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REPORT OF THE

Secretary of the Smithsonian
Institution

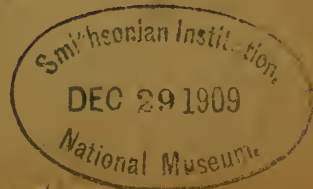
FOR THE YEAR ENDING JUNE 30

1909



(No. 1915)

WASHINGTON
GOVERNMENT PRINTING OFFICE
1909





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REPORT
OF THE
SECRETARY OF THE SMITHSONIAN INSTITUTION

CHARLES D. WALCOTT,

FOR THE YEAR ENDING JUNE 30, 1909.

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: I have the honor to submit a report showing the operations of the Institution during the year ending June 30, 1909, 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, the Astrophysical Observatory, and the regional bureau of the International Catalogue of Scientific Literature.

In the body of this report there is given a general account of the affairs of the Institution, while the appendix presents more detailed statements by those in direct charge of the different branches of the work. Independently of this the operations of the National Museum and of the Bureau of American Ethnology are fully treated in separate volumes.

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, and the heads of the executive departments."

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 resident in the city of Washington, and the other four shall be inhabitants of some State, but no two of them of the same State."

There has been no change in the personnel of the Board since my last report.

Meetings of the Regents were held on December 15, 1908, and on February 10, 1909, the proceedings of which will be printed as customary in the annual report of the Board to Congress.

GENERAL CONSIDERATIONS.

I deem it proper here to point out the fact that the activities of the Institution are greatly restricted by the very limited annual income at its disposal.

The influence of the Institution in the development of science in this country is too well known to require comment. Its advice is daily sought on scientific matters, not only by other establishments of learning but by individuals all over the land, and that its usefulness has been by no means restricted to this country is evidenced by the fact that the name of the Smithsonian Institution is equally as well known and respected abroad as at home.

But the means derived from the interest on the Smithsonian fund and other private funds for keeping up the work of the Institution proper have not kept pace with the growth of the country and the constantly increasing demands upon them. The original amount of the Smithsonian fund of about half a million dollars meant many times over in 1846 what it does to-day, even with the half million which has been gradually added since then. Its income has been economically administered, but it is too limited to carry on any extensive investigations. There are many researches and explorations which the Institution is peculiarly well fitted to organize and supervise, on which the income from an endowment of twenty millions could be wisely and effectively expended.

The Institution has in the past few years received a number of noteworthy gifts in the Harriet Lane Johnston, Freer, and Evans art collections, and an endowment for the fine arts would give a great return for centuries to come by making possible the fostering and stimulating of the fine arts in all its branches.

Under the general plan of organization adopted by the Board of Regents in 1847, the work of the Institution in the "increase of knowledge" is not limited to investigations in the field of science and art, but historical and ethnological researches, and statistical inquiries with reference to physical, moral, and political subjects, are enumerated as objects for which appropriations should be made.

In the humanities there is need of a fearless, thorough, scientific study of the elements entering into the great race problems of the Americas. Until the fundamental tendencies of the differing races now within these areas are intelligently understood, not only by the few, but by the many, a practical understanding of threatening social

conditions is impossible. The uplift of the physical, mental, and moral nature of the peoples of the Americas will come only through the increase and diffusion of such knowledge as will stimulate sound reasoning on existing conditions and racial limitations. Ethnology, anthropology, psychology, preventive medicine, education, are some of the tools that must be used in the shaping of the national, community, and individual life of the future. In this great work the Smithsonian Institution will take such active part as opportunity and means permit.

An article on "The Smithsonian Institution," published in the *North American Review*, summarizes the history and work of the Institution, and concludes as follows:

Such has been the result of a single benefaction of half a million of dollars, and perhaps no such result has ever been accomplished by so limited an endowment. Were the great sums given to swell the almost infinite endowments of some of our universities diverted to this unostentatious establishment, its power for good would be immeasurably increased, but, as it is, the bounty of a stranger and an alien has given the American people an agency for good whose influence is incalculable. It presents an opportunity to those who wish to bestow money for some beneficent purpose such as is given by no other on earth, and its scant means and petty endowment are a reproach to our rich and generous nation.^a

ADMINISTRATION.

The affairs of the Institution proper have progressed in a satisfactory manner during the year. All communications have received prompt administrative consideration, and everything possible has been done to carry out the fundamental purposes of the Institution, "the increase and diffusion of knowledge."

In the administrative work of the various branches of the government service placed under the direction of the Institution, it has been the custom to fully avail myself of the assistance of the officers in charge of those branches, and I am glad to say that the business of the year has been carried on vigorously. The extended and complicated operations of the National Museum, including the National Gallery of Art and the erection of the new building, have been effectively managed by the assistant secretary in charge, Mr. Richard Rathbun. The International Exchanges, the library, and the International Catalogue of Scientific Literature continued under the efficient charge of Dr. Cyrus Adler, until his resignation on October 1, 1908, when he removed to Philadelphia to assume the presidency of the "Dropsie College for Hebrew and Cognate Learning." Doctor Adler entered the service of the Institution in 1888 as an assistant

^a The Smithsonian Institution, by Charles Minor Blackford, jr., M. D., *North American Review*, January, 1909. Reprinted as Senate Document No. 717, Sixtieth Congress, second session.

curator in the National Museum. In 1892 he was appointed librarian of the Institution, and in 1905 became assistant secretary. His service of twenty years was marked by a remarkable grasp of the affairs of the Institution, in the administration of which his advice has been of great assistance to the secretaries.

The affairs of the Bureau of American Ethnology have continued in charge of Mr. W. H. Holmes, as chief, who has also acted as curator of the National Gallery of Art. Mr. C. G. Abbot, director of the Astrophysical Observatory, has carried forward the work of this branch both in Washington and on Mount Wilson, California, where duplicate observations have been carried on at a branch station, and the care of the National Zoological Park has continued under the management of Dr. Frank Baker, its superintendent. Although greatly hampered for adequate funds the Park has proved a great attraction to the people of Washington, over 125,000 persons having visited it in a single month.

The advisory committee on printing and publication, appointed in pursuance of executive order of January 20, 1906, is composed of representatives from the Institution and its branches, and has rendered valuable assistance in examining manuscripts proposed for publication, and in the consideration of various matters connected with printing and publication.

The current business of the Institution has been conducted with promptness, and it is gratifying to note that no arrearages in the work of the government branches under its direction were reported in the quarterly statements to the President and in the annual statement which, in accordance with law, accompanied the estimates transmitted to Congress.

FINANCES.

The permanent fund of the Institution and the sources from which it was derived are as follows:

Deposited in the Treasury of the United States.

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
	<hr/>
	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
Part of residuary legacy of Thomas G. Hodgkins, 1894.....	8, 000. 00
Deposit from savings of income, 1903.....	25, 000. 00
Residuary legacy of Thomas G. Hodgkins.....	7, 918. 69
	<hr/>
Total amount of fund in the United States Treasury.....	944, 918. 69

Held at the Smithsonian Institution.

Registered and guaranteed bonds of the West Shore Railroad Company (par value), part of legacy of Thomas G. Hodgkins.....	\$42,000.00
Total permanent fund.....	986,918.69

In addition to the above there are four pieces of real estate bequeathed to the Institution by the late R. S. Avery, some of which yield a nominal rental and all are free from taxation.

That part of the fund deposited in the Treasury of the United States bears interest at 6 per cent per annum, under the provisions of the act organizing the Institution and an act of Congress approved March 12, 1894. The rate of interest on the West Shore Railroad bonds is 4 per cent per annum.

The income of the Institution during the year, amounting to \$84,769.82, was derived as follows: Interest on the permanent fund, \$58,375.12; contributions from various sources for specific purposes, \$20,250, and from other miscellaneous sources, \$6,144.70; all of which was deposited in the Treasury of the United States to the credit of the current account of the Institution.

With the balance of \$18,766.41 on July 1, 1908, the total resources for the fiscal year amounted to \$103,536.23. The disbursements, which are given in detail in the annual report of the executive committee, amounted to \$71,359.53, leaving a balance of \$32,176.70 on deposit June 30, 1909, in the United States Treasury.

The Institution was charged by Congress with the disbursement of the following appropriations for the year ending June 30, 1909:

International Exchanges	\$32,000
American Ethnology	42,000
Astrophysical Observatory	13,000
National Museum:	
Furniture and fixtures.....	50,000
Heating and lighting.....	22,000
Preservation of collections.....	190,000
Books.....	2,000
Postage.....	500
Rent of workshops.....	4,580
Building repairs.....	15,000
National Zoological Park.....	95,000
International Catalogue of Scientific Literature.....	5,000
Transfer of Greenough statue of Washington.....	5,000
Temporary occupancy of government buildings for tuberculosis congress.....	40,000
Total	516,080

Estimates.—The estimates forwarded to Congress in behalf of the government branches of the Institution and the appropriations based thereon for the fiscal year ending June 30, 1910, are as follows:

	Estimates.	Appropriations.
International Exchanges.....	\$32,000	\$32,000
American Ethnology.....	52,000	43,000
Reimbursement of Bell & Co.....	525	.....
Astrophysical Observatory.....	17,000	13,000
National Museum:		
Furniture and fixtures.....	200,000	200,000
Heating and lighting.....	62,000	60,000
Preservation of collections.....	400,000	250,000
Books.....	5,000	2,000
Postage.....	500	500
Rent of workshops.....	a 4,580	.....
Building repairs.....	15,000	15,000
Moving collections.....	10,000	4,000
National Gallery of Art.....	60,000	.....
National Zoological Park.....	110,000	95,000
Readjustment of boundaries.....	40,000	.....
Aviary building.....	80,000	.....
Roadways and walks.....	12,000	.....
International Catalogue of Scientific Literature.....	7,500	6,000
Total.....	1,108,105	720,500

^a The request was made to the Appropriations Committee that this item be eliminated, as rented buildings would be vacated by June 30, 1909.

The Institution is required each year to submit to Congress, through the Secretary of the Treasury, estimates for the support of the several branches placed by the Congress under its administrative charge. The estimates for the fiscal year ending June 30, 1911, were submitted to the Secretary of the Treasury on May 1, 1909, instead of in the fall of the year as heretofore, it being the desire of the President, expressed through the Treasury Department, that more time be given to their examination.

In preparing these estimates I found it imperative that considerable increases should be made in several directions, as follows:

For the Bureau of American Ethnology I have asked an increase of \$10,000, to be allotted for the exploration and preservation of antiquities, researches among the tribes of the Middle West, and for researches in Hawaii and Samoa.

To properly carry on the work of the Astrophysical Observatory likewise requires a greater appropriation. The furnishing and maintenance of the new building for the National Museum necessitates, in general, a large increase in annual appropriations. For the National Zoological Park I have asked a considerable increase, in order that it may be properly maintained and become in greater measure what its name would lead the public to expect and demand in a national park.

Estimates for the year ending June 30, 1911.

International Exchanges.....		\$32, 000
American Ethnology.....		52, 000
International Catalogue of Scientific Literature.....		7, 500
Astrophysical Observatory.....		18, 000
National Museum:		
Furniture and fixtures.....	\$125, 000	
Heating and lighting.....	60, 000	
Preservation of collections.....	400, 000	
Books.....	5, 000	
Building repairs.....	15, 000	
Postage.....	500	
		605, 500
National Zoological Park:		
Maintenance, etc.....	\$110, 000	
Aviary building.....	80, 000	
Roadways and walks.....	14, 000	
Readjustment of boundaries.....	40, 000	
		244, 000
Printing and binding for the Institution and its branches.....		72, 700
Total.....		1, 031, 700

EXPLORATIONS AND RESEARCHES.

The resources of the Smithsonian Institution are at present too limited to permit of large grants for extensive explorations or investigations, but as far as the income allows aid is given in various lines of research work, and it is sometimes found possible to engage in expeditions likely to accomplish important results. If funds could be obtained to be administered under the Institution, the scientific work of the Government might often be supplemented by original researches of a character that would hardly be undertaken by the Government, and which would be of great service to humanity and to science.

Through the National Museum, the Bureau of American Ethnology, and the Astrophysical Observatory the Institution has been enabled to carry on various important biological, ethnological, and astrophysical researches, which are mentioned elsewhere in this report.

SMITHSONIAN AFRICAN EXPEDITION.

Through the generosity of friends of the Smithsonian Institution, there was provided during the past year a special fund to pay for the outfitting and to meet the expenses of the naturalists on a hunting and collecting expedition to Africa under the direction of Col. Theodore Roosevelt. No part of the fund was derived from any government appropriation or from the income of the Institution. The special interest of the Institution in the expedition is the collection of biological material for the United States National Museum.

In June, 1908, the following letter was received from President Roosevelt:

THE WHITE HOUSE, WASHINGTON.

OYSTER BAY, N. Y., *June 20, 1908.*

MY DEAR DOCTOR WALCOTT: About the 1st of April next I intend to start for Africa. My plans are of course indefinite, but at present I hope they will be something on the following order:

By May 1 I shall land at Mombasa and spend the next few months hunting and traveling in British and German East Africa; probably going thence to or toward Uganda, with the expectation of striking the Nile about the beginning of the new year, and then working down it, with side trips after animals and birds, so as to come out at tide water, say, about March 1. This would give me ten months in Africa. As you know, I am not in the least a game butcher. I like to do a certain amount of hunting, but my real and main interest is the interest of a faunal naturalist. Now, it seems to me that this opens the best chance for the National Museum to get a fine collection not only of the big game beasts, but of the smaller mammals and birds of Africa; and looking at it dispassionately, I believe that the chance ought not to be neglected. I will make arrangements to pay for the expenses of myself and my son. But what I would like to do would be to get one or two professional field taxidermists, field naturalists, to go with me, who should prepare and send back the specimens we collect. The collection which would thus go to the National Museum would be of unique value. It would, I hope, include specimens of big game, together with the rare smaller animals and birds. I have not the means that would enable me to pay for the field naturalists or taxidermists and their kit, and the curing and transport of the specimens for the National Museum. Of course the actual hunting of the big game I would want to do myself, or have my son do; but the specimens will all go to the National Museum, save a very few personal trophies of little scientific value which for some reason I might like to keep. Now, can you, in view of getting these specimens for the National Museum, arrange for the services of the field taxidermists, and for the care and transport of the specimens? As ex-President, I should feel that the National Museum is the museum to which my collection should go.

With high regard, sincerely yours,

THEODORE ROOSEVELT.

HON. CHARLES D. WALCOTT,

Secretary Smithsonian Institution,

Washington, D. C.

To which I replied from camp in Montana, where I was carrying on geological investigations for the Institution:

BELTON, MONT., *June 27, 1908.*

To the PRESIDENT,

Oyster Bay, N. Y.

DEAR MR. PRESIDENT: Your letter of June 20, with a copy of a letter Dr. Cyrus Adler wrote you in reply, just received.

I am immensely pleased at the thought of your collections coming to the National Museum, and it will give me the greatest pleasure to provide two taxidermists and their kit, and to arrange for the curing and transport of the specimens.

I leave in the morning for the Kintla Lake region and the Continental Divide, as most of the geological work has to be done above timber line.

Thanking you most heartily and sincerely for the opportunity of securing the African material, I remain,

Sincerely yours,

CHARLES D. WALCOTT.

At the next meeting of the Board of Regents on December 15, 1908, the following resolutions were adopted, formally recording the acceptance of the President's generous offer and expressing the Board's appreciation of the contributions of the friends of the Institution which made this expedition possible:

Resolved, That the Board of Regents of the Smithsonian Institution express to Theodore Roosevelt, President of the United States, its appreciation of his very generous offer contained in his letter of the 20th of June, 1908, to the Secretary of the Institution, with respect to his expedition to Africa; and that it accept the same.

Resolved, That the thanks of the Board of Regents of the Smithsonian Institution be conveyed by the Secretary of the Institution to the donors who have so generously contributed funds to meet the expenses of the naturalists who will accompany Mr. Theodore Roosevelt upon his expedition to Africa, the results of which will be presented by the President to the Smithsonian Institution for the National Museum.

The party sailed on March 23, 1909, from New York on the steamer *Hamburg* for Naples, whence steamer was taken to Mombasa, British East Africa. Those accompanying Mr. Roosevelt were his son Kermit and three naturalists—Lieut. Col. Edgar A. Mearns, surgeon, U. S. Army; Mr. Edmund Heller; and Mr. J. Alden Loring. The expedition arrived in Africa on April 21.

A letter from Mr. Heller, dated at Nairobi May 31, announced the shipment of 20 barrels of large mammal skins in brine, comprising Colonel Roosevelt's first month's collection. The shipment consists of 82 specimens, as follows: Lion, 7; leopard, 1; cheetah, 1; spotted hyena, 1; Cape hartebeest, 14; white-bearded wildebeest, 5; Neumann steinbuck, 5; Kirk dik-dik, 1; common waterbuck, 3; Chanler reedbuck, 4; Grant gazelle, 9; Thomson gazelle, 5, impalla, 2; eland, 1; Cape buffalo, 4; giraffe, 3; hippopotamus, 1; wart hog, 6; Burchell zebra, 7; black rhinoceros, 2. While no new species, so far as is known, is included in this first shipment, the collection will supplement materially the specimens already in the National Museum.

Together with this shipment are expected a large number of specimens of small mammals, and also of birds gathered by Lieut. Col. Mearns and J. Alden Loring, of the expedition party.

Through the Smithsonian African expedition the National Zoological Park has been presented by Mr. W. W. McMillan, of Juja farm, near Nairobi, British East Africa, with an exceptional collection of live African animals. A letter from Lieut. Col. Edgar A. Mearns, dated May 20, states that the collection includes 11 large mammals and 3 large birds, all in fine condition and for the most part well broken to captivity, as follows: A male and female lion, 2 years old; a male and two female lions, 17 months old; a female leopard, a pet of Mrs. McMillan; two cheetahs; a wart hog, 2 years old; one Thomson and one Grant gazelle, well grown; a large

eagle of unusual species; a small vulture; and a large buteo. Specimens of none of these, except the lions and leopard, are at present contained in the park.

STUDIES IN CAMBRIAN GEOLOGY AND PALEONTOLOGY.

In my reports for the past two years reference has been made to studies of the older sedimentary rocks of the North American Continent, which I have been carrying on as opportunity offered for more than twenty years. This work was continued in Montana and the Canadian Rockies during the field season of 1908.

Outfitting at Belton, Mont., the last of June, 1908, the party proceeded with saddle horses and pack mules north past Lake McDonald and on up the valley of the North Fork of the Flathead River to the Kintla lakes. From the Continental Divide northeast of Upper Kintla Lake beautiful views were obtained of the higher peaks, deep canyons, and snow fields north and south of the international boundary. Numerous photographs and notes on the geology were taken.

The party crossed the forty-ninth parallel and moved north up the valley of the Flathead, in British Columbia, making several side excursions into the mountains. The farthest point reached toward the northeast was about 20 miles south of Crows Nest Pass. From there the route led along a trapper's trail up Johnson Creek to the Continental Divide, thence to the town of Pincher Creek and south to Waterton Lake. An examination was made of the oil fields west of Waterton Lake on Cumberland Creek, which is about 15 miles north of the international boundary. From this point the party followed a trail along the western side of Waterton Lake and thence up Little Kootna Creek to the Continental Divide at the head of Mineral Creek, a tributary of McDonald Creek. A few days were spent in taking photographs and examining the geological structure in this vicinity before returning to Belton, on August 1, for supplies.

A trip was next made by the way of Lake McDonald to Gunsight Pass on the Continental Divide, above Upper St. Mary Lake. But smoke from forest fires became so dense that the party returned to Belton and proceeded southward up the South Fork of the Flathead River for about 100 miles. Examinations were made of Gordon Mountain and vicinity and during the return journey several geological sections were examined along the western side of the Continental Divide. Belton was again reached early in September and a trip was made to Marias Pass, which afforded a very fine view of the main range of the Rocky Mountains along the line of the Great Northern Railway.

The scientific results of the 950-mile trip through the forests and on mountain trails will aid materially in the solution of several problems connected with the stratigraphy and structure of the main ranges

of the eastern Rocky Mountains and of the geological position and age of many thousands of feet of the sandstones, shales, and limestones forming the mountains in northern Montana, British Columbia, and Alberta.

On the return an examination was made of the geological formations in the vicinity of Helena, Mont., and of the Wasatch Range, southeast of Salt Lake City, Utah.

Three additional papers giving a summary of the results of my studies in Cambrian Geology and Paleontology were published during the year: No. 3, Cambrian Brachiopoda: Descriptions of new genera and species; No. 4, Classification and terminology of the Cambrian Brachiopoda; and No. 5, Cambrian sections of the Cordilleran area.^a

GEOLOGICAL INVESTIGATIONS IN THE FAR EAST.

In May, 1909, a Smithsonian grant was made to Prof. Joseph P. Iddings, of the United States Geological Survey and the University of Chicago, for geological investigations in Japan, eastern China, and Java. Professor Iddings, who was graduated in the Columbia School of Mines in 1878-79, and in microscopic petrography by the University of Heidelberg in 1879-80, is well fitted for a research of this kind. His connection with and acquaintance in various foreign scientific societies will be of assistance in prosecuting this remote investigation, which will be reported fully as it progresses.

BOTANICAL COLLECTIONS.

Work under a small grant to Miss Alice Eastwood, for re-collecting the botanical species secured by the botanist Thomas Nuttall in 1836 in the region of Santa Barbara, Cal., has been successfully prosecuted, as mentioned in the last report. As a result, Miss Eastman has sent to the National Museum two sets of plants, one of 341 desirable specimens, which have been mounted for the National Herbarium. The second, and by a few specimens the smaller set, will be used for exchange purposes, many valuable additions to the Herbarium being frequently secured in this manner.

INVESTIGATIONS UNDER THE HODGKINS FUND.

As stated in the last report, I have given consideration to the use of the portion of the Hodgkins fund devoted to the increase and diffusion of more exact knowledge of the atmospheric air in relation to the welfare of man. While much valuable work has been done under this fund, it appeared to me that it would be more in consonance with the ideas of the founder, if at least a portion of it might be employed in some way to aid in the knowledge of the

^a Smithsonian Miscellaneous Collections, Vol. LIII, pp. 53-230.

prevention of disease and its cure. In following out this sphere of work the Institution issued a circular, under date of February 3, 1908, offering a prize of \$1,500 for the best treatise on "The relation of atmospheric air to tuberculosis" that should be presented at the international congress on tuberculosis, which was held in Washington from September 21 to October 12, 1908. This prize aroused widespread interest among the students on this subject and resulted in the receipt by the Institution of 81 papers submitted in competition. All of these have been referred to the committee on awards, whose report is expected in a short time.

Grants from the Hodgkins fund, although not numerous during the past year, have been the means of furthering important investigations which are still in progress.

RESEARCHES ON ATMOSPHERIC AIR.

A Hodgkins grant was approved in October, 1908, for the erection of a small stone shelter on the summit of Mount Whitney, California, for the use of investigators during the prosecution of researches on atmospheric air, or on subjects closely related thereto.

The pioneer trip to the summit of Mount Whitney in the summer of 1881 by the late Secretary Langley, at that time director of the Allegheny Observatory, will be recalled in this connection as well as his earnestly expressed conviction that in no country is there a finer site for meteorological and atmospheric observations than the United States possesses in Mount Whitney and its neighboring peaks.

As emphasized in the report of the Langley expedition, a permanent shelter on the peak is an absolute necessity for the prosecution of continued observations there, and the erection of such a shelter has now been made possible by the extension of railway facilities toward the base of the mountain and the improvement of the trails to the summit.

Mr. C. G. Abbot, who succeeded Secretary Langley as director of the Astrophysical Observatory of the Smithsonian Institution, and to whose immediate suggestion and earnest personal efforts the preparation for and the establishment of this important post on Mount Whitney are largely due, began his observations there in the summer of 1909, and obtained important data in the determination of the solar constant.

The cooperation of Prof. W. W. Campbell, the director of Lick Observatory, University of California, at Mount Hamilton, has been most helpful during the erection of the shelter, and the interest of many of the citizens of Lone Pine, near the border line of the government reservation, has been heartily and patriotically expressed. It is easily seen that the local feeling in favor of the station will make its occupation more readily and comfortably available by members

of the research parties who will from time to time desire to work there.

The class of researches to be prosecuted at this exceptionally favorable station are not only of great scientific interest, but are expected also to prove of value in determining questions having a direct, practical influence on the preservation and progress of human life on our globe.

INTERNATIONAL STANDARD PYRHELIOMETERS.

A limited grant from the Hodgkins fund was approved in February, 1909, for the construction of several silver disk pyrhelimeters. These instruments are to be placed in charge of scientific investigators in widely separated localities for the purpose of establishing an international scale for the comparison of observations on solar radiation. The varying results published by observers have made the need of international cooperation in this connection apparent, and the matter has received considerable attention at conferences of the Solar Union.

These simple and comparatively inexpensive instruments are to be constructed after a design by Mr. Abbot. Similar pyrhelimeters have been employed in the researches of the Astrophysical Observatory for several years and have proved entirely satisfactory.

PUBLICATIONS UNDER THE HODGKINS FUND.

Bibliography of aeronautical literature.—An exhaustive bibliography of aeronautical literature, compiled by Mr. Paul Brockett, assistant librarian of the Smithsonian Institution, has been completed to July 1, 1909, and is now in course of publication. This work contains references to about 13,500 published articles and is designed to render available the voluminous literature in all languages, on aviation.

Mechanics of the earth's atmosphere.—In 1891 the Institution published a volume of translations of important foreign memoirs on the "Mechanics of the earth's atmosphere," which was prepared by Prof. Cleveland Abbe. There was put to press during the past year a second collection of papers on this subject.

SMITHSONIAN TABLE AT NAPLES ZOOLOGICAL STATION.

The occupants of the Smithsonian table at Naples during the past year were Dr. C. A. Kofoid, of the University of California and the San Diego Marine Biological Station, and Dr. F. M. Guyer, of the University of Cincinnati. Dr. Kofoid is studying the question of sexual reproduction among Dinoflagellata and carrying on experimental work on autotomy in *Ceratium*, with reference to temperature and vertical distribution in the sea. Their investigations covered a period of seven months.

The present lease of the table expires December 31, 1909, but its renewal for another term of three years has been decided on, so that applications for the seat may now be submitted at any time.

As in former years, the cooperation of the members of the advisory committee has been of great value in the examination of applications for the seat, and is always thoroughly appreciated.

PUBLICATIONS.

The publication work of the Smithsonian Institution has from its beginning been one of its most important functions. It has been the principal medium for the "diffusion of knowledge" throughout the world. The Smithsonian Contributions to Knowledge, the Smithsonian Miscellaneous Collections, and the Smithsonian Annual Reports are publications widely known, and the demand for copies of these works has constantly been much in excess of the possible supply. The editions of the "Contributions" and the "Collections" are necessarily restricted by the limited income of the Institution, and their distribution is almost entirely to public institutions rather than to individuals. The Annual Reports, however, are public documents, issued at the expense of a congressional appropriation. Although this permits of editions of several thousand copies, yet the entire number is each year exhausted soon after the date of publication.

Besides the publications of the Institution proper there are issued under its direction the Bulletins and Annual Reports of the United States National Museum and of the Bureau of American Ethnology, and the Annals of the Astrophysical Observatory. The details relating to these various series during the year will be found in the appendix to this report.

In the series of "Contributions" no new volume was published, although there was issued a new edition of Professor Langley's memoir on "The internal work of the wind," originally printed in 1893. To this new edition was added, as an appendix, a translation of the "Solution of a special case of the general problem," by René de Saussure, which appeared in 1893 in *Revue de l'Aéronautique Théorique et Appliqué*, Paris, in connection with a French reproduction of the above memoir by Professor Langley.

The quarterly issue of the Smithsonian Miscellaneous Collections has now reached its fifth volume. Twenty papers were published in this series during the year. One of these papers, "Some recent contributions to our knowledge of the sun," was a lecture delivered at Washington April 22, 1908, under the auspices of the Hamilton fund of the Smithsonian Institution. Another paper, by Dr. Cyrus Adler, tells of the relation of Richard Rush to the Smithsonian Institution. Mr. Rush was agent of the United States to secure the bequest of

James Smithson. He successfully completed the legal steps necessary to establish the claim of the United States in the English courts, and in August, 1838, arrived in New York with half a million dollars in gold sovereigns which were formally transferred to the Treasurer of the United States. Mr. Rush later rendered important service in the organization of the Institution and was one of its first Regents, serving on the Board from 1846 until his death in 1859.

