# REPORT

OF

# S. P. LANGLEY,

SECRETARY OF THE SMITHSONIAN INSTITUTION,

FOR THE

YEAR ENDING JUNE 30, 1905.

WASHINGTON:
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# CONTENTS.

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*To the Board of Regents of the Smithsonian Institution.*

GENTLEMEN: I have the honor to present herewith my report, showing the operations of the Institution during the year ending June 30, 1905, including the work placed under its direction by Congress in the United States National Museum, the Bureau of American Ethnology, the International Exchanges, the National Zoological Park, and the Astrophysical Observatory.

Following the precedent of several years, there is given, in the body of this report, a general account of the affairs of the Institution and its bureaus, while the Appendix presents more detailed statements by the persons in direct charge of the different branches of the work. Independently of this, the operations of the National Museum are fully treated in a separate volume of the Smithsonian Report, and the Report of the Bureau of American Ethnology constitutes a volume prepared under the supervision of the Chief of that Bureau. The scientific work of the Astrophysical Observatory is recorded in occasional publications.

## THE SMITHSONIAN INSTITUTION.

### THE ESTABLISHMENT.

By act of Congress approved August 10, 1846, the Smithsonian Institution was created an Establishment. Its statutory members are the President, the Vice-President, the Chief Justice of the United States, and the heads of the Executive Departments. The prerogative of the Establishment is "the supervision of the affairs of the

Institution and the advice and the instruction of the Board of Regents."

As organized on June 30, 1905, the Establishment consisted of the following ex officio members:

THEODORE ROOSEVELT, *President of the United States.*
CHARLES W. FAIRBANKS, *Vice-President of the United States.*
MELVILLE W. FULLER, *Chief Justice of the United States.*
JOHN HAY, *Secretary of State.*
LESLIE M. SHAW, *Secretary of Treasury.*
WILLIAM H. TAFT, *Secretary of War.*
WILLIAM H. MOODY, *Attorney-General.*
GEORGE B. CORTELYOU, *Postmaster-General.*
PAUL MORTON, *Secretary of Navy.*
ETHAN ALLEN HITCHCOCK, *Secretary of the Interior.*
JAMES WILSON, *Secretary of Agriculture.*
VICTOR H. METCALF, *Secretary of Commerce and Labor.*

## ORGANIZATION OF THE BOARD OF REGENTS.

The Board of Regents consists of the Vice-President and the Chief Justice of the United States as ex officio members, three members of the Senate, three members of the House of Representatives, and six citizens, "two of whom shall be residents of the city of Washington and the other four shall be inhabitants of some State, but no two of them of the same State."

As organized at the end of the fiscal year, the Board consisted of the following members:

The Hon. M. W. Fuller, Chief Justice of the United States, Chancellor; the Hon. C. W. Fairbanks, Vice-President of the United States; Senator S. M. Cullom, Representative R. R. Hitt, Representative Robert Adams, jr., Representative Hugh A. Dinsmore, Dr. James B. Angell, of Michigan; Dr. Andrew D. White, of New York; the Hon. J. B. Henderson, of Washington City; Prof. A. Graham Bell, of Washington City; the Hon. Richard Olney, of Massachusetts, and the Hon. George Gray, of Delaware.

There are two vacancies on the Board, caused by the death of Senator O. H. Platt and the retirement of Senator Francis M. Cockrell.

## MEETINGS OF THE BOARD OF REGENTS.

At a meeting of the Board of Regents held March 12, 1903, the following resolution was adopted:

"*Resolved*, That in addition to the prescribed meeting held on the fourth Wednesday in January, regular meetings of the Board shall be held on the Tuesday after the first Monday in December and on the 6th day of March, unless that date falls on Sunday, when the following Monday shall be substituted."

In accordance with the above resolution the Board met on December 6, 1904, January 25, 1905, and March 6, 1905.

The following is an abstract of its proceedings, which latter will be found in the annual report of the Board to Congress:

REGULAR MEETING OF DECEMBER 6, 1904.

A statement concerning the disposition of the remains of James Smithson, and the report of the special committee having in charge the final disposition of the remains, was presented to the Board, which adopted the following resolution:

"*Resolved*, That the special committee having in charge the matter of the final disposition of the remains of James Smithson be authorized to receive the original tomb, and to place it, suitably inscribed, with the remains, in some proper position that they may select in the grounds of the Institution; the expenses involved in the matter to be met from the funds of the Institution."

The Secretary made a statement to the Board concerning the progress on the new building for the National Museum. The excavation for the building was begun on June 15, 1904, and the laying of the foundations in concrete was finished November 9, 1904. The contracts for the granite had been entered into.

The Secretary recalled to the Board the various bills introduced for the preservation of antiquities on the national domain. He had learned in the meantime that the Secretary of the Interior had in contemplation a bill which would meet the needs of the Department and be satisfactory to the Institution, which had prepared for the Secretary of the Interior the requisite maps giving the location of antiquities on the public lands. The Secretary of the Interior had also taken preliminary steps for the appointment of guardians for important ruins.

ANNUAL MEETING, JANUARY 25, 1905.

The Secretary announced the reappointment of Dr. J. B. Angell as a Regent for six years, by joint resolution approved by the President January 19, 1905.

The usual resolution relative to income and expenditure was adopted, and the annual reports of the Secretary, the executive committee, and the permanent committee were submitted.

The special committee on the disposition of the remains of James Smithson reported the arrival of the original tomb, and their decision, under the authority given at the previous meeting, to place it and the remains within the Smithsonian building. A statement of the reinterment of the remains will be found on a subsequent page.

The Secretary informed the Board of the proposal of Mr. Charles L. Freer, of Detroit, to bequeath or to make a deed of gift, to take effect upon his death, of a collection of paintings and etchings, largely

those of Whistler and his school, and of American and oriental pottery and other objects of art; and of erecting a building to be used solely for the purpose of exhibiting these objects, on condition that the Regents should provide for the maintenance of the building and collections. The Secretary had laid this matter before the executive committee under date of December 16, which adopted the following report:

"The executive committee, having heard with interest and appreciation the statement by Secretary Langley of the proposition and views of Mr. Charles L. Freer, of Detroit, to intrust to the Smithsonian Institution a collection of works of art, now in his possession, which has already cost $600,000, and to which he proposes to add almost as much more, and to construct for housing it a hall costing $500,000, upon condition that all the expense and responsibility for its care and maintenance shall be provided, are of opinion that it would be well for the Board of Regents to consider such a proposition in sympathy with the broad and cultivated spirit in which it is made; but as it is presented only as a statement of a conversation with Mr. Freer, it is requested by the committee that Secretary Langley communicate with Mr. Freer, and suggest to him that he put in more precise form his views and his wishes, so that the action which the committee may recommend to the Board shall be such as will exactly set forth Mr. Freer's purposes and be given the careful consideration appropriate to such an enduring benefaction.

"It is further requested by the committee that Mr. Freer be communicated with in such time that his reply may be received and be considered by the committee before the meeting of the Board, which occurs on January 25, 1905."

After reading several communications from Mr. Freer on the subject, and the correspondence between him and the Secretary, the following resolution was adopted:

"*Resolved*, That the Chancellor appoint a committee of three Regents, whose duty it shall be to make personal examination of the collection of art objects which Mr. Charles L. Freer has proposed to give or bequeath to the Smithsonian Institution, and make report to the Board of its value and merits; and said committee is further instructed to ascertain from Mr. Freer what alterations, if any, can be made in the conditions of his very generous proposal; and the Secretary of this Institution is hereby added as an additional member of this committee."

The following committee was then appointed: Doctor Angell, Senator Henderson, Doctor Bell, and the Secretary.

REGULAR MEETING OF MARCH 6, 1905.

The Secretary asked the Board's approval of his appointment of Dr. Cyrus Adler as Assistant Secretary of the Institution, and the following resolution was adopted:

"*Resolved*, That the appointment by the Secretary of Dr. Cyrus Adler as Assistant Secretary of the Smithsonian Institution, in

charge of the Library and the Exchanges, with such additional duties as the Secretary may assign him, be approved."

In the absence of Doctor Angell, chairman of the special committee, Senator Henderson presented a report giving an account of the visit of the committee to Detroit and their conference with Mr. Freer. The report was fully discussed, and the following resolution was adopted:

"*Resolved*, That the Board of Regents take this occasion to express their sincere thanks to Mr. Charles L. Freer, of Detroit, for the courtesy shown to the committee of the Regents which recently visited Detroit to examine his art collection; and that further consideration of his generous offer to donate the same to this Institution or the United States be continued until the next meeting of the Board of Regents."

The Secretary stated that Capt. John Donnell Smith, of Baltimore, had donated to the Institution his entire botanical collection, and the Board adopted the following resolution:

"*Resolved*, That the thanks of the Board of Regents be tendered to Capt. John Donnell Smith for his generosity in presenting to the Institution his large and valuable collection of plants and books on botany, which is gratefully accepted."

The Secretary stated that a room in the Smithsonian building had been fitted up as a temporary resting place for the remains of Smithson, and asked the Regents to be present at their transfer.

After adjournment, the Regents repaired to the room referred to, where, in their presence, the remains were placed within the tomb, which was then sealed.

## GENERAL CONSIDERATIONS.

Sixty years ago, when Joseph Henry became the first Secretary of the Smithsonian Institution, the scope of the work he assumed was practically unlimited; Smithson's direction being that his bequest was to be used for the "increase and diffusion of knowledge among men." After considering many suggestions as to how this might best be done, Professor Henry decided that the proper function of the Smithsonian Institution was "to assist men of science in making original researches, to publish them in a series of volumes, and to give a copy of them to every first-class library on the face of the earth." This has remained the policy of the Institution; and although its operations have, of necessity, been modified from time to time, its original breadth of scope has never been narrowed.

The methods of assisting in original research have been various. Numerous grants have been made to qualified investigators, and expeditions have been sent out in many directions. Several enterprises undertaken by the Institution on a small scale outgrew the original intention and, in accordance with the policy of the Institution

not to carry on work that could be done elsewhere, have been allowed to establish themselves independently, chief among which are the United States Weather Bureau, the Geological Survey, and the Fish Commission. Other establishments, as the National Museum, the Bureau of American Ethnology, the International Exchanges, and the National Zoological Park, have continued under the direction of the Institution. It led the way in the organization of library work in the United States; it took the initial steps and continues to support schemes for international cataloguing, and it maintains a benevolent relation with the American Historical Association and the National Society of the Daughters of the American Revolution.

The results of all important investigations and the operations of the Institution and its dependencies are reported upon constantly. Its publications, which include more than 250 volumes, are to be found in all the important libraries of the world, and some of them on the work table of every scientific student. Through the agency of the International Exchange System, these works, together with other public documents and learned treatises, are distributed throughout the civilized world, and the foreign works received in exchange are invaluable in American scientific libraries.

Thus the Smithsonian Institution is in constant association with the Government and all the public institutions of the United States. To them the Institution holds out a friendly cooperation, its aim being, while continuing its own work upon its accepted lines and adapting them to new needs as occasion arises, to continue along the established policy of preventing rivalries, promoting wise cooperation, diminishing waste, and furthering the search for knowledge, the recording of discovered truth, and its dissemination among the people.

In this great work the individual is not lost sight of; the publications of the Institution are widely distributed, its library constitutes an important part of the Library of Congress, and its museum is the rarest in existence in many branches of the natural history and ethnology of the New World. Less imposing than these methods of serving the public, but no less important, is the satisfaction of a constant stream of inquirers, whose letters from every corner of the country bring questions bearing on every branch of knowledge.

## BUILDINGS.

The only important building operation carried on during the past year, of course excepting the work on the new Museum building, was the construction of a mortuary chapel to contain the tomb of James Smithson, brought from Italy.


INTERIOR OF SMITHSON MORTUARY CHAPEL.

DOOR TO SMITHSON MORTUARY CHAPEL, SHOWING IRON GATEWAY MADE FROM RAILING AROUND THE TOMB IN THE SAN BENIGNO CEMETERY, GENOA.

When the San Benigno Cemetery at Genoa was expropriated for municipal purposes by the Italian Government in 1903, the Regents determined to bring the remains of James Smithson to Washington. Dr. Alexander Graham Bell, the committee appointed for this purpose, was successful in his mission, and on January 25, 1904, formally gave the remains into the hands of the Regents. Doctor Bell's report and an account of the ceremonies incident to the removal and reception of the remains were published in the Annual Report for 1904.

The body, upon its arrival in Washington, was placed temporarily in a room in the Smithsonian building containing the relics of Smithson. While resting there, the remains were examined by medical experts and found to be in a remarkable state of preservation. Meanwhile, a small mortuary chapel was prepared for them on the immediate left of the north entrance of the Smithsonian building, and on March 6, 1905, the remains were carried to this chapel and, in the presence of the Regents, replaced in the original tomb, recently brought from Genoa (plates I, II), where they will rest until Congress makes adequate provision for their interment.

Work on the reconstruction on the large archeological hall in the main Smithsonian building has continued throughout the year, as has the process of repairing various portions of the roof of the Museum, including the re-covering of the central rotunda. Some time has also been spent in going through the subcellar of the Museum building removing dead wires, whitewashing, and otherwise improving its condition.

## FINANCES.

The permanent funds of the Institution are as follows:

| | | |
|---|---|---|
| Bequest of Smithson, 1846 | | $515,169.00 |
| Residuary legacy of Smithson, 1867 | | 26,210.63 |
| Deposit from savings of income, 1867 | | 108,620.37 |
| Bequest of James Hamilton, 1875 | $1,000.00 | |
| Accumulated interest on Hamilton fund, 1895 | 1,000.00 | |
| | | 2,000.00 |
| Bequest of Simeon Habel, 1880 | | 500.00 |
| Deposit from proceeds of sale of bonds, 1881 | | 51,500.00 |
| Gift of Thomas G. Hodgkins, 1891 | | 200,000.00 |
| Portion of residuary legacy of Thomas G. Hodgkins, 1894 | | 8,000.00 |
| Deposit from savings of income, 1903 | | 25,000.00 |
| Total permanent fund | | 937,000.00 |

The above fund is deposited in the Treasury of the United States and bears interest at 6 per cent per annum under the provisions of the act organizing the Institution and act of Congress approved March 12, 1894. In addition to the permanent fund, the Regents hold cer-

tain approved railroad bonds which form part of the fund established by Mr. Hodgkins.

At the beginning of the fiscal year July 1, 1904, there was a deficit of $362.80 instead of a credit balance of $46,648.33, as stated in my report for the year ended June 30, 1904. On June 2, 1905, it was discovered that the accountant of the Institution was a defaulter, and that by the aid of false entries and erasures he had been able to conceal his misdeeds from detection. He was immediately placed in the custody of the law and an examination of the books and accounts was commenced, but the total amount of the defalcation had not been determined at the close of the fiscal year, and a more complete statement will be submitted in a special report.

During the year the total receipts deposited in the Treasury of the United States in behalf of the Institution were $74,761.72. Of this sum $57,060 were derived from interest, $10,000 from a temporary loan, and the balance of $7,701.72 from miscellaneous sources. The disbursements during the year amounted to $69,245, the details of which are given in the report of the executive committee. The balance remaining to the credit of the Secretary on June 30, 1905, for the expenses of the Institution, was $5,153.92.

During the fiscal year 1905 the Institution was charged by Congress with the disbursement of the following appropriations:

| | |
|---|---|
| International Exchanges | $27,000 |
| American Ethnology | 40,000 |
| Astrophysical Observatory | 15,000 |
| United States National Museum: | |
| Furniture and fixtures | 22,500 |
| Heating and lighting | 18,000 |
| Preservation of collections | 180,000 |
| Postage | 500 |
| Books | 2,000 |
| Rent of workshops | 4,580 |
| Repairs to buildings | 15,000 |
| National Zoological Park | 95,000 |
| Total | 419,580 |

The following estimates were forwarded as usual to the Secretary of the Treasury for carrying on the Government's interests under the charge of the Institution for the fiscal year ending June 30, 1906. This table shows the estimates and sums respectively appropriated:

| | Estimates. | Appropriations. |
|---|---|---|
| International Exchanges | $34,600 | $28,880 |
| American Ethnology | 50,000 | 40,000 |
| Astrophysical Observatory | 15,000 | 15,000 |
| National Museum: | | |
| Furniture and fixtures | 22,500 | 22,500 |
| Heating and lighting | 18,000 | 18,000 |
| Preservation of collections | 210,000 | 180,000 |
| Purchase of specimens | 10,000 | ---------- |
| Books | 5,000 | 2,000 |
| Postage | 500 | 500 |
| Building repairs | 15,000 | 15,000 |
| Rent of workshops | 4,580 | 4,580 |
| Sunday and night opening | 11,616 | ---------- |
| Transportation of exhibits | 6,500 | 6,500 |
| Building for National Museum | 1,500,000 | 1,500,000 |
| National Zoological Park | 135,000 | 95,000 |
| Readjustment of boundaries, Zoological Park | 60,000 | ---------- |
| Total | 2,098,296 | 1,927,880 |

## RESEARCHES.

In accordance with the original plan of the Institution that its Secretary should devote his time to scientific matters as well as administrative,[a] research work in various fields has been continued under my direction by the Institution and its dependencies.

In the Astrophysical Observatory I have continued work believed to be important, and inaugurated some experiments of novel interest, which are referred to later.

Through the Museum and the Bureau of American Ethnology the Institution has been enabled to carry on various biological, geological, and ethnological researches, which will be found fully described elsewhere in this report.

## HODGKINS FUND.

Frequent applications for grants from the Hodgkins fund are received; and while, as noted in previous reports, the conditions establishing the foundation are such as to measurably restrict the scope of its activities, all requests for aid are carefully considered and acted on. In addition to the researches here mentioned, reports on several interesting investigations, already noted as in progress, are still awaited and will be published later.

A grant has been approved on behalf of Mr. A. L. Rotch, of Blue Hill Meteorological Observatory, whose investigations of the upper

[a] *Resolved*, That the Secretary continue his researches in physical science, and present such facts and principles as may be developed for publication in the Smithsonian contributions. (Adopted at meeting of the Board of Regents, January 26, 1847.)

air currents by means of kites have been aided by the Hodgkins fund. Mr. Rotch conducted a series of experiments at the St. Louis Exposition with ballons-sondes, which carry instruments only, these recording automatically the temperature and pressure of the air, the duration of flight and the place of landing, indicating also the velocity and direction of the air currents traversed. The success of these first experiments in America with recording balloons was such as to warrant their continuance under the same direction, and on their termination the results will be embodied in a report by Mr. Rotch for publication by the Institution.

A paper on the Construction of a Vowel Organ, by Dr. E. W. Scripture, has been recently published by the Institution. This article gives the details of work under a Hodgkins grant approved for the purpose and mentioned in my last report.

In extending his researches in connection with speech or phonetics Doctor Scripture has been fortunate in securing individual gramophone voice records of much historical interest. A voice record of the Emperor of Germany was transmitted by Doctor Scripture in January, 1905, for preservation in the United States National Museum. This record gives, in about two hundred words, the Emperor's conception of the aims and beauty of true manhood and of man's duty to his fellow, and recognizes the wisdom of the Almighty and Omniscient Creator. At present only one other record of His Majesty's voice exists, namely, one made at the same time for preservation in the library of Harvard University.

The experiments conducted by Mr. Alexander Larsen, of Chicago, in connection with the photography of lightning flashes, with a special effort to measure their duration, mentioned in my last report as having been aided by a limited grant from the Hodgkins fund, have been continued during the year and the results carefully reported. An interesting research on the fluorescence of minerals has also been carried on by Mr. Larsen, more than 100 specimens, sent for the purpose by the Institution, having been examined and reported on. During these experiments many interesting facts have been noted, which may prove the basis of further investigation.

A moderate additional grant has been approved during the year on behalf of Doctor von Lendenfeld, of the K. K. Zoologisches Institute, Prague, to assist in defraying the cost of the construction of an improved apparatus for taking the serial instantaneous photographs required for studies of the flight organs of animals. Doctor von Lendenfeld has given serious and protracted attention to this subject, in connection with which numerous articles prepared by him, or under his direction, have been published. A paper by Doctor Mascha, supervised by Doctor von Lendenfeld, on "The Structure of Wing-Feathers," has recently been printed in the Smithsonian Miscella-

neous Collections, and the translation of an article by Doctor von Lendenfeld on the "Relation of Wing Surface to Weight of Body," published originally in the Naturwissenschaftliche Wochenschrift, appeared in the Smithsonian Report for 1904.

In May, 1905, a grant was approved on behalf of Prof. W. P. Bradley, of Wesleyan University, for an experimental investigation of the expansion of air through a nozzle. As all practical forms of apparatus for the production of liquid air depend, so far, upon this type of expansion, the research is deemed an important one, the more so from the fact that the theory of the nozzle expansion of gases is in dispute and must apparently remain so until more complete data are secured.

The results of previous experiments in the liquefaction of air, carried on by Professor Bradley at Wesleyan University, show conclusively that he is in an exceptionally favorable position for the direction of an extended inquiry into the factors which make for efficiency in such a research, and as it is expected that further investigation will materially aid a decision as to certain questions concerning which experimentalists are not fully agreed, the report to be submitted by Professor Bradley is awaited with interest.

Early in the year 1904 a third grant was approved on behalf of Dr. Carl Barus to aid in preparing the completed report of his recent research for publication. This memoir, "A Continuous Record of Atmospheric Nucleation," is in press, as one of the Smithsonian Contributions to Knowledge, and will be the third and last volume of the series giving a detailed account of the investigation of Doctor Barus. A request that a summary of the work should be prepared by the author for presentation before the first international congress on ionization and radioactivity at Liège in September, 1905, was approved, thus enabling an investigation on a subject of much immediate interest, prosecuted under the auspices of the Institution, to be brought to the attention of this notable gathering.

The subscription to the Journal of Terrestrial Magnetism and Atmospheric Electricity has been renewed for the present year, with the understanding that the publication will be maintained in the future without such aid, a stipulated number of copies being forwarded this year, as heretofore, to addresses designated by the Institution.

Among the miscellaneous investigations aided by the Institution during the year I may mention that Dr. Edward L. Greene, associate in botany, United States National Museum, has undertaken to prepare for publication by the Smithsonian Institution a monograph to be entitled "Landmarks of Botanical History." Doctor Greene expects to complete this work in two years. Dr. Albert M. Reese, of Syracuse University, received a small grant to assist him in his

work of collecting in Florida the materials for the study of the embryology of the alligator, and in subsequent investigations. Mr. W. A. Bentley, of Jericho, Vt., has from time to time made numerous photographs of snow crystals and has recently turned over to the Institution 500 glass positives of his best and most interesting photographs, together with a descriptive paper relating to them.

### NAPLES TABLE.

The Smithsonian seat in the Naples Zoological Station has been continuously occupied for the greater part of the present year and, as heretofore, the reports submitted at the close of appointments mention the exceptional opportunities for special research afforded at Naples.

To avoid the confusion and inconvenience likely to result from the duplication of appointments, Doctor Dohrn has recently made a request that two students should not be assigned to Naples at the same period without previous consultation with the management of the station. In order, therefore, to meet the wishes of the always courteous and accommodating director, it is desirable that those wishing to occupy the Smithsonian seat should enter their applications as long a time as possible in advance of the period decided on. This will permit the necessary correspondence in regard to each appointment, when, as is not infrequently the case, there are more applicants than can be readily provided for, and will perhaps also at times afford the opportunity for the extra occupation of an unassigned seat.

It may be added that appointments covering twelve months of the year—June 30, 1905, to June 30, 1906—have already been approved, but as two students are to be received during the same period for one limited appointment, it may be possible to approve additional brief sessions during the year. As before announced, applications for the ensuing year may be taken up for consideration at any time within six months of the period desired.

The appointment of Prof. J. B. Johnston, of the University of West Virginia, terminated March 1, 1905. While at Naples Doctor Johnston obtained and prepared a large amount of material for future experiment and study. Being an experienced teacher, he hopes to embody the results so far secured in a more complete and exact account of the brain, which will be incorporated in a text-book on The Nervous System of Vertebrates, now in course of preparation.

In April Doctor Johnston was succeeded at the station by Dr. Stewart Paton, a former member of the teaching staff of Johns Hopkins University, on whose behalf a second appointment of six months from November 1, 1905, has since been approved. A previous investigation to determine the time when the first spontaneous movements and definite reactions to external stimulation occur in the embryo

will be continued by Doctor Paton, who will investigate also the correlative structural changes in the central nervous system that accompany these functional developments, and will endeavor to determine the elements which conduct the nervous impulses.

I am glad to state that the advisory committee continues the same, and to record my appreciation of the helpful action of the members in recommendations as to appointments to the Smithsonian seat.

## EXPLORATIONS.

### ARCHEOLOGY OF GULF STATES OF MEXICO.

Dr. J. Walter Fewkes, a member of the Bureau of American Ethnology, has carried on an extended archeological reconnoissance for the Smithsonian Institution in the Gulf States of Mexico. His trip was successful, adding information to what is known of the prehistoric inhabitants of this rich but only partially explored region. While the main object of this visit was the increase of our knowledge of Mexican archeology, attention was incidentally given to the striking likeness of many prehistoric objects observed to those from the United States and its bearing on the question of culture migrations. An area was shown in each of the States of Vera Cruz and Tamaulipas, as typical of the prehistoric culture of this region, one of these extending from Xalapa, capital of Vera Cruz, to the Gulf coast, the other being near the city of Tampico, on the banks of the Panuco and Tamese rivers.

The numerous ruins or mounds that occur in these areas, rarely visited by archæologists, are supposed to be typical of the former culture of two great allied peoples, the Totonacs and Huaxtecs, who in prehistoric times inhabited the greater part of Vera Cruz and what is now southern Tamaulipas.

On account of its historical as well as archeological importance, a visit was made to the little-known ruin of Cempoalan, a Totonac metropolis visited by Cortés, the conqueror of Mexico. Archeological literature pertaining to this city is very scanty; there is not a single description in English of the still well-preserved temples of this remarkable capital. On his visit to the site of Cempoalan Doctor Fewkes obtained many fine photographs of the four stately pyramids and gathered much data regarding their construction. He also studied and took photographs of the many small objects found in the neighborhood of the mounds that will later be published. An attempt to determine the site of another flourishing Totonac city revealed, near the ancient Villa Rica de la Vera Cruz, an important cluster of earth mounds of considerable size. These were also photographed and their relics studied.

Doctor Fewkes visited several large ruins in the neighborhood of Xalapa, one of which, near Xicochimalco, he has identified as the remains of the pueblo of Sochimatl, mentioned by Bernal Diaz del Castillo, historian of the conquest. By this identification new light is shed on the hitherto obscurely known route of the conquerors from Cempoalan over the mountains to the plateau of Mexico.

The extensive group of large earth mounds, some of which are remains of pyramidal temples, situated at Texolo, near Xico, were also visited, and important material was gathered from them bearing on their prehistoric inhabitants. The numerous ruins in the vicinity of Tampico were found to be extensive, and objects from them revealed evidences of a high development of culture. Of the large Huaxtec pueblo called Chila, subdued by Cortés, nothing now remains but a group of mounds in an almost impenetrable forest a few miles from Tamos. Many sites of prehistoric pueblos were found on the banks of the Panuco; some of these were once temples, others mortuary hillocks containing pottery offerings and bones of the dead. Numerous shell heaps occur in this region, some of which were visited and examined. About a mile from Tampico, Doctor Fewkes reports, he found a cluster of large earth mounds of considerable extent, up to within a few years concealed by a dense jungle. The most notable ruins in this region lie on the banks of the Champayan lagoon, at the Rancho de San Francisco and Cebadella. In the Sierra de Palma there is a pyramid having a cut-stone facing and stairways similar to those in the Totonac region.

### THE SMITHSONIAN ALASKAN EXPEDITION.

An expedition to Alaska and adjacent territory was made during the summer of 1904 by Mr. A. G. Maddren, under the direction of the Smithsonian Institution, for an examination of the Pleistocene deposits of northern Alaska, in which most of the mammoth and other vertebrate remains occur. His report treats of these formations and the criteria by which they are to be distinguished from the more recent ice and alluvial deposits which have been variously noticed and discussed by travelers and writers. He says:

> The problems of geographic distribution of the animal and vegetable life of North America in Pleistocene time with the disturbance of faunas and floras caused by the widespread glaciation during that period and their subsequent readjustment over the glaciated area all combine to form a complex arrangement, to solve which will require large collections of specimens from the Pleistocene deposits of the unglaciated area of Alaska and the adjacent Canadian territory. At present our knowledge of this fauna and flora is very limited. As far as we know, only one species of elephant (*Elephas primigenius*), the mammoth, inhabited Alaska and Siberia during Pleistocene time.
>
> The longest mammoth tusk so far reported from Alaska is one 12 feet 10 inches long, measured on the outside of the curve. Remains of the rhinoceros

have not been reported with those of the mammoth in Alaska, as in Siberia, and it also appears that the remains of the mammoth in Alaska are not in as fresh a state of preservation as those found in Siberia, which points to the surmise that the mammoth became extinct in Alaska before the last of the species succumbed in Siberia. Associated with the mammoth were herds of large bison and horses. This species of horse may have been the last native to North America, the rear guard of the last migration of these animals across the region of Bering Straits to Asia before the land connection disappeared. There was a species of musk-ox, together with sheep and bear. Descendants of these last three forms have by adaptive changes survived in these northern regions down to the present time.

The relation that the fauna and flora north of the area occupied by glaciers bore to that region in the United States before, during, and after separation by the snow and ice fields; also the relation of forms in Alaska to those of Siberia, with the time and duration of the land connection across Bering Straits and their subsequent separation, form a complex problem, the solution of which will require the accumulation of much material.

Mr. Maddren summarizes his conclusions as follows:

I. That while remnants of the large Pleistocene mammal herds may have survived down to the Recent period and in some cases their direct descendants, as the musk-ox, to the present, most of them became extinct in Alaska with the close of Pleistocene.

II. The most rational way of explaining this extinction of animal life is by a gradual changing of the climate from more temperate conditions, permitting of a forest vegetation much farther north than now, to the more severe climate of to-day, which, subduing the vegetation and thus reducing the food supply, besides directly discomforting the animals themselves, has left only those forms capable of adapting themselves to the Recent conditions surviving in these regions to the present.

III. There are no facts to support the contention that the climate of the Arctic and sub-Arctic regions ever has been colder than it is at present. There are no phenomena presented in those regions that require a more severe climate than that now existing to account for them. There are no ice deposits in Alaska, except those of large glaciers, that may be considered of Pleistocene age. There are no ice beds interstratified with the Pleistocene deposits of Alaska.

IV. That the various forms of land ice, together with the deposits of peat, now existing through the Arctic and sub-Arctic regions of Alaska belong to the Recent period, and these deposits may be most conveniently and logically classified by their position with reference to the Pleistocene and Recent formations and the ice deposits, can not be differentiated satisfactorily into deposits of snow or of water origin by their physical structure and character alone.

### THE SMITHSONIAN GLACIER EXPEDITION.

The expedition dispatched by the Smithsonian Institution to the Canadian Rockies and Selkirks, under the immediate direction of Prof. William H. Sherzer, of the Michigan State Normal School, had a successful season's work on the glaciers along the line of the Canadian Pacific Railway. A selection was made of those five glaciers which are at the present time most readily accessible to the tourist or the student of glacial geology, and these were found to exhibit, more or less strikingly, the characteristics of glaciers throughout

the world. It may be a matter of surprise to many to learn that four or five days of comfortable railway travel places one in the midst of snow fields rivaling in size and grandeur those of Switzerland, that the ice bodies descending from these fields may be studied from modern hotels as a base, and that of those to be reported upon one may safely ride a horse to the very nose of each. For trips on the ice to the passes and neighboring peaks experienced Swiss guides are available during the summer months. So far as is known, there is here the most magnificent development of glaciers of the Alpine type on the American continent, and the purpose of the survey was to gather as much information concerning them as the time and facilities rendered possible. Many photographs with which to illustrate the details of glacial structure were obtained, a number of which accompany a preliminary report of the expedition printed in the Smithsonian Miscellaneous Collections. Professor Sherzer reviews his work as follows:

Field work began July 1, 1904, with two assistants, and continued until the middle of September, camps being made at Lake Louise, Moraine Lake, and in Yoho, Asulkan, and Illecillewaet valleys, in each case as close as practicable to the glaciers under study. Quite in contrast with the two preceding summers, that of 1904 proved exceptionally propitious for field studies. The unusual number of bright days and the reduced precipitation, however, reacted unfavorably in that they permitted forest fires to spread in several of the valleys, and during much of the summer the atmosphere was more or less charged with smoke, rendering distant photography unsatisfactory or quite impossible.

