pupils Fund . . . . .	7,594.01
Virginia Barret Gibbs Fund . . . . .	6,723.42
Willard Peele Hunnewell Memorial Fund . . . . .	5,605.49
Maria Whitney Fund . . . . .	6,403.94
Alexander Agassiz Fund . . . . .	99,500.00
Alexander Agassiz Expedition Fund . . . . .	85,102.71
George Russell Agassiz Funds . . . . .	100,000.00
Maria Whitney and James Lyman Whitney Fund . . . . .	274.01
	\$892,520.12

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 incomes of which are 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 incomes are 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.  
E. L. MARK. On Arachnactis.  
H. L. CLARK. The "Albatross" Hawaiian Echini.

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.                        | W. A. HERDMAN. The Ascidians.               |
| K. BRANDT. The Thalassicolae.                   | S. J. HICKSON. The Antipathids.             |
| O. CARLGREN. The Actinarians.                   | E. L. MARK. Branchiocerianthus.             |
| R. V. CHAMBERLIN. The Annelids.                 | JOHN MURRAY. The Bottom Specimens.          |
| W. R. COE. The Nemertean.                       | P. SCHIEMENZ. The Pteropods and Heteropods. |
| REINHARD DOHRN. The Eyes of Deep-Sea Crustacea. | THEO. STUDER. The Alcyonarians.             |
| H. J. HANSEN. The Cirripeds.                    | — The Salpidae and Doliolidae.              |
| H. J. HANSEN. The Schizopods.                   | H. B. WARD. The Sipunculids.                |
| HAROLD HEATH. Solenogaster.                     |   |

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, as follows:—

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|---------------------------------|---|
| R. V. CHAMBERLIN. The Annelids. | MARY J. RATHBUN. The Crustacea Decapoda.        |
| H. L. CLARK. The Holothurians.  | G. O. SARS. The Copepods.                       |
| H. L. CLARK. The Ophiurans.     | L. STEJNEGER. The Reptiles.                     |
| — The Volcanic Rocks.           | C. H. TOWNSEND. The Mammals, Birds, and Fishes. |
| — The Coralliferous Limestones. | T. W. VAUGHAN. The Corals, Recent and Fossil.   |
| S. HENSHAW. The Insects.        |   |
| G. W. MÜLLER. The Ostracods.    |   |

PUBLICATIONS  
OF THE  
MUSEUM OF COMPARATIVE ZOÖLOGY  
AT HARVARD COLLEGE.

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There have been published of the BULLETIN Vols. I. to LIV., LVI., and Vols. LVIII. to LX.; of the MEMOIRS, Vols. I. to XXXIV., and also Vols. XXXVI. to XXXVIII., XL. to XLII., and XLIV.

Vols. LV., LVII., LXI. and LXII. of the BULLETIN, and Vols. XXXV., XXXIX., XLIII., XLV. to XLIX. of the MEMOIRS, are now in course of publication.

The BULLETIN and MEMOIRS are devoted to the publication of original work by the Officers 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 Jefferscn 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, Professor R. A. Daly, in charge.

These publications are issued in numbers at irregular intervals. 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.