The continued demand for the Smithsonian Physical Tables, prepared by the late Prof. Thomas Gray, necessitated the reprinting of a fourth edition from the stereotype plates. A thorough revision of these Tables is in preparation to bring the work within the range of the important advance made in the science of physics during the last decade.

The volume of "Smithsonian Mathematical Tables: Hyperbolic Functions," prepared by Dr. George F. Becker and Mr. C. E. Van Orstrand, which was in press at the close of the last fiscal year, has been completed as a "special publication."

Three papers descriptive of my researches in Cambrian Geology and Paleontology have been added to those mentioned in my last report. These are: No. 3, Cambrian Brachiopoda: Description of New Genera and Species; No. 4, Classification and Terminology of the Cambrian Brachiopoda; and No. 5, Cambrian Sections of the Cordilleran Area. The last-named paper is accompanied by a number of illustrations of various parts of the Rocky Mountains showing the Cambrian Cordilleran sections which had been examined to a total thickness of more than 12,000 feet.

Among the works in press at the close of the year was a paper on "Landmarks of Botanical History," by Dr. Edward L. Greene, and a work on the "Mechanics of the Earth's Atmosphere," comprising a selection of important French and German papers translated and edited by Prof. Cleveland Abbe.

There was practically completed, ready for press, at the close of the year a Bibliography of Aeronautics containing references to about 13,500 books and papers on that subject, dating from the earliest days of printing down to the publications of the present year.

The greater part of the Annual Report for 1908 was in type at the close of the year, but press work could not be completed. The volume contains 27 papers showing progress made in astronomy, physics, biology, geology, and other branches of knowledge.

To meet the demand for copies of papers by Secretary Langley on aerial navigation, there was reprinted a special edition, under one cover, of four articles that had appeared in the Smithsonian Reports from 1897 to 1904, as follows: "Story of experiments in mechanical flight" (1897); "The Langley aerodrome" (1900); "The greatest flying creature" (1901); and "Experiments with the Langley aero-

drome" (1904). The introduction to this reprint, written by Assistant Secretary Adler, reads as follows:

The international fame of Samuel Pierpont Langley rests primarily upon his epoch-making researches in solar physics, but during the last ten years of his life his name was best known to the world at large by his experiments in mechanical flight.

Mr. Langley was the first to produce a machine heavier than air which, supported and propelled by its own engine and possessing no extraneous lifting or sustaining power, actually made an independent flight for a considerable distance, this being accomplished for the first time on May 6, 1896. He afterwards constructed other models driven by both steam and gasoline engines, which made frequent successful flights, and was thus the first to demonstrate by actual experiment the possibility of mechanical flight.

In addition to building various models and machines, most of which are now on exhibition in the United States National Museum, Mr. Langley recorded his studies and experiments in two technical works—"Experiments in Aerodynamics," published originally by the Smithsonian Institution in 1891, and "The Internal Work of the Wind," the original edition of which was issued by the Institution in 1893. The copious and painstaking notes made by Mr. Langley in connection with his latest experiments in mechanical flight are now in course of preparation for publication and will be issued by the Institution on completion, thus forming the third volume of this more technical series.

Mr. Langley also wrote a few occasional popular papers relating to this same class of experiments, which were published in the Smithsonian reports and elsewhere, the editions of which are now quite exhausted. In order to meet the ever-increasing demand for information on a subject which is now claiming universal attention, and in which Mr. Langley was the pioneer, some of these less technical articles are here brought together and reprinted under a single cover.

The publications of the National Museum during the year included a large number of papers in the Proceedings, and several Bulletins, the general contents of which are enumerated in the appendix.

The Bureau of American Ethnology published its Twenty-sixth Annual Report and a number of Bulletins. One of the Bulletins, No. 42, by Dr. Aleš Hrdlička, gives the results of his study of tuberculosis among certain Indian tribes.

The Annual Reports of the American Historical Association and of the National Society of the Daughters of the American Revolution were received from those organizations and were communicated to Congress in accordance with their national charters.

The allotments to the Institution and its branches, under the head of public printing and binding during the past fiscal year, aggregating \$72,700, were, as far as practicable, expended prior to June 30. The allotments for the year ending June 30, 1910, are as follows:

For the Smithsonian Institution for printing and binding annual reports of the Board of Regents, with general appendixes.....	\$10,000
For the annual reports of the National Museum, with general appendixes, and for printing labels and blanks for the Bulletins and Proceedings of the National Museum, the editions of which shall not exceed 4,000 copies, and binding, in half turkey or material not more expensive, scientific books and pamphlets presented to and acquired by the National Museum library.....	34,000

For the annual reports and bulletins of the Bureau of American Ethnology and for miscellaneous printing and binding for the bureau	\$21, 000
For miscellaneous printing and binding:	
International Exchanges	200
International Catalogue of Scientific Literature	100
National Zoological Park	200
Astrophysical Observatory	200
For the annual report of the American Historical Association	7, 000
Total	72, 700

The practice of sending out abstracts of the publications of the Institution and its branches to newspapers throughout the country has been continued, and in this way many millions of readers, who would not have ready access to the scientific information in the papers themselves, have been reached.

ADVISORY COMMITTEE ON PRINTING AND PUBLICATION.

The committee on printing and publication has continued to examine manuscripts proposed for publication by the branches of the Institution and has considered various questions concerning public printing and binding. Twenty-seven meetings of the committee were held during the year and more than a hundred manuscripts were passed upon. Upon the resignation of Dr. Cyrus Adler, chairman of the committee, as assistant secretary of the Institution, the committee was reorganized as follows: Dr. Frederick W. True, head curator of biology, United States National Museum, chairman; Mr. C. G. Abbot, director of the Astrophysical Observatory; Mr. W. I. Adams, of the International Exchanges; Dr. Frank Baker, superintendent of the National Zoological Park; Mr. A. Howard Clark, editor of the Smithsonian Institution; Mr. F. W. Hodge, ethnologist, the Bureau of American Ethnology; Prof. O. T. Mason, head curator of anthropology, United States National Museum; Dr. George P. Merrill, head curator of geology, United States National Museum; and Dr. Leonhard Stejneger, curator of reptiles and batrachians, United States National Museum.

In order to prevent duplication of work in the examination of papers, the Museum advisory committee on publications was discontinued and its duties transferred to this committee.

THE LIBRARY.

The additions to the Smithsonian Library during the year aggregated 29,729 complete volumes and parts of volumes, besides over 34,000 parts of periodical publications. Of the accessions more than 20,000 were placed in the Smithsonian deposit in the Library of Congress, and the remainder were divided among the libraries of the Secretary's office, the Astrophysical Observatory, the National Zoo-

logical Park, the International Exchanges, and the National Museum library. The library of the Bureau of American Ethnology, which is administered separately from the general library, has also had numerous additions. The Institution has continued the policy of sending to the Library of Congress public documents received in exchange for its publications.

During the last two years special efforts have been made to complete the sets of the publications of scientific societies and learned institutions in the Smithsonian deposit, including serial publications in the main collection, resulting in the receipt of nearly 4,000 parts, an increase of more than 2,000 over the previous year.

The reference books in the Institution and the general library, together with the sectional libraries in the National Museum and the library of the Bureau of American Ethnology, have been very freely consulted.

The importance of the collection of scientific works in the library of the Institution is becoming more and more appreciated each year by the scientific investigator, as is evidenced by the increase in the number of publications withdrawn for consultation, especially the proceedings and transactions of the scientific societies and learned institutions.

The assistant librarian has been engaged in preparing a bibliography of aeronautical literature, which includes the indexing of about 13,500 papers in periodicals and proceedings of aeronautical societies, books and separate pamphlets on the subject, and comprises all available titles, domestic and foreign, published before July 1, 1909. At the close of the year the manuscript was ready for the printer.

PRESERVATION OF AMERICAN ANTIQUITIES.

Under the terms of the act of Congress approved June 8, 1906, uniform regulations for the preservation of archeological and other objects on the public domain were prepared by the Secretaries of the Interior, War, and Agriculture, with the cooperation of the Smithsonian Institution. Under rule 8 of these regulations applications for permits to carry on explorations or researches are referred to the Smithsonian Institution for recommendation, and during the year a number of such applications were acted on by the Institution.

CONGRESSES, CELEBRATIONS, AND EXPOSITIONS.

International Congress of Orientalists.—At the Fifteenth International Congress of Orientalists, held in Copenhagen, Denmark, August 14 to 20, 1908, the Smithsonian Institution and the National Museum were represented by Dr. Paul Haupt, professor of semitic philology in Johns Hopkins University, and associate of the National Museum in historic archeology. At the suggestion of the Institution,

Doctor Haupt, Dr. C. R. Lanman, of Harvard University, Prof. Morris Jastrow, jr., of the University of Pennsylvania, and Prof. A. V. W. Jackson, of Columbia University, were designated by the Department of State as delegates of the United States Government to this congress.

Congress of Americanists.—Dr. Franz Boas, of Columbia University, was representative of the Institution at the Sixteenth International Congress of Americanists, held at Vienna September 8 to 14, 1908, and the Department of State, at the suggestion of the Institution, designated, besides Doctor Boas, the following delegates on the part of the United States Government: Prof. Marshall H. Saville, of Columbia; Dr. George Grant McCurdy, of Yale; Dr. Charles Peabody, of Harvard; and Dr. Paul Haupt, of Johns Hopkins.

Fisheries Congress.—The International Fisheries Congress was held in Washington September 22 to 26, 1908, delegates being present from a large number of countries and from various societies and clubs interested in fisheries. The Institution was represented by Dr. T. N. Gill and Dr. F. W. True; the National Museum by Mr. W. de C. Ravenel and Dr. Leonhard Stejneger. Dr. Richard Rathbun, Assistant Secretary of the Institution, served as delegate at large from the Government. In connection with this congress the Smithsonian Institution had offered a prize of \$200 for the best essay or treatise "On international regulation of the fisheries on the high seas: Their history, objects, and results." This prize was awarded to Mr. Charles H. Stevenson, of the United States Bureau of Fisheries.

Tuberculosis Congress.—In compliance with the direction of the President, the new building for the National Museum was selected for the meetings of the International Congress on Tuberculosis, \$40,000 being placed at the disposal of the Secretary of the Smithsonian Institution for the necessary arrangements in this connection.

The plans for the adaptation of the building to this purpose were put in the hands of the superintendent of construction, Mr. Bernard R. Green, and the work necessary was conducted by him to a successful conclusion. About 100,000 square feet of the building on the first and second floors, exclusive of the south wings, were used for the purposes of the congress. In order to make the space as attractive as possible, muslin was used to cover the rough places and many flags of the United States and of foreign nations were gracefully festooned about the halls. The Institution is indebted to the War, Navy, and Treasury departments, and also to the Bureau of American Republics, for the use of the flags. The temporary arrangements for the illumination of the building required 600 lamps of 80 candlepower each, consuming about 40,000 feet of wiring.

The congress opened on September 21, 1908, and adjourned on October 12. By November 3 all traces of the convention had been

removed and the building was again ready for the resumption of construction operations. About \$25,000 was expended in fitting up the building for the congress (\$15,000 being thus unused from the appropriation).

Thirty-one independent nations and forty-five States of the Union were represented. There were 438 contributors, of whom 312 were citizens of the United States. The total attendance at the congress was approximately 148,000.

Among the contributors to the exhibits the Smithsonian Institution presented results of an investigation among certain of the Indian tribes for the Department of the Interior, with a view to showing the actual amount of tuberculosis existing. This work was done by Dr. Aleš Hrdlička, of the National Museum, who visited the Menominee, Sioux, Quinault, Hupa, and Mohave tribes. The exhibit occupied a space amounting to 18 by 40 feet, and the congress expressed its appreciation of it by awarding the Institution a gold medal.

As already mentioned in the paragraphs on the Hodgkins fund, the Institution offered a prize of \$1,500 for the best treatise on "The relation of atmospheric air to tuberculosis."

Anniversary of birth of Torricelli.—At the exercises commemorating the three hundredth anniversary of the birth of Evangelista Torricelli, held at Faenza, Italy, in November, 1908, Professor Senator Giovanni Copellini was requested to act as the representative of the Institution.

American Mining Congress.—Dr. George P. Merrill, head curator of geology, United States National Museum, represented the Institution and the Museum at the eleventh annual session of the American Mining Congress, held at Pittsburg, Pa., December 2 to 5, 1908.

Pan-American Scientific Congress.—The first Pan-American Scientific Congress was held in Santiago, Chile, December 25, 1908, to January 6, 1909. The Smithsonian Institution was represented by Mr. William H. Holmes, Chief of the Bureau of American Ethnology and curator of prehistoric archeology in the National Museum, who presented a paper on "The peopling of America." An account of the congress, by Mr. Holmes, is given as an appendix to the present report.

Aeronautical exposition.—The Institution sent seven large photographs of the Langley aerodrome to the International Aeronautical Exposition held at Frankfort on the Main, Germany, February 27, 1909.

National Academy of Sciences.—As has been the custom for many years, the Institution afforded facilities for the meetings of the National Academy of Sciences, April 21 to 23, 1909. One of the halls of the National Museum was used for the public meetings of the academy, the council meetings being held in rooms in the Smithsonian

building. The programme of the meetings included the usual number of papers covering a wide field.

Congress of photography.—The Smithsonian Institution accepted an invitation to participate in the International Congress on Photography at Dresden, Germany, May to October, 1909, and sent a number of enlarged photographs and transparencies.

International Archeological Congress.—Upon the recommendation of the Smithsonian Institution Mr. A. M. Lythgoe, of the Metropolitan Museum of Art, and Prof. Paul Baur, of Yale University, were designated by the Department of State as delegates on the part of the United States to the Second International Archeological Congress, which was held at Cairo, Egypt, Easter, 1909.

Darwin celebration.—It was my pleasure, by resolution of the Board of Regents, to represent the Institution at the one hundredth anniversary of the birth of Charles Darwin, held at Cambridge University, England, June 22 to 24, 1909, when the university conferred upon me the degree of Sc. D. In this connection a bronze bust of Darwin, a gift of many of Darwin's admirers in America, was presented to the university.

University of Geneva anniversary.—Prof. J. M. Baldwin, of Johns Hopkins University, was appointed to represent the Smithsonian Institution at the three hundredth anniversary of the founding of the Geneva University, which was held at Geneva July 7 to 10, 1909.

University of Leipzig anniversary.—The Institution accepted an invitation to participate in the five hundredth anniversary of the University of Leipzig held July 28 to 30, 1909, and Dr. William H. Welch, of Johns Hopkins University, Baltimore, Md., consented to act as its representative on that occasion.

Congress for the History of Religions.—Dr. Paul Haupt, of Johns Hopkins University, and Prof. Morris Jastrow, jr., of the University of Pennsylvania, were designated, at the suggestion of the Institution, as delegates on the part of the United States to the Third International Congress for the History of Religions, held at Oxford, England, September 15 to 18, 1909.

Alaska-Yukon-Pacific Exposition.—In the act of Congress approved May 27, 1908, an appropriation of \$200,000 was made for an exhibition by the Government at the Alaska-Yukon-Pacific Exposition held at Seattle, beginning June 1 and closing October 1, 1909. Mr. W. deC. Ravenel, administrative assistant in the United States National Museum, was designated by the Secretary as Representative of the Smithsonian Institution and the National Museum. An allotment of \$24,000 was made for an exhibit by the Institution and the Museum to illustrate our national history, especially with reference to Alaska, Hawaii, the Philippine Islands, and the United States west of the Rocky Mountains. Mr. Ravenel's account of this exhibit is given in an appendix to the present report.

Mr. Ravenel was also appointed by the President as a member of the United States Government board of managers of the exposition.

LANGLEY MEDAL AND MEMORIAL TABLET.

As a tribute to the memory of the late Secretary Samuel Pierpont Langley and his contributions to the science of aerodromics, the Regents on December 15, 1908, adopted the following resolution:

Resolved, That the Board of Regents of the Smithsonian Institution establish a medal to be known as the Langley medal; to be awarded for specially meritorious investigations in connection with the science of aerodromics and its application to aviation.

Following the establishment of this medal a committee on award, composed of the following gentlemen of recognized attainments in the science of aerodromics, was appointed by the Secretary:

Mr. Octave Chanute, of Chicago, chairman.

Dr. Alexander Graham Bell, Washington, D. C.

Maj. George O. Squier, U. S. Army.

Mr. John A. Brashear, Allegheny, Pa.

Mr. James Means, formerly editor of the Aeronautical Annual, Boston, Mass.

The obverse of the medal is the same as in the Hodgkins medal and was designed by M. J. C. Chaplain, of Paris, a member of the French Academy. It represents a female figure, seated on the globe, carrying a torch in her left hand and in her right a scroll emblematic of knowledge, and the words "Per Orbem." The reverse is adapted from the seal of the Institution as designed by Augustus St. Gaudens, the special inscription being inserted in the center instead of the map of the world. The medal is about 3 inches in diameter.

The committee recommended that the first medal be bestowed on Wilbur and Orville Wright, and the medal was awarded to these gentlemen under the following resolution, adopted by the Board of Regents on February 10, 1909:

Resolved, That the Langley medal be awarded to Wilbur and Orville Wright for advancing the science of aerodromics in its application to aviation by their successful investigations and demonstrations of the practicability of mechanical flight by man.

At the meeting of the Board of Regents on December 15, 1908, the following resolution was adopted:

Resolved, That the Secretary of the Smithsonian Institution be requested to report to the Board of Regents as soon as practicable upon the erection in the Institution building of a tablet to the memory of Secretary Langley, setting forth his services in connection with the subject of aerial navigation.

Designs for this tablet are now being prepared by a well-known architect of this city, whose advice I have requested.

MISCELLANEOUS.

GREENOUGH STATUE OF WASHINGTON.

The Greenough statue of Washington, which was transferred to the custody of the Institution by joint resolution of Congress of May 22, 1908, introduced by Representative Mann, was removed from the plaza east of the Capitol in November, 1908, and has been installed in the west hall of the Smithsonian building.

MEMORIAL CONTINENTAL HALL.

Under date of April 30, 1909, the president-general of the National Society of the Daughters of the American Revolution communicated with the President, offering to place at the disposal of the Smithsonian Institution the use of the auditorium in Memorial Continental Hall. The President transmitted this offer to the Secretary of the Institution, and its thanks were expressed in a statement that the needs of the Institution at present are of a special nature and require particularly facilities for laboratory and research work, for which Continental Hall is not well adapted, but should there be need in the future for additional space for lecture purposes and the like, the Institution would be glad to avail itself of the courteous proposal of the Daughters of the American Revolution.

NATIONAL MUSEUM.

The operations of the National Museum are discussed in detail by the assistant secretary in the appendix to this report and also in a separate volume, and need not therefore be fully treated here.

It was expected that the new building would be ready for occupancy before June 30, but delayed contracts and other circumstances prevented its completion. The entire stonework of the outer walls was, however, finished, as were also the roofs and skylights of the building. Much progress was made in the interior and it is expected that some of the halls and workrooms will be ready for use early in the autumn. A large part of the first and second floors and of the basement were utilized in the autumn of 1908 for the meetings and exhibition halls of the Sixth International Tuberculosis Congress, an appropriation having been made by the Government for the erection of necessary partitions and other fittings.

It was found to be in the interest of economy to install in the new building a central heating and electrical plant of sufficient capacity to serve the needs of the older buildings as well, the pipes and wires to be carried through a small connecting tunnel.

Over 250,000 specimens were added to the Museum collections during the year, about 200,000 of them pertaining to biology and the remainder to geology and anthropology. One of the most important

additions to the division of ethnology was a contribution from Dr. W. L. Abbott, consisting of about 500 objects from southwestern Borneo. I may also mention a number of Chinese velvets and embroideries of the Chien-lung period (1736-1795), presented by the Baroness von Sternberg as a memorial to her husband, the late Baron Speck von Sternberg, German ambassador to the United States. To the technological collections were added more than 200 objects transferred from the United States Patent Office. These included a number of rifles, muskets, revolvers, and pistols, making the firearms exhibit in the National Museum one of the finest in the country. Many other objects of interest are enumerated by the assistant secretary in his detailed report. The department of biology received a noteworthy gift of about 1,200 European mammals and 61 reptiles from Mr. Oldfield Thomas, of the British Museum, and Mr. Gerrit S. Miller, of this Museum. This has so greatly increased the importance of the National Museum collection of the mammals of Europe that it now ranks as one of the largest and most valuable in the world. I may also mention a contribution of about a thousand mammals and birds of Borneo, received from Dr. W. L. Abbott.

In connection with the work of excavation and repair of the Casa Grande ruins in Arizona, under the direction of the Smithsonian Institution, as authorized by act of Congress approved March 4, 1907, there were collected and placed in the National Museum about 650 stone axes and hammers, rubbing and grinding stones, earthenware bowls and vases, pieces of basketry and textile fabrics, shell ornaments, and wooden implements. From similar excavations in the Mesa Verde National Park, Colorado, there were received about 500 objects of like character. The department of geology received a large series of Cambrian fossils from the Rocky Mountains, collected during my field studies in that region. There were also added to the collections many interesting objects pertaining to mineralogy and paleobotany. Eighty-two regular sets of geological specimens to the number of 7,739 were distributed during the year for educational purposes, besides 1,300 specimens of geology, marine invertebrates, and fishes arranged in special sets.

In my last report mention was made of a loan collection of laces, embroideries, rare porcelains, enamels, jewelry, and other artistic objects, temporarily installed in the hall occupied by the gallery of art. This collection was brought together by Mrs. James W. Pinchot with the assistance of a committee of ladies of Washington. The extent of the collection is limited on account of present lack of space. The lace exhibit is specially noteworthy in variety and value. It is expected that this temporary collection will lead to a permanent exhibit of art objects that may help to elevate the standard of American art workmanship.

Two field parties in which the Institution and Museum are greatly interested left this country during the year for important collecting regions, from both of which especially valuable results may be expected. The first, which will explore Java and some of the adjacent islands, is being conducted by Mr. Owen Bryant, of Cohasset, Mass., entirely at his own expense. He is accompanied by Mr. William Palmer, of the Museum staff, and will present to the Museum a large share of the specimens obtained. The party sailed at the beginning of the calendar year 1909. The second expedition is that under the direction of Col. Theodore Roosevelt into British East Africa and more inland districts. This expedition is more fully mentioned on another page.

In the near future it will be possible to give the national collections adequate space and more systematic arrangement. In the new building it is proposed to exhibit collections representing ethnology, archeology, natural history, and geology, while the older buildings will be more specially given up to the arts and industries. The Museum thus amply provided with space will enter upon a new era of prosperity and usefulness.

NATIONAL GALLERY OF ART.

Some notable accessions have been made to the National Gallery of Art as enumerated in the appendix. I may specially mention additions to the Charles L. Freer collection, consisting of a number of oil paintings, pastels, 247 pieces of oriental pottery, and 25 miscellaneous examples of oriental art. Mr. William T. Evans has also increased his generous gift of works of contemporary American artists so that it now numbers 84 oil paintings, representing 58 artists. This collection, which had been exhibited for some months at the Corcoran Gallery of Art, was transferred to the Museum building during the first week of July, 1909.

Congress having failed to authorize the adaptation of the large hall of the Smithsonian building for the exhibition of the rapidly increasing collection of works of art, it has become necessary to make temporary use of one of the halls in the new Museum building and its adaptation to that purpose will soon begin.

BUREAU OF AMERICAN ETHNOLOGY.

The Bureau of American Ethnology during the year has been engaged mainly in making summaries of the information resulting from many years of study, both in the field and office, of the languages, social organization and government, systems of belief, religious customs, and arts and industries of the Indians, as well as their physical and mental characteristics.

The bureau has collected data relating to 60 families or linguistic stocks and upward of 300 tribes. It does not expect to study all of the tribes in detail, but rather to investigate a sufficient number as types which may stand for all. The results of the work heretofore accomplished are embodied in 26 published reports, 36 bulletins, 8 volumes of contributions, and in many manuscripts preserved in the archives of the bureau. It has seemed wise at this stage of the researches to prepare a summary of our knowledge of the tribes, and this has taken the form of a Handbook of the Indians, of which one large volume is published and the second nearly through the press. In order to keep this summary within the compass of an easily consulted handbook many important subjects are treated merely in outline. Other handbooks dealing with the more important branches of the work are in course of preparation. The first is the Handbook of Languages, which is now in press and will form two volumes. The arts and industries are also being treated in separate volumes, and handbooks relating respectively to religions, folklore, social customs, government, sign language, pictography, æsthetic arts, physical and mental characters, pathology and medicine, archeology, geographical names, etc., are in prospect.

The people of the United States have two great obligations which the bureau is trying to fulfill: (1) That of acquiring a thorough knowledge of the Indian tribes in the interests of humanity; (2) that of preserving to the world an adequate record of the American race which is so rapidly disappearing. The work is of national, even of world-wide, importance, and unless steadfastly carried forward by the Government can never be completed.

Recently much popular interest has been manifested in the antiquities of the country, more especially in the great pueblo ruins and cliff dwellings of the arid region, and the Fifty-ninth Congress enacted a law for the preservation of these antiquities. A first step in making this law effective is their exploration. A second is the excavation and repair of the more important ruins to insure their preservation and to make them available to the public and for study.

Dr. J. Walter Fewkes, of the Bureau of American Ethnology, has continued the work of excavation and repair of the ancient ruins in the Mesa Verde National Park, in cooperation with the Department of the Interior. During the year the repair of Spruce Tree House was completed, and at the end of June he had made excellent progress in uncovering and repairing the crumbling walls of Cliff Palace, the greatest of the ancient ruins of its kind in this country.

There is need also for ethnological work in the Hawaiian Islands and Samoa, for the following reasons: It is regarded as most important that the Government should have definite and detailed information regarding the native inhabitants of these islands, which

are under its control and for whose welfare it is responsible. It is not less a duty of the nation to preserve some record of this peculiar race for the purposes of history and science, as neglect will become a source of deep regret. An experienced ethnologist should make investigations regarding the history, social institutions, religion, and general culture of the people, and a physical anthropologist should study their physical and mental characteristics.

A work by Dr. N. B. Emerson—*Unwritten Literature of Hawaii: the Sacred Songs of the Hula*—is now in press, and there is also being prepared by Dr. Cyrus Thomas, of the bureau's staff, and Prof. H. M. Ballou, of Boston, Mass., a catalogue of books and papers relating to the Hawaiian Islands.

Another field for research that should be developed is among the tribes of the Middle West. There is now a strong sentiment among historical societies and educational institutions of this section in favor of prosecuting more vigorously the studies of the tribal remnants of the Mississippi Valley, for it is realized that when the old people of the present generation have passed away the opportunity for collecting historical and ethnological data will be lost forever.

Mr. J. P. Dunn has been engaged as a collaborator of the bureau on a study of the linguistics of the Algonquian tribes of this region, and Prof. H. E. Bolton, of the University of Texas, has continued his studies on the tribes of Texas.

Other collaborators of the bureau have been making special investigations relating to various tribes in different parts of the country.

INTERNATIONAL EXCHANGES.

For the purpose of more fully carrying into effect the provisions of the exchange convention concluded at Brussels on March 15, 1886, and proclaimed by the President January 15, 1889, a resolution was passed by Congress during the year setting aside a certain number of copies of the daily Congressional Record for exchange with the legislative chambers of foreign countries. Under the authority contained in this resolution arrangements for the exchange of the parliamentary record have been entered into with 21 governments, and the matter has been taken up with a number of other countries. It should be stated in this connection that the convention here referred to was the second exchange agreement concluded at Brussels between the United States and other countries on March 15, 1886. The first convention was for the exchange of government documents and scientific and literary publications, while the articles of the second agreement made it obligatory on the contracting States to transmit, immediately upon publication, a copy of the official journal to the legislatures of each. The full text of the resolution, together with

further details concerning this exchange, will be found in the appended report on the exchanges.

The increase in the number of packages handled by the bureau during the past year was the largest in the history of the exchanges—25,777 more packages having passed through the service than in 1908, the total number being 228,875. The weight of these packages was 476,169 pounds, a gain of 40,884 pounds over the preceding year.