Covered with a veneering of rock débris over its lower third, the Victoria glacier, at Lake Louise, is not the most interesting of the series to the casual observer, who is liable to carry home the idea that it is simply a stone heap, and a rather uninteresting pile at that. Geologically, however, this glacier is the most active and varied of any of those that can be conveniently reached in the entire region, and nearly six weeks were devoted to the study of it and its tributary, the Lefroy. In spite of the many visits which a camp alongside the glacier for this length of time permitted, as well as numerous visits during two previous seasons, not one failed to reveal some new feature or to shed important light on one previously observed. This longer stay at the Victoria permitted measurements of the forward flow of ice under variable conditions of temperature, the construction of an accurate cross section, the determination of the amount of surface melting, and the varying amounts of drainage and sediment discharged—work which was not feasible on the other glaciers, to each of which but seven or ten days could be devoted. A detailed survey was made of each of the five glaciers, from the nose around each way to the nevé field, by means of plane table or compass and steel tape, and full data for a map of the ice and moraines and for a general description were procured. Especial attention was given to the structure of the ice itself, with the hope of shedding more light on some of the points still under discussion.

Only the most general statements concerning those results of the field studies in which the scientific public may be interested will now be noted. The glaciers generally were found to be still in retreat, the Wapta, at the head of Yoho Valley, having exceeded its average of the last three years by a few feet, while the Illecillewaet, at Glacier House, receded but one-third of the average which it

has maintained during the last seventeen years. The Asulkan, in an adjoining valley, which had been advancing for about two years, has remained practically stationary during the last year. The Victoria presents an oblique front of nearly half a mile, and its lower 800 feet, completely vencered with rock as above stated, has pushed out into the forest at a comparatively recent date. This part has remained quiet apparently for a number of years, but accurate measurements to stones embedded in the face show that a very gradual wastage occurred during the summer, with a small stream of clear, ice-cold water as confirmatory evidence.

Farther up, for a distance of about 1,600 feet, there is a steep ice front which is so nearly parallel with the main axis of the glacier that there is a question as to whether it is not its side. Here the front of the ice is receding, the amount for the last year being about the same as the average maintained for the last five or six years, and this in spite of an actual forward flowing movement of the ice of 2 to 3 inches daily in summer and perhaps half this amount in winter. The Wenekchemna glacier, in the Valley of the Ten Peaks, proved of exceptional interest because of its almost unique character, only one other of the type—the Malaspina in Alaska—having been described. The Wenekchemna consists of a sluggish ice mass, relatively short, but broad, formed by the lateral coalescence of about a dozen short ice streams, each of which retains its identity more or less perfectly entirely across the glacier, and maintains its own nose and motion independently of its neighbors. Accurate measurements to stones embedded in the frontal slope showed that some of these ice streams are stationary, some receding, and others advancing, the most rapid advance being near the center, where freshly cut trees were observed. To those who do not fully appreciate all the factors of the problem it is frequently a matter of surprise that a glacier in one valley may be in retreat while that in an adjacent valley may be advancing, as has just been the case in the Asulkan and Illecillewaet valleys; but in the case of the Wenekchemna there is still more varied behavior in streams that are actually side by side almost throughout their length.

## PUBLICATIONS.

It is largely through its publications that the Institution carries out that vital principle of its foundation, "the diffusion of knowledge among men." Each year adds something of importance to the long series of published works comprised in the Smithsonian Contributions to Knowledge, the Smithsonian Miscellaneous Collections, and its Annual Reports. All these are published by the parent Institution, but the series is augmented by the Proceedings and Bulletins of the National Museum, the Reports and Bulletins of the Bureau of American Ethnology, and the Annals of the Astrophysical Observatory, which bring before the public specialized matter no less important.

The details of the work of the past year are given in the Editor's report, the subjects treated in that time including practically every branch of human knowledge.

To the series of Contributions there has been added a third memoir by Dr. Carl Barus, entitled "A Continuous Record of Atmospheric Nucleation," in which the author further discusses his researches on

the nucleus, as published in "Experiments with Ionized Air" (Smithsonian Contributions to Knowledge, vol. xxix, 1901) and in "Structure of the Nucleus," issued as part of the same volume in 1903. The investigation was carried on with the aid of a grant from the Hodgkins fund. Doctor Barus describes the nucleus as a dust particle small enough to float in the air but larger than the order of molecular size, and shows that such a particle precipitates condensation in an atmosphere saturated with water in its immediate vicinity. He uses the term "nucleation" to denote the number of nuclei per cubic centimeter regardless of their source—which may be from mechanical, thermal, chemical, high potential, or radio-active processes—or their special properties. By far the greater number are initially ionized, or at least carry an electric charge, and where they occur in thousands and millions of approximately uniform size they give rise to condensational phenomena of transcendent beauty and importance.

The articles printed in the Miscellaneous Collections are, as the name of the series would indicate, miscellaneous in character. The past year has added 38 numbers to this series of papers, including several relating to the bibliography of chemistry; an exhaustive catalogue of Diptera, or two-winged flies, showing the geographical distribution of several species known to spread disease; accounts of explorations in Alaska and among the Canadian glaciers; some interesting popular papers by Doctor Gill on the sculpin, the tarpon, the ladyfish, and the carp, and a lecture by Dr. Andrew D. White on the diplomatic service of the United States, the first of the series of lectures under the Hamilton bequest.

The Contributions and Miscellaneous Collections just spoken of are published at the expense of the Institution fund in editions of 1,500 copies, and are intended solely for distribution to the large libraries and institutions of learning throughout the world.

The Annual Report, on the other hand, is published by a Government appropriation in an edition of some 12,000, and is intended for a more general distribution. Primarily, this volume is a report to Congress on the operations of the Institution during the year, but its popular interest lies largely in its General Appendix, containing a number of papers showing the recent progress of the world's scientific work. To the selection of appropriate papers for this Appendix I have given much personal attention for several years past.

The manuscript of the work of the late Dr. G. Brown Goode, on some contributions of America to the progress of science, which during the past year has been worked over by Mr. Kenneth M. Goode, editorial assistant, is now almost in its final shape, and will, I hope, appear as a Smithsonian publication during the coming year.

The Institution proper distributed during the year a total of 60,063 volumes or parts of volumes of the series of Smithsonian Contributions, Miscellaneous Collections, Reports, and publications not included in the regular series,[a] making an increase of 13,455 over the number sent out during the previous year.

## THE LIBRARY.

The library of the Smithsonian Institution is, first of all, a library of science, and, secondly, a collection of catalogues and bibliographical apparatus. The general aim, as stated in the original plan, has been "to procure a complete collection of the memoirs and transactions of learned societies throughout the world, and an entire set of the most important scientific and literary periodicals." In 1866 the main portion of the Smithsonian library was for administrative purposes transferred to the custody of the Library of Congress, and became one of the important elements of that great National Library. This collection continues as the Smithsonian Deposit. It has annually increased in size and importance, and at present aggregates nearly half a million entries.

There is retained at the Institution such books as are of immediate importance to investigators carrying on their researches in the Smithsonian building. This reference collection, together with the special libraries of the National Museum, the Astrophysical Observatory, the National Zoological Park, and the Bureau of American Ethnology, numbers about 55,000 volumes.

Besides the accessions of books from customary sources, during the past year there has been received a valuable library relating to civil engineering bequeathed to the Institution by the late Dr. J. Elfreth Watkins; also a collection of about 1,600 books on the flora of tropical America, presented by Capt. John Donnell Smith, and a large number of additions to the Watts de Peyster Collection Napoleon Bonaparte.

The International Catalogue of Scientific Literature established three years ago, with administrative headquarters in London, now contains over half a million reference cards, 50,000 of which are references made for the United States by the Smithsonian Institution. The entire work of preparing cards for this country is done in connection with the library of the Institution, the cost of the work thus far having been borne out of an allotment made by the Institution.

[a] Contributions to Knowledge, 4,540; Miscellaneous Collections, 27,558; Reports, 25,425; publications not in regular series, 1,905; publications not Smithsonian yet distributed by the Institution, 635.

### CORRESPONDENCE.

From its correspondence it appears that the Institution is generally considered by the public as an establishment to which requests may be addressed for information on all branches of knowledge, for the solution of various scientific problems, for the examination and indorsement both of scientific investigations and crude, unscientific speculations, for supplying answers to questions in prize contests, and the like. It seems well, therefore, to state that while responses are cheerfully given, as far as practicable, to all legitimate requests for scientific information, the Institution does not undertake to maintain a general question bureau. The communications received cover every conceivable subject, from new theories of the physical phenomena of the universe to a request for information as to the value of some supposedly rare book, and the preparation of the data desired entails the expenditure of a considerable amount of time and labor by the members of the Institution's staff. Many of these correspondents are men of considerable culture and of much general reading, but are wanting in that special training which is necessary for successful scientific investigation, and correspondence with this class is especially difficult to manage, since the rejection of the propositions made is generally attributed to prejudice and is resented by the writers, who array themselves as martyrs to science.

During the year many letters have been received from inventors who desire either grants of money with which to develop their various devices or an expression of the Institution's opinion as to the merits of their inventions. As the Institution has no funds from which such aid can be given, and as the Secretary is prohibited by a decision of the Board of Regents from expressing an opinion of this character, he is obliged to refuse all such requests. It would seem proper to state also that the Institution does not supply information of a commercial nature, such as is customarily furnished for a fee by engineers or other professional advisers, or which is designed to benefit some individual rather than the public.

In spite of these restrictions, however, the conduct of this correspondence is an important agency for the diffusion of knowledge among men.

### NATIONAL GALLERY OF ART.

In the message of President Roosevelt communicated to the two Houses of Congress at the beginning of the third session of the Fifty-eighth Congress (dated December 6, 1904) he says:

> The collection of art contemplated in section 5586 of the Revised Statutes should be designated and established as a national gallery of art, and the Smithsonian Institution should be authorized to accept any additions to said collection that may be received by gift, bequest, or devise.

The section of the Revised Statutes cited by the President is the act of foundation of the Smithsonian Institution, which declares that "whenever suitable arrangements can be made from time to time for their reception, all objects of art and of foreign and curious research, all objects of natural history, plants, and geological and mineralogical specimens belonging to the United States * * * shall be delivered to such persons as may be authorized by the Board of Regents to receive them, and shall be so arranged and classified in the building erected for the Institution as best to facilitate the examination and study of them;" so that the first object of the Institution, in the eyes of its founders, appears to have been to give it the curatorship of the Art collections of the nation.

During its early years this object was promoted in various ways: among others, by the acquisition of a very valuable collection of prints and engravings belonging to the Hon. George P. Marsh. After the fire in the Institution in 1865 these prints were deposited for temporary safe-keeping in the Library of Congress and (with other works of art) in the Corcoran Gallery.

Subsequently an appropriation was granted by Congress for making a fireproof room in which these could be kept, but it was not until 1896 that the Regents provided for their recall to the Institution. In the journal of the proceedings of the Board for 1896 (Smithsonian Report, 1896, pp. xiii and xiv) will be found the action taken by the Board providing for their restoration to their own immediate control. The following resolution offered then by Senator Gray was adopted:

*Resolved*, That the question of the propriety of bringing the works of art belonging to the Institution under the more immediate control of the Board of Regents be referred to the executive committee and the Secretary, with power to act.

In pursuance of this the Institution brought back to its own keeping a number of prints of value, both from the Library of Congress and the Corcoran Gallery, leaving, by an amicable understanding with the latter establishment, as a loan, a few of the works of art, notably a large picture by Healy.

The old name of the collections was the "Gallery of Art," a title which seems almost too ambitious for the present collections of the Institution, though it is to be hoped that this designation will be justified by their future increase. These have been placed by me in a room specially fitted up for that purpose (the Art Room), under the temporary charge of the librarian.

There is now in the courts awaiting legal interpretation a will containing a bequest of a valuable collection of art objects.

On January 3, 1905, Mr. Charles L. Freer, of Detroit, offered under certain contingencies to bequeath to the Smithsonian Institution his valuable art collection, proposing at the same time to provide after

his death for a building of appropriate design and proportion, provided the Institution would undertake its maintenance. The objects include a remarkable collection of the works of the late J. A. McNeil Whistler and a number of oriental art objects. The proposal of Mr. Freer is still under consideration by the Board of Regents.

### HAMILTON LECTURE.

A number of years ago Mr. James Hamilton left a small bequest to the Smithsonian Institution, the income of which was to be appropriated biennially by the Secretary, either in money or a medal, for such contribution, paper, or lecture on any scientific or useful subject as the Secretary might approve.

The Regents of the Institution decided to let this small sum accumulate, and it is only recently that the Secretary has found himself able to commence to employ the income as a lecture fund. The first address under the auspices of this fund was delivered by Dr. Andrew D. White, LL. D., D. C. L., in the lecture hall of the National Museum on March 9, 1905, and was entitled "The Diplomatic Service of the United States with some Hints toward its Reform."

This lecture was printed by the Smithsonian Institution as a pamphlet of some twenty pages and was distributed to members of Congress, officers of the Department of State, various members of the diplomatic corps, the libraries of the larger universities, presidents of colleges, and others likely to be interested in the important question discussed.

### SMITHSONIAN DELEGATES AT INTERNATIONAL CONGRESSES.

*Congress on Zoology.*—Messrs. Leonhard Stejneger and Gerrit S. Miller, jr., of the United States National Museum, represented the Institution and Museum at the Sixth International Congress on Zoology held at Berne, Switzerland, August 14–19, 1904.

*Congress of Americanists.*—Mr. William H. Holmes, Chief of the Bureau of American Ethnology, represented the Institution at the Fourteenth International Congress of Americanists held at Stuttgart, August 18–23, 1904. He delivered an address on the "Contributions of American Archeology to Human History" and presented to the congress a set of 75 bound volumes relating mainly to American archeology and ethnology, published by the Smithsonian Institution and its two Bureaus—the National Museum and the Bureau of American Ethnology.

*Congress of Orientalists.*—Prof. Paul Haupt, honorary curator of the Division of Historical Archeology, United States National Museum, represented the Smithsonian Institution and the Museum at the Fourteenth International Congress of Orientalists held at Algiers in April, 1905.

*Congress of Psychology.*—Dr. William James, professor of philosophy at Harvard University, was designated to represent the Smithsonian Institution at the Fifth International Congress of Psychology at Rome, April 26–30, 1905.

*Botanical Congress.*—Mr. F. V. Coville, curator of the Division of Plants in the National Museum, represented the Smithsonian Institution and the Museum at the Second International Botanical Congress at Vienna, June 11–18, 1905.

*Ornithological Congress.*—Dr. Leonhard Stejneger, curator of the Division of Reptiles and Batrachians in the National Museum, represented the Smithsonian Institution and the Museum at the Fourth International Ornithological Congress at London, June 12–17, 1905.

*International Convention of the International Catalogue of Scientific Literature.*—Dr. Leonhard Stejneger represented the Institution at the meeting of this body held in London, July 25–30, 1905.

## NATIONAL MUSEUM.

A great museum, in the modern usage of the word, has been defined as "an institution for the preservation of those objects which best illustrate the phenomena of nature and the works of man, and the utilization of these for the increase of knowledge and for the culture and enlightenment of the people." This thought is that of one very especially conversant with the subject, and implies both a collection for the student and an exhibition for the visitor. It is this second part of the museum's work, the exhibition collection, which was probably in the minds of those who originally described the future Smithsonian museum as containing "objects of art and of foreign and curious research," although even at that early date they added "and all objects of natural history, plants, and zoological and mineralogical specimens belonging to the United States." Under the impulse of Congressional legislation the Museum has obtained a signal advantage over the national museums of other countries, since by law all collections made by the surveys of the Government of the United States must be deposited here, thus providing for the systematic preservation of collections of great extent and vast importance.

From the foundation of the Institution to about 1857 its specimens were collected solely to serve as materials for research, and the exhibition collections belonging to the United States were maintained at the Patent Office. At the date mentioned Congress made an appropriation to the Smithsonian Institution for the building of cases to receive these collections, which were known as the "National Cabinet of Curiosities," and from that time on the Institution's

museum besides aiding students served to instruct and entertain the public. The great growth of the Museum dates from the close of the Centennial Exhibition in 1876, since which time collections have been actively gathered and exhibited because of their educational value. Neither purpose has been lost sight of because of the other, and the instruction of the public has been secured not only by dignified exhibition of interesting objects, but by adding to them series of instructive labels based upon the maxim that a good educational museum consists in a series of carefully prepared labels with well selected specimens attached. With these two great purposes in mind the Museum has now succeeded in bringing together catalogued objects amounting to over 6,000,000 in number, the exhibition series being so installed that the individual objects or groups would not stand as inert curiosities by themselves, but are arranged in such manner as to show their relation either to the orderly development of nature or to the varied manifestations of human thought and activity.

It can not but be realized that the Museum's main attainment from this point of view consists not only of the collections or of the building which houses them, but to an ever increasing degree in the possession of the experts who have the custody of these collections and the knowledge to classify them and to make them available for public instruction. I regret to say that the enormous growth of the collections in the Museum has not been accompanied by any proportionate increase in its administrative and scientific staff. The greatest efficiency can hardly make up for the numerical inability to cope with the increasing work, and it becomes each year more painfully apparent that the personnel of the establishment must be materially augmented if the present standards are to be maintained.

Despite this paucity of workers and the congested halls, the past year has been as successful as any in the history of the National Museum. During this time more additions to its collections have been recorded than in any previous year save the period immediately following the Centennial Exhibition of 1876. From the Louisiana Purchase Exposition alone over thirty carloads were received, including many valuable ethnological and technological exhibits. Besides this there were the usual accessions from the Government surveys and from donations and exchanges. Altogether, nearly 250,000 specimens have been entered during the year, while a mass of material is yet to be sorted out, these recent additions bringing the total number of specimens now preserved in the Museum collections well over 6,000,000.

That only a very small fraction of these specimens can ever be on public exhibition is evident, yet those stored away are by no means the least important. The scientific staff is constantly engaged in re-

search in connection with the work of classification, and students from kindred institutions frequently visit Washington or have collections sent to them for investigation.

Duplicate material is used, when not actually needed for study, for the purpose of exchange with other museums, and to a limited extent, by authority given by Congress to the Regents of the Institution, for distribution among American schools. Fourteen thousand specimens were distributed during the past year to schools and colleges throughout the land for the general purpose of promoting education.

The present crowded condition of the building has rendered it difficult to place any more collections there, and such as come in from one source or another are in the main temporarily stored in rented buildings. While it has been found impossible to increase the amount of material on exhibition, the standard of the objects exhibited is being constantly improved, and the methods of installation represent the most modern practice in this regard.

In the division of ethnology a place has been made for a Malaysian collection contributed by Dr. W. L. Abbott and an interesting Philippine exhibit gathered by Dr. E. A. Mearns. Over the hall of mammals has been hung the cast of a great sulphur-bottom whale, about 80 feet in length. Another noteworthy addition during the past year is the reconstructed skeleton of a gigantic Triceratops, measuring almost 20 feet.

During the course of the year some 235,000 persons, an average of 753 visitors a day, have viewed these collections. This number would unquestionably be greatly increased should it become feasible to open the building at night or on Sundays.

Work on the new building, for the continuation of which Congress at its last session appropriated $1,500,000, is progressing satisfactorily. The excavation was completed and the heavy concrete foundation laid last autumn. The erection of the outer walls of granite is now well under way.

The completion of this structure will, it is hoped, mark the beginning of a new era in the activities of the National Museum. No longer cramped for space, it can suitably care for the splendid collections intrusted to its care; by exhibiting these, and by labels, publications, and lectures, it will still further endeavor to impart definite instruction along definite lines to all who care to learn. Then, as now, the first great lesson it will try to enforce is that a museum is in nowise a cabinet of curios to while away an idle moment, but an active instrument for the diffusion of knowledge among men.

## THE BUREAU OF AMERICAN ETHNOLOGY.

The energies of the Bureau during the past year have been devoted chiefly to preparing for publication the proposed Handbook of Indians, which will include not only descriptions of the tribes and their settlements, but also popular articles covering the whole range of ethnological and archæological research relating to them. No work of its kind so comprehensive in scope has ever been attempted, and the effort to combine popular treatment with scientific accuracy has involved an extra amount of time and labor. Almost all the prominent ethnologists of the country have written special articles for the Handbook, and all the staff of the Bureau and ethnologists resident in the city have aided in criticism and revision.

Though somewhat curtailed through the necessity of retaining several ethnologists for work on the Handbook, the field work of the Bureau has been continued in Maryland, Virginia, Oklahoma, Indian Territory, Arizona, New Mexico, Oregon, and Mexico. Dr. J. Walter Fewkes, under a grant from the Smithsonian Institution, made an extended archæological trip through Mexico; Dr. Ales Hrdlicka, of the National Museum, made a visit to Arizona in behalf of the Bureau; and Mr. E. L. Hewett was commissioned to visit New Mexico for the purpose of making researches among the ancient ruins of the so-called Pajarito Park district.

The systematic study of visiting Indian delegations has been continued with success. During the year 22 delegations consented to be photographed, and in some cases allowed themselves to be measured and even to have plaster casts of their faces taken.

The work of compiling an archæological map of the United States, which had received some attention in previous years, was carried forward with all possible dispatch during the past year.

## INTERNATIONAL EXCHANGES.

The International Exchange Service of the Smithsonian Institution has for more than fifty years been the medium of exchange of documents and scientific publications between the Government and learned institutions of the United States and those of foreign countries. Through its operations the Library of Congress has secured a large collection of public documents, and an unequaled collection of scientific serials has been acquired by the Institution for its deposit in the Library of Congress. Each year the service grows in size and importance. The weight of packages handled by it in 1899 was 317,883 pounds; in 1905 it was 474,871 pounds, an increase of 40 per cent in six years.

The number of exchange correspondents now aggregates 51,880, or nearly 4,000 more than the number ten years ago. These are scattered throughout every corner of the civilized world, and new centers of scientific activity are opening up every year. It is largely through the system of International Exchanges that the Institution realizes the catholicity of its founder's bequest, which contemplated the diffusion of knowledge among all men. Moreover, this constant exchange of courtesies among the learned institutions of the world has not only served to enrich the universities, libraries, museums, and learned societies of our country and those with whom we exchange, but has at the same time done much to promote friendly relations among the nations themselves.

## NATIONAL ZOOLOGICAL PARK.

The annual appropriation made for the service of the National Zoological Park was in the following terms:

> For continuing the construction of roads, walks, bridges, water supply, sewerage, and drainage; and for grading, planting, and otherwise improving the grounds; erecting and repairing buildings and inclosures and providing seats in the park; care, subsistence, purchase, and transportation of animals, including salaries or compensation of all necessary employees; the purchase of necessary books and periodicals; the printing and publishing of operations, not exceeding one thousand five hundred copies, and general incidental expenses not otherwise provided for, ninety-five thousand dollars.

The collection of animals exhibited has increased, and comprised at the end of the year over 1,300 individuals of all species. A considerable number of these were born at the park, and 128 birds were received from the exhibit made at the Louisiana Purchase Exposition.

The new house for mammals, mentioned in last year's report, is now approaching completion and will constitute one of the most attractive features of the park. As this structure is necessarily built from the general appropriation for the park, its progress is limited by the amount of funds available for use. As the care of the animals, the maintenance of the collection, the improvement and care of the grounds, including the roads and walks, the repair of all structures, fences, and inclosures must also be defrayed from this appropriation, it is obvious that considerable economy must be exercised in order to have any funds for the erection of buildings.

The park exists, in the words of the act of Congress, "for the advancement of science and the instruction and recreation of the people." The first and primary object is never to be lost sight of, but in pursuance of the second much is done to facilitate the visits of those who seek the pleasant influences of rural scenery and open air. For this reason it is thought that attempts should be made to enhance the

park features by greater care of the indigenous trees and the planting of copses where such are required, by the establishment of seats, and by perfecting the roads and walks as far as practicable. The park is now the nearest to the city of any large stretch of open, picturesque country, and this would seem to be almost a duty owed to the public.

This again brings to mind a project often urged upon Congress, but never realized by an actual appropriation for the work. I refer to the plan for extending the park to the nearest boundary road on the southeast and the west. This has often been referred to in previous annual reports, and it would seem that the present time is particularly favorable for the accomplishment of this object, since roads have recently been established by act of Congress quite near to the present boundaries.

Among the more pressing needs of the park is a small building with outlying yards, which can be used as a hospital and quarantine for sick animals and, incidentally, as a pathological and anatomical laboratory. In this connection, in view of the fact that the primary object of the park is for "the advancement of science," it must be considered how much our knowledge has been increased by such establishments as the Jardin des Plantes, of Paris, under Buffon, Cuvier, or Milne-Edwards; the gardens of the Zoological Society in London, by Huxley and others, and those at Berlin and elsewhere. I approve the recommendation of the superintendent that a modest laboratory for pathological research be added to the park equipment.

During the last year the number of visitors to the park has further increased, and it is not too much to say that no equal expenditure by Congress has brought so much of instruction and rational enjoyment to the people.

## ASTROPHYSICAL OBSERVATORY.

As for several years past, the operations of the Astrophysical Observatory have been almost wholly directed toward measuring the amount of the solar radiation, and its loss in transmission through the sun's envelope and through our own atmosphere.

I do not yet regard the evidence of solar variability as conclusive, but still as rendering this conclusion more probable, and I am glad to state that two lines of investigation have this year become very prominent in the work of the Observatory, which will almost certainly lead to a conclusion regarding this important question.

The first of these is the almost daily bolometric examination of the large solar image formed by the great horizontal telescope, for the purpose of detecting changes in the transparency of the solar absorbing envelope. This work depends so little on the transparency of our

own atmosphere that it can be done almost as well in Washington as at a station more favored as regards atmospheric transparency and freedom from clouds. The past year has not given evidence of very marked variations either in the transparency of the sun's envelope or in the supposedly dependent mean temperature of the earth, but on the contrary the observations have continued most of the time near the mean in both respects. Such changes as have been noted are not, however, contradictory to the view that alterations of the transparency of the sun's envelope do occur, and cause changes in the amount of solar radiation received by the earth, which in turn cause departures of the earth's temperature from its mean.

The second line of investigation to which I have referred above is the determination of the total solar radiation outside our atmosphere, by observations with the bolometer and pyrheliometer at a station located in a relatively clear and cloudless region and at a considerable altitude above sea level. As long ago as February, 1902, at the request of the Hon. C. D. Walcott, and for the consideration of the Carnegie Institution, I urged in a letter to him the great utility of an observatory for solar research to be located at a high altitude and charged with the determination of the question of the amount of solar radiation and the limits of its variability. An observatory for solar research has now, in fact, been established by the Carnegie Institution on Mount Wilson, in southern California, after extensive tests of different proposed sites. By invitation of the director, Prof. George E. Hale, and in accord with the authorization of Congress for the undertaking of observations at high altitudes by the Astrophysical Observatory, I have sent to Mount Wilson an expedition in charge of Mr. C. G. Abbot, for the purpose of determining the conditions for studying the variability of the sun.

The expedition is equipped with spectro-bolometric and pyrheliometric apparatus of the highest quality, and wholly adequate to making the most accurate possible determinations of solar radiation and its transmission through our atmosphere. As I have elsewhere remarked, I am not convinced that it is possible to estimate exactly the loss of radiation in our atmosphere by any observations whatever, but it does seem that the estimates which can be made from the observations of the Mount Wilson expedition will be so close an approximation to the truth that if a notable variation of solar radiation outside our atmosphere occurs the results will show it. Furthermore, similar observations are being continued as usual in Washington. Mr. Abbot reports that the sky above Mount Wilson is of great clearness and uniformity, and that weeks and even months pass there without a cloud appearing above the horizon, so that observations may be made almost every day with good prospects

of success. It is expected that the expedition will remain on Mount Wilson until late in the autumn.

I take this opportunity to express my obligation to the Carnegie Institution and to Professor Hale and his coworkers for the aid and counsel they have so generously extended in furthering the objects of the expedition.

Additional details of the work of the Astrophysical Observatory will be found in the report of the aid acting in charge.

## NECROLOGY.

### ORVILLE HITCHCOCK PLATT.

It is with a keen personal regret that I have to record the death on April 22, 1905, of Senator Orville H. Platt, of Connecticut, who for six years had served on the Board of Regents, and who at all times took much personal interest in the welfare of the Institution.

Senator Platt was born in Washington, Conn., July 19, 1827. After an academic education he undertook the study of law at Litchfield. He was admitted to the bar in 1849, and practiced at Meriden. He became secretary of state of Connecticut in 1857. In 1861–62 he was a State senator; later he served as a member of the State house of representatives and as speaker of that body. From 1879 until the time of his death he was United States Senator from his native State, and his public life belongs to his country. I shall not add here my poor testimony to that of the history which will record his contribution to the national good. He was a man honored by all and best loved by those who best knew him.

Respectfully submitted.

S. P. Langley,
*Secretary of the Smithsonian Institution.*

# APPENDIX TO THE SECRETARY'S REPORT.

## Appendix I.

### REPORT ON THE UNITED STATES NATIONAL MUSEUM.

Sir: I have the honor to submit the following report upon the condition and operations of the National Museum during the year ending June 30, 1905.

At the beginning of the year the excavation for the new building on the northern side of the Mall was actively under way and in the autumn the heavy concrete foundations were completed. In October, 1904, the contracts were executed for the granite required for the outer walls and for the trimmings of the two courts. Contracts for other materials were also entered into at intervals during the remainder of the year, all at prices which insure the putting up of the structure within the limit of $3,500,000 fixed by Congress. It was hoped that work upon the basement might begin by February or March, but unfortunately the winter was severe, with much snow, which interfered with quarrying, and up to the close of the fiscal year not enough stone had been received to warrant the commencement of building operations. The date at which this report is written, however, permits it to be said that the first basement stone was laid on August 21, 1905, and no further delays are anticipated.

In respect to the increase of collections, the year's record has never been exceeded, except during the period immediately following the Centennial Exhibition of 1876. There were the usual accessions from the Government surveys and through donation and exchange, but the Louisiana Purchase Exposition, held at St. Louis, furnished an opportunity probably not soon again to be presented for securing a very large amount of valuable material, especially in ethnology, mineral technology, and other branches of the useful arts, which was accepted to the extent of over thirty carloads. Only a small proportion of these objects could, however, be directly added to the classified and exhibition collections, owing to lack of space, and the greater part have been placed in storage to await the completion of the new building.

Among the additions from other sources was one of special moment consisting of the large and important private herbarium and botanical library of Capt. John Donnell Smith, of Baltimore, which the owner has most generously presented. The former comprises over 100,000 mounted plants, and the latter above 1,500 volumes.

The number of accessions, including only that small part of the material from the exposition which it was possible to place on record, was 1,692, and of specimens 245,384.

Except for the crowded state of the buildings, the Museum is now in as good condition as at any time in its history. The standard of the exhibition collections was materially improved, though their expansion practically ceased some years ago. The reserve, or study, collections were extensively utilized

in the promotion of knowledge, and duplicate specimens to the number of over 14,000 were distributed to educational establishments throughout the country.

*Buildings and equipment.*—The roofs of the Museum building have, as usual, demanded most attention in the matter of repairs. The temporary strengthening a few years ago of the supporting iron framework over the main halls has continued to be effective, but most of the slate covering had so far deteriorated that in 1904 the roof above the east hall was coated experimentally with asphalt, burlap, and slag. Having answered its purpose through one season, the roofs of the other halls and of the rotunda and one pavilion were similarly treated during last year. The metal work upon the roofs also required extensive overhauling, and several skylights were added. The 20 large windows in archeological hall, which have been approaching a condition bordering upon collapse, were completely repaired and made practically as strong as ever.

In view of the crowded condition of all the public halls, the building of only a few exhibition cases was called for. To provide, however, for the care and arrangement of the very extensive accessions received during the year, mainly from the Louisiana Purchase Exposition, the Government surveys, and a few large private donations, a considerable amount of storage furniture was demanded. The number of permanent cases of this character constructed was 213, and of drawers 1,032, in addition to which much shelving was put up and many boxes made for the storage of material in bulk and the distribution of duplicates.

The heating plant, with the addition of a few radiators, has given good service. Steam was maintained from October 8, 1904, to May 2, 1905, on an average of sixteen hours a day, the expenditure of coal amounting to 830 tons. A new arrangement of telephones was effected at the beginning of the year whereby the cost was materially reduced, and as a special fire precaution six standard alarm boxes of the pattern used by the District of Columbia have been installed in different parts of the Museum building.

*Organization and staff.*—The organization of the Museum remains the same as heretofore, except that a Department of Mineral Technology, with Dr. Charles D. Walcott, Director of the United States Geological Survey, as curator, was established in the autumn of 1904, to permit of proper direction in the selection of objects relating to this subject at the Louisiana Purchase Exposition.

Dr. Cyrus Adler was made curator, and Dr. I. M. Casanowicz assistant curator of the Division of Historic Archeology. In the Division of Plants Dr. J. N. Rose was advanced to associate curator and Mr. W. R. Maxon to assistant curator, the position of aid being filled by the appointment of Mr. J. H. Painter. Dr. James E. Benedict, assistant curator of the Division of Marine Invertebrates, has supervised the exhibits in biology and had charge of the collections of comparative anatomy. Mr. Herbert S. Barber was appointed aid in the Division of Insects, and Mr. B. H. Ransom, of the Bureau of Animal Industry, assistant custodian of the Helminthological collections.

Mr. Charles Schuchert, for some years assistant curator of Stratigraphic Paleontology, who resigned to accept the professorship of paleontology in Yale University, has been succeeded by Dr. Ray S. Bassler. Vacancies in the Section of Vertebrate Paleontology were filled by the selection of Mr. James W. Gidley and Mr. Charles W. Gilmore as preparators, and of Mr. Norman H. Boss as assistant preparator.