The congressional appropriation for carrying on the system of exchanges during 1909 was \$32,200 (the same amount as was granted for the preceding year), and the sum collected on account of repayments was \$3,777.33, making the total available resources \$35,977.33.

The results of the efforts of the bureau to procure larger returns of publications from abroad for the Library of Congress and the several departments and bureaus of the Government have been more than satisfactory—in fact, they have far exceeded my expectations, in some cases hundreds of volumes having been received.

The Japanese department of foreign affairs, which has in the past been good enough to distribute exchanges sent in its care for correspondents in Japan, has recently signified its willingness to forward to the Smithsonian Institution consignments bearing addresses in the United States.

A bureau of exchanges has been established by the Kingdom of Servia and placed under the direction of the department of foreign affairs at Belgrade, and the Argentine exchange bureau has been separated from the National Library and connected with the supervising commission of public libraries at Buenos Aires.

The total number of full sets of United States official publications now sent regularly to depositories abroad is 55, and the number of partial sets 33, Servia having been added during the year to the former and Alsace-Lorraine to the latter.

The number of correspondents has increased from year to year until the aggregate is now 62,630, or 2,507 more than at the conclusion of the fiscal year 1908.

NATIONAL ZOOLOGICAL PARK.

The National Zoological Park during the year added 576 new animals to its collections, which offsets a loss of 562 by exchange, death, and return of animals, and brings the number of individuals on hand June 30, 1909, up to 1,416. There were 564,639 visitors, a daily average of about 1,547, the largest number in any one month being in April, when 127,635 were counted, a daily average of 4,254.

The entire support of the park was derived from an appropriation of \$95,000 for general purposes, including the purchase, transportation, care, and maintenance of animals; the care and improvement

of grounds; the construction and repair of all buildings, inclosures, roads, walks, and bridges. Of this amount the increased price of necessary provisions and labor brought the cost of maintenance alone to about \$85,000. It was therefore possible to do little toward permanent construction or improvement of the more or less temporary shelters, roads, walks, and inclosures which lack of adequate funds at the time of the inception of the park made it necessary to build. It has not been possible as yet to develop the park to the standard that such institutions usually attain at the capitals of great nations.

The improvements made during the year were for the most part those necessary for the safety of visitors. A series of yards for bears and ten new yards for foxes and wolves were constructed, however, and many of the roads treated with tar preparations to prevent dust and abrasion. The superintendent of the park states that there are needed: A new aquarium, the present building being originally a hay shed, now in a most dilapidated condition; a general aviary and out-of-door shelter for hardy birds; an inclosure for sea lions and seals; an antelope house; a more centrally located office building; a restaurant and retiring rooms for visitors; and further improvements to roads and walks.

Of the 576 accessions to the collections during the year, 124 were gifts to the park, 12 were received in exchange, 307 were purchased, 9 were deposited, 110 were born and hatched in the National Zoological Park, and 14 were captured in the Yellowstone National Park. It is expected that the collections of the Zoological Park will benefit either directly or indirectly through the Smithsonian African expedition under Mr. Theodore Roosevelt, which left this country in March and is at present engaged in gathering specimens of fauna in Africa.

The appropriations during the eighteen years since it was established have permitted of the erection of only three permanent buildings, all of the others having necessarily been constructed cheaply and as temporary makeshifts to meet the successively urgent requirements of the growing collections. The result is that at the present time most of the animals are housed in poor wooden buildings and exposed cages, which are not only inadequate and unsightly but also entail a larger annual expense for repairs and maintenance than the dictates of economy would seem to justify. Elaborate and ornate buildings are not called for, but the necessity for substantial structures adapted to the requirements of the different groups of animals can not be too strongly urged.

It is also to be borne in mind that the Zoological Park is a part of the great park system extending through Rock Creek Valley. Its main roads are continuous with those leading up the creek and are traversed by the same vehicles, including heavy automobiles, which

makes it necessary to maintain these roads on a better basis than would be required if they were intended solely as entrances to the Zoological Park. The heavy expense which this involves falls upon the appropriation for the park, a fact which, it is felt, may not have been fully realized by the Congress in considering the park estimates.

Attention has heretofore been called to the importance of acquiring the narrow tracts of land lying between the park boundaries and the recently established highways on the southeast and west. The highways were located as close to the park as the topography would permit, so as to reduce these tracts to a minimum width, with the expectation that they would be acquired by the Government. Property in this vicinity is gradually increasing in value, and in the interest of economy the tracts should be secured now so that the park boundaries may be permanently established and guarded against injurious encroachment by adjacent grading.

ASTROPHYSICAL OBSERVATORY.

The work of the Astrophysical Observatory during the year consisted:

(1) Of bolometric observations carried on at Washington on the brightness of different parts of the sun's image; also some experimental work on the transparency of the air for long-wave rays, such as the earth radiates. A computation of the results of these experiments is now far enough advanced to show their satisfactory quality. Precise knowledge of the selective absorption of our atmosphere for earth rays is still lacking, and contradictory views are still being expressed about this important subject; hence it is hoped that these experiments will be useful in the study of the dependence of the earth's temperature on radiation.

(2) Spectrobolometric measurements of the solar constant of radiation have been continued at the Mount Wilson observatory in California. As in former years, evidences of a fluctuation of solar radiation were found in the results of the measurements thus far obtained. A new and improved standard pyrheliometer was found to be more satisfactory than the one used in 1906, and great confidence is felt in the results obtained with it. Efforts have also been made to carry the bolometric measurements much farther in the ultra-violet through the use of a large quartz prism, a large ultra-violet glass prism, and two magnalium mirrors. Mr. Abbot, the director of the Astrophysical Observatory, visited the summit of Mount Whitney (14,502 feet), where the institution is preparing to erect a shelter house for the use of observers. This is the mountain upon which Mr. Langley carried on his well-known observations in 1881, and it is believed that the location will prove to be of great value in the further study of the solar constant of radiation.

As stated in the two preceding annual reports, it is highly desirable to continue the solar observations throughout the year, and this can be accomplished by observing during the winter and spring months in southern Mexico, where a cloudless sky and high altitude of the sun may be had, although during those months bad observing conditions occur in the United States. Hitherto lack of funds has prevented a Mexican expedition.

The work of the observatory is receiving highly favorable notice both in this country and abroad, its results being employed by our own Weather Bureau and by foreign investigators as a basis for their measurements on the radiation of the sun.

INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

The purpose of the International Catalogue of Scientific Literature is to collect and publish in 17 annual volumes a classified index of the current scientific publications of the world. This is accomplished by the cooperation of 32 of the principal countries of the world, each having a regional bureau which prepares the data necessary and indexes all scientific literature published within its domain. The material thus prepared is forwarded to a central bureau in London for publication in the annual volumes.

The various subscribers throughout the world bear the entire cost of printing and publishing by the central bureau, each country taking part in the enterprise bearing the cost of indexing and classifying its own publications. The 17 annual volumes combined contain between 10,000 and 12,000 printed pages.

The regional bureau for the United States furnishes yearly about 30,000 classified citations to American scientific literature, which is between 11 and 12 per cent of the total work.

Millions of dollars are being spent each year in scientific investigation and many of the foremost men of the day are devoting their entire time to such work. The results of their labors find publicity through some scientific journal of which there are over 5,000 being regularly indexed by the various regional bureaus, and over 500 in the United States alone. In addition to these periodicals are hundreds of books and pamphlets, all of which the International Catalogue aims to index in its yearly work.

The International Catalogue furnishes in condensed, accurate, and permanent form a minutely classified index to all of these publications. It is necessary for each paper to be carefully studied by a person competent to thoroughly understand the subject treated, as the method of classification actually furnishes a digest of the contents in addition to the usual bibliographical data. The catalogue is to science what the legal digest is to law.

During the past year 34,409 classified index cards of American scientific literature were prepared and forwarded to London, as compared with 28,528 during the year preceding. The publication of the sixth annual issue was completed during the year and 9 of the 17 volumes of the seventh annual issue were received from the Central Bureau and distributed to the subscribers in this country.

NECROLOGY.

OTIS TUFTON MASON.

It is with deep regret that I have to announce the death, on November 5, 1908, of one of our strong men, Prof. Otis T. Mason, who had been associated with the Institution since 1873, first as a collaborator in ethnology, next as curator of that branch, and finally as head curator of the department of anthropology. I may say, indeed, that this association and influence dates much farther back, when, at 12 years of age, in 1851, he began his education in Washington when the activities of the Institution affected every intelligent citizen.

Professor Mason was born in 1838, so that his life has been almost contemporaneous with the Smithsonian Institution, and he bears an honorable share in its history. He says in his autobiography:

My first studies were in the culture of the eastern Mediterranean peoples, which I followed persistently until the early seventies, when a chance acquaintance with Professor Henry and Professor Baird, of the Smithsonian Institution, opened the Western Hemisphere to my mind and changed the current of my life.

His agreeable qualities as a man, his earnestness in his work, and his contagious enthusiasm render this loss a most severe one to the Institution.

Respectfully submitted.

CHARLES D. WALCOTT, *Secretary.*

APPENDIX I.

REPORT ON THE UNITED STATES NATIONAL MUSEUM.

SIR: I have the honor to submit the following report on the operations of the United States National Museum for the fiscal year ending June 30, 1909:

BUILDINGS.

Although it had been fully expected, as explained in the last report, that the new building would be completed before the close of the year, delayed contracts and other circumstances interfered so greatly with the progress of the work that no part of the structure was in condition for occupancy at the end of June. The entire stonework of the outer walls of the building, including the porch, columns, and front of the south pavilion in which the main entrance is located, was, however, finished, as were the roofs and skylights of the building generally. The placing of the slate on the dome of the rotunda and on the adjacent roof of the south pavilion was under way, but the laying of the extensive granite approaches, for which the stone has been delivered, had not been begun.

Much remains to be done in the interior of the rotunda, but as it is the main part of the building which is most urgently needed for the accommodation of the collections and laboratories, it is there that the work has been most energetically prosecuted. Except for some special items, such as metal doors, transoms, etc., the construction of which will require several months, it is expected that at least some parts of the building will be ready for use and that the moving from the older buildings may be started before autumn.

It is interesting to mention that the building has already been made to serve a commendable purpose as the meeting place of the Sixth International Tuberculosis Congress, held in the early autumn of 1908. Being then in a very unfinished condition, it was necessary to make special arrangements, authorized by an act of Congress, for such partitions and other fittings as were required for the accommodation of the several sections and for the display of the extensive collections that were brought together. A large part of the first and second floors as well as of the basement was given over to the congress, and while the progress of construction on the building was thereby much retarded, the delay may be regarded as fully sanctioned by the exceptionally important nature of the event which occasioned it.

The reconstruction of the main roofs of the old Museum building was completed during the summer of 1908, when the slate covering of the rotunda was replaced with tin. The use of slate on these roofs in the beginning had been a mistake in view of their generally slight pitch and the relatively light character of the supporting iron framework. The old roofs had always leaked badly, but up to the present time the new ones have shown no weakness of any kind, and it is felt that they have been built in a proper and substantial manner. Other important repairs interfered with the work of filling in the large archways between the halls of the old building, intended, as explained in previous

reports, to provide against the spread of fire, though something was done in this direction. A much-needed alteration in the arrangements and conveniences of the photograph gallery was in progress at the end of the year.

Much work was done in the preparation and construction of furniture for the new building, more especially for the storage rooms and laboratories, in which it is important that fireproof material be employed to the greatest extent possible. There is already in use a large amount of wooden furniture of modern and appropriate design which it would be extravagant to dispense with, and it is therefore being sheathed with sheet steel to conform to the required conditions.

In regard to new storage furniture, an effort is being made to obtain all metal work, and in view of its recent reduction in cost, due to competition, it now appears feasible to provide for the protection of the immense reserve collections on a basis in keeping with the substantial character of the building. There were on hand at the close of the year 2,407 exhibition cases, 3,184 storage cases, and 1,645 pieces of office and laboratory furniture.

The boiler and electrical plant installed in the new building, embodying the latest improvements, is found to be of sufficient capacity for also heating and lighting the older buildings, and, in the interest of economy, it has been decided to make this one plant serve for all. Plans for carrying this arrangement into effect were nearly completed at the close of the year, and it is expected that the connections can be made before autumn. It will be necessary to construct a small tunnel for carrying the pipes and wires from the new building to the Smithsonian building, where they will enter the existing conduits. While the new building will be heated by hot water, steam will be carried to the older buildings, the latter being the medium for which their pipes and radiators are now adapted.

NATIONAL GALLERY OF ART.

By a third deed of gift, dated May 10, 1909, Mr. Charles L. Freer, of Detroit, Mich., added to his large donation of American and oriental art the following examples acquired since the transfer of the previous year, namely: Four oil paintings and 1 pastel, by Dwight W. Tryon; 3 oil paintings and 1 pastel, by Thomas W. Dewing; a portrait of ex-President Roosevelt, by J. Gari Melchers; 2 oil paintings, 1 water color, 4 drawings and sketches, 1 album of sketches, and 3 etchings and dry points, by James McNeill Whistler; 4 oriental paintings; 247 pieces of oriental pottery; and 25 miscellaneous examples of oriental art.

Mr. William T. Evans, of New York, also continued to make important additions to his collection of the works of contemporary American artists, which, at the close of the year, numbered 84 oil paintings received in Washington, representing 58 artists. As the Corcoran Gallery of Art required for its own use the space which has been occupied by the Evans pictures, the transfer of the latter was arranged for in June and carried into effect during the first week of July, 1909. The walls and screens of the picture gallery in the Museum building were entirely given over to this collection, and the new installation displays the paintings to much better advantage than the previous one. This change, however, necessitated the removal of the paintings which have hitherto been hanging in the gallery to temporary quarters in the Smithsonian building.

It has now become imperative to provide some place where the paintings belonging to the National Gallery of Art can be segregated, and since the fitting up of the second story of the Smithsonian building has so far failed to secure the approval of Congress, it has been decided to make temporary use of one of the skylighted halls in the new Museum building. Its adaptation to this purpose will be taken up early in the new fiscal year.

It should be mentioned that the full-length portrait of Guizot, the French statesman and writer, by G. P. A. Healy, belonging to the Government, has been recalled from the Corcoran Gallery of Art. An important addition to the historical-portrait series is a full-length painting of Rear-Admiral George W. Melville, U. S. Navy, by Sigismond de Ivanowski. This portrait was executed on the order of a number of friends of the distinguished naval officer and presented through the American Society of Mechanical Engineers at their annual meeting, held in Washington, in May, 1909.

ART TEXTILES.

The loan collection of art textiles and other objects begun in May, 1908, by Mrs. James W. Pinchot, with the assistance of a number of ladies of Washington, has received much attention, and its importance has been greatly increased by many valuable additions. The limited amount of space which could be allotted to this subject in the picture gallery tended to restrict the number of contributions, but as soon as the removal of the paintings to another hall has been effected the entire area of the present one will become available. The collection is now contained in 24 cases, of which 9 are devoted to laces, 7 to other art fabrics, 4 to porcelains, 2 to enamels, and 2 to fans. With these are also exhibited numerous examples of silverware, jewelry, and wood and ivory carving. There have been 22 contributors since the last report. The assemblage of lace constitutes the most noteworthy part of the collection, being exceeded in variety and value only by the collections of the Metropolitan Museum of Art of New York and the Boston Museum of the Fine Arts. This art movement, so auspiciously inaugurated and so earnestly supported, if it be sedulously followed up, is certain to prove an important factor in the future history of the National Museum. It was started with the definite purpose of stimulating the formation of a permanent exhibit, which should be valued not only on account of its attractiveness and historical interest, but more especially as furnishing motives and designs which may help to elevate the standard of art workmanship in this country. Its growth has been exceptional, and it is hoped that its intent will be fulfilled.

ADDITIONS TO THE COLLECTIONS.

The total number of accessions to the Museum during the year was 1,358, comprising 254,787 specimens, distributed among the three departments, as follows: Anthropology, 26,400; biology, 216,324; and geology, 12,063.

Department of Anthropology.—The most important contribution in ethnology consisted of about 500 objects illustrating the handiwork and domestic arts of the natives of southwestern Borneo, collected and presented by Dr. W. L. Abbott, to whom the Museum was already indebted for several large gifts of a similar character from the Malaysian region. Next should be mentioned a valuable collection obtained by Dr. Aleš Hrdlička in the course of his investigations relative to tuberculosis among the Indians of the southwestern United States, and many objects from the northern coast of Alaska, donated by Mr. E. de K. Leffingwell, who is conducting extensive explorations in that region. Ethnological material was also received from the Philippine Islands, Africa, and Central and South America.

Most noteworthy among the additions in prehistoric archeology were the collections resulting from the work of Dr. J. Walter Fewkes, of the Bureau of American Ethnology, in the excavations and repairs, conducted first at the Casa Grande ruins in Arizona, under a special appropriation by Congress to the Smithsonian Institution, and, later, at the Spruce Tree House in the Mesa

Verde National Park, Colo., under authority from the Department of the Interior. The number of objects forwarded to Washington from the former locality was 662 and from the latter 501. In these important undertakings, justified by the great historical and scientific significance of the ruins, everything that formed an integral part of the structures or could be safely left at the sites was allowed to remain, only such objects being taken away as would tend to attract looting or would be likely to fall into the hands of unwarranted collectors.

The division of historic archeology was enriched by a manuscript of the Mahabharata, the great epic of India, containing 90,000 couplets, written in Sanscrit characters on palm leaves, a gift from the learned Rajah Sir Sourindro Mohun Tagore. Several interesting additions were made to the very valuable loan collection of Jewish ceremonial objects by the generous friend of the Museum, Haidji Epbriam Benguiat, of New York.

The collections of physical anthropology, which are not restricted to the human race, but also extend to other groups of the higher vertebrates, received important additions from many widely separated regions. Mention should especially be made of the generous action by the Metropolitan Museum of Art, of New York City, in allowing the National Museum to share, without expense, in the results of its Egyptian excavations, which are in charge of Prof. Albert M. Lythgoe. The skeletal remains of the ancient Egyptians found in the tombs uncovered by the explorations, and hitherto not generally preserved, are now being saved and in greater part turned over to the National Museum, where their study should result in interesting contributions on the physical characteristics of these peoples. A large number of remains were received during the year, and, on the invitation of the Metropolitan Museum, Doctor Hrdlička, assistant curator in charge of these collections, had the opportunity of visiting Egypt last winter for the purpose of instructing the excavators as to the best methods of preserving and packing the remains for shipment and of making studies on the spot.

The division of technology received numerous accessions, including many objects transferred from the Patent Office. The subjects principally represented were firearms (of which the Museum collection is now the finest in the country), electrical devices, calculating machines, printing presses, the early history of the aeroplane, and watch movements.

Two gifts of exceptional beauty and value from the Government of China were added to the collections in ceramics. One was a celadon vase of large size and graceful shape, the other one of the famous peachblow vases from the imperial treasure house at Mukden.

To each of the divisions of graphic arts and musical instruments a few additions were made. Plans were begun for broadening and enlarging the collections of medicine so as to meet the requirements of the recent extensive investigations into this subject, and they will be carried out as soon as additional space becomes available.

Among many gifts and loans to the division of history, mention should be made of a number of valuable presents to the Hon. Gustavus Vasa Fox by the Czar of Russia during his mission to that country in 1866, and bequeathed to the Museum by his widow; also interesting relics of the *Jeannette* arctic expedition of 1879-1881, and memorials of Gen. Judson Kilpatrick, U. S. Army, and Commander Harry H. Hosley, U. S. Navy.

Department of Biology.—The largest amount of zoological material from any single source was derived from the Bureau of Fisheries, and especially from the explorations of the steamer *Albatross* among the Philippine Islands, in which Dr. Paul Bartsch, assistant curator of mollusks, participated for about

a year, being detailed as a member of the scientific staff of that vessel. A part of the collections obtained on this expedition, including over 100,000 specimens of mollusks and other groups of marine invertebrates, was transferred directly to the Museum for working up. Doctor Bartsch was also enabled to make some important collections of birds and reptiles. The same bureau likewise turned over to the Museum other important collections of marine invertebrates and fishes, chiefly from explorations in various parts of the Pacific Ocean.

Among important gifts were about 1,200 European mammals presented by Mr. Oldfield Thomas, of the British Museum, and Mr. Gerrit S. Miller, jr.; about 700 mammals and 200 birds collected in Borneo by Dr. W. L. Abbott; about 600 specimens, mainly of invertebrate animals obtained in Labrador, by Mr. Owen Bryant; and a large collection of Peruvian reptiles, mollusks, crustaceans, and sponges from the Peruvian Government. The large collection of birds secured during the expedition of Mr. Robert Ridgway to Costa Rica was received in the summer of 1908. Besides those mentioned above the principal accessions of reptiles came from the Philippines and Panama, and of fishes from New South Wales and Florida.

The division of insects received over 32,000 specimens, including several accessions of special value. Mr. William Schaus added to his previous noteworthy donations about 16,000 specimens of Lepidoptera from Costa Rica and other tropical countries. Mr. H. L. Viereck, of the Bureau of Entomology, and Mr. J. C. Crawford, of the National Museum, presented their private collections of Hymenoptera, amounting to over 5,000 specimens in all. Lord Walsingham and Mr. F. D. Codman contributed many Central American species described in the *Biologia Centrali Americana*. The balance of the accessions consisted mainly of transfers from the Department of Agriculture, and represented many parts of the United States.

The additions to the collections of mollusks and other marine invertebrates were mainly derived from the explorations of the Bureau of Fisheries, as elsewhere described. A notable gift from the Zoological Museum of Copenhagen, Denmark, consisted of several hundred crabs from the Gulf of Siam, including 20 genera and 66 species new to the Museum.

The herbarium received extensive collections, coming mostly from Mexico, New Mexico, Oregon, and the Philippines.

Department of Geology.—Nine series of rock specimens, the results of field work in as many parts of the United States, were transferred by the Geological Survey. In invertebrate paleontology the more noteworthy additions were a large series of Cambrian fossils from the Rocky Mountain region, resulting from the explorations of Secretary Walcott during the summer of 1908; a large collection of Paleozoic fossils from the Appalachian Valley and central Tennessee, made by the curator of the division; and a collection of Tertiary fossils from the Coalinga district, California, received from the Geological Survey. A large amount of material from the Fort Union beds of Sweet Grass County, Mont., representing many new and little known mammalian species, constituted the principal accession in vertebrate paleontology.

CARE AND PRESERVATION OF COLLECTIONS.

The collections have been maintained in good condition notwithstanding the overcrowding in all the divisions. Much of the routine work was planned with the view of placing the collections in such shape as to permit of their removal to the new building in systematic order, but the delay in the completion of the building has made this part of the task especially difficult. With the assur-

ance that the new structure would be finished during the winter or spring of 1909, no appropriation was requested or obtained for continuing the occupancy of the rented buildings, in which, for many years, large quantities of museum specimens and other property have been housed. As these buildings had to be surrendered at the end of the year it became necessary to transfer nearly all of this material in bulk to the new building, where it occupies a large part of one of the exhibition floors. Under more favorable circumstances it would have been unpacked and assorted beforehand.

As good progress was made in the sorting, classifying, labeling, and cataloguing of the accessions of the year as was possible under the adverse conditions and with the relatively small staff of experts attached to the Museum. The examination of the collections resulting in many important scientific contributions, in which a number of specialists connected with other establishments have participated.

The exhibition collections have been added to and changed only in minor ways, principally in connection with the loan collection of art textiles, technology, history, and historic archeology.

MISCELLANEOUS.

Of duplicate material, chiefly natural history, separated from the collections in the course of recent studies, over 9,000 specimens arranged in classified sets for educational purposes were distributed to many high-grade schools and colleges throughout the country. About 10,000 duplicates were used in making exchanges with museums and other scientific establishments, from which an equivalent in new material has been or will be received. To specialists in different fields connected with other institutions, both at home and abroad, about 19,000 specimens were sent for examination, all of which, except some of the duplicates, will be returned to the Museum. A large part of the work on these loan collections is being carried on directly in the interest of the National Museum.

The number of visitors to the public halls was a little less than a quarter of a million, which is about the annual average. This is in striking contrast with the records of large museums in other places, where the hours of opening are extended to evenings and Sundays for the benefit of the working people. While the additional cost involved in the extra hours of heating and the employment of a few more watchmen would be inconsiderable, the means at the disposal of the museum have never been quite sufficient to accomplish this worthy purpose. It is hoped that this matter may be satisfactorily adjusted in connection with the new building.

The publications issued by the Museum consisted of the annual report for the year ended June 30, 1908; volumes 34 and 35 and part of volume 36 of the Proceedings; 3 bulletins and parts of 2 other bulletins. They comprised 91 separate papers and memoirs, all of which except the administrative report were descriptive of Museum collections. In addition, a number of papers of the same character were printed in the Quarterly Issue of the Miscellaneous Collections of the Smithsonian Institution and elsewhere.

The additions to the library, which is restricted to the subjects covered by the activities of the Museum, consisted of 2,680 books, 3,671 pamphlets, and 227 parts of volumes, which increased the total contents of the library to 36,244 volumes and 56,010 unbound papers. The annual appropriation of \$2,000 for the purchase of books, periodicals, and pamphlets required for the classification of collections, is wholly inadequate to meet the needs of this work, and should be at least doubled. For a large part of its increase the library is dependent

upon gifts and exchanges, but even these means combined with the purchase fund are not nearly sufficient to satisfy the important demands in this direction.

In conjunction with the Institution, the Museum is participating extensively in the government exhibit at the Alaska-Yukon-Pacific Exposition at Seattle, which opened on June 1 and will close on October 16. The general subject which, in accordance with the law, the Institution and Museum were directed to illustrate is that part of the national history of the United States which relates to Alaska, the Philippine Islands, and that section of the country lying west of the Rocky Mountains. Samoa and Guam have also been included. The collections assembled for this purpose, obtained partly from original sources and in part selected from the Museum exhibits, consist of models, pictures, and actual objects, representing the peoples, conditions, etc., from prehistoric to modern times. The exhibit is interesting and instructive and has been attractively arranged.

The Museum, in conjunction with the Bureau of American Ethnology, also sent to the International Photographic Exhibition at Dresden, Germany, a series of enlarged photographic prints and transparencies covering a variety of subjects, but designed to illustrate the perfection to which the art of photography has attained in this country in the portrayal of scientific subjects.

Respectfully submitted.

RICHARD RATHBUN,

Assistant Secretary in charge of U. S. National Museum.

DR. CHARLES D. WALCOTT,

Secretary of the Smithsonian Institution.

APPENDIX II.

REPORT ON THE BUREAU OF AMERICAN ETHNOLOGY.

SIR: The operations of the Bureau of American Ethnology for the fiscal year ended June 30, 1909, conducted in accordance with the act of Congress making provision for continuing researches relating to the American Indians, under direction of the Smithsonian Institution, were carried forward in conformity with the plan of operations approved by the Secretary June 18, 1908.

As in previous years, the systematic ethnologic work of the bureau was intrusted mainly to the regular scientific staff, which comprises eight members. As this force is not large enough to give adequate attention to more than a limited portion of the great field of research afforded by the hundreds of Indian tribes, the deficiency was supplied in a measure by enlisting the aid of other specialists in various branches of ethnologic work. By this means the bureau was able to extend its researches in several directions at a comparatively modest outlay.

The work of the bureau for the year comprised: (A) The continuation of various unfinished researches among the Indian tribes and (B) the summarizing for publication of available data from all sources.

(A) The unfinished researches were in continuation of systematic investigations already in hand and were essential to a reasonable rounding out of the work among the tribes. These researches were distributed as follows:

Regular force: Matilda Coxe Stevenson, the Pueblo tribes; James Mooney, the Great Plains tribes; J. N. B. Hewitt, the Iroquoian tribes; J. R. Swanton, the Southern tribes; F. W. Hodge, literary researches for the Handbook of the Indians; J. W. Fewkes, archeology of Southwestern tribes; W. H. Holmes, technology of the tribes; Cyrus Thomas, bibliography of Hawaii.

Collaborators: Franz Boas and eight assistants, the languages of the tribes; Aleš Hrdlička, the physical anthropology of the tribes; Frances Densmore, ceremony and songs of the Ojibwa tribes; J. P. Dunn, linguistics of the Algonquian tribes of the Middle West; N. B. Emerson, the Hawaiians; H. M. Ballou, the Hawaiians; H. E. Bolton, the tribes of Texas; J. P. Reagan, Northwest Coast tribes; Alice C. Fletcher, the Omaha tribe; Francis La Flesche, the Omaha tribe; W. F. Gerard, etymology of Indian names.

(B) The summarizing of the materials now available relating to the tribes was initiated by the preparation of the Handbook of the Indians, which assumes to cover the whole ground in brief articles arranged in alphabetical order. Its preparation has led to a clearer understanding of the work done and to be done, and the researches now in hand contemplate the preparation of a series of handbooks, each to be devoted to a full presentation of a single branch of the subject, as follows:

(a) Handbook of the Tribes: History, distribution, settlements, population, etc., of each stock, tribe, and minor group. Preliminary assemblage of the data is embraced in the present Handbook of American Indians, of which Part I is published and Part II almost ready.

(b) Handbook of Languages: Volume I now in press, Volume II in preparation. As several hundred languages are to be considered, a number of years will be required to complete the work.

(c) Handbook of Race History: Physical and mental characters, physiology, pathology, medicine, etc. Researches in hand, but requiring extensive additional investigation.

(d) Handbook of Social Systems: Organization and customs of society, the family, clan, tribe, confederacy, government, etc. A large body of material is already in hand, but much additional research is necessary.

(e) Handbook of Religious: Religious customs, rites and ceremonies, folklore, etc. The large body of data in hand requires much elaboration, with additional research.

(f) Handbook of Technology: Arts, industries, implements, utensils, manufactures, building, hunting, fishing, etc.

(g) Handbook of the Esthetic Arts: Painting, sculpture, ornaments, music, drama, etc.

(h) Handbook of Sign Language.

(i) Handbook of Pictography.

(j) Handbook of Treaties and Land Cessions.

(k) Handbook of Games and Amusements.

(l) Handbook of Burial Customs.

(m) Handbook of Economics: Food resources, culinary arts, medicinal resources, etc.

(n) Handbook of Archæology. The extensive researches of past years need to be supplemented by much additional exploration.

(o) Handbook of Geographical Names.

(p) Handbook of Hawaii. Researches initiated by the preparation of a bibliography of 6,200 titles now nearly ready and a work on mythology now in press.

(q) Bibliographies.

(r) Dictionaries.

(s) Grammars.

(t) Portfolios of portraits, etc.

The body of data in hand relating to the Indians probably surpasses that heretofore obtained relating to any primitive people, but still falls short of the rounding out that should characterize the work of the American nation, dealing as it does with a race and a culture which are rapidly disappearing.

During the year researches were carried on in Arizona, New Mexico, Colorado, Texas, Oklahoma, Louisiana, South Carolina, Indiana, and Oregon, and were incidentally extended to the Argentine Republic, Chile, Bolivia, Peru, California, Washington, and British Columbia.

The chief devoted his time while in the office to the administrative work of the bureau, giving the necessary attention to his duties as curator of the Section of Prehistoric Archæology and to the National Gallery of Art in the National Museum. During the year considerable progress was made in the preparation of a work already well advanced, on the stone implements of North America.

Having been designated by the Department of State to represent the Smithsonian Institution at the First Pan-American Scientific Congress, held at Santiago, Chile (at which he represented also the George Washington University), on October 29 the chief took passage on the Hamburg-American steamer *Amerika* for England, sailing thence by way of Vigo, Spain, and Lisbon, Portugal, to Buenos Aires. After spending ten days in the Argentine capital with members of the delegation, making official visits and pursuing studies in various public institutions, he traversed the pampean country by rail to Mendoza, and thence up the Mendoza River to Las Cuevas at the base of the cumbre or crest of the Andes. Taking coach at this point he crossed to the Chilean

side and soon reached Santiago. The three weeks spent in Santiago were taken up largely with affairs of the delegation, including official duties and attendance on meetings of the Congress. The section of the natural sciences, including anthropology, met daily, and on December 28 the chief acted as chairman of the section. His contribution to the programme of the congress was a paper on "The peopling of America," an abstract of which follows:

Discussion of the problem of the origin of the American aborigines involves consideration of several important questions, as follows:

- (1) Evolution of the human species from lower forms.
- (2) Geographical location of the original home of the race.
- (3) Dispersal to the different land areas of the globe.
- (4) Differentiation of the subraces physically and culturally.
- (5) Chronology of the racial history.

In the present state of our knowledge we can not assume to dispose finally of these several questions. It is most important, however, that the whole subject should be passed under review at frequent intervals, and the data assembled, classified, and critically examined. The writer's views, formulated after careful consideration of the various phases of the subject presented, considering more especially the North American evidence, are expressed in the following summary of probabilities:

(1) That the human family is monogenetic; that is to say, the present subraces have been derived by differentiation from a common stock.

(2) That the precursor—that is to say, man before he reached the human status—occupied a limited area.

(3) That this area was tropical or subtropical and was situated in the Old World rather than in the New.

(4) That multiplication of numbers led to wide distribution, and that isolation on distinct land areas finally led to the differentiation of the subraces.

(5) That the separation into distinct groups began at an early period, but not until after the typical human characters had been developed.

(6) That the human characters were acquired in Tertiary time, and that dissemination extended to distant continents, mainly in Quaternary time.

(7) That the pioneers of the present American race belonged to the well-differentiated Asiatic subrace and that they reached America by way of Bering Strait.

(8) That the early migrations included few individuals and occurred at widely separated periods; that the movements were slow and by means of the ice bridge in winter or by skin boats in summer.

(9) That the culture of the immigrants in all cases was very primitive, not rising above the hunter-fisher stage.

(10) That successive migrations involved numerous distinct groups or tribes, so that the American race is a composite of diversified Asiatic elements more or less completely amalgamated.

(11) That the result was a new people and a new culture, essentially American.

(12) That the Eskimo—forming a widely distributed ethnic group occupying the northern shores of both continents—acquired their physical characteristics and peculiar culture under the influence of Arctic conditions, and that they are the descendants of marginal tribes early forced to the northward from southern Eurasian sources of population.

(13) That occasional accessions of population may have resulted from the accidental arrival of voyagers from other lands, though not in numbers large enough to affect the race perceptibly.

(14) That in the present period prior to the Columbian discovery occasional voyagers from southern Asiatic culture centers or from Japan or China may have reached American shores and left an impress on the culture of middle America.

(15) That the peopling of America with the present race was accomplished in late Glacial or post-Glacial time rather than in early Glacial or Tertiary time.

(16) That much of the recorded geological evidence of great human antiquity in America is unreliable and requires critical revision.

(17) That the aboriginal peoples will soon disappear as the result of interminglings with other races and failure to accommodate themselves to new conditions; that America will be fully occupied by a cosmopolitan people embody-

ing the best elements of every civilization—a race of superior capacity and force, destined in its full fruition to surpass all others in the grandeur of its achievements; and that the activities of the present and of future Pan-American scientific congresses will contribute a worthy share in the accomplishment of this grand result.

At the closing session of the congress the chief was made a member of a committee of five to arrange for the next meeting of the congress, to be held in Washington, D. C., in October, 1912.

While in Santiago much attention was given to the national museum, which contains a great deal of material illustrating the ethnology and archeology of Chile, and a number of private collections, rich chiefly in Peruvian antiquities, were visited.

The homeward trip from Santiago included excursions to Bolivia, where the small national museum was visited and where studies were made of the ruined city of Tiahuanaco; to Peru, where a brief period was devoted to a study of the rich collections of the national museum; and to Panama for a short stay. Washington was reached on February 11, and reports were then prepared for the institutions which the chief represented as delegate and for publication in scientific journals.

The services of the chief were enlisted during the early months of the year in the preparation of the Institution's exhibit to illustrate the history of the Pacific Coast States and the Pacific islands at the Alaska-Yukon-Pacific Exposition at Seattle. Before leaving for South America in October he designed a number of lay-figure family groups, which were elaborated by the sculptor during the winter months; and on his return from the South he attended to the completion of these groups and to the construction of a model of the Santa Barbara mission establishment, California, for the exposition. On May 4 he proceeded to Seattle to assist in setting up the exhibits, stopping en route to select a site on the southern rim of the Grand Canyon of the Colorado suitable for the erection of the monument to the late Maj. J. W. Powell recently provided for by the Congress; at Los Angeles, to examine the collections in the Southwestern Museum; at Santa Barbara, to study the plan of the mission; and at San Francisco, to visit the museum of the University of California. While in Seattle visits were made to Tacoma, Wash., and to Victoria, British Columbia, for the purpose of examining collections of ethnological and archeological material preserved in these places. The chief returned to Washington on June 11.

During the year the chief made studies of a more or less elaborate nature in the following museums:

- Blackmore Museum, Salisbury, England.
- University of La Plata Museum, Argentine Republic.
- Faculty of Philosophy and Letters Museum, Buenos Aires, Argentine Republic.
- National Museum, Buenos Aires.
- National Museum, Santiago, Chile.
- National Museum, La Paz, Bolivia.
- National Museum, Lima, Peru.
- California University Museum, San Francisco.
- Southwestern Museum, Los Angeles.
- Ferry Museum (Tozier collection), Tacoma, Wash.
- University of Washington Museum, Seattle, Wash.
- Provincial Museum, Victoria, British Columbia.
- Field Museum of Natural History, Chicago.
- Academy of Sciences Museum, Philadelphia.

Early in the year the bureau was urged by the officers of the Mississippi Valley Historical Association to contribute data relating to the history of the Indian tribes of the region for the meeting of the association convened in St. Louis June 15, 1909. The chief contributed a paper entitled "Remarks on the aboriginal history of the Mississippi Valley;" and Mr. James Mooney and Dr. John R. Swanton were designated to attend the meeting and present papers dealing with kindred subjects.

Mrs. M. C. Stevenson, ethnologist, remained in the field, in New Mexico, during the entire year. Having established headquarters at Española, she devoted her time largely to investigations among the local Pueblo tribes, interrupting the work for short periods to record valuable data communicated by visiting members of the Zuñi tribe. Her researches included detailed studies of the history, social organization and customs, religion and religious practices, and arts and industries of the Santa Clara and San Ildefonso tribes; and progress was made in the comparative study of these varied subjects among the numerous pueblos.

Aside from the more systematic ethnological work, Mrs. Stevenson gave much attention to her unfinished papers on "The preparation of cotton, yucca, and wool for the loom by the New Mexican tribes" and on the "Medicinal and food plants used by the Zuñi Indians."

Mr. F. W. Hodge, ethnologist, was engaged chiefly in continuing the editorial work on Part 2 of the Handbook of American Indians, carrying along the proof reading toward the close of the alphabet and writing and inserting many articles on lesser subjects that it had been found essential to include. In this work he had the assistance especially of Mr. J. N. B. Hewitt, who prepared articles pertaining chiefly to the Iroquois tribes; of Mr. William R. Gerard, of New York, who revised and rewrote numerous articles involving the etymology of Indian terms; and of Dr. Herbert E. Bolton, of the University of Texas, who continued to supply, to the end of the alphabet, articles relating to the tribes of Texas. The work of completing the second part of the Handbook of American Indians did not proceed as rapidly as was hoped at the beginning of the year, owing to the fact that the burden of the administrative work of the bureau devolved upon Mr. Hodge when the chief was called to South America and later to the Seattle Exposition, as previously mentioned. In the handbook work Mr. Hodge had the clerical assistance of Mrs. Frances Nichols. It is now expected that Part 2 will be ready for distribution in the near future. Mr. Hodge represented the bureau on the Smithsonian advisory committee on printing and publication, and served also as a member of the subcommittee on bibliographical citations. In addition he prepared answers to many inquiries from correspondents, oftentimes requiring considerable research.

Dr. Cyrus Thomas, ethnologist, devoted his time during the year to work on the catalogue of books and papers relating to the Hawaiian Islands. This catalogue, in the preparation of which Prof. H. M. Ballou, of Boston, Mass., is joint author, has grown to an extent not anticipated at the outset. During the last and next preceding fiscal years Professor Ballou examined, for this purpose, the libraries of Boston and other cities of New England, and also of New York. He also visited Hawaii, where he made a careful examination of the public and private libraries of Honolulu, obtaining thereby considerable early mission and official material of a bibliographical nature not found elsewhere. During the same period Doctor Thomas visited Boston and Worcester twice, searching the libraries chiefly along special lines to which Professor Ballou had not given exhaustive attention; he also devoted considerable time to an examination of the libraries of Washington. In addition to these researches considerable bibliographical material has been obtained by corre-

spondence. As a result of this work the number of titles in the catalogue (which is now about finished) reaches some 6,200—more than eight times the number in the largest catalogue in the same field hitherto published. Hon. George R. Carter, former governor of the Territory of Hawaii, has given much encouragement to this work; in fact, with Professor Ballou, he formed the leading spirit in its inception, though the beginning of the work for the bureau was undertaken quite independently. Doctor Thomas has appended a subject or cross-reference catalogue of about 3,200 titles, which is so nearly complete that it is hoped the entire work will be submitted for publication before the end of August, 1909. In addition to this work Doctor Thomas assisted to some extent in the preparation of Part 2 of the Handbook of American Indians, and attended to such official correspondence as was referred to him.

Mr. James Mooney, ethnologist, during the entire year was occupied chiefly in an investigation of the subject of the Indian population north of Mexico at the period of first disturbance and occupancy of the country by the whites. A preliminary study was condensed for introduction into Part 2 of the Handbook of the Indians. The final work is expected to appear as a bulletin of the bureau. The investigation is being carried out in detail for each well-defined geographic section, and for each tribe or tribal group separately, from the earliest period to the present, with careful sifting of authorities and consideration of Indian habits of living. No such detailed and extended study of the subject has ever before been attempted, and the result must prove of interest and importance. The usual share of attention was given also throughout the year to the preparation and proof reading of various articles for the Handbook of the Indians and to routine correspondence. On request of the Mississippi Valley Historical Association, Mr. Mooney, together with Doctor Swanton, attended the meeting of that body at St. Louis, June 17-19, as representatives of the bureau, and presented papers on the ethnology of the central region.

During the year Dr. John R. Swanton, ethnologist, was engaged as follows: The months of October, November, and December, 1908, were spent in Oklahoma, Texas, and Louisiana. In Oklahoma the Natchez linguistic material collected by Gallatin, Pike, Brinton, and Gatschet was gone over with one of the four surviving speakers of the Natchez language, and about fifty pages of text were recorded. In Texas the Alibamu Indians were visited in an endeavor, partially successful, to determine the relationship of the Pascagoula tribe, formerly resident near them. In Louisiana the linguistic material collected by Gatschet and Duralde was gone over with some of the surviving Attacapa, Chitimacha, and Tunica. On the way to Washington Doctor Swanton visited Columbia, S. C., to examine the early archives of that State. The most important result of the expedition, however, was the discovery at Marksville, La., of a woman who remembers a large amount of the Ofo language formerly spoken on Yazoo River. As large a vocabulary of this language as possible was recorded.

In the office Doctor Swanton completed the proof reading of his work "Tlingit myths and texts," which was ready for the press at the close of the year. He completed also a bulletin on "The Indian tribes of the lower Mississippi Valley and northern coast of the Gulf of Mexico," and read proofs of the same. Additional work was accomplished as follows: The editing of the late J. O. Dorsey's material on the Biloxi language (in press), and the proof reading of the same; the copying of texts collected during the field expedition above referred to, and incorporating the linguistic material then obtained with the material previously collected in the Natchez, Attacapa, Chitimacha, and Tunica languages, and the copying on cards of the Ofo vocabulary; the reading of

galley proofs of sketches of the grammar of the Haida and the Tlingit for the Handbook of Indian Languages; assistance rendered Doctor Thomas in preparing for publication his bulletin on the languages of Mexico and Central America, and work incidental to the preparation for publication of Byington's Choctaw Dictionary (in press).

Mr. J. N. B. Hewitt, ethnologist, was occupied in the office during the entire year. For a large portion of the time he was engaged in amending and transcribing the Onondaga text which, with a long supplement, is to form Part II of his Iroquoian Cosmology, and in supplying an interlinear rendering and a free translation of the text. From his researches in connection with the preparation of articles for the Handbook of the American Indians he arrived at facts which greatly modify hitherto accepted views regarding the location and interrelations of the tribes around lakes Huron and Michigan. In this connection he pursued extended studies of the early history of the Potawatomi, Mascoutens, Kickapoo, Sauk, Foxes, Miami, and the "Nation de la Fourche," or "Tribe of the Fork," in an effort to identify these tribes with those known to the early Hurons by names which occur in the writings of Champlain, Sagard, and the Jesuit Fathers. The expulsion of the Potawatomi, Sauk, Foxes, and the Tribe of the Fork from their earliest known habitat in Michigan by the Neutrals and their Ottawa allies—not by the Iroquois, as commonly asserted—was determined, and the most probable course of their retreat fixed. Similar research was conducted among early records to determine as far as possible the identity of the tribes whose names are recorded on the Dutch "Carte Figurative" of 1614, which represents them as living along the middle and upper Susquehanna River and its western affluents. As these names were erroneously identified as Spanish in origin, and as such adopted without question, much confusion and many inaccuracies have arisen in recent historical works.

Mr. Hewitt continued the collection and elaboration of linguistic data for the sketch of Iroquois grammar as exemplified in the Onondaga and the Mohawk, with parallel illustrative examples from the Seneca, Cayuga, and Tuscarora. He also partially rewrote the articles "Seneca" and "Sauk" for the Handbook of American Indians, and endeavored, so far as was feasible, to incorporate in the remaining galley proofs of this work the results of his later researches. Mr. Hewitt was also called on to prepare data of an ethnologic nature for official correspondence.

At the beginning of the year Dr. J. Walter Fewkes, ethnologist, was in the field, having just completed the excavation and repair of the cliff ruin known as the "Spruce-tree House," in Mesa Verde National Park, Colorado. Before the close of July he returned to Washington and commenced the preparation of a report on this work, and undertook to complete the reports of unfinished researches of previous years. During his stay in Washington his services were enlisted in the building of a number of large models of the ruins for the Alaska-Yukon-Pacific Exposition at Seattle and in supervising the painting of panoramic views of the Cliff Palace in Mesa Verde National Park for the same purpose.

In June Doctor Fewkes again took up his work among the Mesa Verde ruins, and by the close of the year had made excellent progress in uncovering and reinforcing the crumbling walls of Cliff Palace, the greatest of the ancient ruins of its kind in the arid country.

The funds for the actual work of excavation and repair of these ruins were furnished by the Department of the Interior, which has control of the park. Being the essential feature of the park, it is most fortunate that these important and interesting ruins are now receiving adequate care and protection,

since in recent years the progress of destructive agencies, especially the activities of relic hunters, has been very rapid.

SPECIAL RESEARCHES.

As in former years, a number of collaborators were engaged in conducting researches of a special nature in various fields. Dr. Franz Boas, honorary philologist of the bureau, continued his labors on the Handbook of Languages, assisted by a number of students. Prominent among these is Dr. Leo J. Frachtenberg, who at the close of the year was engaged in studying the language of the Siletz tribe on its reservation in Oregon. Volume I of the Handbook of Languages is now in press, and the work of Doctor Boas for the year included the proof reading of this volume as well as the preparation of the text of Volume II.

Miss Frances Densmore continued her researches relating to the music of the Chippewa, and a paper dealing with this subject was submitted for publication as Bulletin 45. A number of valuable phonographic records were obtained.

Mr. J. P. Dunn, who was assigned the linguistic work among the western Algonquian tribes left unfinished by the late Doctor Gatschet, continued the study of the Miami language among tribal remnants in Indiana and Oklahoma, and submitted a number of preliminary papers.

COLLECTIONS.

The collections acquired by the bureau and transferred to the National Museum during the year comprise fifteen accessions, the more important being as follows:

Collection of West Indian antiquities, purchased from C. W. Branch, St. Vincent, British West Indies.

Indian relics from Moosehead Lake, Maine, presented by Mr. J. D. McGuire.

Cache of flaked stone objects from Moosehead Lake, Maine, purchased from T. Wilson.

Collection of bones, pottery fragments, etc., obtained by Mr. J. D. McGuire and Dr. Aleš Hrdlička at Piscataway, Md.

Archeological objects collected by Dr. J. W. Fewkes, ethnologist, during the excavation and repair of Spruce-tree House in the Mesa Verde National Park, Colorado.

Pottery fragments from Coden, Ala.

Stone implements from Tiahuanaco, Bolivia, and an earthenware vessel from Nazco, Peru, collected by Mr. W. H. Holmes.

Fragments of earthenware of the variety known as "salt vessels," from the vicinity of Shawneetown, Ill., presented by Mr. R. Moore, of Equality, Ill.

Ethnologica of the Chitimacha Indians, collected by Dr. John R. Swanton.

PUBLICATIONS.

The editorial work remained in charge of Mr. J. G. Gurley, who for a short period had the assistance of Mr. Stanley Searles.

Work on the publications of the bureau during the fiscal year may be briefly summarized as follows: The proof reading of the Twenty-sixth Annual Report and of Bulletin 34 was completed, and these publications were issued. The Twenty-seventh Annual Report and Bulletins 39, 41, 42, 43, 46, and 47 were prepared for and submitted to the Government Printing Office. Of these at the close of the year Bulletin 42 was issued, while Bulletins 39 and 41, also Bulletin 38 (the proof reading of which occupied much time during the year), were substantially ready for the bindery. The Twenty-seventh Annual and Bulletin 43 were in galley form, and considerable progress had been made in the

composition of Bulletins 46 and 47. The preparation of nearly all the manuscript of Bulletin 40, Part I, was finished, and most of the volume was in type.

At the close of the year manuscripts duly approved for publication as bureau bulletins were on hand, as follows:

Bulletin 37 (partially edited). Antiquities of central and southeastern Missouri, by Gerard Fowke.

Bulletin 44 (partially edited). Linguistic families of Mexico and Central America, by Cyrus Thomas, assisted by John R. Swanton.

Bulletin 45. Chippewa music, by Frances Densmore.

The distribution of publications continued as in former years. The Twenty-sixth Annual Report was issued in July, and Bulletin 34 in December. During the year 1,676 copies each of the Twenty-sixth Annual Report and Bulletin 34 were sent to regular recipients, and 3,000 volumes and pamphlets were transmitted in response to special requests, presented largely by Members of Congress. The number of requests for the bureau's publications greatly exceeded those received during any previous year.

ILLUSTRATIONS.

The preparation of illustrations continued in charge of Mr. De Lancey Gill, with Mr. Henry Walther as assistant. Illustrative material for six bulletins and one annual report was completed during the year; of this material 498 illustrations were photographic prints and 77 were drawings. Proofs of the illustrations of three bulletins were examined and approved. Portrait negatives of 22 visiting Indian delegations to the number of 196 were made. The total output of the photographic laboratory was as follows: New negatives, 473; films exposed in the field and developed in the office, 454; photographic prints, 3,498.

LIBRARY.

The library continued in charge of Miss Ella Leary, librarian. During the year 1,459 volumes and about 700 pamphlets were received and catalogued, and about 2,000 serials, chiefly the publications of learned societies, were received and recorded. As the law now permits the binding of miscellaneous publications belonging to the library at the expense of the allotment for general printing and binding, it was found possible to bind a much larger number of volumes than in previous years, and thus to save many valuable works that were threatened with destruction. During the year 2,194 volumes were sent to the bindery, and of these all but about 500 had been received before the close of the fiscal year. In addition to the use of its own library, which is becoming more and more valuable through exchange and by limited purchase, it was found necessary to draw on the Library of Congress for the loan of 513 volumes. The library of the bureau now contains 15,511 volumes, about 11,000 pamphlets, and several thousand unbound periodicals.

LINGUISTIC MANUSCRIPTS.

Mr. J. B. Clayton served as custodian of manuscripts. The bureau now possesses 1,678 manuscripts, mostly linguistic, 19 having been added during the year, mainly by purchase. All of these are of great value, and the number includes four by Miss Frances Densmore on Chippewa music, four by Mr. J. P. Dunn on Miami and Peoria linguistics, one each by Miss Alice C. Fletcher on the Omaha Indians, Mr. D. I. Bushnell on the Choctaw Indians of Louisiana, and Mr. Paul Radin on the Winnebago Indians. The card catalogue of manuscripts is complete to date.

Respectfully submitted.

W. H. HOLMES, *Chief.*

DR. CHARLES D. WALCOTT,
Secretary of the Smithsonian Institution.

APPENDIX III.

REPORT ON THE INTERNATIONAL EXCHANGES.

SIR: I have the honor to submit a report on the operations of the International Exchange Service during the fiscal year ending June 30, 1909.

The most noteworthy event in connection with the service during the year was the passage of the following resolution:

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purpose of more fully carrying into effect the provisions of the convention concluded at Brussels on March fifteenth, eighteen hundred and eighty-six, and proclaimed by the President on January fifteenth, eighteen hundred and eighty-nine, the Public Printer is hereby authorized and directed to supply to the Library of Congress such number as may be required, not exceeding one hundred copies, of the daily issue of the Congressional Record for distribution, through the Smithsonian Institution, to the legislative chambers of such foreign governments as may agree to send to the United States current copies of their parliamentary record or like publication, such documents, when received, to be deposited in the Library of Congress. (Approved March 4, 1909.)

Though the Smithsonian Institution has endeavored on previous occasions to have the Congress set aside a number of copies of the daily Congressional Record for exchange with foreign governments, it has only now been possible to have the matter favorably acted upon—twenty years having elapsed since the ratification by this Government of the Brussels convention for the immediate exchange of the official journal.

Upon the passage of the above resolution, the Congressional Record was at once sent to the following countries, the parliaments of which already transmit their official journal to the Library of Congress or have agreed to do so:

Australia.	Greece.	Portugal.
Austria.	Guatemala.	Roumania.
Belgium.	Honduras.	Russia.
Brazil.	Hungary.	Servia.
Canada.	Italy.	Spain.
Cuba.	New South Wales.	Switzerland.
France.	Prussia.	Uruguay.

The subject has been brought to the attention of other countries, and it is anticipated that during the coming year this proposed exchange, which is of so much importance to the members of the various national legislatures, will be entered into with a number of additional governments. It should be stated, in this connection, that the exchange here alluded to is separate and distinct from the exchange of official documents which has existed between the United States and other countries for a number of years. It is interparliamentary, and provides for the immediate transmission, direct by mail, of the official journal as soon as published.

That the Smithsonian system of exchanges is appreciated by governmental and scientific establishments and men of learning throughout the world is indicated by the large number of packages intrusted to its care for distribution.

During the past year 228,875 packages were handled, being an increase over the number for the preceding year of 25,777—the largest annual increase in the history of the service. The total weight of these packages was 476,169 pounds, a gain of 40,884 pounds.

The handling and recording of these parcels has taxed to the utmost the limited force engaged in conducting the service, and it has only been possible to keep abreast of the work by the diligent application of each employee.

The appropriation by Congress for the support of the service during 1909 was \$32,200 (the same amount as was granted for the preceding year), and the sum collected on account of repayments was \$3,777.33, making the total available resources for carrying on the system of international exchanges \$35,977.33.

In the last report it was stated that the bureau had entered upon an active and definite campaign to secure reciprocal returns from abroad for the exchanges sent by this Government and its departments and bureaus. Though this work has added greatly to the correspondence of the office, it has been pursued with unabated vigor during the past year, and the results have been more than satisfactory. In some cases the returns have exceeded all expectations, hundreds of volumes having been received.

While the Japanese department of foreign affairs at Tokyo has, for a number of years, been good enough to distribute exchanges sent in its care for correspondents in Japan, the department has only recently signified its willingness to act in the full capacity of a bureau of exchanges—forwarding to the Smithsonian Institution consignments for distribution in the United States, as well as transmitting to their addresses in Japan exchanges sent in its care.

Reference was made in the last report to the fact that the Kingdom of Serbia, which was one of the signatories to the Brussels convention of 1886, had not established a bureau of exchanges and that the good offices of the Department of State had been solicited in bringing the matter to the attention of the Servian officials. I am gratified to state that these efforts have resulted in the establishment of a bureau under the department of foreign affairs at Belgrade. Packages received for Serbia in the future will therefore be sent to that department for distribution instead of being forwarded through the Smithsonian agent in Germany, as formerly. In the communication from Serbia regarding this subject, it is stated that copies of all of the official, scientific, and literary publications will henceforth be forwarded to the United States, and a request is made for similar documents of this Government. Serbia has accordingly been added to the list of those countries receiving full sets of official publications, the first shipment, consisting of 20 cases containing a collection of documents published since 1901, having been made on June 22, 1909.