The following gentlemen, to whom the Museum has become indebted for distinguished services or noteworthy contributions, were designated as honorary associates: In historic archeology, Dr. Paul Haupt, of Johns Hopkins University;

in zoology, Dr. W. L. Abbott, of Philadephia; in botany, Capt. John Donnell Smith, of Baltimore; in mineralogy, Rev. L. T. Chamberlain, of New York City; in paleobotany, Prof. Lester F. Ward, of Washington.

*Additions to the collections.*—The principal source of accessions during the past year was the Louisiana Purchase Exposition. The exhibition made in that connection by the Museum itself contained many important objects acquired through the Government appropriation for the exposition, which, excepting such as were sent to the Lewis and Clark Exposition, were subsequently incorporated in the public series here. Much more extensive and noteworthy, however, were the gifts made to the national collections by several foreign governments, by many States of the Union, and by a large number of individuals having exhibits at St. Louis. So extensive, in fact, were these contributions that they amounted in bulk to about 30 carloads of specimens, besides five of exhibition cases. Of this number 25 cars were filled with collections illustrative of mineral technology alone, comprising examples of the natural and finished products and of the appliances of manufacture in many branches of mineral industry. Unfortunately the arrangement and display of this instructive material must be deferred until more space becomes available through the completion of the new building. The Department of Geology also received many important additions, especially in the way of large masses and pieces appropriate for exhibition. The contributions in ethnology, next in extent to those in mineral technology, were exceedingly varied and interesting, since they relate to the customs and industries of several peoples, and will richly supplement the existing collections.

Through the accessions already noted, the total number of specimens in the Museum has been increased to about 6,141,990, classified as follows: Anthropology, 986,964; biology, 4,409,135; geology, 745,891.

The most noteworthy additions in ethnology, besides those obtained at St. Louis, were from the several islands between Sumatra and Borneo, the Mergui Archipelago, and the island of Mindanao of the Philippine group; from pueblos, cliff houses, and caves in western Socorro County, New Mexico; and from the Apache and Pima Indians of Arizona, and the pueblo of Zuni. To the collections in physical anthropology was added a large amount of material bearing upon the natural history of several races of man, especially the American Indians, Negroes, Slavs, and Filipinos.

The most important acquisitions in historic archeology consisted of Arabic manuscripts and prints from the Moros of Mindanao, and of coins, pottery lamps, and jars from the Orient. The Division of Prehistoric Archeology obtained two valuable collections of implements from Japan; many interesting specimens from Australia and Tasmania, Cape Colony, Thuringia (Germany), and Belmonti, Italy; and a large number of stone implements and pottery from the United States, Mexico, and South America.

The collection of timekeeping devices was increased by several gifts and loans, and acknowledgments are due to the War Department for depositing numerous pieces of ordnance, among them being many of considerable historic interest.

The Division of Graphic Arts received many contributions from foreign exhibitors at the Louisiana Purchase Exposition, and two pictures taken by Daguerre. Among the accessions in ceramics were an extensive and very beautiful collection of glassware from the Union Glass Works; examples of Teco ware and Van Briggle pottery, and a collection of typical Japanese and Chinese porcelains and pottery and of Japanese lacquer work.

To the collection of American history were added 768 objects, mostly loans,

including many personal military relics and examples of the wearing apparel and other articles of the colonial period in Maryland and New York.

Mention may here be made of the large oil portrait of the Empress Dowager of China, painted by Miss Katherine A. Carl and presented to the United States by the Government of China, with appropriate ceremonies at the White House. The picture, encased in its heavy and elaborately carved frame of camphor wood, was transferred directly to the custody of the Museum and temporarily installed in the lecture hall.

About 217,538 specimens were acquired by the Department of Biology, the principal increases as regards number of specimens being in the divisions of Plants, Insects, and Mollusks, though in other branches the additions were not less important. The Division of Mammals received large collections containing many novelties from Malaysia and the Philippine Islands, besides many interesting specimens from southern Europe, Brazil, and Japan, the Kamerun district of West Africa, and Bewean Island in the Java Sea. The most important additions to the Division of Birds were from the Philippine Islands, Malaysia, and Costa Rica. Of reptiles, collections were obtained from Japan, Formosa, the Philippine Islands, Malaysia, China, France, Switzerland, Jamaica, Guatemala, and several parts of the United States. The Division of Fishes received by transfer from the United States Bureau of Fisheries type collections from Samoan waters and Hawaii, and a very large number of specimens from the Pacific and Atlantic coasts of North America.

The Bureau of Fisheries was also the largest single contributor to the Division of Mollusks, having transferred some 5,000 specimens from recent dredgings of the steamer *Albatross* on the coast of California. Other important accessions comprised land and fresh-water shells from Texas, California, and Montana; about 1,500 identified specimens of Philippine shells from the collection of the late Herr Mollendorff, and many marine mollusks from Alaska. While no single large collection was received by the Division of Insects, yet as a whole the additions were of average importance, aggregating over 34,000 specimens from many parts of the world.

The Division of Marine Invertebrates obtained from the Bureau of Fisheries 300 lots of foraminifera from the region about the Hawaiian Islands and a large collection of crustaceans and samples of ocean bottom from the *Albatross* cruise of the winter of 1904–5 in the eastern part of the Central Pacific. The most important additions to the Helminthological Collection was a series of parasites from Egypt.

The past year has been especially noteworthy as regards the increase of the collection in the Division of Plants, the additions having been very much greater than in any previous year in the history of the Museum, embracing 750 accessions and 143,690 specimens. This was chiefly owing to the generous gift by Capt. John Donnell Smith, of Baltimore, of his entire private herbarium, which alone contained 100,889 specimens from different regions, but mainly from tropical America. This large and valuable donation, the work of many years in assembling, was accompanied by a choice botanical library of over 1,500 volumes. The next important contribution was by transfer from the United States Department of Agriculture of 13,965 specimens from many parts of the United States, and from Alaska, Greenland, Canada, Mexico, Guatemala, Europe, and India.

The Department of Geology acquired by gift at the Louisiana Purchase Exposition important series of ores, minerals, and economic products from Brazil, Siam, Ceylon, Greece, and several of the States, and through other sources, many interesting minerals and cut gems.

The collections in Stratigraphic Paleontology were mainly increased through transfers from the Geological Survey, of which the principal ones consisted of large numbers of Niagaran fossils from Tennessee, of Ordovician fossils from the slates at Arvonia, Va., and of Devonian and Carboniferous fossils from Colorado. A very valuable acquisition was the gift by Mr. E. O. Ulrich and Dr. R. S. Bassler of the type and figured specimens of 65 species. The Section of Vertebrate Paleontology received two large collections from the Geological Survey, one made in the Wasatch Eocene of the Big Horn basin, Wyoming, the other from the Oligocene of Oelrichs, S. Dak. In Paleobotany, the most important additions were about 400 specimens from the coal fields of São Paulo and Santa Catharina, Brazil, and about the same number from the higher beds of the anthracite series in the vicinity of Pottsville, Pa.

*Explorations.*—As custodian of the national collections, the Museum depends chiefly for its increment upon the Government explorations conducted by such establishments as the Geological Survey, the Bureau of Fisheries, several of the bureaus of the Department of Agriculture charged with biological research, and the Bureau of American Ethnology, though in the history of the Museum both the Army and Navy have figured conspicuously. The very limited means available for the purpose prevents any extended amount of field work by members of the Museum staff.

From October, 1904, to March, 1905, the steamer *Albatross*, of the Bureau of Fisheries, made extensive explorations in the eastern part of the Central Pacific Ocean, under the scientific direction of Dr. Alexander Agassiz. For the Bureau of American Ethnology Dr. J. Walter Fewkes investigated the sites of ancient Totonac semicivilization in southern Mexico, and Mrs. Matilda Coxe Stevenson continued her studies among the Zuni Indians of New Mexico, both of these expeditions being productive of important collections. Mr. E. A. Schwarz, who visited Cuba for the Department of Agriculture, brought back a large collection of insects which is especially rich in Coleoptera. Mr. A. G. Maddren, under a grant from the Smithsonian Institution, made a reconnoissance of a part of the Yukon River basin of Alaska, during which he secured fragmentary remains of several interesting Pleistocene mammals.

Reference should also be made to the movements of two of the most generous benefactors of the Museum, Dr. W. L. Abbott and Maj. Edgar A. Mearns, surgeon, U. S. Army, from both of whom important contributions were received during the year. The former, with headquarters at Singapore, has recently been working in the Mergui Archipelago and on the islands of Banka, Billiton, and Karimata, where his detailed and painstaking inquiries have furnished most important results in both zoology and ethnology; the latter, who was with the army of Maj. Gen. Leonard Wood on the island of Mindanao, has collected in the same lines and with the same care.

Of field work conducted by assistants of the Museum, the following may be mentioned: Dr. Alés Hrdlička, during his investigations among the Apaches and Pimas of Arizona in the spring of 1905, obtained an important series of ethnological specimens, and Dr. Frederick W. True made several short trips to near-by places in Maryland and Virginia for the purpose of securing remains of the cetaceans which occurred in this region during the Cretaceous period. Dr. Leonhard Stejneger and Mr. Gerrit S. Miller, jr., collected animals and plants in Switzerland, France, and Italy during the summer of 1904. Mr. Robert Ridgway, who was in Costa Rica from November, 1904, to June, 1905, obtained a large series of the birds of that country, and was instrumental in securing a most important donation from the national museum at San José. Dr. W. L. Ralph visited the Dismal Swamp, Virginia, and the Adirondack region of New

York, while Mr. Barton A. Bean collected in Carroll County, western Maryland.

Dr. F. V. Coville, while engaged in field work for the Department of Agriculture in Texas, Arizona, and New Mexico, obtained many plants which have since been transferred to the Museum, and Prof. O. F. Cook made botanical collections in Guatemala. Mr. W. R. Maxon was in Jamaica during the first part of the year, and later, accompanied by Mr. Robert Hay, in Guatemala under detail to the Department of Agriculture. In June, 1905, Dr. J. N. Rose, with Mr. Joseph H. Painter, left on a collecting trip to Mexico, which will be continued during the summer.

The Department of Geology was enriched from several localities through cooperative work with the United States Geological Survey, participated in by Dr. George P. Merrill, and Dr. R. S. Bassler; and in June Mr. Charles W. Gilmore accompanied one of the field parties of the Survey to New Mexico, where he obtained a small but interesting series of fossil vertebrates.

*Researches.*—The classified arrangement of the collections prescribed by law calls for a large amount of research work in the study and naming of specimens, although a greater or less proportion of the material received has already been identified. A full compliance with this requirement has at no time been possible, since the attention of the scientific staff on its past and present basis has been mainly absorbed in the mere care and preservation of the collections, and the maintenance of the exhibition features. Much help is obtained, however, from the scientific men of other institutions, many of whom are interested in one or other of the subjects represented in the Museum, and they may visit Washington or have collections sent to them for the purposes of investigation. The results of most of the inquiries conducted in the Museum laboratories are only indicated in the manuscript records, which are virtually a descriptive history of the national collections, constantly in progress, but the working up of a collection from any particular locality or region, or of a group of objects, large or small, may lead to a positive contribution to knowledge, meriting dissemination through the medium of publication. Some of the more important investigations of the past year, both by assistants of the Museum and by others, have been as follows:

In the Department of Anthropology, Dr. Walter Hough began a detailed study of the very extensive Pueblo collections, continued his observations upon the primitive uses of fire, and nearly completed a report on the Hopi Indians of Arizona. The collections in archeology were utilized by Mr. W. H. Holmes in preparing subjects and illustrations for the Handbook of North American Indians and by Dr. J. W. Fewkes in working up the results of his recent archeological explorations in the Antillian region. Several lines of research in physical anthropology occupied the attention of Dr. Alés Hrdlička, and a paper descriptive of the Howland loan collection of Buddhist religious art was written by Dr. I. M. Casanowicz.

In the Department of Biology, Dr. F. W. True prepared a diagnosis of the fossil skull of a new genus and species of sea lion from Oregon and began a report on the collection of ziphioid whales in the Museum. Mr. Gerrit S. Miller, jr., spent several months at the natural history museums of London, Paris, Berlin, and Leiden in completing his studies and identifications of the very extensive East Indian collection of mammals belonging to the National Museum and of material from other regions. Dr. E. A. Mearns, while in Washington during the winter, studied and described the unique collection of mammals and birds which he brought from the Philippines and completed the first part of his report on the mammals obtained in connection with the Mexican boundary survey.

Mr. Robert Ridgway continued the preparation of his monograph on the birds of North and Middle America. The birds obtained by Dr. W. L. Abbott on the islands off the west coast of Sumatra were the subject of study by Dr. Charles H. Richmond, and those secured by the same explorer in Kilimanjaro and the China Sea by Mr. H. C. Oberholser, of the Biological Survey. Mr. J. H. Riley reported on a collection from the islands of Antigua and Barbuda. Mr. Barton A. Bean, in conjunction with Dr. C. H. Eigenmann, of Indiana University, worked up the specimens of fishes brought from the Amazon River by Prof. J. B. Steere in 1901. The Characinidæ have been referred to Doctor Eigenmann, and the Pacific deep-sea fishes are being studied by Dr. C. H. Gilbert, of Leland Stanford Junior University.

Dr. W. H. Dall completed a revision of the land and fresh-water mollusks of North America north of latitude 49°, a review of the classification of the American Cyclostomatidæ, and papers on land and fresh-water shells from the Bahamas and Central America. He also has in progress reports on the Pyramidellidæ, in joint authorship with Dr. Paul Bartsch; and on recent collections from the Bureau of Fisheries. Dr. William H. Ashmead has about completed his work on the superfamily Formicoidea or ants, and Mr. D. W. Coquillett has been engaged upon a monograph of the North American mosquitoes. Miss M. J. Rathbun prepared for the Bureau of Fisheries two reports on Brachyura and Macrura, collected at the Hawaiian Islands and in Alaska, and continued her studies on the fresh-water crabs. Dr. Harriet Richardson completed a comprehensive monograph of the North American Isopods, and Dr. T. Wayland Vaughan gave much time to the madreporarian corals.

Dr. J. N. Rose reports satisfactory progress with his researches on the flora of Mexico and on the Crassulaceæ and Cactaceæ of North America. Mr. William R. Maxon prepared several papers on ferns, and Mr. J. H. Painter studied the Mexican species of Meibomia. Capt. John Donnell Smith, associate in botany, continued his investigations and the printing of his extensive work, and Dr. E. L. Greene, under a grant from the Smithsonian Institution, began upon an important paper to be entitled "Landmarks of Botanical History."

Dr. George P. Merrill completed a contribution to a history of American geology and conducted observations on the origin of asbestiform serpentine and the weathering of building stones. Research work in mineralogy was mainly confined to the study of the structure of meteorites by Mr. Wirt Tassin. Dr. R. S. Bassler submitted a paper on the Bryozoa of the Rochester Shales. The report of Dr. Anton Handlirsch, of Vienna, on the Paleozoic insects represented in the Museum collection was received during the year and will soon be published. An important work, sent to press before the close of the year, was a catalogue of the type specimens of fossil invertebrates contained in the collections of the Museum.

In Paleobotany, Prof. Lester F. Ward completed the second part of his monograph on the status of the Mesozoic floras of the United States. Mr. David White has made extensive use of the Lacoe collection in the preparation of a report on the stratigraphic succession of the Pottsville floras in the basins of the Appalachian trough, while Dr. F. H. Knowlton has been engaged upon the flora of the Laramie group and in the study of material from Alaska.

*Distribution and exchange of duplicate specimens.*—Duplicate invertebrate fossils to the number of some 60,000 specimens, gradually segregated from the reserve series during the progress of researches, were prepared for the use of educational institutions, being made up into several hundred sets. There also remained on hand for the same purpose a few sets of fishes, marine invertebrate animals, and geological specimens illustrating rock weathering and soil formation. Of these several collections, which are recognized as very helpful

in connection with science teaching in the higher schools and colleges, 121, aggregating over 14,000 specimens, were distributed during the year. In making exchanges with scientific establishments and individuals about the same number of duplicate specimens were utilized, but as an equivalent is obtained in these transactions they directly benefit the collections.

*Exhibition halls.*—The crowded state of the exhibition halls prevents any extensive additions to the public collections, but specimens are frequently received which are deemed of sufficient importance to replace others that have been for some time on display, and the installations in all branches are being constantly improved. In ethnology the interesting Malaysian collection of Dr. W. L. Abbott and Philippine collection of Dr. E. A. Mearns were substituted for some of the older material from Polynesia; the basketry collection was rearranged and several conspicuous examples of the handiwork of the Indians of southern Alaska were installed. To the exhibition in historic archeology were added a series of biblical gems, coins of the Bible, oriental manuscripts, etc. The entire collection of prehistoric archeology, occupying the large upper hall of the Smithsonian building, recently renovated, is being thoroughly revised and will soon again be opened to the public. The exhibits in technology received some interesting accessions, especially in the lines of electrical apparatus, firearms, and railroad appliances. In the gallery of ceramics the collection of purely artistic ware in porcelain, glass, lacquer, and metal work was arranged by countries in a series of separate cases.

The most important additions in biology consisted of objects which had been obtained and prepared for the Museum display at the Louisiana Purchase Exposition, including a number of large exotic mammals, the skeleton and cast of the exterior of a sulphur-bottom whale about 80 feet long, accurately colored casts of several large snakes, and a fine set of models of deep-sea fishes. The American faunal exhibit of insects was nearly completed, and the synoptic series of marine invertebrates was enlarged. A number of large examples of important rocks and ores, besides several minerals and gems, were added to the collections in geology, but the most noteworthy feature was a skeleton of the great fossil Dinosaurian reptile, *Triceratops prorsus*, consisting chiefly of the actual bones of this Cretaceous monster, the few missing parts being reproduced in plaster. It stands 8 feet 2 inches high and measures 19 feet 8 inches long.

*Visitors.*—The Museum building was visited during the year by 235,921 persons, and the Smithsonian building by 149,380 persons, making an average daily attendance of 753 at the former and of 477 at the latter.

*Meetings and lectures.*—The lecture hall was used during the last half of the year for several important functions. On March 9, 1905, the Hon. Andrew D. White delivered, before a distinguished audience, the first lecture under the Hamilton fund of the Smithsonian Institution, his subject being "The diplomatic service of the United States, with some hints toward its reform." On March 25 occurred the commencement exercises of the United States Naval Medical School, the President of the United States being present and delivering the diplomas to the graduates. Saturday afternoon lectures on zoological and botanical subjects were given there from March 18 to April 22, under the auspices of the Biological Society of Washington, the speakers being Dr. Albert Mann, Dr. L. O. Howard, Dr. A. D. Hopkins, Dr. George T. Moore, Mr. William L. Underwood, and Dr. F. W. True.

The regular annual session of the National Academy of Sciences was held from April 18 to 20, the lecture hall being used for the public meetings and the office of the Assistant Secretary for business purposes, and on May 3 the hall

was occupied, for one of its daily sessions, by the American Institute of Mining Engineers, then holding its annual meeting in Washington.

*Publications.*—The publications issued during the past year comprised the Annual Report of the National Museum for 1903; volume 3 of Bulletin No. 50, forming the third part of Mr. Robert Ridgway's monograph of the "Birds of North and Middle America;" part 4 of volume 8 of "Contributions from the National Herbarium," entitled "Studies of Mexican and Central American Plants, No. 4," by Dr. J. N. Rose; volume 9 of the same series, composed of a single paper on "The Useful Plants of the Island of Guam," by Mr. William E. Safford; and the greater part of volume 28 of the Proceedings of the Museum. The General Appendix to the Report for 1903 comprised two papers, one by the Assistant Secretary, entitled "The United States National Museum: An Account of the Buildings Occupied by the National Collections," the other by Dr. A. B. Meyer, of Dresden, entitled "Studies of the Museums and Kindred Institutions of New York City, Albany, Buffalo, and Chicago, with Notes on some European Institutions."

*Library.*—The working library of the Museum now contains about 24,170 bound volumes and 38,643 unbound papers, the additions during the past year having comprised 3,573 books, 3,048 pamphlets, and 563 parts of volumes. It is chiefly dependent on exchanges for its increases, but a large share of the books required for the classification of the collections are not to be obtained in this way, and the $2,000 annually appropriated by Congress is entirely inadequate to supply even the most important demands in this respect.

*Expositions.*—The exhibit made by the Museum, in conjunction with the other bureaus of the Institution, formed one of the especially noteworthy features of the Louisiana Purchase Exposition, at St. Louis, Mo., which closed on December 2, 1904. Arrangements were then begun for the Lewis and Clark Exposition, at Portland, Oreg., which opened on June 1, and is to continue until October 15, 1905. Dr. Frederick W. True was designated as the representative of the Institution and Museum, and Dr. Marcus W. Lyon, jr., as chief special agent. The exhibit for Portland, which had necessarily to be planned upon a much smaller scale than the one at St. Louis, was made up almost entirely of selections from the latter, though a few novelties were added.

Respectfully submitted.

RICHARD RATHBUN,
*Assistant Secretary in charge of U. S. National Museum.*

OCTOBER 1, 1905.

## Appendix II.

### REPORT OF THE CHIEF OF THE BUREAU OF AMERICAN ETHNOLOGY.

Sir: I have the honor to submit the following report of the operations of the Bureau of American Ethnology, for the fiscal year ending June 30, 1905, in accordance with the act of Congress making provision "for continuing ethnological researches among the American Indians, under the direction of the Smithsonian Institution," approved April 28, 1904.

The work of the Bureau has been conducted in accordance with the plan of operations approved by the Secretary June 17, 1904. The systematic researches have been carried forward by the seven members of the Bureau's scientific staff, assisted by a large number of associates and collaborators who have been called on to prepare papers on special subjects or to conduct investigations for which their qualifications especially fitted them. During the year seven members and associates of the Bureau have made researches in the field, the regions visited including Maryland, Virginia, Oklahoma, Indian Territory, Arizona, New Mexico, Oregon, and Mexico.

The amount of field work has been somewhat curtailed by the necessity of detaining a number of the ethnologists in the office to assist in the completion of the Handbook of the Indians (hitherto referred to as the Cyclopedia or Dictionary of the Indian Tribes), which was designed to be submitted to the Secretary at the close of the year. The enlargement of the scope of the work to include not only descriptions of the tribes and their settlements, but also popular articles covering the whole range of ethnological and archeological research relating to them, greatly increased the amount of investigation required, but the value of the Handbook as a work of reference has been more than proportionately increased. With the view of revising and unifying the great number of articles designed for introduction into the Handbook a committee of revision was organized, consisting of members of the Bureau and all available resident anthropologists, fourteen in all, who met three times each week to discuss the papers presented. The meetings of this committee proved both interesting and profitable, and suggested the advisability of holding similar meetings hereafter for the discussion of current researches of the Bureau.

As a result of the preparation of the papers for the Handbook, covering, as they do, the entire range of Indian ethnology and administration, the researches conducted in the office during the year have been exceptionally comprehensive; every branch of anthropologic research, including somatology, psychology, linguistics, sociology, religion, technology, and æsthetics, has received such consideration as the comprehensive though necessarily brief articles for the Handbook required. Besides the articles treating of these primary departments of research, many others have been prepared, on the various phases of the history, archeology, biography, and education of the Indians and the administration of their affairs. With the exception of the bibliography and index, which were retained for reference in proof reading, the manuscript for the Handbook, accompanied with about 800 illustrations, was submitted to the Secretary July 1.

Under the auspices of the Smithsonian Institution the Chief visited Europe for the purpose of attending the International Congress of Americanists, held at Stuttgart, Germany, beginning August 18, 1904. In addition to representing the Smithsonian Institution, he served as delegate of two other scientific organizations, and was also designated by the Department of State as the official representative at the congress of the United States Government. As a member of the scientific staff of the National Museum he was intrusted with the additional commission of visiting a number of the principal museums of Europe for the purpose of acquiring information to be utilized in the erection and furnishing of the new National Museum building. On July 26 the Chief sailed from New York in company with Mr. J. R. Marshall, of the firm of Hornblower & Marshall, architects of the new building, and reached Plymouth, England, August 1. Nine days were spent in visiting the museums of London, Oxford, and Cambridge, and eight days in similar observations in Paris, and on August 18 Stuttgart was reached. The opening session of the Congress of Americanists was held in the forenoon of that day and was attended by a large number of members and other prominent persons, including His Majesty, King William II, of Wurttemberg, who, in response to the address of the president of the congress, Prof. Karl von den Steinen, expressed at length his appreciation of the aims and work of the congress, and his pleasure at having the session held in his capital city.

A report of the last meeting of the congress, held at New York City in 1902, was presented by Dr. Franz Boas, honorary philologist of the Bureau, and other routine business was transacted. Members of the congress were invited to take luncheon with the King at his suburban palace, which was followed by a reception in the palace gardens. The King's interest was highly appreciated and contributed much to the success of the congress. During the presence of the Americanists receptions were also held by Count von Linden, vice-president of the congress, and by Mr. Edward N. Ozmun, United States consul at Stuttgart. Sessions were held on August 19, 20, 22, 23, and 24, and a large number of papers, dealing in the main with questions of American history, ethnology, and archeology, were read. On the 20th the Chief of the Bureau of American Ethnology delivered an address on "Contributions of American Archeology to Human History," and at its close he presented to the congress a set of 75 bound volumes, relating chiefly to American archeology and ethnology, published by the Smithsonian Institution and two of its bureaus—the National Museum and the Bureau of American Ethnology—for which the president extended the thanks of the congress. The Chief also presented a series of 66 photographs of American Indians, representing delegations which visited Washington during the winter of 1903–4, the series having been taken cojointly by the Bureau of American Ethnology and the National Museum. Various excursions were made to points of interest, the principal being to Schaffhausen, Switzerland, to visit the sites of Dr. J. Nuesch's recent explorations of the famous lake-dwelling stations at Schweizerbild and Koenigsbau.

After the adjournment of the congress, the Chief proceeded to Dresden, where, under the guidance of Dr. A. B. Meyer, director of the Royal Zoological and Anthropological Museum of Saxony, the various museums of that city were examined. After leaving Dresden, a number of cities in Germany, Holland, and Belgium were visited with a view to museum study, and on August 12 he returned to Paris, and on the 25th sailed from Cherbourg, en route for New York. Between the date of his arrival in Plymouth, August 1, and his departure from Paris, September 25, the Chief of the Bureau visited and made studies of upward of 50 museums. These observations are embodied in a separate report submitted to the Secretary of the Smithsonian Institution.

RESEARCH WORK.

Shortly after his return from Europe in September, the Chief found it necessary to undertake the preparation of a number of articles relating to aboriginal art and archeology for the Handbook of the Indians. Among the subjects treated at some length are archeology, architecture, art, antiquity, Bureau of American Ethnology, bonework, catlinite, cliff-dwellings, copper, engraving, graphic art, mines and quarries, metal work, ornament, pottery, sculpture, shell-heaps, shellwork, and stonework. The only field work undertaken by the Chief during the year was a brief visit to Cavetown, Md., for the purpose of observing the exploration there being conducted by Dr. Charles Peabody and Mr. W. K. Moorehead in the well-known cave near that village. Mr. J. D. McGuire had begun the exploration of this cave for the Carnegie Institution in 1903 and had obtained valuable evidence of its former occupancy by Indians. The present work, which consisted of extensive excavations within the outer chamber of the cavern, yielded much additional material of the same general character.

During the first few weeks of the year Mr. James Mooney, ethnologist, was at St. Louis supervising the final installation of the Kiowa heraldry exhibit in the Smithsonian section of the Government building, Louisiana Purchase Exposition. This exhibit comprised about 120 articles, filling 50 feet of wall case, together with one floor case, and consisted of 90 small shield models, 4 original shields, 5 tipi models, 6 paintings on buckskin, with several ceremonial lances and smaller objects. On the completion of this work, after a brief leave of absence, Mr. Mooney returned to Mount Scott, in the Kiowa country, Oklahoma, where he continued his researches, including the preparation of models and the collection of ethnological material. A number of Cheyenne tipi models were also made for the Field Columbian Museum, of Chicago, with funds provided by that institution, as authorized by joint arrangement with the Bureau. At the end of October Mr. Mooney returned to Washington and was engaged in writing a preliminary paper on Kiowa heraldry until about the end of the calendar year, when he was called on to cooperate in the preparation of the Handbook of the Indians, for which work the following articles were furnished: Arawakan colony, Calusa tribe, Cheyenne tribe, Kiowa tribe, military societies, peyote, population, shields, skin-dressing, signals, sign language, Timucua tribe. Besides these about 100 minor articles were prepared, treating of tribes, biographies of noted Indians, and other subjects. In connection with this work the available information relating to the ancient tribes of Florida and the Gulf States generally was found to be so deficient and confused that Mr. Mooney undertook an investigation of the subject from original sources. A part of the results has been embodied in the Handbook of the Indians, and the foundation has been laid for an extended paper on the ethnology of this region to form a complement to his previous studies of the Siouan tribes of the east and the Cherokee. In the meantime he also supervised the photographing of the large series of shield models and other parts of the heraldry collection made by him during previous years, and prepared catalogues and labels for such portions of this material as were required for the Bureau exhibit at the Lewis and Clark Exposition.

Dr. J. Walter Fewkes, ethnologist, spent the first six months of the year in the completion of the text of his monograph on the Aborigines of Porto Rico. He left Washington on January 7, 1905, for an extended archeological trip to the Republic of Mexico, under a grant from the Smithsonian Institution, and returned on the 15th of May. About three weeks were spent by Doctor Fewkes in the City of Mexico making arrangements with officials for letters

to those who could aid him in the prosecution of his studies. While not thus engaged at the capital his time was profitably employed in studying the collections in the Museo Nacional and one or two private collections, and in making several excursions to places of archeological interest in the neighborhood of the city, including several of the ruins near Lake Tezcoco, as well as those at Iztapalapa and at San Juan Teotihuacan. While awaiting letters of introduction from the President to the governors of Veracruz and Tamaulipas, Doctor Fewkes visited Cuernavaca, where he made photographs of the so-called "Victory stone," or chimalli, the pictograph of the eagle, and the famous stone lizard, and made a trip also to the ruins of Xochicalco and Tepotzlan. From the ruin known as Casa del Tepozteco he obtained copies of inscriptions on the raised seat in the inner room.

After receiving the necessary letters through the courtesy of President Diaz, Doctor Fewkes proceeded to Xalapa, in the State of Vera Cruz, which he made the base of operations during February, March, and a part of April. While in that city considerable time was devoted to an examination of the magnificent collection of Governor Dehesa, as well as the collection of Señora Estafania and others. The vicinity of Xalapa was found to be particularly rich in ruins and mounds, among which are those at Coatepec, Bandarilla, and Xalapa Viejo. An excursion was made also to Texolo, where there are thirteen or more large mounds, some of which are evidently the remains of temples of an old Totonac city. Xico Viejo, an undescribed ruin of a Nahuatl garrison town mentioned by Bernal Diaz and Gomara, was also visited in the mountains near the trail taken by Cortés from the coast to the City of Mexico in 1519. Instructive photographs of this ruin were taken, and notes made on the idols and pottery found in the neighborhood.

Doctor Fewkes made two visits to the ruins of Cempoala, about 20 miles from the city of Vera Cruz. On the first visit he was accompanied by an official representative of Governor Dehesa, by the alcalde of San Carlos, a neighboring town, and by the inspector and owner of the ruins. On the second trip, when he spent a week at the ruins, Governor Dehesa kindly permitted him to employ the services of the State photographer, Señor Ximines.

At the close of March Doctor Fewkes visited the old city of Villa Rica de la Vera Cruz, now called Antigua, founded by Cortés. In the neighborhood of this city but on the opposite side of the river he found many mounds indicating the site of a large prehistoric city. Other ruins were observed at Santa Fe.

Doctor Fewkes examined some of the antiquities about Cordova and Orizaba; he also visited the pyramid of Cholula near Puebla, and about the middle of April proceeded to the State of Tamaulipas, spending about three weeks at Tampico in a study of the numerous ruins along the Panuco and Tamise rivers and on the adjacent lagoons, and in visiting the extensive shell heaps and temple mounds a mile east of Tampico and others not far from the site of the old town, Tampico Viejo. Doctor Fewkes found numerous antiquities at Altamira and mounds on the banks of the Champayan lagoon. Many other evidences of former occupancy, as idols, pottery, stone weapons, and ornaments, were seen in this region. The old city of Chila, destroyed by Cortés, situated about 10 miles west of Tampico, was found to be hidden in a forest. Evidences of temples and burial mounds also occur abundantly in this locality. About 50 photographs of bowls, jars, and idols found in the neighborhood of Panuco, Tampico, and the lagoons along the banks of the Tamise River, were made. Of more than usual interest are those of large stone idols at Altamira and in the courtyard of a house in Tampico.

On his return to Washington Doctor Fewkes continued the study from his notes and photographs, and prepared a general account of his visit to Cempoala

and Xicochimalco, which was transmitted for publication by the Smithsonian Institution. The illustrative material brought back includes about 200 large photographic negatives, numerous smaller views, tracings of pictographs, and many drawings, plans, and maps.