In response to a request forwarded to the Library of Congress through the Department of State, Alsace-Lorraine was added to the list of foreign countries receiving partial sets of official documents of the United States. The first shipment, composed of 6 cases, was made under date of April 29, 1909.

Just before the close of the year a communication was received from the director of the Biblioteca Nacional at Buenos Aires, stating that by decree of his Government the Argentine bureau of exchanges had been withdrawn from the national library and connected with the comisión protectora de bibliotecas populares, Buenos Aires, which is under the direction of the department of public instruction. Consignments intended for that country will therefore be forwarded to the commission in the future. The Institution desires to record here its grateful acknowledgments for the services rendered in the past by the national library in the distribution of exchanges in the Argentine Republic.

In spite of the extra efforts put forth by this bureau in making shipments to all countries at least once a month—in some instances, two, three, and even

four times a month—complaints regarding delay in the delivery of packages to addresses in other countries have been received by the Institution. These delays, as a rule, occur in the various foreign exchange bureaus after consignments have passed beyond the control of the Institution. An improvement in the service in this respect can therefore be brought about only by the societies and individuals in other countries themselves taking the matter up directly with their own governments. Whenever such complaints have been received this course has been suggested.

So far as reported to this office, the service has not suffered the loss of any of its consignments during the past year. When it is considered that nearly 2,000 boxes were shipped to every quarter of the globe, this statement is worthy of note.

INTERCHANGE OF PUBLICATIONS BETWEEN THE UNITED STATES AND OTHER COUNTRIES.

The statement which follows shows in detail the number of packages received for transmission through the International Exchange Service during the year ending June 30, 1909:

Country.	Packages.		Country.	Packages.	
	For.	From.		For.	From.
Algeria.....	146	68	Dominica.....	43	.....
Angola.....	3	.....	Dutch Guiana.....	33	.....
Antigua.....	46	.....	Ecuador.....	247	31
Arabia.....	29	.....	Egypt.....	369	282
Argentina.....	3,378	464	Falkland Islands.....	5	.....
Austria-Hungary.....	8,003	2,903	Fiji Islands.....	38	.....
Azores.....	32	.....	France.....	13,074	5,969
Bahamas.....	33	.....	French Cochin China.....	41	7
Barbadoes.....	110	.....	French Guiana.....	3	.....
Beira.....	12	.....	German East Africa.....	22	.....
Belgium.....	4,535	2,753	Germany.....	24,821	8,763
Bermudas.....	79	.....	Gibraltar.....	4	2
Billiton.....	2	.....	Gold Coast.....	7	.....
Bismarck Archipelago.....	1	.....	Grenada.....	7	.....
Bolivia.....	180	.....	Great Britain and Ireland..	22,808	8,427
Borneo.....	6	.....	Greece.....	1,548	3
Brazil.....	2,713	486	Greenland.....	8	.....
British America.....	7,306	446	Guadeloupe.....	2	.....
British Burma.....	47	2	Guatemala.....	384	.....
British Central Africa.....	1	.....	Haiti.....	1,242	.....
British East Africa.....	4	.....	Hawaiian Islands.....	46	.....
British Guiana.....	84	.....	Honduras.....	318	.....
British Honduras.....	64	.....	Hongkong.....	188	1
Bulgaria.....	215	131	Iceland.....	60	37
Canary Islands.....	18	.....	India.....	2,710	176
Cape Colony.....	1,663	22	Italy.....	7,458	1,352
Cape Verde Islands.....	1	.....	Jamaica.....	261	68
Ceylon.....	263	.....	Japan.....	3,244	1,646
Chile.....	2,461	2,450	Java.....	220	128
China.....	1,088	65	Kongo Free State.....	2	.....
Colombia.....	1,348	1	Korea.....	66	.....
Costa Rica.....	1,672	4	Lagos.....	2	.....
Cuba.....	1,544	265	Liberia.....	527	1
Curaçao.....	11	.....	Lourenço Marquez.....	122	.....
Cyprus.....	6	.....	Luxemburg.....	84	41
Denmark.....	2,022	1,015	Macao.....	1	.....

Country.	Packages.		Country.	Packages.	
	For.	From.		For.	From.
Madagascar	30		St. Kitts	14	
Madeira	8		St. Lucia	12	
Malaya	6		St. Martin	12	
Malta	128	1	St. Pierre and Miquelon.....	14	
Martinique	14		St. Thomas	17	
Mauritius	74		St. Vincent	4	
Mexico	1,763	257	Salvador	186	83
Montenegro	105		Samoa	17	
Montserrat	2		Santo Domingo	35	
Morocco	15		Sarawak	3	
Natal	248	16	Senegal	6	
Netherlands	3,226	1,517	Servia	735	1
Nevis	3		Siam	1,193	76
Newfoundland	152	39	Sierra Leone	24	
New Hebrides	13		Society Islands	20	
New South Wales	2,955	462	South Australia	1,605	439
New Zealand	1,880	243	Spain	2,599	185
Nicaragua	230	1	Straits Settlements	224	4
Norfolk Islands	13		Sudan	34	1
Norway	2,670	522	Sumatra	6	
Orange River Colony	129	1	Sweden	8,366	50
Panama	190		Switzerland	4,348	1,540
Paraguay	170	2	Tasmania	1,321	11
Persia	45		Transvaal	1,411	10
Peru	1,562	761	Trinidad	127	
Philippine Islands	199		Tunis	39	8
Porto Rico	27		Turkey	1,556	
Portugal	1,800	2	Turks Islands	20	
Portuguese West Africa	3		United States	52,524	180,292
Queensland	1,589	261	Uruguay	1,965	867
Reunion	27		Venezuela	1,289	2
Rhodesia	36		Victoria	3,329	208
Roumania	536	12	Western Australia	1,463	551
Russia	5,339	2,435	Zanzibar	17	
St. Croix	4		Total	228,875	228,875
St. Helena	8				

During the year there were sent abroad 1,963 boxes (an increase over 1908 of 54 boxes), of which 236 contained complete sets of United States Government documents for authorized depositories and 1,727 were filled with departmental and other publications for depositories of partial sets and for distribution to miscellaneous correspondents.

EXCHANGE OF GOVERNMENT DOCUMENTS.

The number of packages sent abroad through the International Exchange Service by United States Government establishments during the year was 122,340, an increase over the number forwarded during the preceding twelve months of 19,646; while 20,216 packages were received in exchange, an increase of 3,363. This disparity between the number of packages received and those sent may be accounted for largely by the fact that many returns for the publications forwarded abroad are not made through the exchange service, but are sent to their destinations direct by mail. This difference is further due to the

practice of sending consignments to the Library of Congress intact, in many cases a whole box of publications being entered on the records of this office as one package.

FOREIGN DEPOSITORIES OF UNITED STATES GOVERNMENT DOCUMENTS.

In accordance with treaty stipulations and under the authority of the congressional resolutions of March 2, 1867, and March 2, 1901, setting apart a certain number of documents for exchange with foreign countries, there are now sent regularly to depositories abroad 55 full sets of United States official publications and 33 partial sets—Servia having been added during the year to the list of countries receiving full sets and Alsace-Lorraine to the list of those receiving partial sets, the details concerning which will be found above. The recipients of full and partial sets are as follows:

DEPOSITORIES OF FULL SETS.

- Argentina: Ministerio de Relaciones Exteriores, Buenos Aires.
 Argentina: Biblioteca de la Universidad Nacional de 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: Bibliothèquc Royale, Brussels.
 Brazil: Bibliotheca Nacional, Rio de Janeiro.
 Canada: Parliamentary Library, Ottawa.
 Cape Colony: Government Stationery Department, Cape Town.
 Chile: Biblioteca del Congreso Nacional, Santiago.
 China: American-Chinese Publication Exchange Department, Shanghai Bureau of Foreign Affairs, Shanghai.
 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.
 England: London School of Economics and Political Science, London.
 France: Bibliothèquc Nationale, Paris.
 France: Préfecture de la Seine, Paris.
 Germany: Deutsche Reichstags-Bibliothek, Berlin.
 Greece: Bibliothèquc Nationale, Athens.
 Haiti: Secrétairerie d'État des Relations Extérieures, Port au Prince.
 Hungary: Hungarian House of Delegates, Budapest.
 India: Home Department, Government of India, Calcutta.
 Ireland: National Library of Ireland, Dublin.
 Italy: Biblioteca Nazionale Vittorio Emanuele, Rome.
 Japan: Department of Foreign Affairs, Tokyo.
 Manitoba: Provincial Library, Winnipeg.
 Mexico: Instituto Bibliográfico, Biblioteca 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: Stortingets 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.
 Servia : Ministère des Affaires Etrangères, Belgrade.
 South Australia : Parliamentary Library, Adelaide.
 Spain : Depósito de Libros, Cambio Internacional y Biblioteca General del
 Ministerio de Instrucción Pública y Bellas Artes, Madrid.
 Sweden : Kungliga Biblioteket, Stockholm.
 Switzerland : Bibliothéque Fédérale, Berne.
 Tasmania : Parliamentary Library, Hobart.
 Transvaal : Government Library, Pretoria.
 Turkey : Department 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.

DEPOSITORIES OF PARTIAL SETS.

Alberta : Legislative Library, Edmonton.
 Alsace-Lorraine : K. Ministerium für Elsass-Lothringen, Strassburg.
 Bolivia : Ministerio de Colonización y Agricultura, La Paz.
 British Columbia : Legislative Library, Victoria.
 Bremen : Kommission für Reichs- und Auswärtige Angelegenheiten.
 Bulgaria : Minister of Foreign Affairs, Sofia.
 Ceylon : United States Consul, Colombo.
 Ecuador : Biblioteca Nacional, Quito.
 Egypt : Bibliothéque Khédiviale, Cairo.
 Guatemala : Secretary of the Government, Guatemala.
 Hamburg : Senatskommission für die Reichs- und Auswärtigen Angelegenheiten.
 Hesse : Grossherzogliche Hof-Bibliothek, Darmstadt.
 Honduras : Secretary of the Government, Tegucigalpa.
 Jamaica : Colonial Secretary, Kingston.
 Liberia : Department of State, Monrovia.
 Lourenço Marquez : Government Library, Lourenço Marquez.
 Malta : Lieutenant-Governor, Valetta.
 Montenegro : Ministère Princier des Affaires Étrangères, Cetinje.
 Natal : Colonial Governor, Pietermaritzburg.
 Newfoundland : Colonial Secretary, St. John.
 New Brunswick : Legislative Library, St. John.
 Nicaragua : Superintendente de Archivos Nacionales, Managua.
 Northwest Territories : Government Library, Regina.
 Nova Scotia : Legislative Library, Halifax.
 Orange River Colony : Government Library, Bloemfontein.
 Panama : Secretaria de Relaciones Exteriores, Panama.
 Prince Edward Island : Legislative Library, Charlottetown.
 Paraguay : Oficina General de Informaciones y Canjes y Commisaria General
 de Inmigracion, Asuncion.
 Roumania : Academia Romana, Bucarest.
 Salvador : Ministerio de Relaciones Exteriores, San Salvador.

Straits Settlements: Colonial Secretary, Singapore.
 Siam: Department of Foreign Affairs, Bangkok.
 Vienna: Bürgermeister der Haupt- und Residenz-Stadt.

CORRESPONDENTS.

The record of exchange correspondents at the close of the year contained 62,630 addresses, being an increase of 2,507 over the preceding year. A table showing the number of correspondents in each country at the close of 1907 will be found in the report for that year.

LIST OF BUREAUS OR AGENCIES THROUGH WHICH EXCHANGES ARE TRANSMITTED.

Following is a list of bureaus or agencies abroad through which the distribution of exchanges is effected. Those in the larger and many in the smaller countries forward to the Smithsonian Institution in return contributions for distribution in the United States:

Algeria, via France.
 Angola, via Portugal.
 Argentina: Presidente de la Comisión Protectora de Bibliotecas Populares, Ministerio de Instrucción Pública, Buenos Aires.
 Austria: K. K. Statistische Central-Commission, Vienna.
 Azores, via Portugal.
 Barbados: Imperial Department of Agriculture, Bridgetown.
 Belgium: Service Belge des Échanges Internationaux, Brussels.
 Bermuda. (Sent by mail.)
 Bolivia: Oficina Nacional de Inmigración, Estadística y Propaganda Geográfica, La Paz.
 Brazil: Serviço de Permutações Internacionais, Bibliotheca Nacional, Rio de Janeiro.
 British Colonies: Crown Agents for the Colonies, London.^a
 British Guiana: Royal Agricultural and Commercial Society, Georgetown.
 British Honduras: Colonial Secretary, Belize.
 Bulgaria: Institutions et Bibliothèque Scientifiques de S. A. R. le Prince de Bulgarie, Sofia.
 Canada. (Sent by mail.)
 Canary Islands, via Spain.
 Cape Colony: Government Stationery Department, Cape Town.
 Chile: Servicio de Canjes Internacionales, Biblioteca Nacional, Santiago.
 China: Zi-ka-wei Observatory, Shanghai.
 Colombia: Oficina de Canjes Internacionales y Reparto, Biblioteca Nacional, Bogota.
 Costa Rica: Oficina de Depósito y Canje de Publicaciones, San José.
 Cuba. (Sent by mail.)
 Denmark: Kongelige Danske Videnskabernes Selskab, Copenhagen.
 Dutch Guiana: Surinaamsche Koloniale Bibliotheek, Paramaribo.
 Ecuador: Ministerio de Relaciones Exteriores, Quito.
 Egypt: Director-General, Survey Department, Giza (Mudiria).
 France: Service Français des Échanges Internationaux, Paris.
 Friendly Islands. (Sent by mail.)
 Germany: Karl W. Hiersemann, Königsstrasse 29, Leipzig.

^a This method is employed for communicating with several of the British colonies with which no medium is available for forwarding exchanges direct.

- Great Britain and Ireland: Messrs. William Wesley & Son, 2S Essex street, Strand, London.
- Greece: Bibliothèque Nationale, Athens.
- Greenland, via Denmark.
- Guadeloupe, via France.
- Guatemala: Instituto Nacional de Guatemala, Guatemala.
- Guinea, via Portugal.
- Haiti: Secrétaire d'Etat des Relations Extérieures, Port au Prince.
- Honduras: Biblioteca Nacional, Tegucigalpa.
- Hungary: Dr. Julius Pikler, Municipal Office of Statistics, City Hall, Budapest.
- Iceland, via Denmark.
- India: India Store Department, India Office, London.
- Italy: Ufficio degli Scambi Internazionali, Biblioteca Nazionale Vittorio Emanuele, Rome.
- Jamaica: Institute of Jamaica, Kingston.
- Japan: Department of Foreign Affairs, Tokyo.
- Java, via Netherlands.
- Korea. (Shipments temporarily suspended.)
- Liberia: Department of State, Monrovia.
- Lourenço Marquez: Government Library, Lourenço Marquez.
- Luxemburg, via Germany.
- Madagascar, via France.
- Madeira, via Portugal.
- Mexico. (Sent by mail.)
- Montenegro: Ministère Princier des Affaires Étrangères, Cetinje.
- Mozambique, via Portugal.
- Natal: Agent-General for Natal, London.
- Netherlands: Bureau Scientifique Central Néerlandais, Bibliothèque de l'Université, Leyden.
- Newfoundland. (Sent by mail.)
- New Guinea, via Netherlands.
- New Hebrides. (Sent by mail.)
- New South Wales: Board for International Exchanges, Public Library, Sydney.
- New Zealand: Dominion Museum, Wellington.
- Nicaragua: Ministerio de Relaciones Exteriores, Managua.
- Norway: Kongelige Norske Frederiks Universitet Bibliotheket, Christiania.
- Paraguay: Ministerio de Relaciones Exteriores, Asuncion.
- Persia: Board of Foreign Missions of the Presbyterian Church, New York City.
- Peru: Oficina de Reparto, Depósito y Canje Internacional de Publicaciones, Ministerio de Fomento, Lima.
- Portugal: Servico de Permutações Internacionaes, Bibliotheca Nacional, Lisbon.
- Queensland: Board of Exchanges, Brisbane.
- Roumania, via Germany.
- Russia: Commission Russe des Echanges Internationaux, Bibliothèque Impériale Publique, St. Petersburg.
- Saint Christopher. (Sent by mail.)
- Salvador: Ministerio de Relaciones Exteriores, San Salvador.
- Santo Domingo. (Sent by mail.)
- Servia: Department of Foreign Affairs, Belgrade.
- Siam: Department of Foreign Affairs, Bangkok.
- South Australia: Public Library of South Australia, Adelaide.
- Spain: Depósito de Libros, Cambio Internacional y Biblioteca General del Ministerio de Instrucción Pública y Bellas Artes, Madrid.
- Sumatra, via Netherlands.

Sweden : Kongliga Svenska Vetenskaps Akademien, Stockholm.
Switzerland : Service des Echanges Internationaux, Bibliothèque Fédérale Centrale, Bern.
Syria : Board of Foreign Missions of the Presbyterian Church, New York.
Tasmania : Royal Society of Tasmania, Hobart.
Transvaal : Government Library, Pretoria.
Trinidad : Victoria Institute, Port of Spain.
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 of Victoria, Melbourne.
Western Australia : Public Library of Western Australia, Perth.
Zanzibar. (Sent by mail.)

Dr. Cyrus Adler resigned his position as assistant secretary in charge of library and exchanges on September 30, 1908.

Respectfully submitted.

F. V. BERRY,

Chief Clerk, International Exchange Service.

DR. CHARLES D. WALCOTT,

Secretary of the Smithsonian Institution.

APPENDIX IV.

REPORT ON THE NATIONAL ZOOLOGICAL PARK.

SIR: I have the honor to submit the following report on the condition and operations of the National Zoological Park for the fiscal year ending June 30, 1909.

RESOURCES.

The entire support of the park was provided for by an item in the sundry civil act approved May 27, 1908, appropriating \$95,000 for general purposes, including the purchase, transportation, care and maintenance of animals; the care and improvement of grounds; the construction and repair of all buildings, inclosures, roads, walks, and bridges. A sum of equal amount has been appropriated annually for several years past. The considerable increase in the prices of the necessary provisions and labor has made it increasingly difficult to do anything toward developing the park to the standard that such institutions usually attain at the capitals of great nations. The expenses of maintenance alone amounted to about \$85,000, so it will be seen that there was but little margin left for additional works.

It should be remembered that at the inception of the park the funds provided for buildings and improvements were entirely inadequate for its proper equipment and that consequently the management was forced to construct cheap, temporary shelters, roads, walks, and inclosures. These have now arrived at about their limit of usefulness and do not admit of further economical repair. It is not for the interest of the Government to continue to erect structures of this class, and it would certainly be advantageous to have sufficient appropriations to replace them with satisfactory permanent buildings.

BUILDINGS AND INCLOSURES.

The principal improvements made during the year were the completion of a series of bear yards and the construction of a series of 10 new yards for wolves and foxes.

Bear yards.—Six yards of the series had been built up to the beginning of the year. During 1908-9 the terminal yard, 42 feet wide and 26 feet deep, at the east end of the series, was built, and the north end of the series was completed by the construction of three yards from 32 to 36 feet deep and 32, 24, and 40 feet wide, respectively. All of the yards have floors of rock and concrete except the large one at the north end, where most of the area has been left in the original hard clay over which is spread a thick layer of sand. A concrete walk 12 feet wide was constructed in front of all the new yards, and a trellis of steel bars was built over the walk and in front of the cages, over which vines will be trained, to afford shelter until trees are large enough to give sufficient shade. The cost of the work on the bear yards during the year was about \$6,000. The steep bank adjoining the yards was graded and a macadam walk with stone steps was built to furnish a convenient approach.

The completion of the series of yards made it possible to transfer all of the bears from the temporary wooden cages that they have been occupying to their permanent quarters. The cages were then removed, and the area which they had occupied was graded and planted.

Wolf and fox yards.—Since the occupation of the park the wolves and foxes have been kept in temporary yards near the lion house. This has been unsatisfactory in several respects, the yards being of an irregular and unsightly character, rather obtrusive, and not as secure as desirable. A better site for them was selected at the foot of the steep acclivity, where the stream from the beaver valley empties into Rock Creek. There were constructed here a series of ten yards having a total frontage of 230 feet, with a depth varying from 16 to 36 feet. The fence was constructed of heavy wire netting with square mesh, on steel posts, and has a height of 6 feet 6 inches. A retiring den for each yard was excavated in the hill at the rear of the cages and arranged with a door outside the inclosure for the keeper's use. These cages, as well as the bear yards, were completed and occupied in the late autumn of 1908.

An entirely pleasant feature of this site is its secluded, woodland character, enhanced by the little stream flowing down over rocks to the creek. Considerable planting was done here, using the material indigenous to the neighborhood in order to retain as far as possible the original character of the forest.

The cost of this series of yards was about \$2,600.

ROADS AND WALKS.

Lack of funds prevented the continued prosecution of the repair of roads and walks in the park, only such work being done as was absolutely necessary for the public safety. The Adams Mill road and part of the road along the banks of the creek were treated with a coal-tar product known as "terracolio," to obtain freedom from dust and prevent the washing of the roadbed during heavy rains. This was fairly successful. Some of the walks were treated with another coal-tar preparation known as "tarvia." This, too, proved an excellent preventive of dust and abrasion.

The shaded walk and stairway from the Adams Mill entrance to the lower levels of the park was completed and a small rest house and shelter built at the upper end. It is believed that this walk can be made one of the most attractive features of the park. In spite of the careful watch, some difficulty is experienced in preventing the uprooting and carrying away by visitors of the ferns and other specimens that have been planted in profusion along its sides. The amount expended on the walk during the present year was about \$700, while the rustic shelter, 20 by 25 feet, cost approximately \$400.

ACCESSIONS AND LOSSES.

Gifts included 5 chamois from Bernese Oberland, received through the Department of the Interior from the Swiss Government as a gift to the United States Government; 3 young Alaskan brown bears from Mr. George Mixer, 2d, of Boston, Mass.; 3 Barbados woolless sheep, from the United States Department of Agriculture; a large grizzly bear and female black bear with 2 cubs were received from Lieut. Gen. S. B. M. Young, superintendent Yellowstone National Park; also 2 mule deer and 2 prong-horn antelopes from Maj. H. C. Benson, who succeeded General Young at the Yellowstone Park. Ten beavers were also obtained in the Yellowstone Park through the cooperation of General Young.

A lioness, a pair of Sarus cranes, 2 European flamingoes, and a fishing cat were received in exchange for surplus animals.

Purchases included a pair of Rocky Mountain sheep, an Arabian camel, a reindeer from Alaska, a cassowary, 2 South American condors, 2 jabirus, etc.

Births numbered 110, and included a Brazilian tapir, 3 American bison, a yak, 4 tigers, 2 black bears, a llama, 6 Barbary sheep, 17 deer of 6 species, kangaroos, armadillos, etc., also various birds.

The deaths included the Philippine water buffalo, which died from peritonitis resulting from the bursting of an abscess of the rumen; a young orang, which died from leukemia; and a leopard, which, also, died from peritonitis. A Rocky Mountain goat, which was deposited in the park, died thirty-seven days after its receipt, from tuberculosis, which evidently had been contracted while it was kept in confinement near the place of capture in British Columbia. An European flamingo, a crowned pigeon, and several other birds died from aspergillosis, and five storks from cercomonad roup.

One hundred and thirty-eight autopsies were made by the pathologists of the Bureau of Animal Industry and two by the Laboratory of Hygiene, which gave the following results:

Cause of death, 1908-9.

Pneumonia.....	20	Hydrophilosis.....	1
Tuberculosis.....	16	Subcutaneous acariasis.....	1
Pulmonary congestion.....	8	Uncinariasis.....	2
Aspergillosis.....	6	Proteus bacillosis.....	3
Enteritis (and gastro-enteritis).....	20	Echinococcosis.....	1
Nephritis.....	6	Porocephalus infestation.....	2
Necrosis of liver.....	2	Rabies.....	3
Hepatitis.....	1	Myofibroma.....	1
Parenchymatous degeneration of liver.....	1	Goiter.....	1
Fatty degeneration of liver.....	1	Osteomalacia.....	2
Peritonitis.....	5	Impaction of bowel.....	3
Pericarditis.....	2	Impaction of crop.....	1
Fatty degeneration of heart and liver.....	1	Urinary concretions in cloaca.....	1
Valvular obstruction of heart.....	1	Broken egg in cloaca.....	1
Septicemia.....	1	Starvation.....	5
Leukemia.....	1	Starvation resulting from cystic tumor in throat.....	1
Cercomonad roup.....	4	Stillborn.....	4
Infectious entero-hepatitis.....	1	Accident.....	7
Coccidial typhlitis.....	1	No cause found.....	2

VISITORS.

The number of visitors to the park during the year was 564,639, a daily average of about 1,547. The largest number in any month was 127,635, in April, 1909, a daily average of 4,254.

During the year there visited the park 148 schools. Sunday schools, classes, etc., with 4,611 pupils, a monthly average of 384 pupils. While most of them were from the city and the immediate vicinity, 25 of the schools were from neighboring States, and classes came from Lowell, Warren, Boston, Fall River, and Dover, Mass.; Portland, Augusta, and Auburn, Me.; and Wallingford; Vt.

NEEDS OF THE PARK.

Aquarium.—The present building was originally a hay shed of ordinary Virginia pine lumber. It is now in a most dilapidated condition, the foundation

having sunk so much as to crack the glass of the fish tanks, thus causing them to leak. It will be necessary to close this building temporarily unless some means are found for totally reconstructing it. An exhibit of fish and other marine animals is one of the most attractive that can be given in a zoological collection, and it is very desirable that it should be maintained.

General aviary.—The need for a structure of this character is evident to any intelligent visitor to the park. Only a part of the collection can now be exhibited to the public because of lack of room. A number of outdoor shelters and cages should also be provided for the exhibition of hardy birds.

Inclōsure for sea lions and seals.—A proper pool for these animals, with suitable shelter, should be built as soon as possible. A good site for such an exhibit would be just above the wolf and fox dens in the beaver valley.

Antelope house.—The inadequacy of this building has been mentioned in previous reports. If any considerable additions of ruminant animals are received at the park, it will be necessary to enlarge it.

Office building.—It is greatly to the disadvantage of the park to have the superintendent's office at so great a distance from the general working force. A suitable structure should be built near the center of activity.

Restaurant and public comfort.—The park is becoming more and more a place of frequent resort for the public, as is shown by the number of visitors. The present arrangements are totally inadequate. A good restaurant building is urgently needed. Shelters and addition public comfort quarters for visitors are also wanted. At present, whenever a quick rainstorm occurs, many visitors are unable to get proper shelter.

Roads and walks.—It is highly desirable that the construction of roads and walks, which was commenced under the appropriation of \$15,000, made in 1907, should now be continued. The general appropriation for the park is insufficient for this purpose.

STATEMENT OF THE COLLECTION.

Accessions during the year :

Presented	124
Received in exchange.....	12
Purchased.....	307
Deposited.....	9
Born and hatched in the National Zoological Park.....	110
Captured in Yellowstone National Park.....	14
Total.....	576

Presented.

Diamond rattlesnake, C. R. Kappone, Cairo, Ga.....	1
Rhesus monkey, F. N. Meyer, Department of Agriculture.....	2
Alligator, Mrs. G. F. Graham, jr.....	1
Common canary, William J. Myatt, Sharon Hill, Philadelphia, Pa.....	27
Chapman's curassow, C. H. Jones, Campeche, Mexico.....	1
Purplish guan, C. H. Jones, Campeche, Mexico.....	1
Barbados sheep, experiment station, United States Department of Agriculture.....	3
Alaska peninsula, brown bear, George Mixter, 2d, Boston, Mass.....	3
Common canary, R. L. Beard, 1013 H street NW., Washington, D. C.....	1
Unidentified bird, Wm. J. Myatt, Sharon Hill, Philadelphia, Pa.....	1
Chicken snake, E. T. Carrico, Stithton, Ky.....	1

Hog-nosed snake, E. T. Carrico, Stithton, Ky.....	1
Capuchin monkey, Miss M. Alexander, Moorefield, W. Va.....	1
Coyote, the President, Washington, D. C.....	1
Banded rattlesnake, Dr. Prentiss Wilson, 2024 O street NW., Wash- ington, D. C.....	1
Blacksnake, Mrs. Hall, 2428 Wisconsin avenue, Washington, D. C.....	1
Spotted lynx, Mr. Hunt, superintendent registry division, city post-office..	1
Black bear, the President, Washington, D. C.....	1
Cooper's hawk, Russel Meredith, 1219 Girard street, Washington, D. C....	1
Hog-nosed snake, Capt. J. Walter Mitchell, the Evening Star, Washing- ton, D. C.....	1
Gray fox, Miss M. P. Offerdinger, 330 A street NE., Washington, D. C....	1
Lizard, D. J. Nicholson, Orlando, Fla.....	1
Diana monkey, Nikolai Sokoloff, 14 Park lane, Jamaica Plain, Boston, Mass.....	1
Sharp-shinned hawk, W. A. Sherman, Vienna, Va.....	1
English rabbit, Mrs. John R. McLean, Friendship, D. C.....	11
Common ferret, Mrs. John R. McLean, Friendship, D. C.....	1
Alligator, Miss Sarah Leon, 1133 Fourteenth street, Washington, D. C....	1
Yellow-fronted amazon, E. A. Klages, Crafton, Pa.....	1
Rabbit, J. B. Henderson, jr., 1306 Euclid place, Washington, D. C.....	1
Brown capuchin monkey, Hon. S. B. Elkins, United States Senate.....	1
Pine snake, George V. Green, 304 Tenth street NW., Washington, D. C....	2
Barn owl, Charles Ewald, Alexandria, Va.....	1
Mallard duck, Mrs. L. E. Johnson, 1007 L street NW., Washington, D. C..	1
Red-tailed hawk, Jesse Hand, jr., Belleplain, N. J.....	1
Belgian hare, J. H. Fellows, 5504 Wisconsin avenue, Washington, D. C....	1
American raven, J. K. P. Gates, Keokee, Va.....	1
Barn owl, Adrian Poole, Ashburn, Va.....	1
Barred owl, 1111 K street NW., Washington, D. C.....	1
Screech owl, W. S. Hinman, 2700 Thirteenth street NW., Washington, D. C.....	1
Bullfinch, attaché of the Austrian embassy, Washington, D. C.....	1
Common opossum, the President, Washington, D. C.....	3
Common opossum, W. L. McAtee, Department of Agriculture.....	1
Mule deer, Maj. H. C. Benson, superintendent Yellowstone National Park, Wyoming.....	2
Prong-horn antelope, Maj. H. C. Benson, superintendent Yellowstone National Park, Wyoming.....	2
Raccoon, Charles H. Smith, Piedmont, Va.....	1
Raccoon, F. J. Clark, Irvine, Pa.....	1
Common opossum, Pink Cherry Market Company, Atlanta, Ga.....	9
Alligator, Mr. Widderfield, 1217 Connecticut avenue NW., Washington, D. C.....	3
Yellow-fronted amazon, Richard Wood, 43 Quincy place, Washington, D. C.....	1
Common skunk, F. Johnson, Washington, D. C.....	1
Great horned owl, F. Johnson, Washington, D. C.....	2
Alligator, attaché of the Austrian embassy, Washington, D. C.....	1
Alligator, Harry Williams, 418 E street NE., Washington, D. C.....	1
Bald eagle, C. F. Brock, 53 I street NE., Washington, D. C.....	2
Chamois, Swiss Government.....	5
Common canary, George Hawkins, 2316 First street NW., Washing- ton, D. C.....	1

Black snake, F. C. Harley, Washington, D. C.....	1
Black muscovy duck, J. H. Holmead, 3531 Thirteenth street NW., Wash- ington, D. C.....	1
Alligator, John H. Knight, 1410 Chapin street NW., Washington, D. C....	1
Common canary, A. L. Brandon, 2130 G street, Washington, D. C.....	1
Common goat, Louis Brandt, 400 New Jersey avenue NW., Washington, D. C.....	1
Cougar, A. P. Proctor, New York City.....	1
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SUMMARY.

Animals on hand July 1, 1908.....	1,402
Accessions during the year.....	576
Total	1,978
Deduct loss (by exchange, death, and returning of animals).....	562
On hand June 30, 1909.....	1,416

	Species.	Individuals.
Mammals.....	143	578
Birds.....	173	711
Reptiles.....	38	127
Total.....	354	1,416

Respectfully submitted.

FRANK BAKER, *Superintendent.*

Dr. CHARLES D. WALCOTT,

Secretary of the Smithsonian Institution.

APPENDIX V.

REPORT ON THE ASTROPHYSICAL OBSERVATORY.

SIR: During the past year the temporary wooden shelters used for observing on Mount Wilson, California, in 1905, 1906, and 1908 have been torn down and replaced by a structure of cement blocks. This was erected at a cost of \$2,200 on a plot of ground 100 feet square in horizontal projection, leased for a term of ninety-five years by the Smithsonian Institution from the Mount Wilson Solar Observatory. The new observing shelter is L shaped in plan, 36 feet long, 27 feet wide, and with the two branches of the L 14 and 10 feet wide, respectively. Four tall piers are provided for the future erection of a tower over the south end of the structure. The proposed tower is intended for use as a vertical telescope in solar observations and also as a suitable station for making measurements of the brightness of the sky and clouds. Within the new building is a chamber of constant temperature in which is the spectro-bolometric outfit, and also a dark room for photographic work and a small office room. The site leased is on the edge of a precipitous ridge overlooking canyons about 1,000 feet deep on the east, south, and west. It is thoroughly isolated from disturbances caused by electric service, gas engines, or traffic, and seems to be peculiarly well adapted for the work in hand.

The personnel of the observatory has continued principally unchanged. Mr. L. B. Aldrich completed his temporary service as bolometric assistant on September 20, 1908. Dr. L. R. Ingersoll was engaged temporarily as bolometric assistant on Mount Wilson beginning June 21, 1909.

WORK OF THE YEAR.

1. Work at Washington.

Mr. Fowle has continued bolometric observations of the brightness of different parts of the sun's image whenever conditions favored. No measurements of the solar constant of radiation were attempted at Washington, as that branch of the work can seldom be done there successfully, on account of smoke and clouds.

A most interesting piece of experimental work on the transparency of air for the long-wave rays, such as the earth radiates, had been begun by Mr. Fowle early in 1908. Results have been obtained by him for the transmission of all rays between wave-lengths 1μ and 10μ , through a column of air 400 feet long, containing various known amounts of water vapor. Computation of the results from these experiments is so far advanced as to show their satisfactory quality. Many additional experiments with still longer columns of air and other amounts of water vapor, and extending as far down in the spectrum as wave-length 17μ , are in preparation.

The late Secretary Langley stated,^a as a result of his Mount Whitney observations: "I consider that the temperature of the earth under direct sunshine, even though our atmosphere were present as now, would probably fall

^a Report of the Mount Whitney Expedition, p. 123.

to -200° C. if that atmosphere did not possess the quality of selective absorption." A little later his experimental results on the temperature of the moon led him to change this view, for he said:^a "As between my observations and my inferences, I hold to the former; and since later and long-continued observations * * * show that the temperature of the sunward surface of the moon (which is certainly nearly airless) is almost certainly not greatly below zero (centigrade), I have been led to believe myself mistaken in one of my inferences drawn from former experiments." Precise knowledge of the selective absorption of our atmosphere for earth rays is still lacking, although two decades have elapsed since this was written, and contradictory views are still being expressed about this very important subject by able writers. It is hoped that Mr. Fowle's experiments will add much definite information, useful in the study of the dependence of the earth's temperature on radiation.

Computations of the results of Washington and Mount Wilson observations have gone on steadily, but it has not been possible to keep the reductions abreast with the numerous observations now being obtained. It has been considered desirable to make daily observations of the "solar constant of radiation" during the observing season at Mount Wilson, and the reduction of each day's observations requires several days of measurements and computations at Washington.

2. *Work at Mount Wilson.*

Spectro-bolometric measurements of the "solar constant of radiation" were continued by Mr. Abbot (with the assistance till September 20 of Mr. Aldrich) on every favorable day until about November 20, 1908. The expedition was renewed late in the following spring by Mr. Abbot, and observations begun on June 1, 1909. As in former years, evidences of a fluctuation of solar radiation were found in the results of the measurements of 1908 thus far obtained. Various improvements in the modes of observing have been made, especially in the bolometric measurements of the ultra-violet region of the spectrum, and also in pyrheliometry. A new and improved standard pyrheliometer was tried repeatedly on Mount Wilson. Its action is more satisfactory than the one used in 1906, and great confidence is felt in the results obtained with it. Apparently the results published on the provisional arbitrary scale of pyrheliometry employed in Volume II of the Annals are several per cent higher than they would be if expressed on the scale of the standard calory. On the other hand, the results of the year indicate that a larger allowance of increase should have been made for solar rays in the ultra-violet and extreme infra-red regions of the spectrum not observed in 1905 and 1906 by the bolometer, and this increase will probably nearly or quite compensate the change of scale in pyrheliometry, leaving the mean "solar constant" value very near to 2 calories per square centimeter per minute, as stated in Volume II of the Annals. Great efforts have been made this past year to carry the bolometric measurements much further in the ultra-violet. For this purpose a large quartz prism, a large ultra-violet glass prism, and two magalium mirrors have been procured and are now in use on Mount Wilson, and daily observations are now carried as far as wave-length 0.335μ .

3. *Mount Whitney Expeditions.*

In August, 1908, with Director Campbel, of the Lick Observatory, Mr. Abbot spent about twenty-four hours on the summit of Mount Whitney (14,502 feet). This mountain, which was the objective point of the famous expedition of Mr. Langley in 1881, was recommended by him to be reserved by the Government

^a The Temperature of the Moon, p. 193.

and used as the site for an observatory. The reservation was in fact made, but no observatory has been established there. Mr. Abbot carried with him to Mount Whitney a pyrheliumeter and wet and dry thermometers, and made observations on the summit both in the afternoon and morning hours. Both he and Mr. Campbell were favorably impressed with the advantages of the place for observing, and with the relative convenience of ascending the mountain, considering its great altitude. Fine building stone, sand, and water were found at the summit. Messrs. Campbell and Abbot, therefore, recommended to the Secretary of the Smithsonian Institution that a grant from the Hodgkins fund should be made for the purpose of erecting on the summit of Mount Whitney a stone and steel house to shelter observers who might apply to the Institution for the use of the house to promote investigations in any branch of science. This recommendation was approved, and the house is now in course of construction (July, 1909).

It has been held by some astronomers that measurements of the "solar constant of radiation" by high and low sun observations from a single station at a low altitude, or even at the altitude of Mount Wilson, are subject to a great error by reason of the impossibility of correctly allowing for loss in our atmosphere. In order to ascertain if this objection is well founded, an expedition to Mount Whitney by Mr. Abbot is planned for August, 1909. He will carry a complete spectro-bolometric outfit, for which Mr. Kramer has constructed the mechanical parts in the shop of the Astrophysical Observatory at Washington. This apparatus will point directly at the sun, so as to dispense with reflections at a coelostat. A quartz prism and two magnalium mirrors constitute the sole optical parts of the spectroscope, as it will generally be used, but a glass prism and silvered mirrors will also be employed in the examination of the water vapor bands and of the infra-red spectrum. With the quartz and magnalium outfit it is expected to measure the energy of the spectrum from about wave-length 0.30μ in the ultra-violet to wave-length 4μ in the infra-red. Simultaneously with these "solar constant" measurements on Mount Whitney complete observations of the same kind will be made on Mount Wilson by Doctor Ingersoll, and if the results of the two shall agree it is thought that there will be left no ground for reasonable doubt of the accuracy of the method.

SUMMARY.

The principal work of the year comprises frequent spectro-bolometric examinations of the relative brightness of different parts of the sun's disk for rays of several different wave lengths; measurements of the transmission of long-wave rays, such as the earth emits, through very long columns of moist air; the steady continuation of the reduction of Mount Wilson and Washington observations; six months of almost daily observation on Mount Wilson for the determination of the variability of the sun; a preliminary observing expedition to the summit of Mount Whitney; and the complete preparation of apparatus and arrangements for a series of observations of the "solar constant" by the spectro-bolometric method, to be made simultaneously at Mount Wilson and Mount Whitney in August, 1909.

Respectfully submitted.

C. G. ABBOT, *Director.*

DR. CHARLES D. WALCOTT,
Secretary of the Smithsonian Institution.

APPENDIX VI.

REPORT ON THE LIBRARY.

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, 1909:

The retirement early last fall of Dr. Cyrus Adler, librarian of the Institution and later assistant secretary in charge of library and exchanges, in order to assume the presidency of the Dropsie College for Hebrew and Cognate Learning, of Philadelphia, Pa., was a serious loss to the library. His loyalty, his knowledge of library science at home and abroad, his love of books, and his intimate acquaintance with the workings of this library were invaluable not only to the Institution but to investigators at large.

The accessions recorded for the Smithsonian deposit, Library of Congress, numbered 1,623 volumes, 11,947 parts of volumes, 2,937 pamphlets, and 777 charts, making a total of 17,284 publications.

The accession numbers run from 488,289 to 495,195. These publications were sent to the Library of Congress as soon as received and entered, and in their transmission 166 boxes were required, which, it is estimated, contained the equivalent of 6,640 volumes, while the number of pieces sent, which includes parts of periodicals, pamphlets, and volumes, was 29,679. This does not include, however, about 3,883 parts of serial publications secured by exchange to complete sets transmitted separately.

The policy of sending to the Library of Congress public documents presented to the Smithsonian Institution, without stamping or entering, has been continued, and the number of publications given above does not include these, nor does it include other publications sent to the Library of Congress which are received through the International Exchanges.

The libraries of the Smithsonian office, of the Astrophysical Observatory, and the National Zoological Park have received 294 volumes and pamphlets and 1,690 parts of volumes and charts, making a total of 1,984, and a grand total, including the publications for the Smithsonian deposit, of 23,151.

The parts of serial publications entered on the card catalogue numbered 26,640, and 1,119 slips for completed volumes were made, together with 477 cards for new periodicals and annuals, which were added to the permanent record from the periodical recording desk.

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

Basel.	Heidelberg.	Philadelphia.
Bern.	Jena.	Rostock.
Bonn.	Kiel.	St. Petersburg.
Breslau.	Königsberg.	Strassburg.
Dresden.	Leipzig.	Warsaw.
Erlangen.	Lund.	Wurzberg.
Freiburg-im-Breisgau.	Marburg.	Zürich.
Giessen.	New York.	
Halle-an-der-Saale.	Paris.	

Similar publications have been received from the technical high schools at—

Budapest.	Karlsruhe.	Prague.
Darmstadt.	Louvain.	Upsala.
Hannover.	Paris.	Wiesbaden.

In carrying out the plan to effect new exchanges and to secure missing parts to complete sets, 2,396 letters were written, resulting in about 477 periodicals being added to the lists and the receipt of about 3,883 parts lacking in the sets, which partially filled or entirely completed the various series of publications in the Smithsonian deposit. In writing for the missing parts of publications the library has had assistance from the International Exchanges of the Institution, but the results of these requests can not be definitely stated, as the replies from them were still coming in at the close of the year. In addition, the library has cooperated with the International Exchanges in sending out lists of government documents and serial publications of that class needed to complete the sets in the Library of Congress to the following: Argentine Republic, Austria-Hungary, Baden, Bavaria, Belgium, Bolivia, Bremen, Province of Buenos Aires, Colombia, Costa Rica, Cuba, Department of the Seine and city of Paris, France, Germany, Greece, Guatemala, Haiti, Free City of Hamburg, Grand Duchy of Hesse, Honduras, Italy, Jamaica, Japan, Malta, Mexico, Montenegro, Newfoundland, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Prussia, Roumania, Russia, Sweden, Salvador, Saxony, city of Vienna, Uruguay, Wurtemberg.

A decided increase has been noted in the number of persons consulting the publications in the reading room, and in addition there were issued, for office use, 30 bound volumes of periodicals and 3,706 parts of scientific periodicals and popular magazines, making a total of 3,736. While the consultation has been chiefly by members of the staff, the various bureaus of the Government have availed themselves of the opportunity to use these publications and those in the sectional libraries of the Institution.

The mail receipts numbered 28,059 packages. The publications contained therein were stamped and distributed for entry from the mail desk. About 4,980 acknowledgments were made on the regular forms, which are in addition to those for publications received in response to the requests of the Institution for exchange.

The employees' library.—The books added numbered 19, and of these 18 were purchased, while 110 volumes of periodicals were bound. The number of books borrowed was 1,922, and the sending of a selected number of books from this library to the National Zoological Park and the Bureau of American Ethnology has been continued.

Art room.—The cataloguing of the collection of engravings in the art room received attention as time would allow, but there still remains a great deal to be done.

Bibliography of aeronautics.—The bibliography of aeronautical literature, which includes the indexing of papers in periodicals and proceedings of aeronautical societies, together with books and separate pamphlets on the subject, was completed, bringing the work up to July 1, 1909. At the close of the year the manuscript was ready for the printer.

American Historical Association.—The exchange of the annual reports of the American Historical Association from the allotment agreed upon for that purpose has resulted in a number of publications of historical societies throughout the world being added to the Smithsonian deposit at the Library of Congress.

UNITED STATES NATIONAL MUSEUM.

The library of the Museum has received many gifts of importance during the year. Dr. Charles A. White, Dr. William Healey Dall, and Dr. Charles W.

Richmond have added scientific publications which are of value in completing sets and filling in of the series of authors' separates. From the estate of Dr. Otis Tufton Mason, through the executor, Dr. E. B. Pollard, the Museum has received Doctor Mason's working library of anthropological publications, together with a collection of his manuscript notes. Dr. Wirt Tassin, for some time assistant curator of the Division of Mineralogy, contributed about 1,000 pamphlets relating to mineralogy and kindred subjects. There has also been secured by purchase from the estate of Dr. William H. Ashmead a complete collection of his writings, together with his manuscript notes.

Acknowledgments are also due to Dr. E. A. Schwarz, Mr. Wilfred H. Osgood, Dr. O. P. Hay, and Dr. W. P. Hay for collections of publications which they have presented. Additions have also been received to the William Schaus collection and a special bookplate engraved for it is now being placed in the books.

In the Museum library there are now 36,244 volumes, 56,010 unbound papers, and 110 manuscripts. The additions during the year consisted of 2,680 books, 3,671 pamphlets, and 227 parts of volumes. There were catalogued 1,280 books, 1,400 complete volumes of periodicals, and 4,213 pamphlets.

Special attention has been given to the preparation of volumes for binding, with the result that 1,783 books were sent to the government bindery.

The number of books, periodicals, and pamphlets borrowed from the general library amounted to 20,266, including 9,000 which were assigned to the sectional libraries. This does not include, however, the large number of books consulted in the library but not withdrawn.

The sectional libraries established in the Museum have remained the same, the complete list now standing as follows:

Administration.	History.	Palaeobotany.
Administrative assistant.	Insects.	Parasites.
Anthropology.	Invertebrate palaeontology.	Photography.
Biology.	Mammals.	Physical anthropology.
Birds.	Marine invertebrates.	Prehistoric archaeology.
Botany.	Materia medica.	Reptiles.
Comparative anatomy.	Mesozoic fossils.	Superintendent.
Editor.	Mineralogy.	Taxidermy.
Ethnology.	Mollusks.	Technology.
Fishes.	Oriental archæology.	
Geology.		

SUMMARY OF ACCESSIONS.

The following table summarizes all the accessions during the year except for the Bureau of American Ethnology, which is separately administered:

Smithsonian deposit in the Library of Congress, including parts to complete sets -----	21,167
Office, Astrophysical Observatory, National Zoological Park, and international exchanges -----	1,984
United States National Museum library -----	6,578
Total -----	29,729

Respectfully submitted.

PAUL BROCKETT,
Assistant Librarian.

Dr. CHARLES D. WALCOTT,
Secretary of the Smithsonian Institution.

APPENDIX VII.

REPORT ON THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

SIR: I have the honor to submit the following report on the operations of the United States Bureau of the International Catalogue of Scientific Literature for the fiscal year ending June 30, 1909.

The United States Regional Bureau is one of the 32 regional bureaus now cooperating, through a central bureau in London, in the production of the International Catalogue of Scientific Literature. The aim of the enterprise is to index and classify all current published scientific papers and by means of 17 annual volumes publish and distribute the data thus prepared to the various subscribers to the catalogue throughout the world. The methods employed in indexing and classifying each paper result in what is practically an analytical digest of the subject of each paper, this being accomplished by means of references to classification schedules which are arranged to include in systematic order each minute subdivision or subject of all the recognized natural and physical sciences. The regional bureaus are supported by the countries in which they are established, thus allowing all funds derived from subscriptions to be used to defray the actual cost of printing and publishing. The bureau in this country is supported by a direct congressional appropriation.

The allotment for the present fiscal year was \$5,000, the same as for previous years; the number of the staff has remained the same, namely, five persons. During the year there were 34,409 classified index cards prepared by this bureau and forwarded to London as follows:

Literature of 1901.....	133
Literature of 1902.....	235
Literature of 1903.....	373
Literature of 1904.....	309
Literature of 1905.....	1,656
Literature of 1906.....	4,410
Literature of 1907.....	8,509
Literature of 1908.....	18,784
Total	34,409

The corresponding total for the fiscal year ending June 30, 1908, was 28,528, thus showing an increase of 5,881, or over 20 per cent. There has been an increase also in the number of citations furnished by other bureaus, for since the beginning of the enterprise in 1901 the number of pages in the combined 17 annual volumes has increased nearly one-third, as shown by the following table:

	Pages.
First issue.....	7,763
Second issue.....	8,826
Third issue.....	8,493
Fourth issue.....	8,681
Fifth issue.....	10,785
Sixth issue.....	10,049

The number of cards sent from this regional bureau has increased as follows:

For fiscal year 1902.....	6,990
For fiscal year 1903.....	14,480
For fiscal year 1904.....	21,213
For fiscal year 1905.....	24,182
For fiscal year 1906.....	25,601
For fiscal year 1907.....	28,629
For fiscal year 1908.....	28,528
For fiscal year 1909.....	34,409

Should this increase continue it would add largely to the cost of publication, and as there would be no corresponding addition to the receipts a decided deficit would result, for the subscription price to the catalogue, namely, \$85 a year for 17 volumes, was fixed on a basis of the size and cost of the first annual issue. It appears not only desirable, but necessary, to condense the references as much as possible, though condensation, without loss of usefulness, necessitates much greater care on the part of the classifier in preparing a digest. It can not be hoped that much change in the present methods can be made without increasing the force of the bureau.

The following-named volumes of the catalogue were received and delivered to subscribers in this country, as follows:

Sixth Annual Issue—Physics, Chemistry, Palæontology, General Biology, Botany, Anthropology, Physiology, and Bacteriology, completing the issue.

Seventh Annual Issue—Mathematics, Mechanics, Physics, Astronomy, Mineralogy, Geology, Geography, Palæontology, and Zoology.

Through the resignation of Dr. Cyrus Adler, assistant secretary of the Smithsonian Institution, who was in charge of the United States branch of the International Catalogue, both this bureau and the organization as a whole met with a great loss, notwithstanding the fact that Doctor Adler still remains one of the members of the International Council, the body vested with the supreme control of the catalogue. Doctor Adler was closely identified with the work from the time the original ways and means were being discussed, and it is not too much to say that had it not been for his interest and efforts Mr. Langley, the late Secretary of the Institution, would not have aided the enterprise as he did with the private funds of the Institution. Had not this aid been forthcoming at the time the whole undertaking would have failed, for cooperation on the part of the United States was essential, and, this Government failing at first to lend its aid, there remained no other body than the Smithsonian Institution in a position to become responsible for the work in this country.

It is felt that this International Catalogue of Scientific Literature is but a beginning of what will be eventually a great cooperative international index and digest of all records of human achievement. There is no question of the need for such a publication and, with the satisfactory beginning already made, it is a question of cost alone which limits the field of the present enterprise to include only the literature of pure science to the exclusion of the extensive and valuable literature of the applied sciences and other technical literature.

There have been no losses of property during the year, excepting those caused by ordinary wear and deterioration.

In the sundry civil bill approved March 1, 1909, \$6,000 was appropriated to carry on the work for the fiscal year ending June 30, 1910. This sum is an increase of \$1,000 over the appropriation for previous years.

Respectfully submitted.

LEONARD C. GUNNELL,
*Chief Assistant, Bureau of International
Catalogue of Scientific Literature.*

DR. CHARLES D. WALCOTT,
Secretary of the Smithsonian Institution.

APPENDIX VIII.

REPORT ON THE PUBLICATIONS.

SIR: I have the honor to submit the following report on the publications of the Smithsonian Institution and its branches during the fiscal year ending June 30, 1908:

There have been distributed a total of 757 volumes and separates in the series of Smithsonian Contributions to Knowledge, 15,080 in the series of Smithsonian Miscellaneous Collections, 22,991 in the series of Smithsonian Annual Reports, and 4,022 in the series of Special Publications. In addition thereto there were sent out by the Institution 1,313 publications not included in the Smithsonian series, making a grand total of 44,163, a decrease of 15,732 from the previous year. The total number of letters relating to publications received amounted to 6,825, an increase of 280 over the previous year.

I. SMITHSONIAN CONTRIBUTIONS TO KNOWLEDGE.

In the series of Smithsonian Contributions to Knowledge there appeared during the year no original papers, but there was published in August, to meet the increasing demand for the work, a reprint of Mr. Langley's memoir on *The Internal Work of the Wind*, originally published in 1893 in quarto form as No. 884, Smithsonian Contributions to Knowledge. To the present edition was added as an appendix a translation of the "Solution of a special case of the general problem," by René de Saussure, which appeared in 1893 with "*Le Travail Intérieur du Vent*" in *Revue de l'Aéronautique Théorique et Appliquée*, Paris, pages 58-68.

II. SMITHSONIAN MISCELLANEOUS COLLECTIONS.

In the series of Smithsonian Miscellaneous Collections, Volume LII, there were published 20 papers in the quarterly issue, volume 5, parts 2 and 3; and in the regular series, Volume XXXV, a fourth revised edition of the Smithsonian Physical Tables by Thomas Gray; and in Volume LIII of the regular series, 3 papers by Charles D. Walcott.

In the quarterly issue the following papers were published:

1813. Smithsonian Miscellaneous Collections. Quarterly issue. Volume 5, part 2 (containing Nos. 1814-1823). Octavo. Pages 121-276, with Plates IX-XVIII.

1814. The Nettelroth Collection of Invertebrate Fossils. By R. S. Bassler. Published September 23, 1908. Octavo. Pages 121-152, with Plates IX-XI.

1815. A New *Opuntia* from Arizona. By J. N. Rose. Published October 6, 1908. Octavo. Page 153, with Plate XII.

1816. The Story of the Devil-Fish. By Theodore Gill. Published October 15, 1908. Octavo. Pages 155-180.

1817. Indians of Peru. By Charles C. Eberhardt, American consul at Iquitos, Peru. Published October 24, 1908. Octavo. Pages 181-194, with Plates XIII, XIV.

1818. On *Opuntia Santa-Rita*, a Species of Cactus of Ornamental Value. By J. N. Rose, associate curator, division of plants, United States National Museum. Published December 29, 1908. Octavo. Pages 195, 196, with Plate XV.

1819. Two New Species of *Abronia*. By Anton Heimerl, University of Vienna, Austria. Published December 23, 1908. Octavo. Pages 197, 198.

1820. Preliminary Notice of a Collection of Recent Crinoids from the Philippine Islands. By Austin Hobart Clark, collaborator, department of marine invertebrates, United States National Museum. Published December 23, 1908. Octavo. Pages 199-234.

1821. The Relation of Richard Rush to the Smithsonian Institution. By Cyrus Adler. Published January 16, 1909. Octavo. Pages 235-251, with Plate XVI.

1822. Descriptions of Some New Species and a New Genus of American Mosquitoes. By Harrison G. Dyar and Frederick Knab, of the United States Department of Agriculture. Published January 12, 1909. Pages 253-266.