Dr. Cyrus Thomas, ethnologist, was engaged during the year largely on the Handbook of the Indians, assisting Mr. Hodge in the laborious task of preparing the manuscripts for publication. Among the articles written by Doctor Thomas during the year for this work are agriculture, calendar, counting, Five Civilized Tribes, fortifications, habitations, maize, migrations, mortuary customs, mounds and mound builders, population, reservations, treaties, besides a number of biographical sketches and archeological articles of a more special character. The work of reading the proofs of Bulletin 28, which required especial acquaintance with archeology and glyphic systems of the ancient Mexicans, was also intrusted to Doctor Thomas. This reading was completed before the end of the year. Doctor Thomas was also frequently called on for data required in official correspondence relating to his special branches of research.

Mr. J. N. B. Hewitt, ethnologist, at the beginning of the year began the preparation of various articles for the Handbook of the Indians, and continued the correction and elaboration of the material pertaining to the Iroquoian stock for the same work. Among the articles furnished are those on adoption, clans and gentes, confederations, chiefs, government, mythology, religion, scalping, wampum, and women. The work of cataloguing the collection of linguistic manuscripts, of which Mr. Hewitt is custodian, was completed as far as copying the old cards in duplicate, when the work was laid aside for that of the Handbook. Mr. Hewitt also gave material assistance in furnishing data required in the correspondence of the Bureau relating to tribes and languages.

Mrs. M. C. Stevenson, ethnologist, spent the month of July in New Mexico, where she had been for some months making a study of the arts, industries, religion, and social customs of the Zuñi tribe. It was observed that the Zuñi pantheon is largely similar to that of the Hopi and the Rio Grande pueblos. Although the Zuñi worship numerous deities which take both human and bestial form, they believe also in a supreme power without form, yet embracing all form, the breath of life—life itself. These beliefs indicate that the Zuñi have reached a higher stage of culture than has previously been supposed, although it can not yet be said to what extent this may be attributed to the Spanish influence to which the tribe was more or less subjected for three centuries. Various details relating to Zuñi life were investigated, and valuable information regarding mortuary customs was obtained through the death and burial of Naiuchi, a celebrated priest-chief, whose demise occurred during Mrs. Stevenson's stay in Zuñi pueblo. Native plants entering into the medicine and dietary of the Zuñi were also studied; the arts of preparing and dyeing wool, which have not been practiced for many years, were observed, and specimens of the native materials and devices employed in the process, as well as of the dyed wool, were collected. Studies of symbolism as embodied in Zuñi textile and ceramic art, and investigations into the everyday life, and especially the child-life, of the pueblo were likewise made.

Early in August a day was spent by Mrs. Stevenson with the Santa Clara Indians in making a series of photographs of their annual fiesta. The month was occupied principally, however, in a study of the Sia Indians, a few days being given to the neighboring Jemez pueblo. On the 27th Mrs. Stevenson reached Cochiti, whence a visit was made to the great stone carving of cougars on the mesa 10 miles distant. In Mrs. Stevenson's comparative studies

these sculptures are of special interest, as they are referred to in some of the most sacred myths of the Zuñi. The first of September was employed in a visit to the cavate and mesa ruins about 12 miles from Santa Clara and in making observations among the Tewa people of San Ildefonso, Santa Clara, and San Juan pueblos. The religious beliefs, rituals, and daily customs of these people were found to be closely allied to those of Zuñi, difference in language alone indicating that distinct peoples are involved. In October Mrs. Stevenson returned to Washington, where she has since been engaged in the revision of proofs of her memoir on the Zuñi Indians, in the Twenty-third Annual Report, and, as opportunity afforded, in the elaboration of her several studies on Zuñi religious beliefs, on the edible and medicinal plants of Zuñi, on symbolism as embodied in the textile and ceramic arts, and on the dyeing of textile fabrics.

Dr. J. R. Swanton, ethnologist, was engaged during the year in copying and preparing for the press material obtained by him among the Tlingit Indians of Alaska during the winter of 1903–4. This work, as completed, consists of 137 pages treating of the general ethnology of the Tlingit peoples, 20 native texts with interlinear and free translations, the words of about 100 songs, with translations, together with English versions of 88 stories obtained at Sitka and Wrangell—altogether forming 900 typewritten pages. Doctor Swanton has also prepared grammatical accounts of the Dakota, Haida, and Tlingit languages for introduction into the Handbook of Indian Languages now in course of preparation under the direction of Dr. Franz Boas, honorary philologist of the Bureau; and he has also been called on to contribute several articles for the Handbook of the Indians, including kinship, names and naming, priests and priesthood, thunderbird, totem poles, secret societies, and social organization.

Dr. A. S. Gatschet, ethnologist, continued his work on certain unfinished linguistic studies which it was hoped could be completed for publication before his failing health made further progress impossible, but in January he was compelled to practically relinquish his efforts, and on March 13 was placed on furlough.

Early in the year arrangements were made with the United States National Museum to have Dr. Ales Hrdlicka, curator of physical anthropology in the Museum, visit Arizona and New Mexico on behalf of the Bureau for the purpose of making physical, physiological, and medical observations among the Apache and Pima Indians. Leaving Washington on January 20, Doctor Hrdlicka began his studies, five days later, on the San Carlos Apache Reservation, where he remained until February 8, when he visited a group of Apache residing near what is known as the Sawmill, in the Black River Region. From this point he returned to San Carlos, and on February 13 reached the Rice Station Apache School and district, situated farther northeast on the reservation. On February 26, Doctor Hrdlicka endeavored to reach the White Mountain branch of the Apache, but was prevented from doing so by exceptionally heavy rains. On March 1 he was able to proceed to Sacaton, Ariz., where studies of the Pima tribe were made. From March 12 to 16 he was at Casa Blanca. On the latter date he returned to Casa Grande, and thence proceeded to El Paso, Tex., reaching the reservation of the Mescalero Apache in New Mexico on the 19th. After remaining six days with the Mescaleros, Doctor Hrdlicka began his return journey, reaching Washington March 31.

Doctor Hrdlicka's researches were conducted with the object of supplementing his former investigations among the same tribes. As much attention as possible was devoted to the children, from birth onward, the number examined

being nearly 1,000. Other important subjects to which study was especially devoted were fecundity, mortality, native foods, hygiene, disease, and curative means and methods. These studies were greatly facilitated by the officials of the Indian Office, and met with little objection on the part of the Indians.

In addition to his direct anthropologic investigations, Doctor Hrdlicka succeeded in gathering specimens of about 150 medicinal and food plants and a number of ethnological objects. He procured one Apache skull and five complete Apache skeletons, and in addition to making observations of value among the ancient ruins of the general region, obtained many archeological specimens from hitherto unexplored ruins in the San Carlos Valley.

In April, Mr. E. L. Hewett, who was engaged during the winter months in preparing for the Bureau an archeological map of Colorado and New Mexico, was commissioned to proceed to New Mexico for the purpose of making extended researches among the ancient ruins of the so-called Pajarito Plateau district. His first work was the investigation of numerous deserted and ruined pueblos of the Tewa tribes. This was followed by excavations of ancient mounds in Otowi Canyon, which yielded results of exceptional interest. Upward of 175 burials were uncovered, and the osseous remains of more than 100 individuals were collected and forwarded for study in the National Museum. The art remains comprise numerous entire earthenware vessels and many fragments, with a fair complement of implements of bone and stone. Mr. Hewett was fortunate in reaching this arid spot in an exceptionally wet season, as he found water within easy reach. At the close of the year he had completed his studies within the boundaries of Pajarito Plateau and was preparing to explore explore the plateaus and mountains to the west and the Jemez Valley beyond.

In June a report reaching the Bureau that important finds of prehistoric remains of man and art had been made on the site of the forthcoming Jamestown Exposition, near Norfolk, Va., Mr. J. D. McGuire was commissioned to visit the locality and report on the character of the discoveries made. Mr. McGuire spent one day on the exposition grounds collecting such information as was available, and later reported that although traces of human remains had been exposed in the excavations of the exposition company, the reports had been greatly exaggerated, the discoveries being meager and uniform in character with the relics of countless other sites in the Chesapeake-Potomac region.

The work of Dr. Franz Boas, honorary philologist, was confined to the preparation of the Handbook of American Languages which has been under way for several years. The main part of the field work for the first part of the Handbook was closed during the present year and some field work designed to be embodied in the second part was taken up. Doctor Boas also furnished the article on languages for the Handbook of the Indians.

In the course of the fiscal year the following manuscripts for the Handbook of American Languages have been submitted.

1. Dr. P. E. Goddard: Grammatical notes on the Hupa (Athapascan stock).
2. Dr. A. L. Kroeber: Grammatical notes on the Yuki (Yukian stock).
3. Dr. Roland B. Dixon: Grammatical notes on the Maidu (Pujunan stock).
4. Dr. William Jones: Grammatical notes on the Sauk and Fox (Algonquian stock).
5. Dr. John R. Swanton: Grammatical notes on the Dakota (Siouan stock).
6. Dr. John R. Swanton: Grammatical notes on the Haida (Skittagetan stock).
7. Dr. John R. Swanton: Grammatical notes on the Tlingit (Koluschan stock).
8. Dr. Franz Boas: Grammatical notes on the Kwakiutl (Wakashan stock).
9. Dr. Franz Boas: Grammatical notes on the Chinook (Chinookan stock).

The following manuscripts are still outstanding:

1. J. N. B. Hewitt: Grammatical notes on the Iroquois (Iroquoian stock).
2. Dr. Franz Boas: Grammatical notes on the Eskimo (Eskimauan stock).
3. Dr. Franz Boas: Grammatical notes on the Tsimshian (Chimmesyan stock).

During the year the grammatical notes on the Shoshoni by Mr. H. H. St. Clair, 2d, have been revised.

The general plan of the Handbook of Languages has undergone no material change, except in so far as it was deemed advisable to add briefer articles on the grammar of the remaining languages of the northern part of the continent. These are the Tlingit, the Salish, the Kutenai, and the Chemakum. It is also deemed advisable to add a sketch of one of the coast languages of Oregon which was collected during the year 1904–5 by Mr. St. Clair, who submitted his material on the Coosa and Takilma of Oregon during the present year.

It also seemed desirable to add some data relating to the formation of the noun in Chinook, which seemed of importance in order to clear up some questions relating to the fundamental traits of that family of languages. Since all our information on this stock is derived from one informant, it seemed essential to obtain additional material from other sources and from another dialect. For this reason preparations were made to send Mr. E. Sapir to the upper Columbia River to make a study of the Wasco. In the preparation of this work the Kathlamet Dictionary, based on Bulletin 26, was arranged and copied.

The work on the southern group of languages will require long and energetic field work. So far only one of the languages of the Gulf States, the Yuchi, has been taken up, this tribe being selected because it seems most likely to furnish material that will be not only of linguistic value but will afford knowledege of the early history and customs of the Southeast. This work has been intrusted to Mr. Frank G. Speck, who spent the summer of 1904 among the Yuchi tribe and who returned to this field at the close of the fiscal year.

## HANDBOOK OF THE INDIANS.

Work on the Handbook of the Indians North of Mexico, hitherto frequently referred to as the "Dictionary of Indian Tribes," has been vigorously prosecuted during the year under the immediate supervision of Mr. F. W. Hodge, of the Smithsonian Institution, who, with the approval of the Secretary, has devoted most of his time thereto. Mr. Hodge has had the almost undivided assistance of Dr. Cyrus Thomas; and, as occasion required, nearly the entire scientific staff of the Bureau has aided both in the preparation of the anthropologic and kindred articles and in the revision and elaboration of the tribal descriptions found to be necessary by reason of recently acquired knowledge. So far as the funds of the Bureau afforded, the aid of ethnologists not officially connected with the Bureau was also enlisted. The services generously rendered by these, either gratuitously or for merely a nominal consideration, are highly appreciated.

As outlined in former reports it was originally the plan of Major Powell to classify the linguistic families, tribes, and settlements north of Mexico and to identify the various names by which these had been known in the vast literature of the subject, with a brief description of each such group. This material, recorded on many thousands of cards, became known as the "Cyclopedia of Tribes, with Synonymy."

In 1903 the Secretary altered the scope of the work by directing the incorporation of brief separate articles pertaining to the habits, customs, arts, and industries of the Indians, and of their dealings with the Government, together with biographies of noted individuals and a list of words of northern Indian

origin that have been incorporated into the English language. No work so comprehensive in its scope had hitherto been attempted, consequently in making plans for the new departure it became necessary to begin at the foundation. The popular style of treatment was ever kept in mind, and considerable time was consumed in correspondence with experts best qualified for the preparation of many of the special articles called for by the enlarged plan. For these reasons it has not been possible to complete the work at an earlier date. Owing to the fact that many of the specialists do not reside in Washington, it was difficult, within a limited time, to arrange for entire consistency in treatment and to prevent repetition through encroachment of one subject on another when written by many hands. On this account, and for the purpose of obtaining the views and criticisms of as many experts as possible, conferences were held, as already mentioned, three times each week, which were faithfully attended by the ethnologic staffs of the Bureau and the National Museum, as well as by other resident ethnologists; and ethnologists from elsewhere, while visiting Washington, often gave this committee of revision the benefit of their criticism.

As the articles prepared both by the regular attendants and by others were read at the conferences, and thus were accorded opportunity for criticsim, the value of the meetings in promoting the authoritativeness of the forthcoming Handbook is inestimable. New subjects were constantly suggested, and in some instances much new light was shed on others, after having been written, by reason of the personal knowledge of one or another of the critics present.

In addition to the special articles elsewhere mentioned in this report as prepared by members of the Bureau, the following are among the more important of those that have been furnished by specialists not officially connected with it:

By Dr. Franz Boas: Languages.

By Dr. A. F. Chamberlain: Armor, Basque influence, Chinook jargon, Dutch influence, Eliot's bible, English influence, fur trade, German influence, God (words for), Hawaiian influence, Kutenai, linguistic families, "Lost Ten Tribes," maple sugar, Melungeons, Negro and Indian, Scandinavian influence, Spanish influence, white man (names for), wild rice, and many articles pertaining to words of Indian origin incorporated into the English language.

By Mr. Stewart Culin: Games.

By Dr. William H. Dall: Russian influence.

By Miss Anna Dawes: Commission to the Five Civilized Tribes.

By Dr. G. A. Dorsey: Ceremony, Sun Dance.

By Mr. Wilberforce Eames: Bible translations, dictionaries, periodicals.

By Dr. Livingston Farrand: Marriage and divorce, and many articles descriptive of some of the linguistic families of the Northwest.

By Miss Alice C. Fletcher: Adornment, agency system, buffalo, camping and camp circles, civilization, dramatic representation, dreams and visions, earth lodge, etiquette, fasting, feasts, furniture, governmental policy, grass lodge, land tenure, masks, music and musical instruments, oratory, orientation, poetry, property and property right, quillwork, soldiers, tatoooing, totems, trading posts, war and war discipline and articles descriptive of the Caddoan tribes.

By Mr. Gerard Fowke: "Lansing man," and many articles on technological subjects.

By Mr. H. W. Henshaw: Atlantis, exchange, pictography, popular fallacies, slavery, sweating and sweat houses.

By Dr. George Bird Grinnell: Horse.

By Mr. F. W. Hodge: Adobe, irrigation, kiva and many tribal articles, especially those pertaining to the Southwestern Indians.

By Dr. Walter Hough: Altar, clothing, collecting and excavating, dyes and pigments, fire making, food, illumination, preserving and mending, snake dance, in addition to a large number of brief articles on various implements, utensils, materials used in manufacturing processes, etc.

By Dr. Ales Hrdlicka: Anatomy, artificial head deformation, cannibalism, mixed bloods, health and disease, physiology.

By Dr. Otis T. Mason: Arrows, bows, and quivers; arts and industries, basketry, beadwork, boats, commerce, domestication of animals, education, environment, featherwork, hunting implements, invention, needlework, traps, travel and transportation, weapons, weaving.

By Dr. Washington Matthews: Color symbolism, culture heroes, dry-painting, ethics, family, magic, measurements, medicine, mourning.

By Mr. J. D. McGuire: Drilling, fishing, pipes, smoking, storage and caches, tobacco, trails and trade routes.

The Bureau was also fortunate enough to have the services of Dr. A. L. Kroeber, of the University of California, who generously revised the accumulated material pertaining to many of the linguistic families of California, and in addition gave much valuable information respecting the Shoshonean and Yuman families and the Mission Indians. The remaining Californian stocks were reviewed by Dr. P. E. Goddard, also of the University of California, and by Dr. Roland B. Dixon, of Harvard University.

With the exception of a few articles that had not been quite finished by those to whom the subjects were assigned, the manuscript of the body of the Handbook, recorded on more than 40,000 cards, together with about 800 illustrations, was submitted to the Secretary for transmittal to the Public Printer on July 1, 1905, for publication in two octavo volumes as Bulletin 30 of the Bureau. These cards do not include about 37,000 cross-references to the tribal synonyms, nor the bibliography, which are retained for use in reading the proofs of the text. After serving this purpose they will be ready to be put in type to appear at the close of the work.

### ARCHEOLOGICAL MAP.

The work of compiling an archeological map of the United States, which had received some attention in previous years, was carried forward with all possible dispatch during the last year. The departments of the Government having control of the public lands have undertaken to protect from despoliation by commercial relic hunters and unskilled and unauthorized explorers the archeological remains of these lands, and excellent progress in this direction has been made, especially by the Department of the Interior. For years the Bureau has been collecting data relating to these remains, and whenever called on has furnished all available information for the use of the departments in carrying out this laudable enterprise. During the winter months Mr. J. D. McGuire was engaged in collecting and collating data relating to the antiquities of Arizona and Utah, and in platting these on topographical maps furnished by the United States Geological Survey; and Mr. E. L. Hewett has carried forward to practical completion a corresponding work in Colorado and New Mexico. The several maps have been completed so far as the data is at hand. Accompanying the maps is a card catalogue of the various sites, giving information regarding location, character of remains, and explorations previously carried on. These maps and catalogues are at the disposal of the departments when called for.

In New Mexico the following sheets embrace 512 sites of sufficient interest to be catalogued: Santa Fe, Santa Clara, San Pedro, Pajarito Park, Bernal,

Las Vegas, Chaco Canyon, Mount Taylor, Largo, Lamy, Wingate, Jemez, Taos, Tierra Amarilla, Quemado, Acoma, Manzano, Pinos Wells, Tularosa, Chloride, San Marcial, Fort Stanton, Big Hatchet, Chama, El Paso, Fort Bayard, Las Cruces, San Juan, Albuquerque, and Tres Hermanos. In Colorado the Mesa Verde sheet alone includes 54 sites. On the 21 Arizona sheets (Tusayan, Fort Defiance, San Francisco Mountain, Echo Cliff, St. Johns, Prescott, Verde, Florence, Holbrook, Canyon de Chelly, Solomonsville, Globe, Phoenix, Casa Grande, Fort Apache, Diamond Creek, Chino, Marsh Pass, Tombstone, and Tucson) 270 sites are recorded, and on the Utah sheets (Ashley, Beaver, Escalante, Fish Lake, Henry Mountain, Kanab, Manti, Salt Lake, San Rafael, St. George, Price River, Uinta, La Salle, Abajo, and Utah) are noted 122 sites. The 1,008 archeological sites thus catalogued are scattered over an immense territory and come under the jurisdiction of the Interior, Agricultural, and War departments.

### EXPOSITION WORK.

The exhibit of the Bureau installed in the Smithsonian section of the Government building of the Louisiana Purchase Exposition at St. Louis during 1904, and described in the report for that year, was dismantled at the close of the exposition and a large part of it transferred to Portland, where it has been installed as a part of the Institution's exhibit at the Lewis and Clark Exposition. The remainder of the material has been returned to Washington and deposited in the National Museum.

### STUDY OF INDIAN DELEGATIONS.

The systematic study of visiting Indian delegations has been continued with success. During the year 23 delegations, representing 21 tribes, have been conducted, through the agency of Mr. Andrew John, to the Bureau and National Museum laboratories. Upward of 280 portrait negatives have been made, and casts and measurements of a number of individuals have been obtained. Few Indians of the higher type, however, are willing to submit to the experience of having the face encased in plaster. The tribes represented are as follow:

| | Photo. | Cast. | Measurement. | | Photo. | Cast. | Measurement. |
|---|---|---|---|---|---|---|---|
| Apache | 3 | | | Oneida | 1 | | |
| Catawba | 1 | 1 | 1 | Onondaga | 1 | | |
| Cherokee | 1 | | | Osage | 5 | 1 | 2 |
| Choctaw | 1 | | | Pawnee | 4 | | 4 |
| Cayuga | 5 | | | Pueblo | 11 | | 11 |
| Colville | 3 | | | Seneca | 3 | 2 | 1 |
| Creek | 3 | | 3 | Stockbridge | 1 | | 1 |
| Flathead | 2 | | | Sioux | 11 | | 11 |
| Menominee | 4 | 1 | 2 | Wyandot | 2 | | |
| Mission | 1 | | | Total | 68 | 6 | 37 |
| Modoc | 4 | | | | | | |
| Omaha | 1 | 1 | 1 | | | | |

### COLLECTIONS.

The ethnological collections obtained during the year fall considerably short of those of previous years, owing to the reduced amount of field work undertaken. This condition was due, as already explained, to the necessity of keeping most

of the scientific staff in Washington to aid in the completion of the Handbook of Indians. The accessions are a valuable collection, made by Mrs. M. C. Stevenson at Zuñi, a series of archeological objects obtained by Doctor Hrdlicka in Arizona and New Mexico, and several minor collections, all of which have been deposited in the National Museum.

### PUBLICATIONS.

The distribution of publications has continued as in former years. The great increase in the number of libraries in the country and the multiplication of demands from the public generally have resulted in an almost immediate exhaustion of the quota of volumes allotted to the Bureau, few copies of any of the reports remaining six months after the date of issue. Part II of the Twenty-second Annual Report was issued in January. During the year 1,591 copies of the Twenty-first and Twenty-second Reports were sent to regular recipients, and 2,000 volumes and pamphlets were transmitted in response to special requests, presented largely by members of Congress. The proof reading of the Twenty-third Annual and of Bulletin 28 was practically completed at the close of the year, and it is expected that the press work of these publications will shortly be begun. The Twenty-fourth Report was in the hands of the printer before the close of the year, and Bulletins 29 and 30, the latter being the Handbook of the Indians, were ready to be submitted to the Secretary on June 30, 1905, while the Twenty-fifth Annual Report was completed, with the exception of a small number of illustrations.

### EDITORIAL WORK.

The editorial work of the year has presented features of exceptional difficulty, on account of the large number of papers dealing with linguistics and technical subjects. The Bureau has had the services of Mr. Frank Huntington for the greater part of the year, and Mr. J. P. Sanborn, jr., received a probational appointment as editor in May. The reading of the proofs of Mrs. Stevenson's monograph on the Zuñi Indians for the Twenty-third Annual Report, a work of much technical difficulty, was intrusted mainly to Mr. E. G. Farrell.

### ILLUSTRATIONS.

The work of preparing illustrations has continued in charge of Mr. DeLancey Gill, who has been assisted, as heretofore, by Mr. Henry Walther. The photographic work has included the making of portraits of members of 21 Indian delegations which visited the capital during the year. Three views of each individual were taken, besides several group views, the negatives numbering 298. In preparing illustrations for the publications of the Bureau upward of 200 negatives were made, and 156 films exposed in the field by members of the Bureau were developed in the laboratory. During the year about 2,350 prints were made, mainly for immediate use in illustrating the Bureau publications. Illustrations prepared for the Twenty-fourth Annual Report number 45; for the Twenty-fifth Annual Report, 128; for Bulletin 30, 800. Illustrations transmitted with reports submitted to the Secretary for publication are: For the Twenty-fourth Annual Report, 1,103; for Bulletin 30, 871. Illustrations edited for the Twenty-third Annual Report number 25; for the Twenty-fourth Annual Report, 1,102. The printed editions of 48 colored plates submitted by the engravers for the Twenty-third and Twenty-fourth Annual Reports, numbering about 450,000 prints, were individually examined and approved or rejected.

### LIBRARY.

The library has been in immediate charge of Miss Ella Leary, who has had the assistance of Mrs. Ella Slaughter. The accessioning and cataloguing of the books, pamphlets, and periodicals received during the year have been kept up to date, and the cataloguing of the publications of scientific societies has been commenced. Owing to the crowded condition of the library and their questionable place in an ethnological library, about 400 publications relating to natural history, received through exchange, have been transferred to the National Museum. During the year there have been received and recorded 398 volumes, 500 pamphlets, and the current issues of upward of 500 periodicals; 120 volumes have been bound at the Government Printing Office. The library now contains about 12,563 bound volumes, 7,000 pamphlets, and a large number of periodicals bearing on ethnology and kindred topics. Purchase of books for the library has been restricted to those that bear on the subject of anthropology, with special reference to the American Indians, and only indispensable works have been obtained by this means.

### CLERICAL WORK.

The clerical force of the Bureau consists of four regular employees—Mr. J. B. Clayton, head clerk; Miss Emilie R. Smedes and Miss May S. Clark, stenographers; and Miss Ella Leary, clerk and acting librarian. During the year the compilation of the Handbook of the Indians necessitated the employment of additional clerks with special training in dealing with cyclopedic material and in bibliographic work. In this the services of Mrs. F. S. Nichols, Mrs. Gertrude L. Rogers, and Miss Laura W. Steever have proved invaluable.

### PROPERTY.

The property of the Bureau is comprised in seven classes, as follow: Office furniture and appliances; field outfits; linguistic and ethnological manuscripts and other documents; photographs, drawings, paintings, and engravings; a working library; collections held temporarily by collaborators for use in research, and undistributed residue of the editions of Bureau publications.

The additions to the property of the Bureau for the year include a typewriter and a few necessary articles of furniture. The only improvement made in the offices was the changing of the electric-light wiring, which was done under the direction of the District authorities at a cost of $116.55

Respectfully submitted.

W. H. Holmes,
*Chief of Bureau.*

Mr. S. P. Langley,
*Secretary of the Smithsonian Institution.*

## Appendix III.

### REPORT ON INTERNATIONAL EXCHANGES.

Sir: I have the honor to submit the following report of the operations of the International Exchange Service during the year ending June 30, 1905:

The system for the interchange of publications between learned institutions and individuals in the United States and those in other countries was inaugurated by the Smithsonian Institution almost at the very beginning, and was maintained at the expense of the private fund of the Institution exclusively from 1850 to 1881, when Congress made a small appropriation to assist in the work. Since that time Congressional appropriations have been made annually, but at no time have they been large enough to provide for the entire expense of the service, the Institution having supplied all other necessary means from its private fund, with the aid of United States departments and bureaus and State institutions, which have been asked to reimburse the Institution, at the uniform rate of 5 cents per pound, for a part of the expense of preparing, boxing, and transporting contributions.

The number of packages dispatched during the year was greater than ever before, and, as a record of every package is required, the work has been considerably augmented, but there has been no increase in the clerical force.

The offices occupied by the Exchange Service, consisting of five rooms, are in the southeast basement of the Smithsonian building, and are equipped with the necessary folding and sorting tables, bins, file cases, desks, etc. In addition to the customary supplies for general clerical employment, the service requires large quantities of cards, labels, and printed forms. The supplies for packing and shipping are considerable, and so far as practicable are obtained under annual contract.

On May 1, 1905, the Institution was informed that the steamship *Buteshire*, which sailed from New York on November 26, 1904, was subject to general average adjustment on account of fire in the hold of the vessel during the voyage. Twelve cases of international exchanges destined for Australian ports formed a part of the cargo, and in the event that the contents of any of these cases prove to be irreparably damaged they will be replaced by duplicate volumes, if practicable.

The following tabular statement shows the weight and number of packages transmitted each month during the year, and also the increase over the previous twelve months in each class of correspondents. The second table is a statement of exchange transmissions during each year since 1898.

*Tabular statement of the work of the International Exchange Service during the fiscal year 1904–5.*

| Date. | Number of packages handled. | Weight of packages handled. | Number of correspondents June 30, 1905. | | | | Packages sent to domestic addresses. | Cases shipped abroad. |
|---|---|---|---|---|---|---|---|---|
| | | | Foreign societies. | Domestic societies. | Foreign individuals. | Domestic individuals. | | |
| 1904. | | | | | | | | |
| July | 11,232 | 29,131 | | | | | | |
| August | 10,191 | 27,175 | | | | | | |
| September | 11,047 | 21,690 | | | | | | |
| October | 17,131 | 52,511 | | | | | | |
| November | 9,347 | 24,743 | | | | | | |
| December | 18,389 | 57,919 | | | | | | |
| 1905. | | | | | | | | |
| January | 14,518 | 38,149 | | | | | | |
| February | 18,026 | 50,599 | | | | | | |
| March | 11,964 | 39,636 | | | | | | |
| April | 20,297 | 64,631 | | | | | | |
| May | 11,024 | 26,957 | | | | | | |
| June | 12,587 | 41,730 | | | | | | |
| Total | 165,753 | [a]474,871 | 14,018 | 3,574 | 27,263 | 7,025 | 44,898 | 2,027 |
| Increase over 1903–4 | 6,770 | [a]6,539 | 761 | 110 | 2,362 | 575 | 6,196 | 40 |

[a] Decrease.

The following table shows the number of packages of exchanges handled and the increase in the number of correspondents each year from 1898 to 1905:

| | 1898–99. | 1899–1900. | 1900–1. | 1901–2. | 1902–3. | 1903–4. | 1904–5. |
|---|---|---|---|---|---|---|---|
| Number of packages received | 97,835 | 113,563 | 121,060 | 125,796 | 150,217 | 158,983 | 165,753 |
| Weight of packages received pounds | 317,883 | 409,991 | 414,277 | 396,418 | 559,718 | 481,410 | 474,871 |
| Correspondents: | | | | | | | |
| Foreign societies | 10,322 | 10,845 | 11,295 | 11,760 | 13,121 | 13,257 | 14,018 |
| Foreign individuals | 13,378 | 15,385 | 16,261 | 17,701 | 21,332 | 24,901 | 27,263 |
| Domestic societies | 2,596 | 2,721 | 2,996 | 3,182 | 3,319 | 3,464 | 3,574 |
| Domestic individuals | 4,673 | 5,000 | 5,153 | 5,557 | 6,240 | 6,450 | 7,025 |
| Packages to domestic addresses | 30,645 | 28,625 | 31,367 | 33,961 | 33,980 | 38,702 | 44,898 |
| Cases shipped abroad | 1,500 | 1,768 | 1,757 | 1,847 | 2,461 | 1,987 | 2,027 |

The total number of correspondents has increased from year to year until the aggregate is now 51,880, or 3,808 more than at the conclusion of the fiscal year 1903–4. The correspondents in the United States number 10,599, and those in all other countries 41,281. Of the latter number organized bodies maintaining libraries number 14,018, and those classified as individuals aggregate 27,263.