1823. Notes to Quarterly Issue. Volume 5, part 2. Octavo. Pages 267-273, with Plates XVII, XVIII.

1860. Smithsonian Miscellaneous Collections. Quarterly issue. Volume 5, part 3 (containing Nos. 1861-1868). Octavo. Pages 277-401, with Plates XIX-XXXVII.

1861. The Archer-Fish and Its Feats. By Theodore Gill. Published March 25, 1909. Octavo. Pages 277-286.

1862. The Peoples of Formosa. By Julean H. Arnold, American consul to Formosa. Published March 25, 1909. Octavo. Pages 287-293, with Plates XIX-XXII.

1863. Our Present Knowledge of Canal Rays: A Detailed Bibliography. By Gordon Scott Fulcher. Published March 25, 1909. Octavo. Pages 295-324.

1864. Observations on Living White Whales (*Delphinapterus leucas*); with a Note on the Dentition of *Delphinapterus* and *Stenodelphis*. By Frederick W. True, head curator of biology, United States National Museum. Published April 28, 1909. Octavo. Pages 325-330, with Plate XXIII.

1865. Some Recent Contributions to Our Knowledge of the Sun. Hamilton Lecture. By George E. Hale, director of solar observatory of Carnegie Institution of Washington, at Mount Wilson, California. Published May 8, 1909. Octavo. Pages 331-360, with Plates XXIV-XXXVI.

1866. Some New South American Land Shells. By William H. Dall, curator, division of mollusks, United States National Museum. Published May 11, 1909. Octavo. Pages 361-364, with Plate XXXVII.

1867. The American Ferns of the Group of *Dryopteris opposita* contained in the United States National Museum. By Carl Christensen, Copenhagen. In Press. Octavo. Pages 365-396.

1868. Notes to Quarterly Issue. Volume 5, part 3. Octavo. Pages 397-399.

In the regular series of Smithsonian Miscellaneous Collections the following have been published:

1038. Smithsonian Physical Tables. Fourth revised edition. By Thomas Gray. Octavo. Pages xxxv, 301. Part of Volume XXXV.

In this edition, published on account of the increased demand for the tables, Professor Gray made a few corrections, particularly in the tables of equivalents of metric and British imperial weights and measures, which were here brought up to date.

1810. Cambrian Geology and Paleontology. No. 3, Cambrian Brachiopoda: Descriptions of New Genera and Species. By Charles D. Walcott. Published October 1, 1908. Octavo. Pages 53-137, with plates 7-10. Part of Volume LIII.

1811. Cambrian Geology and Paleontology. No. 4, Classification and Terminology of the Cambrian Brachiopoda. By Charles D. Walcott. Published October 13, 1908. Octavo. Pages 139-165, with plates 11, 12. Part of Volume LIII.

1812. Cambrian Geology and Paleontology. No. 5, Cambrian Sections of the Cordilleran Area. By Charles D. Walcott. Published December 10, 1908. Octavo. Pages 167-230, with plates 13-22. Part of Volume LIII.

Publications numbered 1810, 1811, and 1812 were in continuation of the studies of Cambrian Geology and Paleontology, by Charles D. Walcott, the series of which began with Nos. 1804 and 1805, Nomenclature of Some Cambrian Cordilleran Formations and Cambrian Trilobites.

There were in press in the regular series of Smithsonian Miscellaneous Collections at the close of the fiscal year, publication No. 1869, The Mechanics of the Earth's Atmosphere (a collection of translations), second collection, by Cleveland Abbe, and No. 1870, Landmarks of Botanical History, Part I, by Dr. Edward L. Greene. There were in manuscript form, approved for publication, a Bibliography of the Occurrence and Distribution of Tin, by Frank L. and Eva Hess, and a Bibliography of Aeronautics, by Paul Brockett, assistant librarian of the Institution.

III. SMITHSONIAN ANNUAL REPORTS.

The Annual Report for 1907 was largely in type at the beginning of the fiscal year, but owing principally to a delay in the securing of paper the report was not finally published until late in the fall:

1824. 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, 1907. Octavo. Pages lvii, 726, with 79 plates.

The following papers, included in the Annual Report of the Board of Regents for 1907, and enumerated in the report on publications for 1908, were issued separately in pamphlet form:

1825. Proceedings of Board of Regents for the year ending June 30, 1907. Report of Executive Committee, Acts and Resolutions of Congress. Octavo. Pages xi-lvii.

1826. The Steam Turbine on Land and Sea. By Hon. Charles A. Parsons, C. B., M. A., D. Sc., F. R. S., M. R. I. Octavo. Pages 99-112, with 8 plates.

1827. The Development of Mechanical Composition in Printing. By Prof. A. Turpain, University of Poitiers. Octavo. Pages 113-129, with 3 plates.

1828. Some Facts and Problems Bearing on Electric Trunk Line Operation. By Frank J. Sprague. Octavo. Pages 131-161, with 7 plates.

1829. Recent Contributions to Electric Wave Telegraphy. By Prof. J. A. Fleming, M. A. D. Sc., F. R. S., M. R. I., Pender professor of electrical engineering in the University of London. Octavo. Pages 163-193.

1830. On the Properties and Natures of Various Electric Radiations. By W. H. Bragg, M. A., F. R. S., elder professor of mathematics and physics in the University of Adelaide. Octavo. Pages 195-214.

1831. Progress in Electro-Metallurgy. By John B. C. Kershaw. Octavo. Pages 215-230, with 10 plates.

1832. Advances in Color Photography. By Thomas W. Smillie, F. R. P. S. Octavo. Pages 231-237, with 1 plate.

1833. The Structure of Lippmann Heliochromes. By S. R. Cajal. Octavo. Pages 239-259.

1834. Bronze in South America before the Arrival of the Europeans. By Adrien de Mortillet, honorary president of the Société Préhistorique de France. Octavo. Pages 261-266.

1835. Some Opportunities for Astronomical Work with Inexpensive Apparatus. By Prof. George E. Hale, director of the Mount Wilson Solar Observatory of the Carnegie Institution of Washington. Octavo. Pages 267-285, with 6 plates.

1836. The Progress of Science as Illustrated by the Development of Meteorology. By Cleveland Abbe. Octavo. Pages 287-309.
1837. Geology of the Inner Earth.—Igneous Ores. By Prof. J. W. Gregory, D. Sc., F. R. S. Octavo. Pages 311-330.
1838. The Salton Sea. By F. H. Newell, Director United States Reclamation Service. Octavo. Pages 331-345, with 9 plates.
1839. Inland Waterways. By George G. Chisholm. Octavo. Pages 347-370.
1840. The Present Position of Paleozoic Botany. By D. H. Scott, F. R. S., lately honorary keeper of the Jodrell Laboratory, Royal Botanic Gardens, Kew. Octavo. Pages 371-405, with 2 plates.
1841. The Zoological Gardens and Establishments of Great Britain, Belgium, and the Netherlands. By Gustave Loisel, director of the Laboratory of General Embryology at the School of Hautes Études, professor of zoology in the secondary courses of the Sorbonne, Paris. Octavo. Pages 407-448, with 8 plates.
1842. Systematic Zoology: Its Progress and Purpose. By Theodore Gill. Octavo. Pages 449-471, with 14 plates.
1843. The Genealogical History of the Marine Mammals. By Prof. O. Abel. Octavo. Pages 473-496.
1844. The Mediterranean Peoples. By Theobald Fischer, University of Marburg. Octavo. Pages 497-521.
1845. Prehistoric Japan. By Dr. E. Baelz, 1876-1902, professor Imperial Japanese University of Tokyo. Octavo. Pages 523-547, with 2 plates.
1846. The Origin of Egyptian Civilization. By Edouard Naville, D. C. L., LL. D., etc. Octavo. Pages 549-564.
1847. The Fire Piston. By Henry Balfour, M. A., curator of Pitt-Rivers Museum, Oxford. Octavo. Pages 565-593, with 5 plates.
1848. The Origin of the Canaanite Alphabet. By Franz Praetorius. Octavo. Pages 595-604.
1849. Three Aramaic Papyri from Elephantine, Egypt. By Prof. Eduard Sachau. Octavo. Pages 605-611, with 2 plates.
1850. The Problem of Color Vision. By John M. Dane. Octavo. Pages 613-625.
1851. Immunity in Tuberculosis. By Simon Flexner, M. D., Rockefeller Institute for Medical Research, New York City. Octavo. Pages 627-645.
1852. The Air of the New York Subway Prior to 1906. By George A. Soper. Octavo. Pages 647-667.
1853. Marcelin Berthelot. By Camille Matignon, professor of mineral chemistry at the Collège de France; former assistant professor to Berthelot at the Collège de France. Octavo. Pages 669-684, with 1 plate.
1854. Linnæan Memorial Address. By Edward L. Greene. Octavo. Pages 685-709, with 1 plate.
- The Report of the Executive Committee and Proceedings of the Board of Regents of the Institution, as well as the Report of the Secretary for the fiscal year ending June 30, 1908, both forming part of the Annual Report of the Board of Regents to Congress, were printed in pamphlet form and published at the December meeting of the Board of Regents, as follows:
1855. Report of the Executive Committee and Proceedings of the Board of Regents of the Smithsonian Institution for the year ending June 30, 1908. Octavo. Pages 3-18.
1856. Report of the Secretary of the Smithsonian Institution for the year ending June 30, 1908. Octavo. Pages iii, 86.
- The greater part of the Smithsonian Report for 1908 was in type at the close of the fiscal year. The General Appendix contains the following papers:

The Present Status of Military Aeronautics. By Maj. George O. Squier, U. S. Army.

Aviation in France in 1908. By Pierre-Roger Jourdain.

Wireless Telephony. By R. A. Fessenden.

Phototelegraphy. By Henri Armagnat.

The Gramophone and the Mechanical Recording and Reproduction of Musical Sounds. By Lovell N. Reddie.

On the Light Thrown by Recent Investigation on Electricity on the Relation between Matter and Ether. By J. J. Thomson.

Development of General and Physical Chemistry During the Last Forty Years. By W. Nernst.

Development of Technological Chemistry During the Last Forty Years. By O. N. Witt.

Twenty Years' Progress in Explosives. By Oscar Guttman.

Recent Research in the Structure of the Universe. By J. C. Kapteyn.

Solar Vortices and Magnetism in Sun Spots. By C. G. Abbot.

Climatic Variations, Their Extent and Causes. By J. W. Gregory.

Uranium and Geology. By John Joly.

An Outline Review of the Geology of Peru. By George I. Adams.

Our Present Knowledge of the Earth. By E. Wiechert.

The Antarctic Question. By J. Machat.

Some Geographical Aspects of the Nile. By Capt. H. G. Lyons.

Heredity and the Origin of Species. By Daniel Trembly MacDougal.

Cactaceae of Northeastern and Central Mexico, together with a Synopsis of the Principal Mexican Genera. By William Edwin Safford.

Angler Fishes, their Kinds and Ways. By Theodore Gill.

The Birds of India. By Douglas Dewar.

The Evolution of the Elephant. By Richard S. Lull.

Excavations at Boghaz-Keui in the Summer of 1907. By Hugo Winckler and O. Puchstein.

Malaria in Greece. By Ronald Ross.

Carl von Linné as a Geologist. By A. G. Nathorst.

Life and Work of Lord Kelvin. By Sylvanus P. Thompson.

The Work of Henri Becquerel. By André Broca.

Owing to the unusual demand for the paper, there was published in March a reprint of number 1688, Parental Care among Fresh-water Fishes, by Theodore Gill, which appeared originally in the Annual Report of the Board of Regents for 1905.

IV. SPECIAL PUBLICATIONS.

Five special publications were issued during the year, as follows:

1808. Catalogue of the Botanical Library of John Donnell Smith, presented in 1905 to the Smithsonian Institution. Compiled by Alice Cary Atwood. Imperial octavo. Pages 94.

The catalogue was printed in an edition of 200 copies on Old Stratford paper, imperial octavo size, from the original stereotype plates used in its first publication by the National Museum as Part I of Volume XII of Contributions from the National Herbarium.

1809. Researches and Experiments in Aerial Navigation. By S. P. Langley. Reprinted from the Smithsonian Reports for 1897, pages 169-181, with 1 plate; 1900, pages 197-216, with 6 plates; 1901, pages 649-659, with 7 plates; 1904, pages 113-125, with 1 plate. Octavo.

The occasion for this reprint of Mr. Langley's papers, which was issued in August, is stated in the introduction. The articles were as follows:

I. Story of Experiments in Mechanical Flight. By Samuel Pierpont Langley. From the Smithsonian Report for 1897, pages 169-181 (with Pl. I). Published originally in the Aeronautical Annual, 1897.

II. The Langley Aerodrome. From the Smithsonian Report for 1900, pages 197-216 (with Pls. I-VI). Slightly abridged from an article published originally in McClure's Magazine, June, 1897.

III. The Greatest Flying Creature. By S. P. Langley (introducing a paper by F. A. Lucas). From the Smithsonian Report for 1901, pages 649-659 (with Pls. I-VII).

IV. Experiments with the Langley Aerodrome. By S. P. Langley. From the Smithsonian Report for 1904, pages 113-125 (with Pl. I).

1858. Contributions to the Life Histories of Fishes. By Theodore Gill. Volume I. 1904-1907. Reprints from Smithsonian Miscellaneous Collections, Smithsonian Annual Report, and Proceedings United States National Museum. Octavo. 323 pages (pagination as in originals), with 28 plates (numbered as in originals).

The contents of this volume is as follows:

- I. A Remarkable Genus of Fishes—the Umbras. April 11, 1904. Smiths. Misc. Coll., Vol. 45, No. 1453.
- II. The Sculpin and its Habits. January 31, 1905. Smiths. Misc. Coll., Vol. 47, No. 1552.
- III. The Life History of the Angler. May 6, 1905. Smiths. Misc. Coll., Vol. 47, No. 1569.
- IV. The Tarpon and Lady-fish and their Relations. May 13, 1905. Smiths. Misc. Coll., Vol. 48, No. 1576.
- V. The Life History of the Sea-Lorse. July 6, 1905. Proc. U. S. Nat. Mus., Vol. 28, No. 1408.
- VI. The Family of Cyprinids and the Carp as its Type. September 8, 1905. Smiths. Misc. Coll., Vol. 48, No. 1591.
- VII. Flying Fishes and their Habits. October 5, 1905. Rep. Smiths. Inst., 1904, No. 1629.
- VIII. Parental Care among Fresh-water Fishes. January 21, 1907. Rep. Smiths. Inst., 1905, No. 1688.
- IX. Some Noteworthy Extra-European Cyprinids. February 4, 1907. Smiths. Misc. Coll., Vol. 48, No. 1662.
- X. Life Histories of Toadfishes (Batrachoidids) compared with those of Weevers (Trachinids) and Stargazers (Uranoscopids). May 4, 1907. Smiths. Misc. Coll., Vol. 48, No. 1697.

1859. Classified List of Smithsonian Publications Available for Distribution March, 1909. Octavo. Pages 39.

1871. Smithsonian Mathematical Tables. Hyperbolic Functions. Prepared by George F. Becker and C. E. Van Orstrand. Octavo. Pages li, 321.

The advertisement explains the purpose and scope of this publication:

“Among the early publications of the Smithsonian Institution was a very important volume of meteorological tables by Dr. Arnold Guyot. They were so widely used by geographers and physicists, as well as by meteorologists, that when the fourth edition was exhausted it was decided to recast the entire work and publish three separate volumes—Meteorological Tables, Geographical Tables, and Physical Tables—each of which have now passed through several editions.

“In the application of the data of these volumes to the study of natural phenomena certain mathematical tables beside those included in ordinary tables of logarithms are urgently needed in order to save recurrent computation on the

part of observers and investigators. It was therefore decided to publish the present volume of Mathematical Tables on 'Hyperbolic functions.'

"Hyperbolic functions are extremely useful in every branch of pure physics and in the application of physics, whether to observational and experimental sciences or to technology. Thus whenever an entity (such as light, velocity, electricity, or radioactivity) is subject to gradual extinction or absorption the decay is represented by some form of Hyperbolic functions. Mercator's projection is likewise computed by Hyperbolic functions. Whenever mechanical strains are regarded as great enough to be measured they are most simply expressed in terms of Hyperbolic functions. Hence geological deformations invariably lead to such expression, and it is for that reason that Messrs. Becker and Van Orstrand, who are in charge of the physical work of the United States Geological Survey, have been led to prepare this volume."

V. 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 to Congress by the Board of Regents of the Smithsonian Institution; (b) The Proceedings of the United States National Museum; (c) The Bulletin of the United States National Museum; and (d) the Contributions from the United States National Herbarium. The editorship of these publications is in charge of Dr. Marcus Benjamin.

The publications issued during the year are enumerated in the Report on the National Museum. These included Volume XXXIV of the Proceedings, containing Museum papers numbered 1610 to 1630; Volume XXXV, papers numbered 1631 to 1658; and Volume XXXVI, papers numbered 1659 to 1694. Three bulletins were issued:

62. Catalogue of the Type Specimens of Mammals in the United States National Museum, including the Biological Survey Collection. By Marcus Ward Lyon and Wilfred H. Osgood.

63. A Monographic Revision of the Coleoptera belonging to the Tenebrionidae Tribe Eleodini inhabiting the United States, Lower California, and Adjacent Islands. By Frank E. Blaisdell, sr.

64. A Critical Summary of Troost's Unpublished Manuscript on the Crinoids of Tennessee. By Elvira Wood.

In the series of Contributions from the United States National Herbarium there appeared:

Volume XII, part 4. The Mexican and Central American Species of *Sapium*, by Henry Pittier; Volume XII, part 5, New or Noteworthy Plants from Colombia and Central America, by Henry Pittier; Volume XII, part 6, Catalogue of the Grasses of Cuba, by A. S. Hitchcock; Volume XII, part 7, Studies of Mexican and Central American Plants, No. 6, by J. N. Rose; Volume XII, part 8, The Alliaceae of the United States, with notes on Mexican Species, by Paul C. Standley; Volume XII, part 9, Miscellaneous Papers, by J. N. Rose, N. L. Britton, and William Maxon; and Volume XIII, part 1, Studies of Tropical American Ferns, No. 2, by William Maxon.

VI. PUBLICATIONS OF THE BUREAU OF AMERICAN ETHNOLOGY.

The publications of the bureau are discussed in detail in another appendix of the Secretary's report. The editorial work is in charge of Mr. J. G. Gurley. The Twenty-sixth Annual Report was issued during the summer, together with the usual number of separates of the accompanying papers, and also Bulletins 34, Physiological and Medical Observations Among the Indians of Southwestern United States and Northern Mexico, by Aleš Hrdlička, and 42, Tuberculosis

Among Certain Indian Tribes, by Aleš Hrdlička. At the close of the fiscal year there were largely in type or at the bindery the Twenty-seventh Annual Report, and Bulletins 38, 39, 40, part 1, 41, 43, 46, and 47.

VII. PUBLICATIONS OF THE SMITHSONIAN ASTROPHYSICAL OBSERVATORY.

As an addenda to the Annals of the Smithsonian Astrophysical Observatory. Volume II, a short note on the Reflecting Power of Clouds was issued, as follows:

1738*a*. Note on the Reflecting Power of Clouds. By C. G. Abbot and F. E. Fowle, jr. (Addenda to Annals of the Astrophysical Observatory, Smithsonian Institution, Vol. II.) Octavo. Pages 3.

VIII. REPORT OF THE AMERICAN HISTORICAL ASSOCIATION.

Volumes I and II of the Annual Report of the American Historical Association for the year 1906, by law approved and communicated to Congress by the Secretary of the Smithsonian Institution, were published in August, 1908.

Volume I contained the following: Report of Proceedings of Providence Meeting, by Charles H. Haskins; Report of Proceedings of Pacific Coast Branch, by Max Farrand; The Renaissance of the Twelfth Century, by D. C. Munro; A Mediæval Humanist, by H. O. Taylor; Report of Conference on Teaching of History in Schools, by J. A. James; Report of Conference on History in College, by Max Farrand; Third Report of Conference on State and Local Historical Societies, by F. H. Severance; Comparison of Virginia Company with Other English Trading Companies, by Susan M. Kingsbury; The Colonial Policy of Great Britain, by G. L. Beer; William Penn, by Edward Channing; Some Aspects of the English Bill for the Admission of Kansas, by F. H. Hodder; The Attitude of Thaddeus Stevens Toward the Conduct of the Civil War, by J. A. Woodburn; History of Indian Consolidation West of the Mississippi, by Annie H. Abel.

Volume II contained the Seventh Report of the Public Archives Commission, with discussions of the following subjects: Summary of present state of legislation of States and Territories relative to the custody and supervision of the public records, by Robert T. Swan; public archives of Arkansas, by John Hugh Reynolds; public archives of Connecticut, by N. P. Mead; state and county archives of Delaware, by Edgar Dawson; state archives of Florida, by David Y. Thomas; archives of Augusta, Ga., and of Richmond County, by Julia A. Flisch; state archives of Ohio and of Ross County, by R. C. Stevenson; local archives of Tennessee, by St. George L. Sioussat; bibliography of public archives of the thirteen original States to 1789, by Adelaide R. Hasse.

The manuscript of Volumes I and II of the Annual Report for 1907 was sent to the Public Printer September 10, 1908, but the work had not been published at the close of the fiscal year. The manuscript of Volume I for 1908 was transmitted on June 17, 1909.

IX. REPORT OF THE DAUGHTERS OF THE AMERICAN REVOLUTION.

The Eleventh Report of the Daughters of the American Revolution was received from the society in accordance with section 3 of the act of incorporation, which reads that "said society shall report annually to the Secretary of the Smithsonian Institution concerning its proceedings, and said Secretary shall communicate to Congress such portions thereof as he may deem of national interest and importance." After revision the report was communicated to Congress on June 1, 1909.

X. SMITHSONIAN ADVISORY COMMITTEE ON PRINTING AND PUBLICATION.

The editor has continued to serve as secretary of the Smithsonian advisory committee on printing and publication. To this committee have been referred the manuscripts proposed for publication by the various branches of the Institution as well as those offered for printing in the Quarterly Issue of the Smithsonian Miscellaneous Collections.

Upon the resignation of Dr. Cyrus Adler, chairman of the committee, as assistant secretary of the Institution, the Secretary on October 21 reorganized the committee as follows: Dr. Frederick W. True, chairman; and Messrs. C. G. Abbot, W. I. Adams, Frank Baker, A. Howard Clark, F. W. Hodge, Otis T. Mason, George P. Merrill, and Leonhard Stejneger. At the same time the Museum advisory committee on printing and publication was discontinued and the responsibilities theretofore devolving upon it were transferred to the Smithsonian committee.

Twenty-seven meetings were held during the year and 110 papers and 6 printed forms were reported on.

XI. PRESS ABSTRACTS OF PUBLICATIONS.

Although the pressure of routine editorial work claimed most of the time of the editorial staff, abstracts of a number of the more popular publications, as well as articles on the work of the Institution and its branches, were furnished to a large number of newspapers, in continuance of the policy inaugurated in March, 1907.

Respectfully submitted.

A. HOWARD CLARK, *Editor.*

Dr. CHARLES D. WALCOTT,
Secretary of the Smithsonian Institution.

APPENDIX IX.

REPORT ON ALASKA-YUKON-PACIFIC EXPOSITION.

SIR: I have the honor to submit the following report of the participation of the Smithsonian Institution and National Museum in the Alaska-Yukon-Pacific Exposition at Seattle, Washington:

The act of Congress approved May 27, 1908, authorizing an exhibit by the departments and bureaus of the Government at the Alaska-Yukon-Pacific Exposition appropriated the sum of \$200,000, to be expended under the direction of the United States Government board of managers, composed of three persons in the employ of the Government, one to be designated by the President as chairman, and one as secretary and disbursing officer. This board was charged with the selection, purchase, preparation, transportation, arrangement, safe-keeping, exhibition, and return of such articles and materials as the heads of the several departments and Secretary of the Smithsonian Institution, respectively, should decide to be embodied in the government exhibit thus authorized. There was also appropriated the sum of \$125,000, to be expended under the direction of the Secretary of the Interior, to aid the people of the district of Alaska and the Territory of Hawaii in providing and maintaining appropriate and creditable exhibits of the products and resources of Alaska and Hawaii; and \$25,000 was appropriated, to be expended under the Secretary of War, to aid the people of the Philippine Islands in providing and maintaining an appropriate exhibit of the products and resources of the Philippine Islands. In addition to this, the Secretary of the Treasury was directed to erect suitable buildings for the government exhibit, including an irrigation and biograph building; also a fisheries building, and buildings for the exhibits of the district of Alaska, the Territory of Hawaii, and the Philippine Islands, for which an appropriation of \$250,000 was made. Mr. Jesse E. Wilson, Mr. W. de C. Ravenel, and Mr. W. M. Geddes were appointed members of the government board of managers; Mr. Wilson, chairman; Mr. Ravenel, vice-chairman; and Mr. Geddes, secretary and disbursing officer.

The act also provided that the Smithsonian Institution and National Museum should exhibit such articles of material of an historical nature as would impart a knowledge of our national history, especially that of Alaska, Hawaii, and the Philippine Islands, and that portion of the United States west of the Rocky Mountains. The Secretary of the Smithsonian Institution designated Mr. W. de C. Ravenel, administrative assistant, United States National Museum, as representative of the Institution and National Museum. Of the total appropriation, \$24,000 was allotted to the Smithsonian Institution and National Museum and about 10,000 square feet of space in the main government building. The preparation of this exhibit was begun as soon as possible after the board was organized, in accordance with plans submitted by the representative, and was practically installed in the government building by June 1, when the exposition opened.

In the preparation of the exhibits by the Institution and the Museum the principal idea kept in view was to present an outline of our national achievements and progress, and of the facts connected with the development of the

western part of the United States, Alaska, Hawaii, and the Philippine Islands. The exhibits were classified as follows:

1. Portraits of eminent persons associated with the discovery and history of America.
2. Portraits of eminent persons connected with the history of the Pacific coast Alaska.
3. Portraits of eminent persons connected with the history of the Hawaiian Islands.
4. Portraits of eminent persons connected with the history of the Philippine Islands.
5. Historic scenes and landmarks.
6. History of the Capitol.
7. Historic vessels.
8. Early American steamboats.
9. History of land transportation.
10. History of the contributions of Henry and Morse to electricity and the telegraph.
11. Medallie history of the United States.
12. History of American cartography.
13. History of the territorial expansion of the United States.
14. History of the Pacific coast and Alaska :
 - The Spanish missions in California.
 - The Russian Orthodox Church in Alaska.
 - The Church of Latter-day Saints.
 - Modern pueblos of Arizona and New Mexico.
 - Ancient pueblos of Arizona and New Mexico.
 - The aborigines of California.
 - The aborigines of the North Pacific coast and Alaska.
 - Paintings and photographs of Alaska.
15. The Philippines :
 - Civilized and uncivilized peoples.
 - Series of photographs.
16. Hawaii :
 - Model of village.
 - Series of photographs.
 - Emerson ethnographic collection.
 - Church mission work in Hawaii.
17. Samoa :
 - The natives.
 - Paintings and photographs.
18. The Mariannes :
 - Series of photographs.
19. The history of photography.
20. The history of medicine in America.

The portion of the exhibit representing persons prominently connected with the discovery and history of America, Alaska, the Hawaiian Islands, and of the Philippine Islands consisted of 190 portraits, and there were also portraits and paintings representing historic scenes and landmarks.

Models of historic vessels were exhibited, including a Viking ship, the *Santa Maria*, the *Half Moon*, the *Mayflower*, and the *Constitution*; also models illustrating the development of the steam vessel, including John Fitch's steamboat, which plied on the Delaware in 1786; the *Clermont*, first used by Fulton in 1807 on the Hudson; the *Phoenix*, the *Savannah*, and others of great public interest.

In the exhibit of land transportation were shown the various early methods of transporting passengers and supplies, arranged in sequence and including models of the early locomotives, such as the John Bull and the Stourbridge Lion.

The collection of electrical and telegraphic apparatus was designed to demonstrate some of the more important features connected with Prof. Joseph Henry's researches in electrical science, and included five of his original instruments and reproductions of other pieces of apparatus.

The medallion history of the United States was portrayed by a series of bronze copies of 23 medals which were struck in honor of the Presidents of the United States from Thomas Jefferson to Theodore Roosevelt, and other medals commemorating special acts and events of historical importance in the development of the country.