*Number of correspondents of the International Exchange Service in each country on June 30, 1905.*

| Country. | Correspondents. | | |
|---|---|---|---|
| | Libraries. | Individuals. | Total. |
| AFRICA. | | | |
| Algeria | 26 | 44 | 70 |
| Angola | 1 | ---- | 1 |
| Ashantee | ---- | 1 | 1 |
| Azores | 7 | 16 | 23 |
| Beira | ---- | 1 | 1 |
| British Central Africa | 1 | 3 | 4 |
| British East Africa | ---- | 3 | 3 |
| Canary Islands | 2 | 9 | 11 |
| Cape Colony | 58 | 107 | 165 |
| Cape Verde Islands | ---- | 5 | 5 |
| Egypt | 43 | 95 | 138 |
| French Kongo | ---- | 2 | 2 |
| Gambia | ---- | 2 | 2 |
| German East Africa | 5 | ---- | 5 |
| Gold Coast | 1 | 4 | 5 |
| Kongo | ---- | 5 | 5 |
| Lagos | 2 | 5 | 7 |
| Liberia | 3 | 10 | 13 |
| Lourenço Marquez | ---- | 5 | 5 |
| Madagascar | 6 | 9 | 15 |
| Madeira | 3 | 4 | 7 |
| Mauritius | 12 | 11 | 23 |
| Morocco | ---- | 14 | 14 |
| Mozambique | ---- | 1 | 1 |
| Natal | 22 | 29 | 51 |
| Orange River Colony | 3 | 6 | 9 |
| Reunion | 4 | 2 | 6 |
| Rhodesia | 8 | 14 | 22 |
| St. Helena | 3 | 2 | 5 |
| Senegal | 1 | 5 | 6 |
| Sierra Leone | 2 | 3 | 5 |
| Sudan | 1 | ---- | 1 |
| Transvaal | 32 | 41 | 73 |
| Tunis | 7 | 8 | 15 |
| Zanzibar | 2 | 5 | 7 |
| AMERICA (NORTH). | | | |
| Canada | 364 | 625 | 989 |
| Central America: | | | |
| British Honduras | 6 | 12 | 18 |
| Costa Rica | 27 | 47 | 74 |
| Guatemala | 44 | 72 | 116 |
| Honduras | 14 | 41 | 55 |
| Nicaragua | 20 | 55 | 75 |
| Salvador | 21 | 15 | 36 |
| Greenland | 2 | ---- | 2 |
| Mexico | 177 | 233 | 410 |
| Newfoundland | 17 | 33 | 50 |
| St. Pierre-Miquelon | 2 | 2 | 4 |
| United States | 3,574 | 7,025 | 10,599 |
| AMERICA (NORTH)—continued. | | | |
| West Indies: | | | |
| Anguilla | ---- | 1 | 1 |
| Antigua | 8 | 6 | 14 |
| Bahamas | 4 | 11 | 15 |
| Barbados | 10 | 27 | 37 |
| Bermuda | 6 | 24 | 30 |
| Bonaire | ---- | 1 | 1 |
| Cuba | 70 | 139 | 209 |
| Curaçao | 3 | 6 | 9 |
| Dominica | 2 | 7 | 9 |
| Green Turtle Cay | ---- | 1 | 1 |
| Grenada | 3 | 6 | 9 |
| Guadeloupe | 2 | 6 | 8 |
| Haiti | 38 | 18 | 56 |
| Jamaica | 21 | 50 | 71 |
| Martinique | ---- | 3 | 3 |
| Montserrat | ---- | 2 | 2 |
| Nevis | ---- | 1 | 1 |
| Porto Rico | 9 | 36 | 45 |
| St. Bartholomew | ---- | 2 | 2 |
| St. Christopher | 2 | 7 | 9 |
| St. Croix | 1 | 4 | 5 |
| St. Eustatius | ---- | 1 | 1 |
| St. Lucia | 2 | 5 | 7 |
| St. Martin | ---- | 2 | 2 |
| St. Thomas | 2 | 8 | 10 |
| St. Vincent | 1 | 2 | 3 |
| Santo Domingo | 3 | 14 | 17 |
| Tobago | ---- | 2 | 2 |
| Trinidad | 16 | 16 | 32 |
| Turks Islands | 3 | 6 | 9 |
| AMERICA (SOUTH). | | | |
| Argentina | 161 | 243 | 404 |
| Bolivia | 22 | 21 | 43 |
| Brazil | 156 | 199 | 355 |
| British Guiana | 19 | 15 | 34 |
| Chile | 98 | 115 | 213 |
| Colombia | 39 | 61 | 100 |
| Dutch Guiana | 5 | 4 | 9 |
| Ecuador | 24 | 28 | 52 |
| Falkland Islands | ---- | 6 | 6 |
| French Guiana | 1 | 2 | 3 |
| Panama | 3 | 17 | 20 |
| Paraguay | 21 | 15 | 36 |
| Peru | 47 | 86 | 133 |
| Uruguay | 54 | 41 | 95 |
| Venezuela | 43 | 51 | 94 |

*Number of correspondents of the International Exchange Service in each country on June 30, 1905*—Continued.

| Country. | Correspondents. | | |
|---|---|---|---|
| | Libraries. | Individuals. | Total. |
| ASIA. | | | |
| Arabia | | 7 | 7 |
| Beloochistan | | 1 | 1 |
| Burma | 14 | 9 | 23 |
| Ceylon | 30 | 18 | 48 |
| China | 50 | 136 | 186 |
| Cyprus | 3 | 4 | 7 |
| Formosa | | 3 | 3 |
| French India | 1 | 1 | 2 |
| Hongkong | 11 | 29 | 40 |
| India | 258 | 309 | 567 |
| Indo-China | 10 | 11 | 21 |
| Japan | 190 | 492 | 682 |
| Korea | 4 | 18 | 22 |
| Macao | 1 | 1 | 2 |
| Malaysia: | | | |
| Borneo | | 1 | 1 |
| British New Guinea | | 1 | 1 |
| British North Borneo | 1 | 2 | 3 |
| Celebes | | 4 | 4 |
| Java | 22 | 39 | 61 |
| New Guinea | | 1 | 1 |
| Philippine Islands | 24 | 32 | 56 |
| Sarawak | 1 | | 1 |
| Sumatra | 1 | 2 | 3 |
| Persia | 3 | 10 | 13 |
| Portuguese India | 1 | | 1 |
| Siam | 7 | 24 | 31 |
| Straits Settlements | 19 | 23 | 42 |
| AUSTRALASIA. | | | |
| New South Wales | 89 | 188 | 277 |
| New Zealand | 92 | 147 | 239 |
| Queensland | 54 | 72 | 126 |
| South Australia | 45 | 80 | 125 |
| Tasmania | 25 | 35 | 60 |
| Victoria | 120 | 184 | 304 |
| Western Australia | 33 | 45 | 78 |
| EUROPE. | | | |
| Austria-Hungary | 793 | 1,445 | 2,238 |
| Belgium | 390 | 549 | 939 |
| EUROPE—continued. | | | |
| Bulgaria | 15 | 22 | 37 |
| Denmark | 121 | 241 | 362 |
| France | 1,861 | 3,375 | 5,236 |
| Germany | 2,621 | 5,124 | 7,745 |
| Gibralter | 1 | 7 | 8 |
| Great Britain | 2,233 | 6,590 | 8,823 |
| Greece | 42 | 60 | 102 |
| Iceland | 17 | 11 | 28 |
| Italy | 900 | 1,265 | 2,165 |
| Luxemburg | 13 | 10 | 23 |
| Malta | 13 | 16 | 29 |
| Montenegro | 2 | 1 | 3 |
| Netherlands | 226 | 416 | 642 |
| Norway | 145 | 211 | 356 |
| Portugal | 111 | 92 | 203 |
| Roumania | 52 | 74 | 126 |
| Russia | 564 | 1,145 | 1,709 |
| Servia | 22 | 16 | 38 |
| Spain | 217 | 313 | 530 |
| Sweden | 196 | 425 | 621 |
| Switzerland | 393 | 788 | 1,181 |
| Turkey | 43 | 103 | 146 |
| POLYNESIA. | | | |
| Fiji Islands | 1 | 9 | 10 |
| German New Guinea | 1 | | 1 |
| Guam | | 1 | 1 |
| Hawaiian Islands | 30 | 77 | 107 |
| Marshall Islands | | 5 | 5 |
| New Caledonia | | 2 | 2 |
| New Hebrides | 1 | | 1 |
| Samoa | | 5 | 5 |
| Seychelles Islands | | 1 | 1 |
| Tahiti | | 8 | 8 |
| Tonga | | 3 | 3 |
| International | 37 | | 37 |
| Total | 17,592 | 34,288 | 51,880 |

EXCHANGE OF GOVERNMENT DOCUMENTS.

All Government publications gratuitously presented to other governments through the International Exchange Service during the year, and similar publications received by the departments and bureaus, are enumerated in the following table. The receipts from abroad show an increase of 4,166 packages, or 25.66 per cent, over the fiscal year 1903–4, while the contributions to other

countries diminished to the extent of 9,643, or 12.89 per cent, during the same period. The increase in receipts is particularly gratifying, and is due principally to earnest demands, both by personal solicitation and by letter, for more adequate reciprocal returns; while the diminution in the contributions of United States official publications is attributable largely to the elimination of many correspondents who have not sent an equivalent in their own publications.

*Statement of United States Government exchanges during the year 1904–5.*

| Name of Bureau. | Packages. | | Name of Bureau. | Packages. | |
|---|---|---|---|---|---|
| | Received for— | Sent by— | | Received for— | Sent by— |
| American Historical Association | 16 | 64 | Department of State | 14 | 2 |
| Astrophysical Observatory | 16 | ..... | Engineer School of Application | 4 | ..... |
| Auditor for the State and other Departments | ..... | 648 | Entomological Commission | 3 | ..... |
| Board on Geographic Names | 1 | ..... | General Land Office | 6 | ..... |
| Bureau of American Ethnology | 246 | 678 | Geological Survey | 742 | 2,414 |
| Bureau of American Republics | 17 | 6 | Health Department of the District of Columbia | 10 | ..... |
| Bureau of Animal Industry | ..... | 68 | Hydrographic Office | 94 | 141 |
| Bureau of the Census | 45 | 1,965 | Interstate Commerce Commission | 24 | 92 |
| Bureau of Education | 118 | 2 | Isthmian Canal Commission | ..... | 1 |
| Bureau of Fisheries | 100 | 558 | Library of Congress | 12,498 | 20,765 |
| Bureau of Foreign Commerce | 3 | ..... | Life-Saving Service | ..... | 69 |
| Bureau of Insular Affairs | ..... | 11 | Light-House Board | 3 | 181 |
| Bureau of Labor | 55 | 53 | Military Secretary's Office | ..... | 268 |
| Bureau of the Mint | 11 | 196 | National Academy of Sciences | 103 | 46 |
| Bureau of Navigation, Navy Department | 3 | ..... | National Botanic Garden | 1 | ..... |
| Bureau of Navigation, Department of Commerce and Labor | ..... | 11 | National Bureau of Standards | 10 | ..... |
| Bureau of Public Health and Marine-Hospital Service | 8 | 548 | National Museum | 316 | 3,622 |
| Bureau of Statistics, Department of Commerce and Labor | 303 | 15,495 | National Zoological Park | 3 | ..... |
| Bureau of Steam Engineering, Navy Department | ..... | 1 | Nautical Almanac Office | 30 | 71 |
| Chief of Staff, U. S. Army | ..... | 149 | Naval Observatory | 154 | 609 |
| Civil Service Commission | 2 | 12 | Navy Department | 14 | ..... |
| Coast and Geodetic Survey | 513 | 314 | Office of the Chief of Engineers | 31 | 83 |
| Commissioner of Internal Revenue | ..... | 8 | Office of the Chief of Staff, U. S. Army | ..... | 8 |
| Commissioners of the District of Columbia | 6 | 50 | Office of Indian Affairs | 3 | ..... |
| Comptroller of the Currency | 35 | 180 | Ordnance Office, War Department | 2 | ..... |
| Department of Agriculture | 494 | 192 | Patent Office | 266 | 1,818 |
| Department of Commerce and Labor | 3 | 1 | President of the United States | 1 | ..... |
| Department of the Interior | 21 | 266 | Senate of the United States | 3 | ..... |
| Department of Justice | ..... | 44 | Smithsonian Institution | 3,720 | 12,217 |
| | | | Superintendent of Documents | 1 | 41 |
| | | | Surgeon-General's Office | 151 | 326 |
| | | | Treasury Department | 9 | 9 |
| | | | War Department | 31 | 6 |
| | | | Weather Bureau | 137 | 911 |
| | | | Total | 20,400 | 65,220 |

RELATIVE INTERCHANGE OF PUBLICATIONS BETWEEN THE UNITED STATES AND OTHER COUNTRIES.

Following is a comparative statement of exchange transmissions between the United States and other countries during the years 1904 and 1905, respectively. Exchanges were conducted with 153 countries during the year ended June 30, 1905, or two more than during the preceding year:

*Comparative statement of packages received for transmission through the International Exchange Service during the fiscal years ending June 30, 1904, and June 30, 1905.*

| Country. | 1904. | | 1905. | |
|---|---|---|---|---|
| | Packages. | | Packages. | |
| | For— | From— | For— | From— |
| Algeria | 131 | 65 | 136 | 35 |
| Angola | 3 | | 2 | |
| Antigua | 67 | | 42 | |
| Arabia | 39 | | 39 | |
| Argentina | 2,936 | 638 | 2,296 | 1,210 |
| Austria-Hungary | 5,349 | 2,969 | 5,136 | 2,743 |
| Azores | 46 | | 35 | |
| Bahamas | 43 | | 45 | |
| Barbados | 103 | | 103 | |
| Beira | | | 17 | |
| Beled-es-Sudan | | | 1 | |
| Belgium | 2,848 | 2,459 | 2,894 | 2,871 |
| Beloochistan | 1 | | | |
| Bermudas | 52 | | 54 | |
| Bismarck Archipelago | 1 | | 1 | |
| Bolivia | 127 | 32 | 279 | 4 |
| Bonaire | 1 | | | |
| Borneo | 13 | | 10 | |
| Brazil | 2,228 | 847 | 2,122 | 1,052 |
| British America | 3,943 | 919 | 3,804 | 762 |
| British Burma | 13 | | 27 | |
| British East Africa | 9 | | 11 | |
| British Central Africa | 3 | | 4 | |
| British Guiana | 112 | | 97 | |
| British Honduras | 53 | | 26 | |
| British West Africa | 4 | | 1 | |
| Bulgaria | 168 | | 121 | |
| Canary Islands | 27 | | 31 | |
| Cape Colony | 542 | 228 | 808 | 153 |
| Cape Verde Islands | 6 | | 2 | |
| Celebes | 4 | | 5 | |
| Ceylon | 123 | | 271 | |
| Chile | 1,736 | 54 | 1,851 | 160 |
| China | 540 | 221 | 559 | 24 |
| Colombia | 872 | | 671 | |
| Kongo | | | 1 | |
| Costa Rica | 1,255 | | 1,167 | |
| Cuba | 1,012 | 97 | 660 | 214 |
| Curaçao | 22 | | 29 | |
| Cyprus | 5 | | 11 | |
| Denmark | 1,319 | 766 | 1,186 | 318 |
| Dominica | 75 | | 71 | |

*Comparative statement of packages received for transmission through the International Exchange Service, etc.*—Continued.

| Country. | 1904. Packages. | | 1905. Packages. | |
|---|---|---|---|---|
| | For— | From— | For— | From— |
| Dutch Guiana | 49 | | 33 | |
| Dutch West Indies | 1 | | | |
| Ecuador | 165 | | 161 | |
| Egypt | 252 | 2 | 385 | |
| Falkland Islands | 13 | | 19 | |
| Fiji Islands | 21 | | 22 | |
| France | 9,764 | 5,032 | 10,630 | 6,338 |
| French Cochin China | | | 43 | |
| French West Africa | 2 | | | |
| Gambia | 2 | | | |
| German East Africa | 8 | | 2 | |
| Germany | 17,621 | 6,928 | 18,289 | 8,464 |
| Gibraltar | 16 | | 21 | |
| Gold Coast | 3 | | 12 | |
| Goree Dakar | 16 | | 18 | |
| Grenada | 8 | | 12 | |
| Great Britain and Ireland | 17,696 | 8,383 | 18,024 | 13,271 |
| Greece | 811 | 4 | 720 | 38 |
| Greenland | 4 | | 5 | |
| Guadeloupe | 19 | | 20 | |
| Guam | 1 | | | |
| Guatemala | 230 | | 194 | |
| Guinea | | | 2 | |
| Haiti | 635 | | 438 | |
| Hawaiian Islands | 96 | | 88 | |
| Honduras | 302 | | 219 | |
| Hongkong | 135 | | 136 | |
| Iceland | 48 | | 47 | |
| India | 1,844 | 182 | 1,773 | 319 |
| Italy | 5,700 | 1,405 | 6,739 | 1,412 |
| Jamaica | 266 | | 233 | |
| Japan | 2,463 | 18 | 2,439 | 84 |
| Java | 248 | 48 | 259 | 127 |
| Korea | 67 | | 69 | |
| Lagos | 2 | | 2 | |
| Leeward Islands | 4 | | 2 | |
| Liberia | 63 | | 83 | |
| Lourenço Marquez | 19 | | 15 | |
| Luxemburg | 88 | 1 | 78 | |
| Madagascar | 24 | | 30 | |
| Madeira | 22 | | 22 | |
| Malta | 50 | | 205 | |
| Marshall Islands | 6 | | | |
| Martinique | 9 | | 19 | |
| Mauritius | 75 | 47 | 61 | 49 |
| Mexico | 2,279 | 1,619 | 2,002 | 1,395 |
| Montenegro | 1 | | 2 | |
| Montserrat | 4 | | | |
| Morocco | 25 | | 20 | 1 |
| Natal | 133 | 95 | 177 | |
| Netherlands | 2,495 | 778 | 2,687 | 1,038 |
| New Caledonia | 7 | | 10 | |

*Comparative statement of packages received for transmission through the International Exchange Service, etc.*—Continued.

| Country. | 1904. Packages. | | 1905. Packages. | |
|---|---|---|---|---|
| | For— | From— | For— | From— |
| Newfoundland | 133 | | 98 | 6 |
| New South Wales | 2,109 | 375 | 2,655 | 782 |
| New Zealand | 975 | 4 | 1,456 | 2 |
| Nicaragua | 239 | | 399 | |
| Norfolk Islands | | | 13 | |
| Norway | 1,495 | 663 | 1,372 | 647 |
| Orange River Colony | 11 | | 201 | |
| Panama | 24 | | 107 | |
| Paraguay | 178 | | 127 | |
| Persia | 51 | | 72 | |
| Peru | 992 | 224 | 886 | 259 |
| Philippine Islands | 86 | 2 | 111 | 633 |
| Porto Rico | 18 | | 19 | |
| Portugal | 1,058 | 337 | 901 | 455 |
| Queensland | 979 | 260 | 852 | 8 |
| Reunion | 14 | | 13 | |
| Rhodesia | 20 | 20 | 21 | 1 |
| Roumania | 335 | 1,233 | 424 | 102 |
| Russia | 4,699 | 2,346 | 4,442 | 2,577 |
| St. Bartholomew | 6 | | | |
| St. Croix | 11 | | 2 | |
| St. Eustatius | 4 | | 1 | |
| St. Helena | 22 | | 21 | |
| St. Kitts | 21 | | 19 | |
| St Lucia | | | 3 | |
| St. Martin | 16 | | 17 | |
| St. Pierre and Miquelon | 17 | | 21 | |
| St. Thomas | 14 | | 23 | |
| St. Vincent | 5 | | 2 | |
| Samoa | 25 | | 32 | |
| Samos | 2 | | | |
| San Salvador | 152 | 8 | 292 | |
| Santa Lucia | 13 | | | |
| Santo Domingo | 3 | | 6 | |
| Servia | 78 | | 86 | 2 |
| Siam | 195 | 110 | 101 | |
| Sierra Leone | 18 | | 22 | |
| Society Islands | 20 | | 21 | |
| South Australia | 2,376 | 4 | 2,035 | 5 |
| Spain | 1,655 | 110 | 1,647 | 65 |
| Straits Settlements | 202 | | 151 | |
| Sumatra | 5 | | 1 | |
| Sweden | 2,123 | 928 | 2,039 | 117 |
| Switzerland | 2,762 | 1,359 | 2,943 | 1,155 |
| Syria | 115 | | 28 | |
| Tasmania | 790 | 24 | 579 | 3 |
| Tonga | 1 | | | |
| Transvaal | 703 | | 604 | 1 |
| Trinidad | 83 | | 92 | |
| Tunis | 38 | | 35 | 12 |
| Turkey | 825 | | 820 | |
| Turks Islands | 25 | | 23 | |

*Comparative statement of packages received for transmission through the International Exchange Service, etc.*—Continued

| Country. | 1904. Packages. | | 1905. Packages. | |
|---|---|---|---|---|
| | For— | From— | For— | From— |
| United States | 38,702 | 116,087 | 44,902 | 116,044 |
| Uruguay | 1,304 | 21 | 916 | 307 |
| Venezuela | 846 | | 660 | |
| Victoria | 1,920 | 816 | 1,683 | 484 |
| Western Australia | 813 | 214 | 639 | 4 |
| Windward Islands | 3 | | | |
| Zanzibar | 21 | | 25 | |

With few exceptions the same arrangements exist for distributing exchanges in other countries as those mentioned in the previous report, and, although it is a source of regret that every country does not maintain an official exchange bureau—among the most important being England, Germany, and Austria-Hungary—the Institution has been successful in enlisting the services of some institution of learning or prominent individual in nearly all countries not officially represented, with the result that means have been found for forwarding exchanges to every part of the world. On account of the extent of the work, and various disturbances which are liable to occur, interruptions and delays are sometimes unavoidable.

China is still considering the proposal to establish an official exchange bureau, and efforts were recently renewed through the diplomatic service with that end in view, but, pending more satisfactory arrangements, facilities have been added to the somewhat limited method of distribution. Packages for Shanghai are now forwarded by post, under frank, through the United States postal agency in that city, and through the courtesy of the Zi-ka-wei Observatory parcels for the provinces are distributed with reasonable dispatch.

On account of the difficulty in transporting exchanges from the coast to the city of Quito all transmissions to Ecuador were suspended for twenty-one months, but through the efforts of the American minister consignments were renewed on April 4, 1905, with the mutual understanding that exchanges for Guayaquil and other coast towns should be packed in separate boxes and distributed to addressees from the port of entry. This arrangement is only temporary, and, on the completion of a railroad now in course of construction from Guayaquil to Quito, it is expected that all consignments will be forwarded direct to the last-mentioned city and thence distributed.

Following is a list of correspondents abroad through which the distribution of exchanges is accomplished. Most of those in the larger and many in the smaller countries forward reciprocal contributions to the Smithsonian Institution for distribution in the United States:

Algeria (via France).
Angola (via Portugal).
Argentina: Museo Nacional, Buenos Ayres.
Austria: K. K. Statistische Central-Commission, Vienna.
Azores (via Portugal).
Barbados: Imperial Department of Agriculture, Bridgetown.
Belgium: Service Belge des Échanges Littéraires Internationaux, Brussels.
Bolivia: Oficina Nacional de Inmigracion, Estadística y Propaganda Geográfica, La Paz.

Brazil: Serviço de Permutações Internacionaes, Bibliotheca Nacional, Rio de Janeiro.
British Colonies: Crown Agents for the Colonies, London.[a]
Bulgaria: Dr. Paul Leverkühn, Sofia.
Canada: Sent by mail.
Canary Islands (via Spain).
Cape Colony: Superintendent of the Government Stationery Department, Cape Town.
Chile: Universidad de Chile, Santiago.
China: Zi-ka-wei Observatory, Shanghai.
Colombia: Biblioteca Nacional, Bogotá.
Costa Rica: Oficina de Depósito y Canje de Publicaciones, San José.
Denmark: Kongelige Danske Videnskabernes Selskab, Copenhagen.
Dutch Guiana: Surinaamsche Koloniale Bibliotheek, Paramaribo.
Ecuador: Minister of Foreign Relations, Quito.
East India: India Store Department, India Office, London.
Egypt: Société Khédiviale de Géographie, Cairo.
France: Bureau Français des Échanges Internationaux, Paris.
Friendly Islands: Sent by mail.
Germany: Karl W. Hiersemann, Königsstrasse 3, Leipzig.
Great Britain and Ireland: Messrs. William Wesley & Son, 28 Essex street, Strand, London.
Greece: Director of the American School of Classical Studies, Athens.
Greenland (via Denmark).
Guadeloupe (via France).
Guatemala: Instituto Nacional de Guatemala, Guatemala.
Guinea (via Portugal).
Haiti: Secrétaire d'État des Relations Extérieures, Port au Prince.
Honduras: Biblioteca Nacional, Tegucigalpa.
Hungary: Dr. Joseph von Körösy, "Redoute," Budapest.
Iceland (via Denmark).
Italy: Ufficio degli Scambi Internazionali, Biblioteca Nazionale Vittorio Emanuele, Rome.
Jamaica: Institute of Jamaica, Kingston.
Japan: Foreign Office, Tokyo.
Java (via Netherlands).
Liberia: Care of American Colonization Society, Washington, D. C.
Luxemburg (via Germany).
Madagascar (via France).
Madeira (via Portugal).
Mexico: Sent by mail.
Mozambique (via Portugal).
Natal: Agent-General for Natal, London.
Netherlands: Bureau Scientifique Central Néerlandais, Bibliothèque de l'Université, Leyden.
New Guinea (via Netherlands).
New Hebrides: Sent by mail.
Newfoundland: Sent by mail.
New South Wales: Board for International Exchanges, Sydney.
New Zealand: Colonial Museum, Wellington.

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[a] This method is employed for communicating with a large number of the British colonies with which no means are available for forwarding exchanges direct.

Nicaragua: Ministerio de Relaciones Exteriores, Managua.
Norway: Kongelige Norske Frederiks Universitet Bibliotheket, Christiania.
Paraguay: Ministerio de Relaciones Exteriores, Asuncion.
Persia (via Russia).
Peru: Oficina de Reparto, Depósito y Canje Internacional de Publicaciones, Ministerio de Fomento, Lima.
Portugal: Bibliotheca Nacional, Lisbon.
Queensland: Exchange Board, Parliament House, Brisbane.
Roumania (via Germany).
Russia: Commission Russe des Échanges Internationaux, Bibliothèque Impériale Publique, St. Petersburg.
Salvador: Museo Nacional, San Salvador.
Santo Domingo: Sent by mail.
Servia (via Germany).
Siam: Minister for Foreign Affairs, Bangkok.
South Australia: Astronomical Observatory, Adelaide.
Spain: Depósito de Libros, Cambio Internacional y Biblioteca General del Ministerio de Instruccion Publica y Bellas Artes, Madrid.
Sumatra (via Netherlands).
Syria: Board of Foreign Missions of the Presbyterian Church, New York.
Sweden: Kongliga Svenska Vetenskaps Akademien, Stockholm.
Switzerland: Service des Échanges Internationaux, Bibliothèque Fédérale Centrale, Berne.
Tasmania: Royal Society of Tasmania, Hobart.
Tunis (via France).
Turkey: American Board of Commissioners for Foreign Missions, Boston.
Uruguay: Oficina de Depósito, Reparto y Canje Internacional, Montevideo.
Venezuela: Biblioteca Nacional, Caracas.
Victoria: Public Library, Melbourne.
Western Australia: Public Library of Western Australia, Perth.
Zanzibar: Sent by mail.

With the exception of points otherwise inaccessible and those countries with which the use of the official post-office frank is permitted, parcels sent to foreign countries during the year were packed in boxes and were forwarded by express or freight. Of the 2,027 boxes of publications thus sent, 203 contained complete series of official documents of the United States for designated depositories, and 1,824 boxes contained United States departmental reports and scientific exchanges for miscellaneous addresses. The number of boxes of miscellaneous exchanges sent to each country is given below:

| | | | |
|---|---|---|---|
| Antigua | 1 | Cape Colony | 12 |
| Argentina | 36 | China | 4 |
| Austria | 74 | Chile | 25 |
| Barbados | 2 | Colombia | 6 |
| Belgium | 72 | Costa Rica | 7 |
| Bermuda | 2 | Cuba | (a) |
| Bolivia | 3 | Denmark | 24 |
| Brazil | 29 | Dutch Guiana | (b) |
| British colonies | 25 | East Indies | 33 |
| British Guiana | 4 | Egypt | 7 |
| British Honduras | 5 | France and colonies | 177 |
| Canada | (a) | Germany | 256 |

[a] Packages sent by mail.
[b] Included in transmissions to Netherlands.

| | | | |
|---|---|---|---|
| Great Britain and Ireland | 362 | Porto Rico | (a) |
| Greece | 12 | Portugal | 14 |
| Grenada | 1 | Queensland | 8 |
| Guatemala | 5 | Roumania | (b) |
| Haiti | 1 | Russia | 72 |
| Hawaii | (a) | Salvador | 7 |
| Honduras | 5 | Santo Domingo | 3 |
| Hungary | 35 | Servia | (b) |
| Italy | 96 | Siam | 3 |
| Jamaica | 4 | South Australia | 13 |
| Japan | 33 | Spain | 18 |
| Liberia | 1 | St. Christopher | 1 |
| Mexico | (a) | Sweden | 59 |
| Natal | 8 | Switzerland | 56 |
| Newfoundland | (a) | Syria | 2 |
| New South Wales | 24 | Tasmania | 4 |
| Netherlands | 40 | Transvaal | 4 |
| New Providence | 1 | Trinidad | 2 |
| New Zealand | 10 | Turkey | 5 |
| Nicaragua | 6 | Turks Island | 1 |
| Norway | 35 | Uruguay | 13 |
| Paraguay | 5 | Venezuela | 6 |
| Peru | 12 | Victoria | 19 |
| Philippine Islands | (a) | Western Australia | 14 |
| Polynesia | (a) | | |

During the year four consignments of United States Government official publications were made to each of the fifty depositories for which provision was made under the joint resolution of Congress approved March 2, 1867. Transmissions consisting of one box each were made to each depository on October 1 and December 27, 1904, and on February 28 and April 24, 1905. On the last date mentioned three additional consignments, comprising complete sets, were forwarded to Cape Colony, Manitoba, and France, respectively, thus increasing the number of regular depositories to fifty-three. A list of these depositories follows:

Argentina: Library of the Foreign Office, Buenos Ayres.
Argentina: Biblioteca Pública Provincial, La Plata.
Australia: Library of the Commonwealth Parliament, Melbourne.
Austria: K. K. Statistische Central-Commission, Vienna.
Baden: Universitäts-Bibliothek, Freiburg.
Bavaria: Königliche Hof- und Staats-Bibliothek, Munich.
Belgium: Bibliothèque Royale, Brussels.
Brazil: Bibliotheca Nacional, Rio de Janeiro.
Canada: Parliamentary Library, Ottawa.
Cape Colony: Government Stationery Department, Cape Town.
Chile: Biblioteca del Congreso, Santiago.
Colombia: Biblioteca Nacional, Bogotá.
Costa Rica: Oficina de Depósito y Canje de Publicaciones, San José.
Cuba: Department of State, Habana.
Denmark: Kongelige Bibliotheket, Copenhagen.
England: British Museum, London.

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[a] Packages sent by mail.
[b] Included in transmissions to Germany.

England: School of Economics and Political Sciences, London.
France: Bibliothèque Nationale, Paris.
France: Préfecture de la Seine, Paris.
Germany: Deutsche Reichstags-Bibliothek, Berlin.
Greece: National Library, Athens.
Haiti: Secrétaire d'État des Relations Extérieures, Port au Prince.
Hungary: Hungarian House of Delegates, Budapest.
India: Secretary to the Government of India, Calcutta.
Ireland: National Library of Ireland, Dublin.
Italy: Biblioteca Nazionale Vittorio Emanuele, Rome.
Japan: Foreign Office, Tokyo.
Manitoba: Provincial Library, Winnipeg.
Mexico: Instituto Bibliográfico, Museo Nacional, Mexico.
Netherlands: Library of the States General, The Hague.
New South Wales: Board for International Exchanges, Sydney.
New Zealand: General Assembly Library, Wellington.
Norway: Storthingets Bibliothek, Christiania.
Ontario: Legislative Library, Toronto.
Peru: Biblioteca Nacional, Lima.
Portugal: Bibliotheca Nacional, Lisbon.
Prussia: Königliche Bibliothek, Berlin.
Quebec: Legislative Library, Quebec.
Queensland: Parliamentary Library, Brisbane.
Russia: Imperial Public Library, St. Petersburg.
Saxony: Königliche Oeffentliche Bibliothek, Dresden.
South Australia: Parliamentary Library, Adelaide.
Spain: Depósito de Libros, Cambio Internacional y Biblioteca General del Ministerio de Instrucción Pública y Bellas Artes, Madrid.
Sweden: Kongliga Biblioteket, Stockholm.
Switzerland: Bibliothèque Fédérale, Berne.
Tasmania: Parliamentary Library, Hobart.
Transvaal: Government Library, Pretoria.
Turkey: Minister of Public Instruction, Constantinople.
Uruguay: Oficina de Depósito, Reparto y Canje Internacional de Publicaciones, Montevideo.
Venezuela: Biblioteca Nacional, Carácas.
Victoria: Public Library, Melbourne.
Western Australia: Public Library of Western Australia, Perth.
Württemberg: Königliche Landesbibliothek, Stuttgart.

The fifty-three sets of United States official publications referred to were delivered to the Smithsonian Institution from time to time as they came from press, and when a sufficient number was received to completely fill the boxes prepared for them a list was printed to accompany each set, which was then shipped to its respective destination.

In addition to the above, partial sets were provided under the joint resolution of Congress approved March 2, 1901, for the purpose of increasing exchanges with countries for which no provision was made under the limited resolution of March 2, 1867. The new depositories that had been designated to the close of the fiscal year 1904–5 were as follows:

Austria-Hungary: Bürgermeister der Haupt- und Residenz-Stadt, Vienna.
Bolivia: United States Minister, La Paz.
British Columbia: Legislative Library, Victoria.
Bulgaria: Minister of Foreign Affairs, Sofia.

Ceylon: United States Consul, Colombo.
Egypt: Bibliothèque Khédiviale, Cairo.
Germany: Grossherzogliche Hof-Bibliothek, Darmstadt.
Germany: Senatskommission für die Reichs- und auswärtigen Angelegenheiten, Hamburg.
Germany: Foreign Office, Bremen.
Guatemala: Secretary of the Government, Guatemala.
Honduras: Secretary of the Government, Tegucigalpa.
Jamaica: Colonial Secretary, Kingston.
Malta: Lieutenant-Governor, Valetta.
Newfoundland: Colonial Secretary, St. John's.
New Brunswick: Legislative Library, St. John.
Natal: Colonial Governor, Pietermaritzburg.
Nicaragua: Superintendente de Archivos Nacionales, Managua.
Nova Scotia: Legislative Library, Halifax.
Northwest Territories: Government Library, Regina.
Orange River Colony: Government Library, Bloemfontein.
Prince Edward Island: Legislative Library, Charlottetown.
Paraguay: Oficina General de Informaciones y Canjes y Commisaria General de Inmigracion, Asuncion.
Roumania: Academia Romana, Bukharest.
Salvador: Ministerio de Relaciones Exteriores, San Salvador.
Straits Settlements: Colonial Secretary, Singapore.
Siam: Foreign Office, Bangkok.

As new countries are constantly being added, the partial sets for the depositories designated under the last resolution are not forwarded simultaneously with those originally provided, but are delivered to the Institution from the Library of Congress and are dispatched with the next succeeding consignments of miscellaneous exchanges to the respective countries in which the depositories are situated.

The agencies in those countries which are supported at the expense of the Smithsonian Institution are represented by Messrs. William Wesley & Son in London, Mr. Joseph von Körösy in Budapest, and Mr. Karl W. Hiersemann in Leipzig.

To those efficient representatives who aid the Institution in promoting the interests of the Exchange Service, both at home and abroad, and to Mr. Charles A. King, deputy collector of the port of New York, grateful acknowledgments are extended.

Respectfully submitted.

F. W. Hodge, *Acting Curator*

Mr. S. P. Langley,
*Secretary Smithsonian Institution.*

## Appendix IV.

### REPORT OF THE SUPERINTENDENT OF THE NATIONAL ZOOLOGICAL PARK.

Sir: I have the honor to submit the following report relating to the condition and operation of the National Zoological Park for the fiscal year ending June 30, 1905.

*New house for mammals.*—The principal work that has been prosecuted during the year for the advancement of the park has been that upon the new house for mammals. The structural ironwork was completed about December 1, 1904, and the tile roof was finished about May 1, 1905. This roof was ornamented by terra-cotta finials after models designed by Mrs. Kemeys. A large conduit for heating and ventilating purposes was constructed under the long axis of the building. The amount expended from the appropriation for the year will reach about $10,000. As the building is situated near the edge of a steep declivity, a heavy fill of earth supported by a retaining wall will be required on the eastern side in order to accommodate the necessary cages and walks. The plastering of this building, the interior and exterior cages, and the woodwork still remain to be done. It is hoped to occupy the building during the coming winter. Considerable delays occur from the difficulty of getting suitable mechanics for the work.

*Temporary bird house.*—To accommodate the birds kept during the summer in the large flying cage, as well as those received from the St. Louis Exposition, two additions were made to this building. A large indoor cage was fitted up for quail, thrushes, cardinals, etc., and another for finches and other small species, the latter communicating with an outdoor cage. Yards were constructed for the north African and Somali ostriches received from the President, and concrete floors were constructed for several of the larger indoor cages. The total cost of the alterations and extensions was about $1,200.

*Carnivora house.*—A new boiler for the heating apparatus was put in with satisfactory results. Considerable repairs were made to the metal roof, and the ironwork of the outside cages was thoroughly cleaned and repainted, all at a cost of about $800.

*Temporary bear cages.*—As funds were wanting for the construction of the permanent dens designed for the collection of bears, the small cages in which those animals are now confined were rearranged so as to give better facilities for drainage. Drains were laid, gutters constructed, and screens planted.

*Inclosures for burrowing rodents.*—The inclosures heretofore used for this purpose at the park have hitherto not been satisfactory, being badly located and permitting the escape of the animals. Two new inclosures that have proved very satisfactory have been made during the year. One of these, for prairie dogs, was formed by excavating the earth to a depth of 4½ feet, paving and grouting the bottom, and then filling in with gravelly earth. Another, for woodchucks, was not excavated so deeply and was closed at the bottom with telford pavement. The cost of the two inclosures was about $500.

*Repairs to inclosures.*—Most of the inclosures in the park are made by wire fencing, which has now been in use from five to eight years. In the course of

this time the wire has become seriously weakened by rust in spite of all efforts made for its preservation. A general reconstruction of the fences and paddocks will soon be necessary. During the year considerable repairs have been given to the fences inclosing the deer and the yak, and an additional inclosure and shelter has been made for deer.

*Public comfort rooms.*—The park is still deficient in suitable public comfort rooms for the accommodation of the public, especially for women and children, and this is especially felt on holidays, when the park is crowded. On Easter Monday thousands of children, with their parents and nurses, remain at the park nearly all day, and the accommodations are wholly insufficient. During the past year the rooms for women have been more than doubled, but they are still too small. A building is badly needed in which a public comfort room and restaurant could be combined.

*Seats and benches.*—During the past year a special clause for the purchase of seats was inserted in the act making general appropriations for the park. One hundred and sixty movable seats and 30 stationary benches were made and distributed throughout the park at points where they may be convenient for the public.

*Coniferous trees.*—The park received during the year an important gift of coniferous trees from Mr. Lowell M. Palmer, of Stamford, Conn. These comprise some thousands of specimens of different species. They will be planted in appropriate situations, and it is believed that they will eventually greatly add to the natural beauty of the park.

*New survey and map.*—The map which was prepared early in the history of the park has gradually become almost useless because of the numerous alterations that have been made. More accurate and abundant detail was also required in order that work might be always effectively planned. For this reason a new survey was made and a map prepared of the most important part of the park, covering about 40 acres. This map shows all trees, shrubbery, water and sewer pipes, and every detail of configuration practicable to express on its scale, which is 50 feet to the inch. Such a survey should be extended to the entire park.

*Important accessions.*—The following animals were received by gift:

From the President: One zebra, 1 lion, 2 gelada baboons, 1 north African ostrich, 1 Somali ostrich (from the King of Abyssinia), 1 female jaguar (from E. H. Plumacher, American consul at Maracaibo, Venezuela), also several small mammals, an eagle, etc.

From E. H. Plumacher, American consul, Maracaibo, Venezuela: Twenty-two specimens, including a young jaguar, 2 ocelots, 2 monkeys, 2 rough foxes, several parrots, etc.

From the Hon. H. G. Squiers, envoy extraordinary and minister plenipotentiary to Cuba: Eight specimens, including 3 Cuban deer and a hawk-bill turtle.

From Admiral Robley D. Evans, U. S. Navy: One Philippine deer.

There were procured for the park by Dr. F. W. Goding, American consul at Newcastle, New South Wales: Fifteen specimens, including 3 kangaroos, 1 female Tasmanian devil (to complete pair), 1 male Tasmanian wolf (to complete pair), 2 brush turkeys, 2 Australian cranes, and some smaller birds.

From J. N. Ruffin, American consul at Asuncion, Paraguay: One young jaguar, 2 capybaras, 2 coypus, and a king vulture.

By exchange there were received from New York Zoological Park: One llama, 1 mandrill baboon, 1 hornbill, 2 crowned cranes.

From the Zoological Garden at Buenos Ayres, Argentine Republic: One pair guanacos, 1 pair peccaries, 1 hairy armadillo, 1 female rhea (to complete pair), 1 pair upland geese, 1 crested screamer, 2 rufous tinamou.

NORTH AFRICAN OSTRICH PRESENTED TO THE PRESIDENT BY THE KING OF ABYSSINIA.

It has been found extremely difficult to make satisfactory arrangements for transportation from distant South American ports. The steamship companies refuse to receive animals without prepayment of transportation charges, which in the case of the United States Government is impracticable. Certain shipments of animals from Buenos Ayres are now waiting until some satisfactory adjustment can be made.

Through exchange with the New Zealand government (arranged by the President and mentioned in 1904 report) 8 roe deer were received. Ten elk, a number of birds, and several small mammals were delivered to the representatives of the New Zealand government in February and are understood to have reached their destination safely. The elk were desired for propagating purposes.

*Births.*—The births, 134 in number, included 1 American bison, 7 elk, 4 mule deer, 2 Columbian black-tailed deer, 3 Virginia deer, 2 fallow deer, 2 Barbary sheep, 1 Brazilian tapir, 23 blue foxes, 7 dingo, 9 gray wolves, several kangaroos, various rodents, etc.; also about 30 young of night heron and other birds which nested in the flying cage. The wild turkeys which were hatched in the spring of 1904 have run at large, and 6, together with the hen, still remain in the park.

*Deaths.*—Gastro-intestinal troubles was the chief cause of death of animals and included 2 young jaguars and several other cats, 2 Tasmanian zebra wolves, a Rocky Mountain sheep, a cassowary, several flamingos, and various other birds and small mammals. A number of blue foxes were lost from uncinaria and two from ascaris canis.

Deaths from tuberculosis, though less in number, included more large animals, among those lost being 1 bison cow, 1 nilghai, 1 red deer, 7 roe deer, 2 elk, and 4 monkeys. The majority of these animals had recently come into the collection and were undoubtedly affected with the disease when received. Three monkeys were lost from osteomalacia, or "cage paralysis," and a tinamou from pulmonary aspergillosis.

Two elk and 1 prong-horn antelope were lost from accident, due in the latter case to fright.

Autopsies were made as heretofore by the pathologists of the Bureau of Animal Industry, either at the park, in the case of large animals, or at the laboratory of the Bureau in the case of the smaller kinds.

*Readjustment of boundaries.*—An item was again submitted in the estimates for $60,000 to purchase the land between the park and the new highways established along the eastern and western sides of the park. (Public Act, April 28, 1904, "For the opening of connecting highways on the east and west sides of the Zoological Park, District of Columbia.") No action was taken by Congress.

*Exhibit at the Louisiana Purchase Exposition.*—This was successfully maintained throughout the season with comparatively little loss. Two keepers were employed during the summer and autumn. The exhibit closed about the middle of November on account of cold weather, the birds being removed and transferred to the National Zoological Park. The cage was purchased by the city of St. Louis at its appraised value.

*Personnel.*—The fixed force of the park numbers about 82 persons, of whom 8 are assigned to the administration, 29 to the care of animals, 20 to the mechanical department, 18 to the care of grounds, and 7 to the watch. Considerable difficulty has been found in obtaining suitable men for positions of keepers of animals. To be effective in this duty it is necessary to be quick, active, always alert, neither timorous nor venturesome, and to have a natural aptitude for

cleanliness. These are qualities that are considerably beyond what is required of a common laborer.

The keepers are divided into three classes receiving compensation as follows:

| | Per month. |
|---|---|
| First class | $65.00 |
| Second class | 62.50 |
| Third class | 60.00 |

These men allege that their service is extra hazardous, that they are usually required to work on Sundays and holidays, and that since the cost of living has advanced considerably of recent years some advance should be made in their wages.

*Hospital and laboratory.*—At present the park has no adequate provision for the care of sick animals nor for the quarantining of those believed to be affected with contagious or infectious diseases. When ill the animals remain in the exhibition cages, their sufferings being displayed to the public, and enhanced by the disturbance which necessarily goes on about them, or, if removed from their cages, they are placed in unsuitable quarters where they are subject to annoyance and far from comfortable. Several cases of contagious disease have been rapidly propagated to several animals for want of means of promptly isolating the first suspected case. There is need for a suitable building placed in a secluded part of the grounds where animals can be properly isolated and treated.

Connected with this there should be a laboratory in which proper examination can be made of the pathological and anatomical material that may come to hand. But very little is known concerning the diseases that affect wild animals and the parasites that associate themselves with them. An extension of our knowledge in this direction would undoubtedly be of benefit to those who are studying the diseases of man.

In other countries the most significant scientific function of collections of living animals has been the advancement of knowledge with regard to the structure, habits, and activities of animals. Nearly all such knowledge has been derived from zoological collections of a character similar to that of the National Zoological Park. For example, in the Jardin des Plantes at Paris, investigations have been carried on since the middle of the eighteenth century by men who achieved, in this way, a world-wide fame, such as Duverney, Daubenton, Buffon, Cuvier, Geoffroy St. Hilaire, and Milne Edwards; in the garden of the Zoological Society of London worked Owen, Flower, Huxley, Sclater, Beddard, and many others; the garden at Berlin afforded Hartmann material for his work on anthropoid apes, and it was at the Amsterdam garden that Fürbringer was able to prepare his monumental work on the structure of birds. The collections of the National Zoological Park should be utilized in a similar way.

It is thought that a modest hospital and laboratory, similar to the one recently established at the zoological garden in Philadelphia, can be built and equipped at a cost of about $8,000. At the New York Zoological Park an institution of this kind is about to be erected which will probably cost considerably more.

*Roads and paths.*—The park is much frequented by carriages. Lying, as it does, along the valley of Rock Creek, it affords the most convenient and pleasant access to the Rock Creek Park that lies north of it, and the main driveway in that park communicates directly with the principal road in the National Zoological Park. On this account it is of especial advantage to the public that the roadways in the National Zoological Park should always be in good con-

GREVY'S ZEBRA PRESENTED TO THE PRESIDENT BY THE KING OF ABYSSINIA.

dition. This is not easy, as the descent into the valley of the creek is so abrupt that the surface of the roads and walks is washed away at every heavy rain. Considerable damage of this kind is done every year, and this entails a constant expense for the repair of the roads and walks. Some of the walks on the steeper slopes should be laid in concrete, which, although more expensive, would be cheaper in the end.

The portion of the park about the Quarry road entrance is in very bad condition, owing to the fact that the roads and grades exterior to the park have been recently changed and that no permanent improvements can be made within the park until the exterior changes are completed. It is hoped that sufficient funds may be appropriated to permit the park to take up the work effectively and place all the roads and walks in a suitable condition.

*Shade trees and forestry.*—Owing to the pressure of other matters, but little attention has been paid to the natural forest in the park. This should, however, be carefully gone over and properly thinned and preserved, as it is one of the principal attractions sought by the public. The trees planted for the shade of the walks and seats are not at present sufficient, and considerable additional planting should be done. It is highly desirable that this should be accomplished as soon as possible, as the trees would increase in beauty and size year by year.

*Schools, etc., visiting the park.*—Since October 15, 1904, a record has been kept of the various schools and other organizations visiting the park. Up to June 30, 1905, there were 65 classes from normal and other schools, including 9 from out of town, with 1,551 pupils; 7 classes from Sunday schools, including 2 from out of town, with 481 pupils; and 20 miscellaneous organizations, including 4 from out of town, with 595 persons.

*Animals in the collection.*

| | Indigenous. | Foreign. | Domesticated. | Total. |
|---|---|---|---|---|
| Mammals | 321 | 173 | 68 | 562 |
| Birds | 366 | 218 | 52 | 636 |
| Reptiles | 95 | 14 | | 109 |
| Total | 782 | 405 | 120 | 1,307 |

*Accessions during the year.*

| | |
|---|---|
| Presented | 90 |
| Purchased and collected | 223 |
| Lent | 6 |
| Received in exchange | 37 |
| Born in National Zoological Park | 134 |
| Received from exhibit at Louisiana Purchase Exposition | 128 |

Cost for purchase, collection, and transportation of above, $3,100.

*Animals presented during the fiscal year ending June 30, 1905.*

| Name. | Donor. | Number. |
|---|---|---|
| Rhesus monkey | Miss Justine Ingersoll, New Haven, Conn | 3 |
| Pig-tailed monkey | do | 1 |
| Gelada baboon | The President | 2 |
| Spider monkey | E. H. Plumacher, United States consul, Maracaibo, Venezuela. | 2 |
| Capuchin | do | 1 |
| Lion | The President | 1 |
| Cougar | F. C. Hill, Cananea, Mexico | 1 |
| Jaguar | E. H. Plumacher, United States consul, Maracaibo, Venezuela. | 2 |
| Ocelot | do | 2 |
| Spotted lynx | Sam Mustain, Carbo, Mexico | 1 |
| Rough fox | E. H. Plumacher, United States consul, Maracaibo, Venezuela. | 2 |
| Kinkajou | Dr. David T. Day, Washington, D. C | 1 |
| Gray coati-mundi | George P. Gall, Washington, D. C | 1 |
| Raccoon | The President | 2 |
| Do | T. W. Edwards, Leesburg, Va | 1 |
| Do | Mrs. C. J. Wilcoxen, Frederick, Md | 1 |
| Do | J. D. J. O'Connor, Washington, D. C | 1 |
| Harbor seal | Bureau of Fisheries exhibit at the Louisiana Purchase Exposition. | 2 |
| Somali zebra | The President | 1 |
| Philippine deer | Rear-Admiral R. D. Evans, U. S. Navy | 1 |
| Cuban deer | Hon. H. G. Squiers, envoy extraordinary and minister plenipotentiary to Cuba, Habana, Cuba. | 3 |
| Common goat | Mrs. Theodore Roosevelt, the White House | 1 |
| Siberian hamster | Mrs. E. N. Fell, Narcoossee, Fla | 1 |
| Hutia-conga | Hon. H. G. Squiers, envoy extraordinary and minister plenipotentiary to Cuba, Habana, Cuba. | 2 |
| Common opossum | The President | 2 |
| Canary | Miss Emma Cook, Washington, D. C | 1 |
| Albino crow | Prof. H. A. Surface, Harrisburg, Pa | 1 |
| Keel-billed toucan | E. H. Plumacher, United States consul, Maracaibo, Venzuela. | 1 |
| Yellow-shouldered amazon | do | 2 |
| Blue-fronted amazon | Samuel Ross, Washington, D. C | 1 |
| Sulphur-crested cockatoo | F. S. Tyler, Washington, D. C | 1 |
| Barn owl | E. S. Schmid, Washington, D. C | 1 |
| Do | George R. Moberly, Frederick, Md | 1 |
| Barred owl | Adam S. Richter, Accident, Md | 2 |
| Do | No. 6 Engine Co., Washington, D. C | 1 |
| Screech owl | Prof. H. A. Surface, Harrisburg, Pa | 1 |
| Golden eagle | The President | 1 |
| Sparrow hawk | Miss Beryl Macauley, Washington, D. C | 1 |
| Venezuelan hawk | E. H. Plumacher, United States consul, Maracaibo, Venezuela. | 2 |
| Red-tailed hawk | Mr. Wehrle, Indiana, Pa | 1 |
| Black vulture | E. H. Plumacher, United States consul, Maracaibo, Venezuela. | 1 |
| Daubenton's curassow | do | 3 |
| Jungle fowl | N. R. Wood, Washington, D. C | 2 |
| European quail | Dr. R. A. Ralph, Washington, D. C | 2 |
| Little blue heron | Nathan Dronenburg, Washington, D. C | 1 |
| North African ostrich | The President | 1 |
| Somali ostrich | do | 1 |

*Animals presented during the fiscal year ending June 30, 1905*—Continued.

| Name. | Donor. | Number. |
|---|---|---|
| Alligator | G. H. Howard, Washingtou, D. C | 1 |
| Do | Mrs. McCallan, Washington, D. C | 5 |
| Mexican tortoise | E. O. Mathews, Parral, Mexico | 2 |
| Gopher turtle | Dr. A. K. Fisher, Washington, D. C | 1 |
| Hawksbill turtle | Hon. H. G. Squiers, envoy extraordinary and minister plenipotentiary to Cuba, Habana, Cuba. | 1 |
| Iguana | E. H. Plumacher, United States consul, Maracaibo, Venezuela. | 2 |
| Comb lizard | Hon. H. G. Squiers, envoy extraordinary and minister plenipotentiary to Cuba, Habana, Cuba. | 1 |
| Cuban lizard | do | 1 |
| Banded rattlesnake | Wm. H. Benton, Washington, D. C | 1 |
| Common boa | E. H. Plumacher, United States consul, Maracaibo, Venezuela. | 3 |
| Cuban tree boa | Hon. H. G. Squiers, envoy extraordinary and minister plenipotentiary to Cuba, Habana, Cuba. | 1 |
| Bull snake | Jas. Fullerton, Red Lodge, Mont | 1 |
| Black snake | do | 1 |
| Do | D. B. Wheeler, Washington, D. C | 1 |
| Do | C. H. Roeder, Sligo, Md | 1 |

SUMMARY.

| | Number. |
|---|---|
| Animals on hand July 1, 1904 | 1,111 |
| Accessions during the year | 618 |
| Total | 1,729 |
| Deduct loss (by exchange, death, and returning of animals) | 422 |
| On hand June 30, 1905 | 1,307 |

Respectfully submitted.

FRANK BAKER, *Superintendent.*

Mr. S. P. LANGLEY,
*Secretary Smithsonian Institution.*

## Appendix V.

### REPORT OF THE OPERATIONS OF THE ASTROPHYSICAL OBSERVATORY FOR THE YEAR ENDING JUNE 30, 1905.

Sir: The equipment of the Astrophysical Observatory is now valued as follows:

| | |
|---|---|
| Buildings | $7,400 |
| Apparatus | 45,300 |
| Library and records | 7,200 |

During the year three wooden shelters, covering, respectively, the cœlostat, the long focus concave mirror, and the bolographic outfit for observing the solar image, have been erected at a cost of $1,135. This item is chargeable to the appropriation for the fiscal year ending June 30, 1904. The fence around the Observatory lot has been renewed at a cost of $554. By permission of the park authorities the Observatory inclosure was at the same time enlarged on the east and south, and now contains 15,300 square feet.

Apparatus chiefly for use in a proposed expedition to a high altitude observing station has been procured at a cost of $3,862. Of this sum, $2,527 is chargeable to the appropriation for the fiscal year ending June 30, 1904. Usual periodicals have been continued, a few books of reference have been purchased, and about 118 volumes have been collated and bound, at a total cost of $369.

No losses of property beyond usual wear and tear have occurred during the year.

*Changes in personnel.*—In the latter half of 1904 Dr. S. A. Mitchell was employed three months as temporary assistant on stellar radiation experiments.

Richard Norris resigned March 31, 1905.

By request of the Chief of the Weather Bureau Mr. H. H. Kimball was assigned to the Observatory temporarily for a period beginning May 1, 1905, in order that he might learn the methods of bolographic observation employed here.

Mr. L. R. Ingersoll was engaged for three months, beginning May 10, 1905, as temporary assistant for the Mount Wilson expedition.

Joseph Dwyer, messenger, was engaged April 1, 1905.

#### WORK OF THE OBSERVATORY.

For convenience I describe the work of the Observatory under the following headings:

(1) Observations at Washington on the variability of the sun.
(2) Miscellaneous work.
(3) Expedition to Mount Wilson in California.

#### (1) OBSERVATIONS AT WASHINGTON ON THE VARIABILITY OF THE SUN.

As indicated in your paper, "On a possible variation of the solar radiation,"[a] and summarized in my last year's report, our observations of several years, but especially of the year 1903, have tended to produce the belief that the total radiation of the sun may vary in comparatively brief periods, these variations of solar radiation being irregular in period, but tolerably frequent

[a] Astrophysical Journal, June, 1904, and London, Edinburg, and Dublin Philosophical Magazine, July, 1904.

and large enough to produce considerable changes of the earth's mean temperature.

During the past year the work of the Observatory has been chiefly directed toward testing the supposed variability of the sun and increasing our knowledge of it. As I have said in my last report, this investigation has three main branches as follows:

First. The determination of the intensity and variation of the total solar radiation reaching the outer limit of our atmosphere. Second, the examination of the distribution of solar radiation over the sun's disk for the purpose of detecting changes of absorption in the solar envelope. Third, the reduction of temperature measurements from numerous meteorological stations to note departures of the temperature of the earth from its mean.

*General view of the results thus far obtained since January, 1902.*

Before reporting fully this year's work I give in the accompanying chart, Plate V, a general view of the results of the last two and a half years touching this question. Three series of observations are represented in the chart, namely:

A. Average departures from mean temperature for 89 stations distributed over the North Temperate Zone, represented by the full line at the top of the diagram.

B. The transmission of the solar envelope for radiations of wave length $0.50\mu$ [a] (green), as computed from spectrobolometric observations of the sun's disk at Washington, represented by the line at the middle of the diagram.

C. The solar radiation outside the earth's atmosphere as computed from spectrobolometric observations at Washington, represented by the lower line of the diagram.

As the observations of type B and earlier ones of type C are frequently separated by long intervals of time, the lines connecting the points should not be interpreted as necessarily indicating the intervening values of the quantity observed.

Observations of the solar constant taken in Washington are seldom of a satisfactory character, owing to the scarcity of days when uniform transparency of the atmosphere persists for the several hours required for the determinations. Accordingly only a few of the observations of type C are entitled to great weight, and these are designated in the diagram by the letter G to denote it. Observations of good character, but less satisfactory than these first, are designated by M, denoting medium weight. A still less perfect class, to which, unfortunately, most of the observations of 1904 and 1905 belong, is designated by the letter L, signifying of little weight. Some observations still less satisfactory than these I have omitted from the diagram as deserving no weight at all.

Considering now the diagram it will be seen that early in the year 1903 there was a long-continued period of abnormally high terrestrial temperature, and this was followed by a still longer period of abnormally low temperature. Corresponding well with this state of affairs are the observations of total solar radiation, and these observations are fortunately almost all of great, or at least medium, weight. In September, 1903, a single observation of the transmission of the solar envelope was made, and this, compared with others of more recent date, is low, indicating that diminished transparency of the solar envelope was the probable reason for the small amount of radiation and low temperature observed at the same time.

In the year 1904 there was no long-continued period of abnormal temperature

[a] Results of a similar trend are obtained for all wave lengths, and this wave length is chosen merely in illustration.

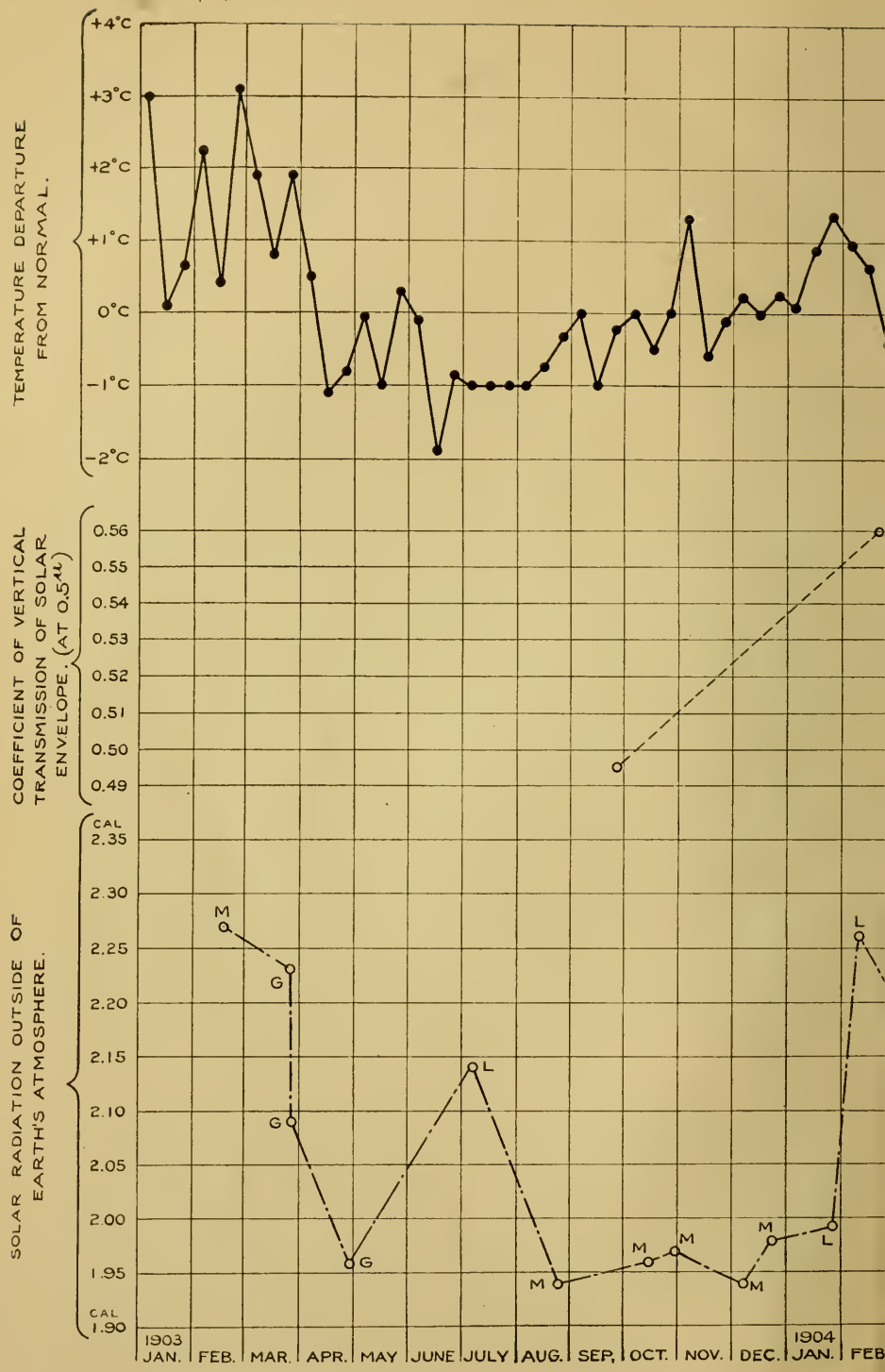
departure comparable with those noted in 1903. So far as there were notable variations from the mean in the temperature of the North Temperate Zone, these occurred in January and February, and in October and November of 1904. On the whole, these departures are confirmatory of the indications of the spectro-bolometric determinations of total radiation for the same periods, but these results, owing to scarcity of good weather, are lamentably inadequate. Still, a medium-weight observation of June indicates average temperature and is followed by it; a first-class observation of October 5 indicates high temperature and is followed by it, and a medium-weight observation of October 22, indicating low temperature, is followed by it. Prior to December there are only two observations of solar transmission, of which the first, a high value, comes just at the end of a period of high temperature, while the second, a low value, in November, comes just preceding a short period of low temperature. In December higher values are found and higher temperatures follow.

The temperature departures of the first half of 1905 also present no such favorable opportunity for comparison with solar radiation phenomena as was presented in 1903. The data on total solar radiation have not been fully reduced as yet, so that they appear still more meager than in former years, and more so than they will after all returns are in. But the weather seldom permitted satisfactory solar constant determinations at Washington in the first half of 1905. Those observations here given fall in fairly well, as will be seen, with the record of temperature departures. Observations of the solar transmission have been made very frequently since December, 1904, and are as a rule nearly average values and indicative of average temperatures, and thus in accord with the facts for the North Temperate Zone. Increasing values in December and January and diminishing ones in February and in April and May have their counterparts in the temperature curve for the North Temperate Zone. The temporarily lower values in June find no counterpart in the temperatures of the North Temperate Zone, but a fall of temperature may possibly be shown early in July.

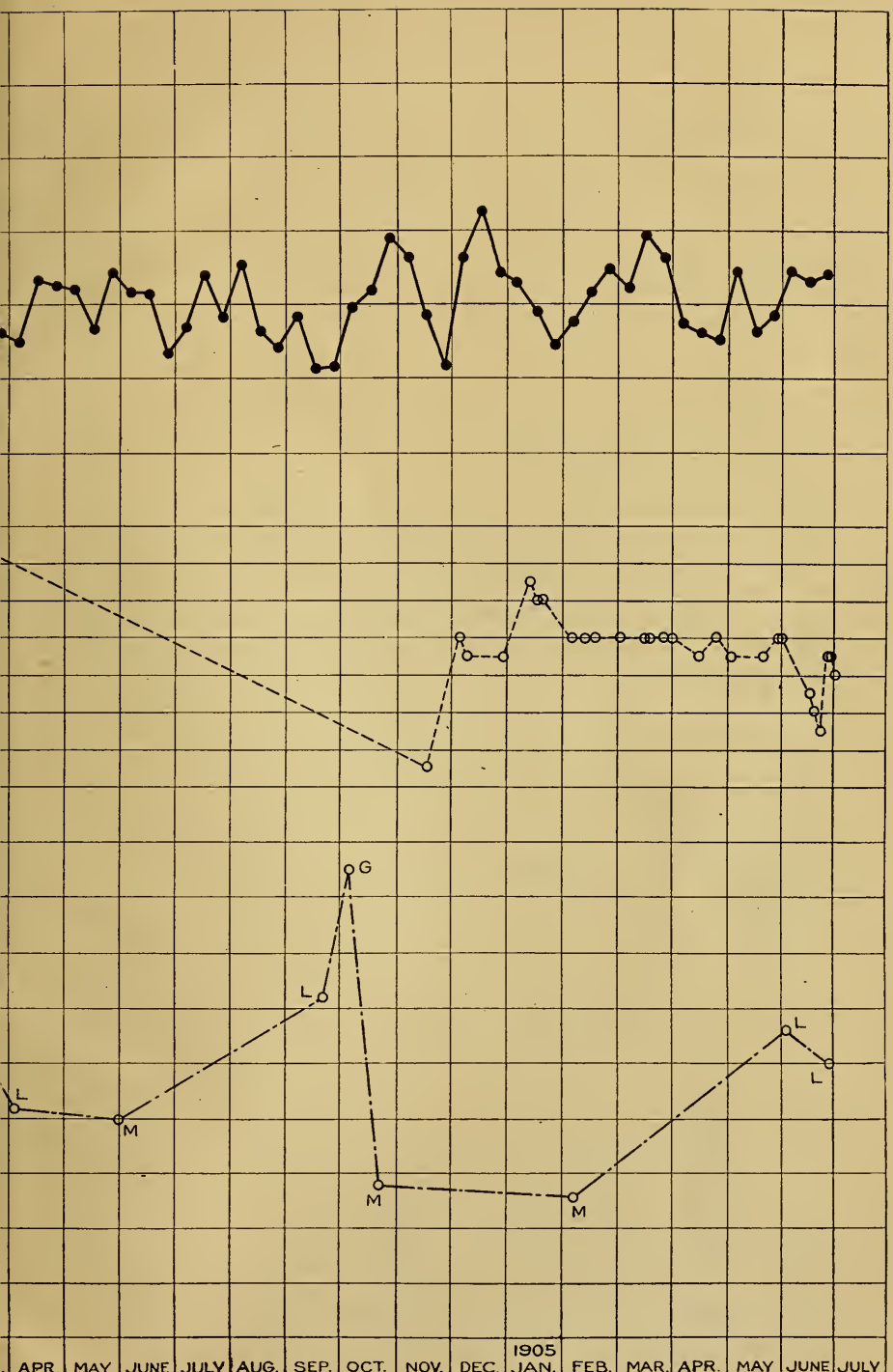
Taking all the facts together we find high values of solar radiation and solar transmission preceding and accompanying high temperatures of the North Temperate Zone; low values of solar radiation and solar transmission preceding and accompanying low temperatures of the North Temperate Zone, and intermediate values of these solar phenomena accompanying intermediate terrestrial temperatures. The evidence at hand is still too fragmentary to produce full conviction, but subject to later confirmation or rejection, as further work shall prove, the results obtained thus far strongly indicate that the transparency of the solar envelope varies at irregular intervals, with consequent fluctuations of the solar radiation transmitted to the earth, and that this in turn affects the mean temperature of the earth.

*Observations of 1904–5.*

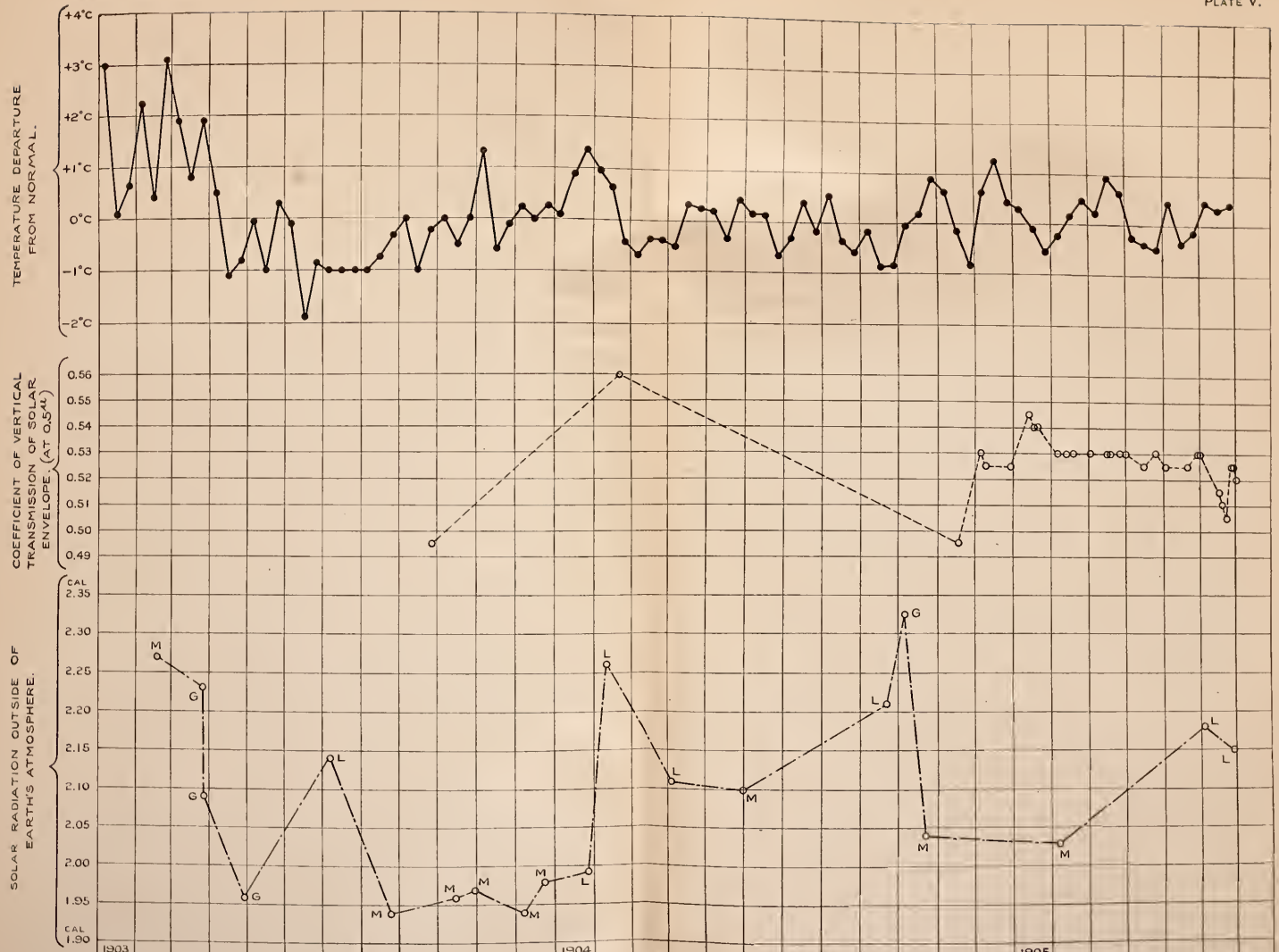
(a) *Solar constant work.*—Determinations of the radiation reaching the earth's surface, both in toto and for separate wave lengths, have been made at all times when conditions permitted, and have been reduced as in former years to give the transmission of our atmosphere, and the total radiation reaching its outer limit. As above stated the number of days when the sky has continued satisfactorily uniform for this purpose have been few, and besides owing to the press of observing and computing work it has not been possible to compute all the results as yet, so that on both accounts the tables which follow are more than usually meager. Table 1 gives in continuation of similar tables in preceding reports the transmission of the atmosphere at various wave lengths for vertical rays.




SOLAR RADIATION AND




ESTRIAL TEMPERATURE.




SOLAR RADIATION AND TERRESTRIAL TEMPERATURE.

TABLE 1.—*Coefficients of atmospheric transmission for radiation from zenith sun.*

| Wave length | μ 0.40 | μ 0.45 | μ 0.50 | μ 0.60 | μ 0.70 | μ 0.80 | μ 0.90 | μ 1.00 | μ 1.20 | μ 1.60 |
|---|---|---|---|---|---|---|---|---|---|---|
| Date. | Transmission coefficients for unit air mass. | | | | | | | | | |
| 1904. | | | | | | | | | | |
| September 22 | 0.55 | 0.65 | 0.72 | 0.81 | 0.86 | 0.88 | 0.89 | 0.90 | 0.90 | 0.90 |
| October 5 | .48 | .58 | .65 | .74 | .80 | .84 | .86 | .87 | .89 | .90 |
| October 21 | .60 | .72 | .78 | .86 | .90 | .93 | .94 | .95 | .97 | .98 |
| November 16 | .54 | .62 | .65 | .74 | .85 | .88 | .90 | .90 | .91 | .91 |
| 1905. | | | | | | | | | | |
| February 7 | .53 | .63 | .68 | .77 | .81 | .85 | .87 | .88 | .91 | .92 |
| June 3 | .45 | .55 | .63 | .74 | .80 | .84 | .87 | .89 | .92 | .96 |
| June 22 | .48 | .54 | .62 | .70 | .76 | .82 | .84 | .86 | .89 | .91 |
| June 27 | .45 | .55 | .63 | .74 | .80 | .84 | .87 | .89 | .92 | .96 |
| Mean | .510 | .605 | .670 | .762 | .822 | .860 | .880 | .892 | .914 | .930 |

The mean results will be found to lie extremely near the corresponding ones for the year 1903–4, so that no further discussion of them seems necessary.

In Table 2 are given the values computed for the solar constant of radiation outside our atmosphere, in continuation of the series published in former years. The method of computation and the assumptions on which it is based have been given in preceding reports and are substantially those employed by you many years ago at Allegheny.

TABLE 2.—*Values of the solar constant of radiation outside the earth's atmosphere from Washington observations.*

| Date. | Character of observation. | Hour angle west. | Air mass. | Solar radiation per square centimeter per minute— | |
|---|---|---|---|---|---|
| | | | | At earth's surface. | Outside atmosphere corrected to mean solar distance. |
| 1904. | | *h. m.* | | *Cal.* | *Cal.* |
| September 22 | Indifferent | 3 17 | 1.97 | 1.25 | 2.20 |
| Do | do | 4 22 | 3.09 | .99 | 2.22 |
| October 5 | Excellent | 2 21 | 1.72 | 1.14 | 2.31 |
| Do | do | 4 15 | 3.37 | .74 | 2.33 |
| October 21 | Good | 1 15 | 1.65 | 1.42 | 2.03 |
| Do | do | 2 12 | 1.91 | 1.39 | 2.05 |
| November 16 | Indifferent | 2 28 | 2.59 | 1.03 | 1.89 |
| Do | do | 2 54 | 3.00 | .92 | 1.99 |
| 1905. | | | | | |
| February 7 | Good | 1 2 | 1.78 | 1.30 | 2.03 |
| Do | do | 2 51 | 2.59 | 1.09 | 2.04 |
| June 3 | Indifferent | 2 36 | 1.25 | 1.32 | 2.20 |
| Do | do | 4 33 | 1.96 | 1.07 | 2.17 |
| June 27 | do | 1 58 | 1.15 | 1.35 | 2.18 |
| Do | do | 3 40 | 1.52 | 1.19 | 2.13 |

The rating of the character of the observation is made chiefly by inspection of the logarithmic plots used in determining the atmospheric transmission, similar to those published facing page 80 of your report for the year ending June 30, 1903. On an excellent day the observations thus plotted, like those just referred to, lie close to representative straight lines, but such days are unfortunately very rare in Washington, and especially within the last two years, owing in part to building and other operations producing smoky and non-uniform atmospheric conditions. The bearing of the results given in Table 2 on the question of the variability of the sun has already been given.

Before leaving the subject of solar constant observations it may well be remarked that Mr. Fowle has published within the year a valuable paper giving a comparison between the solar constant values deduced by the method of homogeneous rays and those deduced for the same days by the old method of high and low sun observations of the total radiation of the sun by the actinometer alone.[a] This old method, the method of Pouillet, gives necessarily too low results, as you long ago demonstrated.[b]

What is valuable in Mr. Fowle's paper is that he shows that the defect is almost constant at Washington, no matter what the time of the year, the transparency of the air, or the humidity, provided the extrapolation is made with moderate solar zenith distances. Thus if observations be made in Washington with the actinometer alone and extrapolated by the aid of a logarithmic plot to the limits of the atmosphere, and a correction of 14 per cent is then added, the result will be practically the same as if the spectrobolometric method had been used. If additional measurements should confirm this result (that a constant difference between the two methods holds here and at other localities), then the process of detecting variations in solar radiation outside our atmosphere would be much easier, for it could be made to depend on actinometer measures alone, and, indeed, old series of observations made years ago could be utilized.

I give in illustration the following table, taken in part from Mr. Fowle's paper above cited, showing how closely solar constant values deduced from pyrheliometer measures alone, by the application of the 14 per cent correction, agree with values deduced when possible from spectrobolometric work of the same days.

TABLE 2a.—*Solar constant values from pyrheliometry.*

| Date. | Range of air masses. | Log. a | a | Radiation computed from pyrheliometry. | Grade of pyrheliometer observations. | Radiation computed by spectrobolometric method. | Grade of spectrobolometric observations. |
|---|---|---|---|---|---|---|---|
| 1902. | | | | | | | |
| October 9 | 1.5–3.0 | 0.113 | 0.771 | 2.18 | Very good | 2.19 | Fair. |
| 1903. | | | | | | | |
| February 19 | 1.8–2.9 | .114 | .769 | 2.25 | do | 2.27 | Very good. |
| March 25 | 1.4–2.6 | .148 | .711 | 2.23 | Excellent | 2.23 | Excellent. |
| March 26 | 1.3–2.3 | .133 | .736 | 2.07 | do | 2.09 | Do. |
| April 17 | 1.2–1.9 | .126 | .748 | 2.17 | Very good | 2.18 | Passable. |
| April 29 | 1.1–1.6 | .170 | .676 | 1.99 | Bad | 1.96 | Very good. |
| July 7 | 1.6–1.5 | .177 | .665 | 2.36 | Short, good | 2.14 | Poor. |
| October 14 | 1.6–3.0 | .107 | .780 | 2.13 | Very good | 1.96 | Very good. |
| December 7 | 2.2–3.7 | .085 | .822 | 1.93 | Excellent | 1.94 | Passable. |
| December 23 | 2.2–3.1 | .077 | .838 | 1.99 | Doubtful | 1.99 | Do. |

[a] F. E. Fowle, Smithsonian Miscellaneous Collections, vol. 47, p. 399, 1905.

[b] S. P. Langley, American Journal of Science (3), XXVIII, p. 163, 1884.

TABLE 2a.—*Solar constant values from pyrheliometry*—Continued.

| Date. | Range of air masses. | Log. a | a | Radiation computed from pyrheliometry. | Grade of pyrheliometry observations. | Radiation computed by spectro-bolometric method. | Grade of spectro-bolometric observations. |
|---|---|---|---|---|---|---|---|
| 1904. | | | | | | | |
| January 27 | 1.9–4.0 | .090 | .813 | 2.02 | Excellent | 2.02 | Fair. |
| February 11 | 1.7–2.9 | .113 | .771 | 2.27 | Very good | 2.26 | Do. |
| May 28 | 1.1–1.9 | .121 | .757 | 2.24 | do | 2.09 | Poor. |
| July 8 | 1.2–1.7 | .158 | .695 | 2.05 | do | | |
| September 15 | 1.4–2.0 | .120 | .759 | 2.25 | Good | | |
| September 22 | 1.4–3.0 | .099 | .796 | 2.22 | Poor | | |
| October 4 | 1.7–3.2 | .126 | .748 | 2.17 | do | | |
| October 5 | 1.5–2.7 | .145 | .716 | 2.30 | Very good | 2.32 | Excellent. |
| October 21 | 1.6–3.0 | .063 | .865 | 2.06 | Fair | 2.04 | Good. |
| November 16 | 2.0–3.8 | .095 | .803 | 1.95 | Very good | 1.98 | Passable. |
| December 29 | 2.4–3.6 | .068 | .855 | 2.24 | do | | |
| 1905. | | | | | | | |
| January 26 | 1.9–3.4 | .067 | .857 | 2.07 | Excellent | | |
| February 7 | 1.8–3.4 | .097 | .800 | 2.12 | Very good | 2.04 | Good. |
| March 2 | 1.6–2.6 | .088 | .816 | 2.23 | Poor | | |
| April 19 | 1.2–2.0 | .184 | .702 | 2.17 | Passable | | |
| April 22 | 1.2–2.1 | .112 | .773 | 2.21 | Fair | | |
| May 2 | 1.3–2.0 | .151 | .706 | 2.18 | Excellent | | |
| May 8 | 1.3–2.0 | .111 | .774 | 2.09 | Fair | | |
| May 20 | 1.2–1.6 | .105 | .785 | 2.14 | Poor | | |
| June 3 | 1.1–2.2 | .128 | .745 | 2.22 | do | 2.18 | Indifferent. |
| June 22 | 1.1–2.0 | .096 | .802 | 2.17 | Very good | | |
| June 27 | 1.1–1.5 | .140 | .724 | 2.28 | Poor | | |

(b) *Transmission of the solar envelope.*—As stated above the apparatus for examining the solar image has been provided with appropriate shelters, and is now much improved over its condition last year. The great coelostat was exhibited at St. Louis in 1904, and as a substitute a smaller coelostat was arranged at the Observatory shop. The larger coelostat was not returned from St. Louis until January, 1905, and, in the press of preparation for the Mount Wilson expedition, time could not well be spared to set it up, so that the smaller instrument has served throughout the year. Many measurements, both of the distribution of radiation along the diameter of the solar disk and of its distribution in sun spots, have been made after the manner explained last year.[a] A revision has been made of all the data obtained relating to the distribution along a diameter, on the assumptions (1) that we study a phenomenon of absorption only; (2) occurring in a homogeneous medium situated outside the photosphere, and (3) extending to 21 per cent of the solar radius.

With these assumptions it appears that the form of the distribution curves as shown in Plate VIII of last year's report agree within the experimental error with that deduced from the ordinary simple exponential absorption formula. As this formula in a logarithmic form is peculiarly adapted to graphical illustrations and comparison of results, all the measurements have been reduced on the above basis and the results to be given below in Table 3 depend on it. It goes without saying that the assumptions made are not harmonious with our conceptions of the sun's absorbing envelope, and they are only made for want of better and for the sole purpose of more readily comparing the results of dif-

[a] Smithsonian Report for 1904, p. 85.

ferent days. This arbitrary method of reduction is necessary, for differences of atmospheric transparency and differences of solar distance make a direct comparison of one observational curve with another complicated and unsatisfactory.

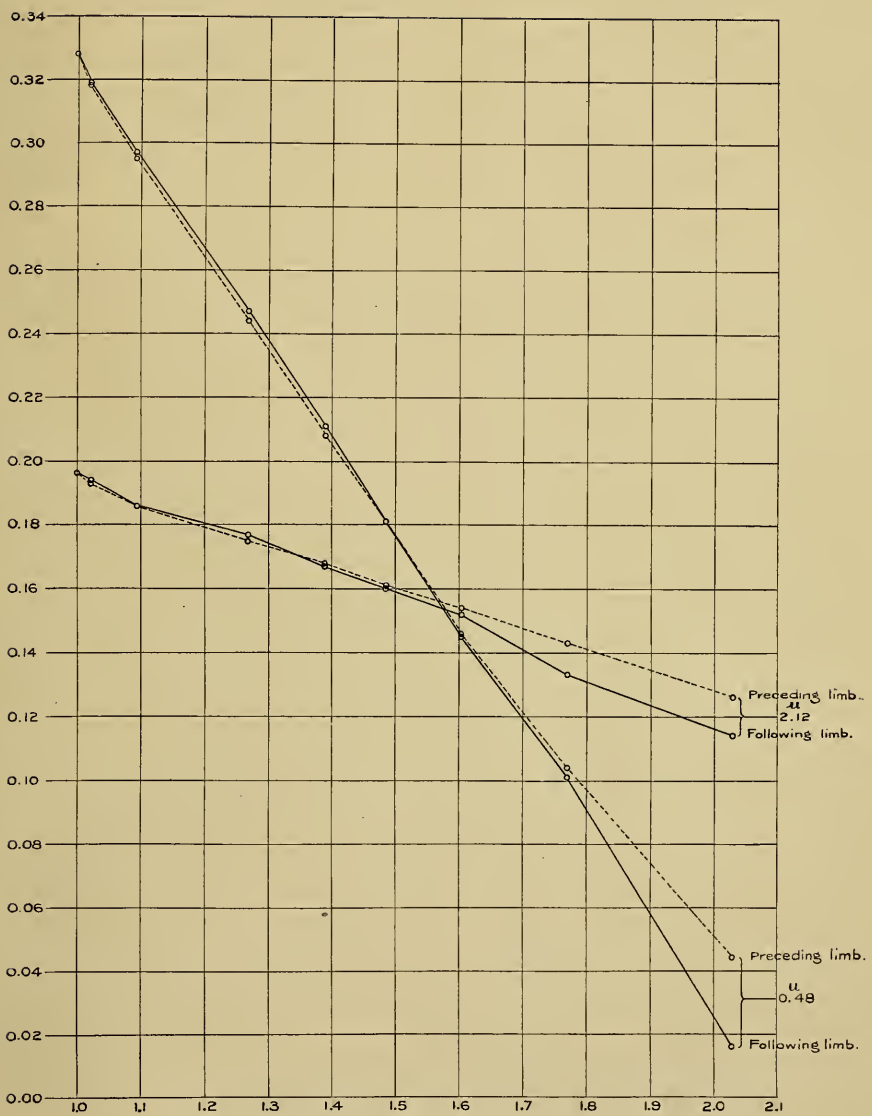
Plate VI shows two of the solar curves plotted with abscissæ as air-masses derived on the above assumptions, and ordinates as the logarithmic deflections.

The general absorption of the solar envelope appears to be like that of the earth's atmosphere, greatest at the violet end of the spectrum. This is shown, and also some of the changes which have been noted in the apparent solar transmission, in Table 3.

In this table the numbers purport to represent the percentage transmission of the solar envelope for vertical rays, on different days, and for various rays between wave lengths $0.4\mu$ in the violet, and $2.0\mu$ in the infra-red. The results are based on the assumptions stated above, and a considerable difference will be noted from the corresponding table of last year, owing to a change in the assumed thickness of the absorbing envelope.

TABLE 3.—*Transmission of solar envelope.*

| Wave length | $\mu$ 0.40 | $\mu$ 0.45 | $\mu$ 0.50 | $\mu$ 0.60 | $\mu$ 0.70 | $\mu$ 0.80 | $\mu$ 0.90 | $\mu$ 1.00 | $\mu$ 1.20 | $\mu$ 1.60 | $\mu$ 2.00 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Date. | Coefficients for vertical transmission. | | | | | | | | | | |
| 1903. | | | | | | | | | | | |
| September 25 | ------ | 0.445 | 0.495 | 0.585 | 0.635 | 0.675 | 0.700 | 0.715 | 0.740 | 0.790 | 0.830 |
| 1904. | | | | | | | | | | | |
| February 20 | ------ | .510 | .560 | .640 | .690 | .730 | .750 | .770 | .800 | .830 | (.850) |
| November 17 | ------ | (.440) | .495 | .575 | .625 | (.660) | ------ | ------ | ------ | ------ | ------ |
| November 28 | ------ | ------ | ------ | ------ | ------ | .69 | .71 | .73 | .76 | .80 | .835 |
| December 6 | ------ | ------ | (.53) | .615 | .665 | .695 | ------ | ------ | ------ | ------ | ------ |
| December 8 | ------ | .475 | .525 | .605 | .660 | .700 | .725 | .745 | .770 | .810 | .840 |
| December 29 | ------ | .475 | .525 | (.600) | .655 | .690 | ------ | ------ | ------ | ------ | .835 |
| 1905. | | | | | | | | | | | |
| January 14 | ------ | ------ | .545 | .625 | .680 | .710 | .735 | .750 | .775 | (.805) | .840 |
| January 17 | ------ | ------ | .540 | .620 | .670 | .705 | .730 | .745 | .770 | (.805) | .840 |
| January 20 | ------ | ------ | .540 | .620 | .670 | .705 | .730 | .745 | .770 | (.805) | .840 |
| February 7 | ------ | .475 | .530 | .610 | .655 | .685 | .710 | .720 | ------ | ------ | ------ |
| February 14 | (0.415) | .475 | .530 | (.610) | (.660) | .695 | .720 | (.740) | ------ | (.810) | .840 |
| February 16 | ------ | ------ | ------ | ------ | ------ | .695 | ------ | ------ | ------ | ------ | .840 |
| February 18 | .450 | .480 | .530 | (.610) | .665 | .695 | .715 | (.735) | ------ | ------ | .840 |
| March 2 | ------ | .480 | .530 | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ |
| March 16 | ------ | .480 | .530 | .605 | .660 | .690 | .710 | .730 | .760 | .795 | .830 |
| March 18 | ------ | .480 | .530 | .605 | .660 | .690 | .710 | .730 | .760 | .795 | .830 |
| March 26 | ------ | .480 | .530 | .605 | .660 | .690 | .710 | .730 | .760 | .795 | .830 |
| March 31 | ------ | .480 | .530 | .605 | .660 | .690 | .710 | .730 | .760 | .795 | .830 |
| April 15 | ------ | ------ | .525 | .605 | .650 | .680 | ------ | ------ | ------ | ------ | ------ |
| April 25 | ------ | .465 | .530 | .605 | .650 | .680 | ------ | ------ | ------ | ------ | ------ |
| May 2 | .48? | .475 | .525 | .605 | .655 | .690 | ------ | ------ | ------ | ------ | ------ |
| May 20 | .48? | .475 | .525 | .600 | .655 | .690 | .710 | .730 | .760 | .800 | .830 |
| June 8 | .450 | .490 | .530 | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ |
| June 9 | .450 | .490 | .530 | .620 | .670 | .710 | .725 | .740 | .765 | .810 | .845 |
| June 17 | ------ | (.465) | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ |
| June 19 | ------ | (.460) | .510 | .590 | .640 | .670 | .700 | .720 | .755 | .795 | .830 |
| June 22 | ------ | ------ | .505 | .590 | .640 | .680 | ------ | ------ | ------ | ------ | ------ |
| June 27 | ------ | ------ | .525 | .595 | .640 | ------ | ------ | ------ | ------ | ------ | ------ |
| June 28 | ------ | ------ | .525 | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ |
| June 29 | ------ | ------ | .520 | .600 | .650 | .685 | ------ | ------ | ------ | ------ | ------ |




ABSORPTION OF SOLAR ENVELOPE.

Ordinates, logarithm of intensity of radiation along diameter of solar image.
Abscissæ, computed length of path of ray in solar envelope.

The bolometric examination of sun spots shows that they, too, exhibit much greater absorption at the violent end of the spectrum than in the infra-red. Thus, if our eye were like the bolometer, and could view sun spots by homogeneous rays of different wave lengths of the infra-red as well as violet, we should see the same spot four times as dark in violet light as when viewed by extreme infra-red rays.

In all the observations and reductions involved in the work described above Mr. Fowle has taken by far the greatest share.

The temperature data plotted in Plate V are reduced from the Internationaler Dekadenberichte, published by the Kaiserliche Marine Deutsche Seewarte. The reductions were made partly by R. Norris and partly by J. Dwyer.

### (2) MISCELLANEOUS WORK.

#### *Radiation of the stars.*

Preliminary preparations were made for the detection of the radiation of the brighter stars. It was at first thought practicable to mount the bolometer in the center of the tube of the 50-centimeter diameter mirror of 1-meter focus and to point the mirror directly upon the star to be examined, but it was quickly found that the disturbances due to exposure to outside air were too great to be permissible with the refined sensitiveness of the bolometric apparatus. Afterwards the mirror and bolometer were placed within the inner chamber of the observatory, and the starlight was reflected in from a 30-inch plane mirror on the coelostat. The galvanometer employed was the one described at pages 91–92 of your report for the year ending June 30, 1902.

The sensitiveness available depends largely on reducing the damping of the needle, and a long time was spent in making the galvanometer case air-tight, so that a pressure of 1/1000 atmosphere or less could be maintained without rapid change. In this we were at length so successful that the change of pressure was hardly appreciable in several months. Great difficulty was encountered in balancing the bolometric apparatus at the high sensitiveness employed on account of small electromotive forces in the galvanometer circuit and its shunts. Thus a balance would be obtained with a certain shunt across the galvanometer, and on passing to the next shunt a very great deflection would be found, due to a new electromotive force in the new shunt circuit. At length it proved necessary to discard shunts wholly, and to employ instead a variable resistance in series with the galvanometer. Great difficulty was still experienced in balancing, but not so great as to render it impossible, as before. When once balanced the apparatus was well behaved. The sensitiveness appeared from tests on candle flames to be very much greater than that obtained by previous experimenters on stellar radiation. Unfortunately the difficulties encountered were not surmounted until early in January, and bad weather prevented a trial on the stars until more important work displaced the investigation for the present.

#### *New apparatus.*

*Bolometer.*—In our previous construction of bolometers we have been guided more by experience than by any theory in their design. While preparing for the research on stellar variation it seemed very desirable to determine the conditions which would insure the highest sensitiveness. Accordingly the subject was studied from the standpoint of Fourier's analytical theory of heat, and numerous experiments were made to further enlighten it. As a result a complete theory of bolometer construction was reached, and it is now possible

to know in advance how to design and construct a bolometer to give the best result under stated conditions.

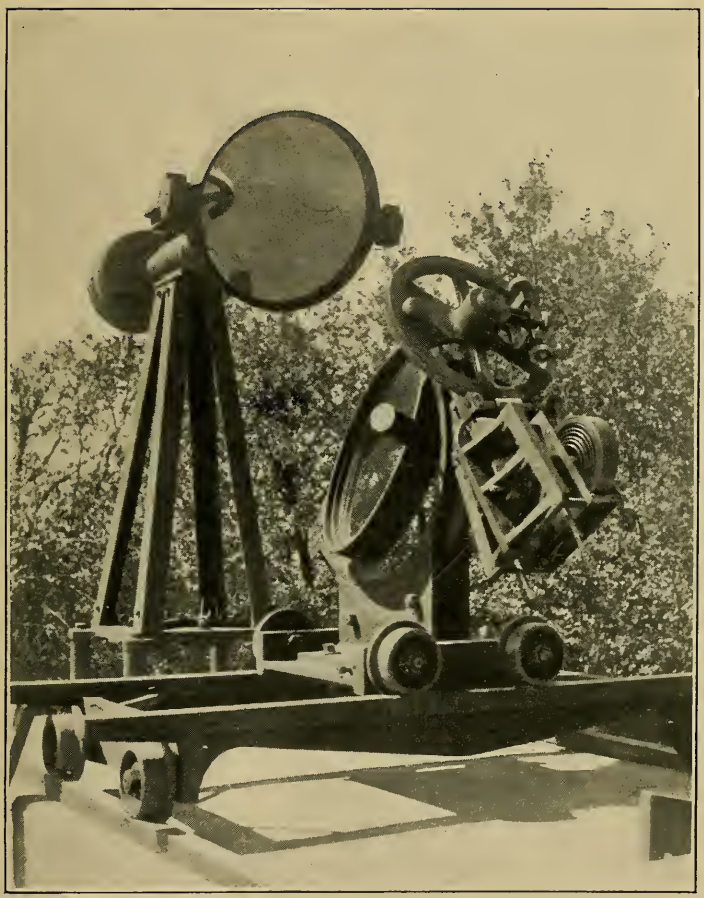
In accordance with the results thus reached, a vacuum bolometer was constructed for the observation of stellar heat which is several times as sensitive for the purpose as the best bolometer hitherto prepared here.

*Cœlostat.*—A new cœlostat with two 15-inch mirrors was obtained for the proposed expedition to a high-altitude station. The general design was prepared at the Observatory, and the construction was by Mr. M. E. Kahler, of Washington, excepting some work done on the clock at the Observatory shop. A photograph of the apparatus as in use at Mount Wilson is here shown (Plate VII).

Several unusual features may be noted. The rotating mirror is shown mounted on a carriage which may travel on ways either east and west or north and south, so as to be adjusted for the position of the sun at any time in the year. The carriage is of the same height as the lower base of the support of the second mirror, and the two mirrors may be interchanged if desired, so that the rotating one can be fixed in one place and the east-and-west and north-and-south motions can be made with the other. The driving clock is fastened to the support of the polar axis and designed to run equally well in any position, so that the adjustment of the axis for different latitudes can be made without altering the driving mechanism. In order to conform to the motion of the carriage, the clock is driven by springs instead of weights. At your suggestion there was introduced a driving spring, which is itself kept wound to a nearly constant tension by two larger springs. Thus the driving force is uniform though the two larger springs run down. The rate of their unwinding is governed by an escapement driven from the governor train. The governor itself is of the centrifugal type, but has springs instead of gravity as the governing force, and will thus run in any position. The accuracy of the clock is ample, so that the reflected beam from the cœlostat frequently remains constant in direction within one minute of arc for a half hour.

*Standard pyrheliometer.*—Mention was made in my last year's report of a new form of pyrheliometer then under construction. This instrument has been completed and forms a part of the equipment of the Mount Wilson expedition. It appears to justify all the hopes that had been connected with it. As stated last year, it receives solar rays in a hollow blackened chamber of the shape of a test tube, from which little radiation can escape by reflection, or heat by convection, owing to the deepness of the chamber and to its numerous blackened diaphragms. A current of water circulates around this chamber and takes up the heat absorbed on its walls. Platinum resistance wires serve to determine the temperature of the water before and after its passage around the chamber. Thus the sun's rays entering a known aperture produce a measurable rise of temperature in a known amount of water. A certain check is had on the accuracy of the measurement, for a coil of wire is introduced within the rear end of the chamber, and in this coil heat may be produced electrically at a known rate. This heat warms the air and indirectly reaches the walls of the chamber, and may be measured as if it were produced by radiation.

At nine recent trials made on several different days, with the instrument in different positions and with different rates of flow of the water current, the heat "found" ran between 97 per cent and 103 per cent of the heat introduced. The mean of nine trials gave 100.4 per cent "found." If, then, the electrically supplied heat is thus closely measurable, much more should that



NEW CŒLOSTAT.

of the sun be, which is absorbed at once on the walls of the chamber instead of indirectly by air convection.

The instrument is mounted equatorially and driven by clockwork, and the rate of flow of the water current, lapse of time and temperature change caused by radiation, are all recorded photographically on a moving drum. Hence a continuous automatic record of the solar radiation is produced. In use at Mount Wilson it is not easy to avoid considerable temperature change of the apparatus, and this causes a slight "drift" of the record, but not enough to prevent runs of several hours' duration without attention.

A considerable part of the apparatus for the continuous pyrheliometer was made by the International Instrument Company, of Cambridge, Mass. The more refined parts for the receipt and measurement of the radiation were constructed by Mr. Kramer at the Observatory shop. In this, and in a great amount of other work during the year, Mr. Kramer has combined skill with rare willingness and interest in a way which deserves commendation.

### (3) THE EXPEDITION TO MOUNT WILSON, IN CALIFORNIA.

From the very beginning, in 1902, of experiments in Washington on the measurement of the solar constant of radiation it has been your aim to continue these measurements at a more favorable situation as regards cloudiness, and particularly as regards elevation. You long ago showed that in optical quality the lower air is far inferior to that lying above, and you have repeatedly stated your conviction that exact determinations of the absorption of the atmosphere are impossible at stations near sea level. Congress having approved of your plan to conduct these observations at high altitudes, apparatus has been collected during the past three years for an expedition to a favorable station for the measurement of the solar constant.

In the meantime the Carnegie Institution had been founded, and by invitation of one of its officers you stated, in a communication to the Hon. C. D. Walcott, dated February 28, 1902, your belief that the establishment by the Carnegie Institution of an observatory to be situated at some high and cloudless point and engaged for at least a complete sun-spot cycle in the accurate determination of the solar constant of radiation would be a worthy astronomical undertaking and one most likely, in your judgment, to yield results of value both from the standpoint of pure science and from that of practical utility to mankind.

In 1904 the Carnegie Institution began the establishment of a solar observatory on Mount Wilson, in California, under the direction of Prof. G. E. Hale, and the objects of this observatory include the measurement of solar radiation, which you had urged. Almost immediately after the installation at Mount Wilson had been begun, Professor Hale, recognizing the large share you have had from the first in promoting the establishment of such an observatory, and knowing of the preparations making at the Smithsonian Astrophysical Observatory for an expedition to a high station to observe the solar constant, invited you to send this expedition to Mount Wilson, and promised all possible cooperation during its stay, and suggested that the work would, if desirable, be taken up by the new solar observatory when the Smithsonian expedition should be withdrawn. This invitation was accepted. The equipment, consisting of a full spectro-bolographic and pyrheliometric outfit, the equal and in some respects the superior of that installed in Washington, was sent forward in April, 1905. The observers, C. G. Abbot in charge, and L. R. Ingersoll, temporary assistant, reached the ground about May 10. Two shelters for the spectro-bolometer and the continuous pyrheliometer, respectively, already framed in the valley below,

were immediately erected on Mount Wilson, and were finished, including all their piers and accessories, in about two weeks. The spectro-bolometer was completely installed and the first bolographic observations were made June 6, 1905.

In the meantime observations had been made nearly every day with the mercury pyrheliometer, and these had given promise of great transparency and uniformity of sky. From the 1st of June hardly a cloud was ever seen above the level of the horizon for many weeks. Extraordinary calmness adds to the advantages of this site. A few of the earliest bolographs were measured at once to see if all appeared to be well, and, as the measurements turned out very satisfactorily, bolographic work was continued nearly every day thereafter, leaving the reduction of the observations to a later time.

Investigations at Washington, as already reported, have given strong grounds for the conclusion that the solar radiation varies considerably and frequently in its amount. It would be most desirable if the Mount Wilson expedition could give ample opportunity to test this conclusion, but in spite of the too short time at present command it has been thought best by you to initiate it, and at the same time to study more closely the manner of the solar variability. To this end the work includes, not only solar-constant measurements, but other studies designed to add to our knowledge of the whole question.

The expedition is under the greatest obligations for the continued aid furnished by the director and staff of the Carnegie Solar Observatory. The results obtained will doubtless form a principal part of next year's report.

## SUMMARY.

The principal object of the Observatory during the past year has continued to be the measurement of the solar radiation. The work of this and the two preceding years strongly supports the view that the radiation of the sun is frequently diminished and augmented for periods of a few weeks or months, in consequence of a variability of the transparency of the solar absorbing envelope, and that this variation of radiation causes and quickly produces changes of several degrees in the mean temperature of the land areas of the earth. It is hoped that the study of the solar radiation will soon prove a valuable aid in forecasting climate.

Important additions and improvements have been made in the equipment of the Observatory, both in buildings and apparatus. The new apparatus includes a standard pyrheliometer, capable of continuously registering the solar radiation and provided with means of certifying the exactness of its measures independently of the theory of the instrument.

An expedition to measure and test the variability of solar radiation has been sent to Mount Wilson, in Southern California.

Respectfuly submitted.

C. G. Abbot,
*Aid Acting in Charge.*

Mr. S. P. Langley,
*Secretary Smithsonian Institution, Washington, D. C.*

## Appendix VI.

### REPORT OF THE LIBRARIAN.

Sir: I have the honor to present the following report on the operations of the library of the Smithsonian Institution for the fiscal year ending June 30, 1905:

The publications received by the Institution and recorded in the accession books of the Smithsonian deposit, Library of Congress, number as follows:

| | Quarto or larger. | Octavo or smaller. | Total. |
|---|---|---|---|
| Volumes | 373 | 1,302 | 1,675 |
| Parts of volumes | 15,267 | 8,612 | 23,879 |
| Pamphlets | 545 | 3,805 | 4,350 |
| Charts | | | 676 |
| Total | | | 30,580 |

The accession numbers run from 460377–468086.

As in the past a few of these publications were retained at the Institution for the use of the scientific staff, but the larger number have been sent direct to the Library of Congress. The entire sendings from the Institution required the use of about 274 boxes, which it is estimated contained the equivalent of 10,960 octavo volumes. This estimate does not include, however, a large number of public documents presented to the Smithsonian Institution and sent direct to the Library of Congress without recording.

At the close of the year ending June 30, 1904, there remained in the Museum library a number of the scientific series, together with books and pamphlets on special subjects, belonging to the Smithsonian deposit, to be withdrawn, checked, and sent to the Library of Congress, these publications having been held at the Museum when that Library was overcrowded in its old quarters at the Capitol. While 7,805 parts were transmitted during the past year, it has not been possible to complete the checking, owing to the fact that the time of the small force in the Smithsonian library was fully occupied with current work, but every effort will be made to finish the task before the close of the present year, when all of the series of periodicals and publications belonging to the deposit, with the exception of those in actual use, will be in the hands of the Librarian of Congress.

The libraries of the Secretary, Office, and Astrophysical Observatory have received during the year 418 volumes, pamphlets and charts, and 2,040 parts of volumes, making a total of 2,458, and a grand total, including books for the Smithsonian deposit and the Watts de Peyster collection Napoleon Bonaparte, of 35,820.

The parts of serial publications that were entered on the card catalogue numbered 26,000. One thousand seven hundred and thirty-five slips for completed volumes were made, and about 720 cards for new periodicals and annuals were added to the permanent record from the periodical recording desk.

Inaugural dissertations and academic publications were received from universities at the following places:

| | | |
|---|---|---|
| Ann Arbor. | Erlangen. | Marburg. |
| Baltimore (Johns Hopkins). | Freiburg. | Philadelphia (University of Pennsylvania). |
| Basel. | Giessen. | Rostock. |
| Berlin. | Grefswald. | Strassburg. |
| Bern. | Halle. | Toulouse. |
| Bonn. | Heidelberg. | Manchester (England). |
| Breslau. | Kiel. | Zurich. |
| | Lawrence (Kansas). | |

In continuing the Secretary's plan to effect new exchanges and to secure missing parts to complete sets, 1,405 letters were written, 301 new periodicals were added to the receipts, and 527 defective series were partly or entirely completed. In addition to the letters above referred to there were 175 postal cards sent asking for current numbers that failed to reach the Institution, which resulted in 103 being received.

The scientific staff and others have continued to consult the proceedings and transactions of the learned societies in the reference room, and from the reading room 21 bound volumes of periodicals were withdrawn and 4,368 scientific periodicals and magazines were borrowed for consultation.

The sectional libraries maintained in the Institution, the Secretary's library, Office library, and the Employees's library, together with those of the Astrophysical Observatory, Aerodromics, International Exchanges, and Law Reference, have been used by persons from the other scientific bureaus of the Government, as well as members of the immediate staff.

In the Secretary's and Office library 107 books were bound, and special attention was given to collating the publications in the Astrophysical Observatory, with the result that 118 completed volumes were bound at the Government bindery. At the National Zoological Park 8 volumes have been added to the library by purchase.

### THE EMPLOYEE'S LIBRARY.

The popularity of the Employee's library has continued, and during the year 3,262 books were borrowed. The new books added to the library by purchase numbered 19, and 78 completed volumes of magazines were bound. The sending of about 40 of the books from this library to the National Zoological Park and 26 to the Bureau of American Ethnology each month has been continued with marked appreciation from the two bureaus.

### THE WATKINS LIBRARY.

Within the last few months the trustees of the estate of the late Dr. J. Elfreth Watkins have turned over to the Smithsonian Institution his large and valuable library consisting in the main of books relating to engineering and transportation. A book plate has been provided and the books listed, and it is hoped that they may soon be available for the use of those interested in the subject to which they relate.

### THE JOHN DONNELL SMITH LIBRARY.

Through the munificence of Capt. John Donnell Smith, of Baltimore, the library of the Smithsonian Institution has become enriched by his collection of botanical works, numbering about 1,600 volumes, containing books bearing upon the flora of tropical America, carefully selected and substantially and

artistically bound. This donation was made in connection with the gift to the Institution of his herbarium, and brings to the National Museum, where the library will be deposited, an unrivaled basis of equipment for the prosecution of a complete botanical exploration of Central America and a critical study of its whole flora.

### WATTS DE PEYSTER COLLECTION NAPOLEON BUONAPARTE.

It is very gratifying to report the rapid increase of the Watts de Peyster Collection Napoleon Buonaparte through the continued gifts of Gen. John Watts de Peyster. The additions during the year numbered 1,775 volumes and 1,007 maps.

### INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

The Institution has continued to act as the representative in the United States for the International Catalogue of Scientific Literature, and has indexed and classified for the Central Bureau at London the scientific literature of the United States. During the past year the number of references sent to the Central Bureau at London was 24,182, an increase of nearly three thousand over the previous year, as follows:

| | |
|---|---|
| Literature of 1901 | 1,619 |
| Literature of 1902 | 2,780 |
| Literature of 1903 | 11,143 |
| Literature of 1904 | 8,640 |
| Total | 24,182 |

All of the first annual issue of the International Catalogue has been published, together with all of the second annual issue, excepting the volume of Zoology and five volumes of the third annual issue, namely, Mathematics, Mechanics, Physics, Astronomy, and Bacteriology.

### MUSEUM LIBRARY.

In the Museum library there are now 24,170 bound volumes and 38,643 unbound papers. The additions during the year consisted of 3,573 books, 3,048 pamphlets, and 563 parts of volumes. There were catalogued 1,952 books, of which 101 belonged to the Smithsonian deposit, and 3,755 pamphlets, of which 185 belonged to the Smithsonian deposit, and 12,216 parts of periodicals, of which 1,309 belonged to the Smithsonian deposit. In the accession book 3,573 volumes, 3,048 pamphlets, and 563 parts of volumes were recorded. The number of cards added to the author's catalogue was 5,942, which does not include 847 cards for books and pamphlets recatalogued.

In connection with the entering of periodicals 55 memoranda were made reporting volumes and parts missing in the sets, together with a few titles of publications that were not represented in the library. The result of this work was the completing or partly filling up of 23 sets of periodicals.

Throughout the whole year attention has been given to the preparation of volumes for binding, with the result that 1,371 books were bound, and at the close of the year there were several hundred more ready for the binder.

The number of books, pamphlets, and periodicals borrowed from the general library amounted to 40,400, including 9,192 which were assigned to the sectional libraries.

There has been but one addition to the sectional libraries established in the Museum, that of the Division of Physical Anthropology, and the complete list now stands as follows:

Administration.
Administrative assistant.
Anthropology.
Biology.
Birds.
Botany.
Children's room.
Comparative anatomy.
Editor.
Ethnology.
Fishes.
Geology.
History.
Insects.
Mammals.
Marine invertebrates.
Materia medica.
Mesozoic fossils.
Mineralogy.
Mollusks.
Oriental archæology.
Paleobotany.
Parasites.
Photography.
Physical anthropology.
Prehistoric archæology.
Reptiles.
Stratigraphic paleontology.
Superintendent.
Taxidermy.
Technology.

In the following table are summarized all the accessions during the year for the Smithsonian deposit, for the libraries of the Secretary, Office, Astrophysical Obsrvatory, United States National Museum, and National Zoological Park. That of the Bureau of American Ethnology is not included, as it is separately administered:

| | |
|---|---|
| Smithsonian deposit in Library of Congress | 30,580 |
| Secretary, Office, and Astrophysical Observatory libraries | 2,458 |
| Watts de Peyster collection Napoleon Buonaparte | 2,782 |
| United States National Museum library | 7,184 |
| National Zoological Park | 8 |
| Total | 43,012 |

Respectfully submitted.

CYRUS ADLER, *Librarian.*

Mr. S. P. LANGLEY,
*Secretary of the Smithsonian Institution.*

## Appendix VII.

### REPORT OF THE EDITOR.

Sir: I have the honor to submit the following report on the publications of the Smithsonian Institution and its bureaus during the year ending June 30, 1905:

#### I. CONTRIBUTIONS TO KNOWLEDGE.

To the series of Contributions but one memoir has been added during the past year—

1651. A Continuous Record of Atmospheric Nucleation. By Carl Barus. City of Washington: Published by the Smithsonian Institution, 1905. Hodgkins fund. Part of Vol. XXXIV. Quarto. (In press.)

#### II. SMITHSONIAN MISCELLANEOUS COLLECTIONS.

To the series of Miscellaneous Collections the following numbers have been added, all but four of them having appeared in the Quarterly Issue:

1444. A Catalogue of North American Diptera (or Two-winged Flies). By J. M. Aldrich. City of Washington: Published by the Smithsonian Institution. 1905. Part of Vol. XLVI. 8vo. Pages 1–680.

1543. Index to the Literature of Gallium, 1874–1903. By Philip E. Browning. City of Washington: Published by the Smithsonian Institution. Part of Vol. XLVI. 8vo. Pages 1–12.

1544. Index to the Literature of Germanium, 1886–1903. By Philip E. Browning. City of Washington: Published by the Smithsonian Institution. Part of Vol. XLVI. 8vo. Pages 1–8.

1549. Inquiry into the Population of China. By William Woodville Rockhill. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 303–321.

1550. The Seeds of Aneimites. By David White. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 322–331, plates XLVII, XLVIII.

1551. Birds in Vroeg's Catalogue, 1764. By C. Davies Sherborn and Charles W. Richmond. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 332–347.

1552. The Sculpin and its Habits. By Theodore Gill. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 348–359, plate XLIX.

1553. Report on the Construction of a Vowel Organ. By E. W. Scripture. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 360–364, 5 figures.

1554. Habits and Life History of the Social Spider. By N. S. Jambunathan. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 365–373, plate L.

1555. Description of a new Sylvietta. By H. C. Oberholser. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 373–375.

1556. The Tugda, or Rice Planter, of the Coyunos, Philippine Islands. By E. Y. Miller. Pages 375–377, plates LI–LII. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII.

1557. Fossil Plants of the Group Cycadofilices. By David White. Reprinted from the Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 377–390, plates LIV–LV.

1560. The Discrepancy between Solar Radiation Measures by the Actinometer and by the Spectro-Bolometer. By F. E. Fowle, jr. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 399–408.

1561. A New Philippine Landshell. By Paul Bartsch. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 409–410, plate LVI.

1562. A New Species of Fern of Genus Polypodium from Jamaica. By William R. Maxon. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 410–411, plate LVII.

1563. Contributions of American Archæology to Human History. By William H. Holmes. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 412–420.

1564. The Birds of the Genus Cinclus and their Geographical Distribution. By Leonhard Stejneger. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 421–430.

1565. Description of a New Swiftlet from Mount Kina Balu, Borneo. By Charles W. Richmond. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 431–432.

1566. Report on Land and Water Shells collected in the Bahamas in 1904, by Mr. Owen Bryant and others. By William Healey Dall. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 433–452, plates LVIII–LIX.

1567. Glacial Studies in the Canadian Rockies and Selkirks. By William Hittell Sherzer. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 453–496, plates LX–LXII.

1568. Photographing on Wood for Photo-engraving. By Thomas W. Smillie. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 497–499.

1569. The Life History of the Angler. By Theodore Gill. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVII. Pages 500–516, plates LXXIII–LXXV.

1571. Index to the Literature of Indium, 1863–1903. By Philip E. Browning. City of Washington: Published by the Smithsonian Institution, 1905. 8 vo. Pages 1–15.

1575. The Structure of Wing Feathers. By E. Mascha. Hodgkins Fund. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. Pages 1–30, plates I–XVI.

1576. The Tarpon and Lady Fish. By Theodore Gill. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. Pages 31–46, plates XVII–XXI.

1577. A Fossil Sea Lion from the Miocene of Oregon. By F. W. True. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. Pages 47–49.

1578. Diatoms, the Jewels of the Plant World. By Albert Mann. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. Pages 50–58, plates XXII–XXV.

1579. Notes on the Nomenclature of Certain Genera of Birds. By H. C. Oberholser. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII.

1580. The Bibliography of Halley's Comet. By E. F. McPike. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. Pages 69–73.

1581. The Ancestral Origin of the North American Unionidæ. By C. A. White. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. Pages 89–112.

1584. Smithsonian Exploration in 1904 in search of Mammoth and other Fossil Remains. By A. G. Maddren. Smithsonian Miscellaneous Collections, part of Vol. XLIX. City of Washington: Published by the Smithsonian Institution, 1905. Pages 1–117, plates I–VI.

1586. The Diplomatic Service of the United States, with some Hints toward its Reform. By Hon. Andrew D. White. Hamilton Lecture. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. Pages 117–138.

1587. The History of the Whale Shark (Rhinodon Typicus Smith). By Barton A. Bean. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. Pages 139–148, plates XXXIV–XXXVI.

1588. The Avian Genus Bleda Bonaparte and some of its Allies. By Harry C. Oberholser. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. Pages 149–172.

1589. Scaphoceros Tyrelli, an Extinct Ruminant from the Klondike Gravels. By Wilfred H. Osgood. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. Pages 173–185, plates XXXVII–XLII.

1590. A New Genus and several New Species of Landshells collected in Central Mexico by Dr. Edward Palmer. By William Healey Dall. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. Pages 186–194, plates XLIII–XLIV.

1591. The Family of Cyprinids and the Carp as its Type. By Theodore Gill. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. (In press.)

1592. The International Catalogue of Scientific Literature. By Cyrus Adler. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. (In press.)

1593. Instances of Hermaphroditism in Crayfishes. By W. P. Hay. Reprinted from Smithsonian Miscellaneous Collections (Quarterly Issue), Vol. XLVIII. (In press.)

### III. SMITHSONIAN ANNUAL REPORT.

The annual report, as usual, is issued in two volumes: Part I being devoted to the Institution proper, Part II to the National Museum. The contents of the Smithsonian volume for 1903 was listed in last year's report, although the book itself was still in the hands of the printer at the time. The same is here true with regard to the volume for 1904.

1595. Annual Report of the Board of Regents of the Smithsonian Institution, showing the operations, expenditures, and condition of the Institution for the year ending June 30, 1904. Washington: Government Printing Office, 1905. Octavo. Pages I–LXXIX, 1–804; 146 plates, 62 text figures.

The Secretary's Report for the year ending June 30, 1904, was put in type in November, 1904, for the use of the Regents. The General Appendix to

the volume was sent to the Public Printer in February, 1905, and had been put into type before the closing of the fiscal year. The contents of the Smithsonian Report for 1904 is as follows:

1596. Journal of Proceedings of the Board of Regents of the Smithsonian Institution at Meetings of December 8, 1903, and January 27 and March 7, 1904. Report of Executive Committee. Acts and Resolutions of Congress. Pages XV–LXXIX.

1547. Report of S. P. Langley, Secretary of the Smithsonian Institution, for the year ending June 30, 1904. Pages 1–108, plates I–XIV.

1597. Experiments with the Langley Aerodrome. By S. P. Langley. Pages 113–125, plate I.

1598. The Relation of Wing Surface to Weight. By R. Von Lendenfeld. Pages 127–130.

1599. The Rumford Spectroheliograph of the Yerkes Observatory. By George E. Hale and Ferdinand Ellerman. Pages 131–161, plates I–XVII.

1600. Construction of Large Telescope Lenses. By Dr. C. Faulhaber. Pages 163–170.

1601. Some Reflections suggested by the Application of Photography to Astronomical Research. By H. H. Turner. Pages 171–184.

1602. Radiation in the Solar System. By Prof. J. H. Poynting. Pages 185–193.

1603. Condensation Nuclei. By C. T. R. Wilson. Pages 195–206, plates I–VIII.

1604. Present Problems of Inorganic Chemistry. By Sir William Ramsay. Pages 207–220.

1605. The Evolution of the Scientific Investigator. By Simon Newcomb. Pages 221–233.

1606. Metals in the Atmosphere. By Alfred Ditte. Pages 235–247.

1607. Observations on Vision in Brightness and in Obscurity, with a Hypothesis on the Cause of Color Blindness. By O. Lummer. Pages 249–258.

1608. A Lightning Spiral Observed Near Basel. By Fr. Klingelfuss. Pages 259–260, plates I–II.

1609. Variations of Specific Gravity. By G. W. A. Kahlbaum. Pages 261–266.

1610. Some new Methods of Lighting. By A. Berthier. Pages 267–274, plate I.

1611. Progress in Wireless Telegraphy. By William Maver, jr. Pages 275–280.

1612. Electric Welding Development. By Elihu Thomson. Pages 281–285, plates I–V.

1613. History of Discoveries of Photography. By Robert Hunt. (Revised by T. W. Smillie.) Pages 287–308, plates I–VII.

1614. Theories of Ore Deposition Historically Considered. By S. F. Emmons. Pages 309–336.

1615. On Mountains and Mankind. By Douglas W. Freshfield. Pages 337–354.

1616. Morocco. By Theobald Fischer. Pages 355–372.

1617. The Work of the Reclamation Service. By F. H. Newell. Pages 373–381, plates I–VIII.

1618. The Yuma Reclamation Project. By J. B. Lippincott. Pages 383–388, plate I.

1619. The Evidence of Evolution. By Hugo De Vries. Pages 389–396.

1620. The Evolutionary Significance of Species. By O. F. Cook. Pages 397–412.

1621. Some Bird Life in British Papua. By R. A. Vivian. Pages 413–418.

1622. Bird Sanctuaries of New Zealand. Pages 419–422.

1623. The House Sparrow. By Dr. J. O. Skinner, U. S. Army. Pages 423–428.

1624. Some Tibetan Animals. By R. Lydekker. Pages 429–435.

1625. The Multiple Origin of Horses and Ponies. By Dr. J. Cossar Ewart. Pages 437–455, plates I, II.

1626. Egyptian and Arabian Horses. By E. Prisse D'Avennes. Pages 457–467, plates I–IV.

1627. Bees and Flowers. By E. L. Bouvier. Pages 469–484.

1628. The Pearl Fisheries of Ceylon. By W. A. Herdman. Pages 485–493.

1629. Flying Fishes and their Habits. By Theodore Gill. Pages 495–515, plates I–IV.

1630. The Stature of Man at Various Epochs. By A. Dastre. Pages 517–532.

1631. Old Age. By Elie Metchnikoff. Pages 533–550.

1632. Contributions of American Archeology to Human History. By W. H. Holmes. Pages 551–558.

1633. Excavations at Gournia, Crete. By Harriet A. Boyd. Pages 559–571, plates I–III.

1634. Archeological Researches on the Frontier of Argentina and Bolivia in 1901–2. By Eric Von Rosen. Pages 573–581, plates I–X.

1635. A General View of the Archæology of the Pueblo Region. By Edgar L. Hewett. Pages 583–606, plates I–XVIII.

1636. The Painting of Human Bones among the American Aborigines. By Ales Hrdlicka. Pages 607–617, plates I–III.

1637. Sling Contrivances for Projectile Weapons. By F. Krause. Pages 619–638, plates I–IV.

1638. Materials Used to Write Upon before the Invention of Printing. By Albert Maire. Pages 639–658, plates I–VIII.

1639. An Inquiry into the Population of China. By William Woodville Rockhill. Pages 659–676.

1640. Chinese Architecture. By Stephen W. Bushell. Pages 677–692, plates I–XIX.

1641. Pewter and the Revival of its Use. By Arthur Lasenby Liberty. Pages 693–713, plates I–VI.

1642. Cameos. By Cyril Davenport. Pages 713–719, plates I–IV.

1643. The Economic Conquest of Africa by the Railroads. By A. Fock. Pages 721–735.

1644. The Present Aspects of the Panama Canal. By William H. Burr. Pages 737–744.

1645. The Sanitation of the Panama Canal Zone. By W. C. Gorgas. Pages 745–749.

1646. The Projected New Barge Canal of the State of New York. By Thomas W. Symons. Pages 751–757, plate I.

1647. Rapid-Transit Subways in Metropolitan Cities. By Milo R. Maltbie. Pages 759–771.

1648. George Gabriel Stokes. By Ernest W. Brown. Pages 773–777, plate I.

1649. Karl Alfred Von Zittel. Translated by Charles Schuchert. Pages 779–786, plate I.

1650. Carl Gegenbaur. By Oscar Hertwig. Pages 787–791, plate I.

IV. PUBLICATIONS OF THE UNITED STATES NATIONAL MUSEUM.

The publications of the National Museum are: (*a*) the Annual Report, forming a separate volume of the Report of the Smithsonian Institution; (*b*) the Proceedings of the United States National Museum: (*c*) the Bulletin of the United States National Museum.

(*a*) The Report for the year ending June 30, 1903, was completed during the past fiscal year, and the Report for 1904 is now in press.

Annual Report of the Board of Regents of the Smithsonian Institution, showing the operations, expenditures, and condition of the Institution for the year ending June 30, 1903. Report of the United States National Museum. Washington: Government Printing Office. 1905. Octavo. Pages I–XV, 1–646. Plates, 120; text figures, 120.

CONTENTS.

Part I. Report upon the condition and progress of the United States National Museum during the year ending June 30, 1903. By Richard Rathbun, assistant secretary of the Smithsonian Institution, in charge of the United States National Museum.

Part II. Papers descriptive of Museum buildings.

The United States National Museum: An account of the buildings occupied by the national collections. By Richard Rathbun.

Studies of museums and kindred institutions of New York City, Albany, Buffalo, and Chicago, with notes on some European institutions. By A. B. Meyer.

(*b*) Although enough separate papers have been published to make up Volume XXVIII of the Proceedings of the United States National Museum, they have not yet been put together in bound form.

The separates so far issued are as follows:

No. 1382. A Treatise on the Acarina, or Mites. By Nathan Banks. Pages 1–114, text figures 1–201.

No. 1383. Notes on Hawaiian Reptiles from the Island of Maui. By Richard C. McGregor. Pages 115–118.

No. 1384. Labracinus the Proper Name for the Fish Genus Cichlops. By Theodore Gill. Page 119.

No. 1385. Note on the Genus Prionurus or Acanthoaulos. By Theodore Gill. Page 121.

No. 1386. Description of a New Species of Fish (Apogon Evermanni) from the Hawaiian Islands, with Notes on other Species. By David Starr Jordan and John Otterbein Snyder. Pages 123–126.

No. 1387. Descriptions of New Genera and Species of Hymenoptera from the Philippine Islands. By William H. Ashmead. Pages 127–158, with plates I–II.

No. 1388. On the Systematic Relations of the Ammodytoid Fishes. By Theodore Gill. Pages 159–163, text figures 1–4.

No. 1389. The Dragonflies (Odonata) of Burma and Lower Siam.—I. Subfamily Calopteryginæ. By Edward Bruce Williamson. Pages 165–187, text figures 1–18.

No. 1390. On the Liparis (Trismegistus) Owstoni Jordan and Snyder. By Peter Schmidt. Pages 189–191, text figures 1–2.

No. 1391. On a Collection of Fishes made in Korea, by Pierre Louis Jouy, with Descriptions of New Species. By David Starr Jordan and Edwin Chapin Starks. Pages 193–212, text figures 1–11.

No. 1392. The Mount Vernon Meteorite. By Wirt Tassin. Pages 213–217, plates III–IV, 1 text figure.

No. 1393. The Scorpænoid Fish, Neosebastes Extaxis, as the Type of a Distinct Species. By Theodore Gill. Pages 219–220, figures 1–2.

No. 1394. Note on the Genera of Synanceine and Pelorine Fishes. By Theodore Gill. Pages 221–225, text figure 1.

No. 1395. Cambrian Brachiopoda, with Descriptions of New Genera and Species. By Charles D. Walcott. Pages 227–337.

No. 1396. On the Generic Characteristics of Prionotus Stearnsii. By Theodore Gill. Pages 339–342, text figure 1–4.

No. 1397. Three New Frogs and One New Gecko from the Philippine Islands. By Leonhard Stejneger. Pages 343–348.

No. 1398. Descriptions of New Species of Tortricid Moths, from North Carolina, with Notes. By William Dunham Kearfott. Pages 349–364.

No. 1399. Note on the Salmon and Trout of Japan. By David Starr Jordan. Pages 365–366.

No. 1400. Descriptions of a New Genus of Isopoda belonging to the Family Tanaidæ and of a New Species of Tanais, both from Monterey Bay, California. By Harriet Richardson. Pages 367–370, text figures 1–13.

No. 1401. A Critical Review of the Literature on the Simple Genera of the Madreporia Fungida, with a Tentative Classification. By T. Wayland Vaughn. Pages 371–424.

No. 1402. Descriptions of New Genera and Species of Mammals from the Philippine Islands. By Edgar A. Mearns. Pages 425–460.

No. 1403. On a Collection of Orthoptera from Southern Arizona, with descriptions of New Species. By Andrew Nelson Caudell. Pages 461–477, text figures 1–6.

No. 1404. North American Parasitic Copepods belonging to the Family Caligidæ. Part 1. The Caliginæ. By Charles Branch Wilson. Pages 479–672, plates v–xxix, text figures 1–50.

No. 1405. Notes on Mammals collected and observed in the Northern Mackenzie River District, Northwest Territories of Canada, with Remarks on Explorers and Explorations of the Far North. By R. MacFarlane. Pages 673–764, plates xxx–xxxiv.

No. 1406. Description of a New Toad from Cuba. By Leonhard Stejneger. Pages 765–767, text figures 1–6.

No. 1407. List of Fishes collected by Dr. Bashford Dean on the Island of Negros, Philippines. By David Starr Jordan and Alvin Seale. Pages 769–803, text figures 1–20.

(*c*) Of the Bulletin of the National Museum there was issued volume 3 of Bulletin No. 50, forming the third part of Mr. Robert Ridgway's monograph of the "Birds of North and Middle America;" part 4 of volume 8 of "Contributions from the National Herbarium," entitled "Studies of Mexican and Central American Plants, No. 4," by J. N. Rose; volume 9 of the same series, composed of a single paper on "The Useful Plants of the Island of Guam," by William E. Safford.

### V. PUBLICATIONS OF THE BUREAU OF AMERICAN ETHNOLOGY.

Twenty-second Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution, 1900–1901. By J. W. Powell, Director. Washington: Government Printing Office, 1904. In two parts. Part II. Pages 1–373; plates 9; text figures 11.

CONTENTS: The Hako: A Pawnee Ceremony. By Alice Fletcher, assisted by James R. Murie.

### VI. REPORT OF THE AMERICAN HISTORICAL ASSOCIATION.

The annual report of the American Historical Association for the year 1904 was received from the Association and transmitted to the Public Printer in May, 1905. Its contents are as follows:

Report of the Proceedings of the Twentieth Annual Meeting, at Chicago, Ill., December 28–30, 1904, by Charles H. Haskins, corresponding secretary.

The Treatment of History, by Goldwin Smith.

On Roman History, by Ettore Pais.

On the Necessity in America of the Study of the Early History of Modern European Nations, by Friedrich Keutgen.

The Chief Currents of Russian Historical Thought, by Paul Milyoukov.

The Work of American Historical Societies, by Henry E. Bourne.

Public Records in Our Dependencies, by Worthing Chauncey Ford.

The Exploration of the Louisiana Frontier, 1803–1806, by Isaac J. Cox.

The Campaign of 1824 in New York, by C. H. Rammelkamp.

Report of the Conference on the Teaching of History in Elementary Schools, by J. A. James.

Report of the Conference on the Teaching of Church History, by Francis A. Christie.

First Report of the Conference of State and Local Historical Societies, by Frederick W. Moore.

State Departments of Archives and History, by Thomas McAdory Owen.

Report of the Proceedings of the First Annual Meeting of the Pacific Coast Branch, by Max Farrand.

Bibliographical Notes on Early California, by Robert Ernest Cowan.

The Nootka Sound Controversy, by W. R. Manning.

Report of the Public Archives Commission on Archives of Alabama, Pennsylvania, North Carolina, Kansas, and Georgia.

Report on the Collection of Materials in English and European History and Subsidiary Fields in Libraries of United States, by Wilbur H. Siebert.

### VII. REPORT OF THE DAUGHTERS OF THE AMERICAN REVOLUTION.

The seventh report of the National Society of the Daughters of the American Revolution was received from that Society in May, and was submitted to Congress in accordance with the requirements of the law.

Respectfully submitted.

A. HOWARD CLARK, *Editor.*

Mr. S. P. LANGLEY,
*Secretary of the Smithsonian Institution.*

O