American cartography and the story of the territorial expansion of the United States were illustrated by maps and by facsimiles of a number of treaties.

The history of the Pacific coast and Alaska was shown by means of paintings, by a model of the Santa Barbara mission building, relics from the different missions, and other interesting objects, an excellent model of St. Michael's Cathedral in Sitka, a large number of photographs of churches, clergy, and a collection of primers, liturgies, manuals, and other religious works connected with Russian missionary efforts in Alaska.

The history of the Mormon Church was illustrated by a collection of portraits of more than 40 persons conspicuous in its establishment and growth; albums containing pictures of Mormon temples and other buildings; and models of the temple and tabernacle in Salt Lake City; also a chart showing the migrations from Vermont to Illinois and other points.

An exhibit which attracted much attention consisted of models and paintings of ancient pueblos of Arizona and New Mexico. The style of buildings adopted by the ancient people of southern Arizona was graphically illustrated by a painting presenting a bird's-eye view of the prehistoric ruin of Casa Grande, situated in the desert about 50 miles southeast of Phoenix. The ruin comprises blocks of buildings, reservoirs, and ditches, fortified inclosures, and other constructions. The original settlement was composed of rectangular structures known as "compounds," illustrated by models A, B, and C. Some of these buildings were used for the performance of sacred rites and as habitations for medicine men and chiefs. The Smithsonian Institution has made extensive excavations and repairs of the Casa Grande ruin.

The characteristics of cliff-dwelling architecture were well portrayed in the model of Mummy Cave, a ruin in northeastern Arizona, and a painting of the Cliff Palace, the largest known of the cliff dwellings, situated in southeastern Colorado. Modern pueblo family life and dwellings were depicted by a group of Zuni Indians of New Mexico, and by the well-known Hopi pueblo of Walpi, Ariz. A life-sized family group of Hupa Indians engaged in their customary occupations was selected to illustrate the aborigines of California.

The culture of the aborigines of the North Pacific coast and southeastern Alaska was represented by objects carved in wood, such as chests, totem poles, and numerous other specimens.

The industries of the western Eskimo of southeastern Alaska were represented by a model of a log house, lay figures of a man and woman, a collection of spears, harpoons, snowshoes, and boats; also specimens of basketry and other objects connected with their domestic pursuits.

A number of historical paintings lent by Mr. T. J. Richardson, and photographs by Lieut. George T. Emmons, U. S. Navy, portrayed the early history of Alaska.

The groups and other objects showing the life and habits of the Philippine Islanders formed a most attractive exhibit. Among these was a family group of the Negritos of Zambales, a small, black people inhabiting several isolated places in various islands of the Philippines. Their houses are nothing but rude shelters, and are scattered throughout the country. There was also exhibited a typical collection of specimens showing the arts and industries of this tribe.

The Igorot of Bontoc were represented by a family group of four figures. This people is of Malayan stock and pursue agriculture and other peaceful vocations. Until quite recently, in contrast to their pacific dispositions, they were addicted to the barbarous practice of head-hunting. Their arts were represented by a number of objects, including articles of personal adornment and carved wooden figures.

The arts and industries of the Moro and Bagobo tribes of Mindanao were shown by specimens of baskets, shellwork, ornaments, metal work, and costumes.

The Tagal, the most progressive of the native tribes, having been in contact with Spanish civilization for several centuries, were represented by articles of pottery, cups, bowls, cloth, costumes, arms, and a lay figure of a weaver at work.

The general history of the Philippine Islands at the close of the war with Spain was portrayed by a series of photographs of the natives, family life, occupations, dwellings, churches, and of historic scenes.

The exhibit illustrating the history of the Hawaiians comprised a model of a village of the early Hawaiians, who formerly lived in grass-thatched houses, grouped into villages, constituting the home of a clan, presided over by a chief and a priest. The exhibit also included a large series comprising several hundred ethnological objects collected by Mr. N. B. Emerson, and of photographs representing buildings, ancient and modern, and various data illustrative of church, settlement, and school work.

The Samoans, who are a robust and active people, living in comfortable palm-roofed houses, were represented by a family group. Oil painting of a Samoan man and woman and photographs of native houses formed a part of the exhibit, as well as a number of objects connected with their social life.

The Guam and Marianne Islands exhibit embraced photographs of some of the natives and their houses.

The evolution and history of photography was well illustrated by a collection prepared by Mr. Thomas W. Smillie, beginning with the earliest permanent photographs, and including examples of nearly all of the most important discoveries and inventions up to the present time. Many of the specimens were made by the inventors of the processes and others in the Museum laboratory. The collections of color photographs are especially fine, beginning with the tinting and then an elaborate coloring of the photograph by hand, and the patented processes for transferring the film to a colored base, which finally led to the almost perfect photographs in color, as made by Ives, Wood, Lippman, Miley, and the autochromes made in our own laboratory.

The history of medicine, prepared by Dr. J. M. Flint, consisted mainly of photographs and biographical sketches of noted doctors, beginning with the physician who accompanied Capt. John Smith to America and covering the twentieth century up to and including experiments conducted by Major Reed for the prevention of yellow fever in Cuba in 1891.

These exhibits by the Institution and the Museum were prepared by the representative, with the assistance of Mr. W. H. Holmes, of the Bureau of American Ethnology; Dr. Walter Hough, acting head curator of anthropology;

Dr. I. M. Casanowicz; Mr. T. T. Belote; Mr. T. W. Smillie; Mr. G. C. Maynard; and Dr. J. M. Flint, U. S. Navy. The groups were designed by Mr. Holmes and modeled by Mr. U. S. J. Dunbar. The models of Casa Grande were made by Mr. H. W. Hendley, under the direction of Dr. J. Walter Fewkes, and the model of the Hawaiian village by Mr. I. B. Millner.

The Museum is indebted to Mr. George Wharton James for the assembling of the exhibits from the California missions; to Rev. A. P. Kashevaroff for designing and collecting the exhibit of the Russian Orthodox Church in Alaska; to a committee of the Church of Latter-day Saints, of which Mr. O. F. Whitney was chairman, for an exhibit illustrating the history of that church; to the Board of Hawaiian Evangelical Association for a series of photographs showing mission work in Hawaii; and to Mr. H. W. Henshaw, Lieut. G. T. Emmons, U. S. Navy; Mr. T. J. Richardson; Dr. C. H. Townsend; and Mr. W. E. Safford for the loan of photographs and paintings.

Special acknowledgement is made of the cordial assistance rendered by the Department of State, the War Department, the Signal Corps, the Bureau of Fisheries, and the American Museum of Natural History.

The exhibit as a whole has attracted much attention, being of especial interest to students of history, and one of the most creditable sent out by the Institution. The exposition will close October 15, 1909.

Respectfully submitted.

W. DE C. RAVENEL,

*Representative Smithsonian Institution
and National Museum.*

Dr. CHARLES D. WALCOTT,

Secretary of the Smithsonian Institution.

APPENDIX X.

THE FIRST PAN-AMERICAN SCIENTIFIC CONGRESS, HELD IN SANTIAGO, CHILE, DECEMBER 25, 1908-JANUARY 6, 1909.

By W. H. HOLMES,

Delegate of United States Government representing the Smithsonian Institution.

The first Latin-American Scientific Congress, which was convened in Buenos Aires in 1898, was projected by the Argentine Scientific Society of that city and successfully carried out. It was attended by representatives of twelve Latin-American republics, and yielded results of such importance that a second congress was convened at Montevideo in 1901; and this was followed by a third at Rio de Janeiro in 1905. Arrangements were made for a fourth meeting at Santiago, Chile, in 1908, and the Chilean organization committee,^a feeling that the activities of the congress, which had been limited to the discussion of the Latin-American problems and interests chiefly, should be extended to a fully Pan-American scope, decided that the Santiago meeting should be known as "The First Pan-American Scientific Congress."

The organization committee, through the medium of the Chilean Government, extended to the Government of the United States an invitation to participate. Secretary Root brought the matter to the attention of President Roosevelt.^b

^a The organization committee was constituted as follows: Honorary president, Marcial Martinez; President, Valentin Letelier; vice-presidents, Manuel E. Ballestros and Miguel Cruchaga; general secretary, Eduardo Poirier; assistant secretary, Augusto Vicuna S.; treasurer: Octavio Maira; Alejandro Alvarez, José Ramon Gutierrez, Alejandro del Rio, Miguel Varas. Luis Espejo Varas, Anselmo Hevia Riquelme, Vicente Izquierdo, Domingo V. Santa Maria.

^b THE PRESIDENT: The Government of Chile has invited the Government of the United States to join in and to be represented by delegates at the Pan-American Scientific Congress, which is to assemble under its auspices at the capital city of Santiago during the ten days beginning December 25, 1908. The work of the congress will comprehend nine sections, devoted, respectively, to pure and applied mathematics, physical sciences, natural sciences, engineering, medicine and hygiene, anthropology, jurisprudence and sociology, pedagogics, and agriculture and animal industry.

Latin-American scientific congresses were held in 1898 at Buenos Aires, in 1901 at Montevideo, and in 1905 at Rio de Janeiro. Growing out of these previous conferences the congress of 1908 will be for the first time Pan-American. It will study and discuss many great subjects in which all the American republics have in common special interests; and its aim is to bring together the best scientific thought of this hemisphere for the scrutiny of many distinctively American problems and for an interchange of experience and of views which should be of great value to all the nations concerned.

It is therefore eminently appropriate that the United States should be adequately represented at this important First Pan-American Scientific Congress

and the President transmitted the invitation to Congress, accompanied by a commendatory message.^a In due course the invitation was officially accepted and a liberal sum appropriated for the purposes of the congress. The committee of organization also extended invitations, through the Department of State at Washington, to a number of universities and other institutions and societies. As a result a large delegation was accredited to the congress. The membership of the delegation and the institutions represented are as follows:

Government delegates.

L. S. Rowe, University of Pennsylvania.
 Paul S. Reinsch, University of Wisconsin.
 Hiram Bingham, Yale University.
 A. C. Coolidge, Harvard University.

and should embrace this opportunity for cooperation in scientific research with the representatives of the other American republics. It is worthy of consideration that, in addition to the purely scientific interests to be subserved by such a congress and in addition to the advantages arising from an interchange of thought and the intercourse of the scientific men of the American countries and the good understanding and friendly relations which will be promoted, there are many specific relations arising from the very close intercourse between the United States and many Latin-American countries, incident to our expanding trade, our extending investments, and the construction of the Panama Canal, which make a common understanding and free exchange of opinion upon scientific subjects of great practical importance.

To make our representation possible I have the honor to recommend that the Congress be asked to appropriate the sum of \$35,000, or so much thereof as may be necessary, to enable the United States to send a number of delegates corresponding to the number of sections into which the congress is to be divided, together with a secretary and disbursing officer, and to pay other necessary expenses.

Inasmuch as it is desired that all communications or scientific works to be presented to the congress be received before September 30, it is much to be hoped that provision for the participation of this government may be made at an early date and that the appropriation be made immediately available.

Respectfully submitted.

ELIHU ROOT.

DEPARTMENT OF STATE,

Washington, December 19, 1907.

^a *To the Senate and House of Representatives:*

I transmit herewith for the consideration of the respective Houses of the Congress a report of the Secretary of State representing the appropriateness of early action in order that in response to the invitation of the Government of Chile the Government of the United States may be enabled fittingly to be represented at the First Pan-American Scientific Congress, to be held at Santiago, Chile, the first ten days of December, 1908.

The recommendations of this report have my hearty approval, and I hope that the Congress will see fit to make timely provision to enable the Government to respond appropriately to the invitation of the Government of Chile in the sending of delegates to a congress which can not fail to be of great interest and importance to the governments and peoples of all the American republics.

THEODORE ROOSEVELT.

THE WHITE HOUSE, *December 21, 1907.*

Col. William C. Gorgas, U. S. Army.
 W. H. Holmes, Smithsonian Institution.
 Bernard Moses, University of California.
 George M. Rommel, Bureau of Animal Industry.
 W. R. Shepherd, Columbia University.
 W. B. Smith, Tulane University.

University and society delegates.

C. H. Hall, University of Minnesota.
 Bernard Moses, University of California.
 Albert A. Michelson, University of Chicago.
 J. Lawrence Laughlin, University of Chicago.
 W. R. Shepherd, Columbia University.
 Thomas Barbour, Harvard University.
 A. C. Coolidge, Harvard University.
 J. B. Woodworth, Harvard University.
 Adolph Hempel, University of Illinois.
 W. H. Holmes, George Washington University.
 Orville A. Derby, Cornell University.
 H. D. Curtis, University of Michigan.
 W. F. Rice, Northwestern University.
 L. S. Rowe, University of Pennsylvania.
 Webster E. Browning, Princeton University.
 William B. Smith, Tulane University.
 Paul S. Reinsch, University of Wisconsin.
 Hiram Bingham, Yale University.
 D. E. Salas, National Education Association.

In June, 1908, meetings of the government delegates were held at the State Department, Washington, under the tutelage of Secretary Root, who conveyed to them such instructions as were deemed necessary. Arrangements were made for the preparation and translation of papers dealing with appropriate subjects for presentation at the congress, and for the disposal of the sum allotted by the Department for the purposes of the congress. The organization of the delegation was completed by the selection of Dr. L. S. Rowe as chairman and Prof. Paul S. Reinsch as vice-chairman.

Under the guidance of Doctor Rowe a number of the delegates assembled in Buenos Aires early in December, where they were the recipients of the hospitality of the President of the Republic and the members of his cabinet, and of the ministers of the United States and Chile. Visits were made to numerous institutions of learning, hospitals, municipal buildings, parks, etc., and the visit to the University of La Plata was signalized by an exceptionally cordial interchange of courtesies. On December 10 the party crossed the Andes and established headquarters in the Hotel Oddo in Santiago. Here, before and during the sittings of the congress, the delegation held frequent meetings to plan and discuss their work in the congress. Meantime other delegations, representing seven North American and Central American and nine South American republics, were on hand; and the meeting for the selection of officers for the congress was held at the University of Chile on December 24.^a It is a noteworthy fact that the

^a The result was as follows: President, Enrique R. de Lisboa, Brazilian minister; vice-presidents, Lorenzo Anadon, Argentine minister; Federico Surveilla S. Quash, delegate from Uruguay, and Matias Manzanilla, delegate from Peru; secretaries, Emilio Fernandez, delegate from Bolivia; Melchior Lazo de la Vega, delegate from Panama; and Enrique Martinez Sobral, delegate from Mexico.

president and vice-president of the congress were the envoys of their respective countries to Chile, thus giving to the congress a somewhat political aspect. This aspect was also imparted in a measure by the naming of representatives of a number of the governments in Chile as chairmen of the national delegations in the congress.

At 10 p. m. on Christmas Day the opening session was held in the spacious Municipal Theater, and proved a most impressive ceremony. The President of the Republic, Señor Pedro Montt, was present, and addresses were made by various officials of the congress and by chairmen of the various national delegations. The address of Doctor Rowe, chairman of the American delegation, delivered in Spanish, was enthusiastically received.^a

^a ADDRESS OF DR. L. S. ROWE AT THE OPENING SESSION.

YOUR EXCELLENCY, LADIES AND GENTLEMEN: This congress possesses an historical significance which it is difficult for us to appreciate at the present time. It marks an epoch in the intellectual development of the American Continent.

Complete isolation from one another has characterized the situation of the countries of this continent. This isolation has been one of the greatest obstacles to progress. The failure to develop a spirit of intellectual cooperation has resulted in a great loss of energy and has been one of the most important obstacles to the solution of many problems which would long ago have been solved had we been able to unite our energies and profit by each other's experience. The true scientific spirit has a far deeper significance than the mere desire to conduct investigations. It can not reach its highest expression if there exist petty rivalries or jealousies. For this reason the development of the scientific spirit contributes so much to the growth of a true international fraternal spirit. A vigorous spirit of cooperation, developed amongst the scientists of the American Continent, will enable us to destroy the last traces of the epoch in which the words "stranger" and "enemy" were synonymous.

The industrial development of the last century offers lessons of much importance to the scientific world. A study of the economic growth of modern countries clearly shows that the principle of competition is gradually giving way to the principle of cooperation.

The formation of trusts as well as the growth of trades' unions constitutes the concrete expression of these new tendencies. The eighteenth century and a considerable portion of the nineteenth were dominated by a spirit of individualism. During more than four generations, it was taken for granted that human progress is dependent on the struggle for existence and the conflict between individual and individual. During the nineteenth century the application of biological principles to human society strengthened this idea. It is the mission of the twentieth century to demonstrate that we must regard the principle of cooperation rather than that of competition as the fundamental principle of social progress.

In this congress it is our high privilege to inaugurate a new epoch giving concrete form to the idea of intellectual cooperation. In the International Bureau of American Republics we have a central organization admirably adapted to contribute toward the realization of this idea. We need such a center in order to place investigators in different portions of the American Continent in contact with one another, and in order that the results of such investigations may be made the common property of all the nations of America.

In the name of the delegation of the United States of America, I desire to express our sincere thanks for this opportunity to take part in the deliberations of this congress. No better opportunity could have been offered to become acquainted with our colleagues and fellow-investigators. The ties here formed

The committee on organization was prompt in the preparation of the programme of meetings, and the press of the city was most generous and helpful in its treatment of the congress. The sectional meetings, which continued during eight days, were held separately under the following heads:

1. Mathematics, pure and applied.
2. Physical and chemical sciences.
3. Natural sciences—biology, paleontology, geology, anthropology, etc.
4. Engineering.
5. Medicine and hygiene.
6. Jurisprudence.
7. Social sciences.
8. Pedagogic sciences.
9. Agriculture and zootechny.

The programme was followed, with necessary modifications from day to day. The majority of the papers were read in full or in extended abstracts, and discussion was free and often spirited. Naturally, popular interest centered largely about the sections dealing with practical problems, as education, sanitation, social science, and engineering; but the more abstract sciences were not neglected. Owing to the great range of the work of the congress and the multiplicity of papers presented in the various sections, no attempt can be made in this place to present the work and results in detail. The list of papers presented by members of the American delegation and forwarded by the other contributors from the United States is as follows:^a

- Astronomical Problems of the Southern Hemisphere. By H. D. Curtis.
 The Electronic Theory of Matter. By W. B. Smith.
 Recent Progress in Spectroscopy. By A. A. Michelson.
 Statistics of the Use of Nitrate of Soda in the United States. By Charles E. Munroe.
 The Economy of Fuels. By William Kent.
 Recent Studies in Experimental Evolution. By Thomas Barbour.
 Notes on the Origin of the North American Prairies. By C. H. Hall.
 Origin of the Minnesota Iron Ores. By C. H. Hall.
 The Peopling of America. By W. H. Holmes.
 The Newer Geological Views Regarding Subterranean Waters. By James F. Kemp.
 The Mineral Wealth of America. By W. R. Ingalls and R. W. Raymond.
 The Shaler Memorial Expedition. By J. B. Woodworth.
 The Application of Electricity to Railways. By Frank J. Sprague.
 Sanitation in the Tropics with Relation to Malaria and Yellow Fever. By W. C. Gorgas.
 Frequency and Prevention of Yellow Fever. By C. J. Finlay.
 Notes on the Sanitation of Yellow Fever and Malaria from Isthmian Experience. By H. R. Carter.
 Plagues: Methods of Control. By J. C. Perry.
 America in the Pacific. By A. C. Coolidge.

possess a significance far deeper than the personal satisfaction they imply. This visit can not help but enlarge our mental horizon, broaden our scientific activity, and strengthen the influence of our university instruction. We congratulate ourselves on the privilege of being present, and desire also to express our appreciation of the great service performed by this Republic in giving such vigorous impulse to the spirit of scientific solidarity.

^a This list is in part a translation from the Spanish, and may be somewhat imperfect.

- America's Contributions to International Law. By Paul S. Reinsch.
- Public Opinion as a factor in our American Democracies. By L. S. Rowe.
- Reasons why the English Colonies on Achieving their Independence Became a Single State, whereas the Latin-American Colonies did not Form a Federation or even a Confederation. By Hiram Bingham.
- Geological Work in Brazil. By Orville A. Derby.
- Foundations of the Spanish and English Colonial Civilization in America. By Bernard Moses.
- Gold and Prices. By J. Lawrence Laughlin.
- Uniformity and Conformity in the Census Methods of the Republics of the American Continent. By S. N. D. North.
- The Influence of Urban Environment on the Life and Thought of the People. By L. S. Rowe.
- The Treatment of Indian Tribes of the United States. By Francis E. Leupp.
- Race Degeneration. By W. B. Smith.
- The Reclaiming of Arid Lands in the United States. By F. H. Newell.
- Instruction in Animal Husbandry in the Agricultural Colleges of the United States. By George M. Rommel.
- National Sanitary Animal Police in the United States. By George M. Rommel.
- The Tendencies of Female Education and its Bearing on the Social Mission of the Women of America. By Wm. F. Rice.
- Standard Time System. By Prof. David Todd.
- Adaptation of Instruction to the American Social Medium. By W. R. Shepherd.
- Nurses as Assistants in the Medical Inspection of Schools. By Dora Keen.
- Recent Advances in the Study of Typhoid Fever. By M. J. Rosenau.
- Pensioning Mothers who Depend on the Labor of their Sons, to Enable the Latter to Pursue their Studies. By Dora Keen.
- Plans and Gauges of Intercontinental Railways. By Wm. J. Wilgus.
- Some Phases of the Early History of Mexico and Central America. By Alcée Fortier.
- The Writing of History in the United States. By W. M. Sloane.
- The Value of Gas Power. By Charles E. Lucke.
- Uniformity of Commercial Law throughout the American Continent. By Roscoe Pound.
- Pan-American Terminology. By C. O. Mailloux.
- Car Lighting in America. By R. M. Dixon.
- Reinforced Concrete Construction for South America. By Wm. H. Burr.
- The New Philippine Currency System. By E. W. Kemmerer.
- Water Supply of Cities and Towns. By Allen Hazen.
- Use of Tertiary Coals in General Metallurgy and in the Manufacture of Coke. By Wm. Hutton Blauvelt.
- The Supply of Potable Water. By Rudolph Hering.
- An Analysis of Five Hundred Cases of Epidemic Meningitis Treated with the Antimeningitis Serum. By James W. Jobling and Simon Flexner.
- American Agriculture in its Relation to Chilean Nitrate. By Wm. S. Myers.
- The Processes for the Concentration of Ore. By Robert H. Richards.
- Future Supply of Iron Ore. By Henry M. Howe.
- These papers, with the exception of a small number which did not arrive in time to find a place in the programme, were presented in Spanish, which was the almost exclusive language of the congress.
- The concluding session of the congress was held at the university in the forenoon of January 5, and various matters of general interest were disposed of. These included a discussion of methods of procedure, policy, and scope of future

congresses, relation of the congress to government and science, etc. A number of resolutions, passed by the sections or presented by the delegations, were offered and adopted.^a An agreement was reached to urge upon the legislative bodies of the various countries represented the adoption of uniform laws dealing with commerce, citizenship, etc., and a plan providing for such uniformity was adopted and will be submitted to the several governments.

By a practically unanimous vote it was decided to hold the next meeting in Washington in October, 1912. This action was cabled to the State Department, and Secretary Root responded in the following message:

"Please express to the Pan-American Scientific Congress the satisfaction with which this Government receives the announcement that Washington has been selected as the meeting place of the congress in 1912."

A committee of five members^b was appointed to arrange with the Department of State at Washington for the appointment of a permanent organization committee for the prospective meeting.

A farewell session was held in the Municipal Theater on the afternoon of January 5, at which fitting addresses were made by officials and delegates:^c

^a Resolution, extending to the governing board and director of the International Bureau of the American Republics the thanks of the Pan-American Scientific Congress for the offer of cooperation:

Whereas the Pan-American Scientific Congress has received with much satisfaction the cordial message of greetings from the Bureau of the American Republics and the kind offer of cooperation; be it

Resolved, That the formal thanks of the congress be transmitted to the governing board and director of the bureau, and that it be recommended to the members of the organization committee of the next Scientific Congress to avail themselves in every possible way of the valuable services which the bureau can render.

Resolution, recommending the establishment of a section of American bibliography in the International Bureau of the American Republics:

Recognizing the importance of establishing closer relations between investigators throughout the American continent and of disseminating the results of scientific investigations, the Pan-American Scientific Congress

Resolves, To recommend to the governing board of the International Bureau of the American Republics:

1. That a special section be established in the International Bureau of the American Republics to be known as the "Section of American Bibliography."

2. That the director of the bureau invite authors and investigators to send their publications to the bureau, on receipt of which notice thereof will be published in the Bulletin, which notice shall include at least a brief summary of the contents of such publication and the price thereof.

3. That the bureau secure for investigators any such publications at a price to be indicated in the Bulletin.

4. That the bureau endeavor so far as practicable to secure official publications for investigators.

5. That the bureau keep a record of the published progress of larger schemes of scientific investigations of Pan-American bearing; and that it strive to bring into closer contact investigators in the same or related fields.

^b L. S. Rowe, George H. Rommel, W. H. Holmes, John Barrett, director of the Bureau of American Republics, and Elmer E. Brown, commissioner of education.

^c CLOSING ADDRESS OF DR. L. S. ROWE.

MR. PRESIDENT, LADIES AND GENTLEMEN: The honor conferred upon my country through the designation of Washington as the next meeting place of this

and at night a dinner was given in the hall of the university, at which there was a generous expression of good feeling and a striking display of oratory.

I can see a time, not far distant, when with each conquest of science the question will immediately arise in the mind of every American, "How can these results be made of service to the democracies of this continent?"—a time when in every field of endeavor the American republics may call upon one another for counsel in the solution of their problems, and be certain to receive the best expert advice. Then, and not till then, shall we have developed a real continental spirit; then, and not till then, shall we have fulfilled the obligations

great assembly is the more significant because of its spontaneous character. For this demonstration of confidence, good will, and fraternal solidarity I want to thank you, not only in the name of the delegation of the United States of America, but also on behalf of that larger body of scientists and investigators who are imbued with the same spirit that has actuated this congress, and who now look forward to the privilege of welcoming to our shores the men upon whose efforts the progress of this continent depends. We can not hope to surpass the hospitality of this great republic, but we can assure you that the welcome will be no less sincere, and the determination to place every possible facility at your disposal, no less effective than has been the case here in Chile.

Viewed in its proper perspective, this congress has been one of the most extraordinary assemblages of modern times; more extraordinary in many respects than either The Hague or the Pan-American conferences. That a large group of men, representatives of every section of a great continent, should be able to get together and, casting aside all petty prejudices, freely and frankly exchange the results of their careful investigations and ripe experience, is not only a tribute to the culture of this continent, but is also an indication of the extent to which our ideas have advanced beyond those which we inherited from our European mother countries.

The fact that we have met to place the results of the best scientific thought at the disposal of all the countries here represented, and through them at the service of the civilized world, contains a lesson of deep and lasting import which no other assembly of modern times has been able so clearly to impress upon the civilized world.

The historian of the intellectual development of the American continent, in reviewing the work of these assemblies, will probably give to the Santiago congress the honor of having clearly demonstrated that the republics of the American continent, because of their geographical position; because of the peculiar conditions under which they were settled; and because of the special racial problems which they present, are confronted by a series of problems distinctively American. The mere fact of the existence of these problems involves an obligation not only to ourselves, but to the civilized world to concentrate our efforts upon their solution. Through their solution we can make that contribution to the progress of mankind which the world has the right to expect of us.

We can best hope to do this by carrying to our respective countries the spirit that has hovered over this congress—that of service in its broadest and highest sense. This spirit of service must be made the keynote of our national and of our international relations. The republics of the American continent must demonstrate to the civilized world that the willingness and determination to be of service to our fellow-men is the corner stone of a philosophy which the nations of this continent are determined to make the guiding principle of their conduct.

which our privileged position in the world's affairs has placed upon us. I can imagine no greater distinction for the next congress than the possibility of marking a further step in the development of this spirit of service and of continental solidarity.

And, now, in closing, let me again extend the thanks of the delegation of the United States of America to you, the members of the organizing committee, for your broad grasp of the purposes of the congress and the skill with which these purposes have been made real and effective; to you, our colleagues, for your cordial reception of newcomers in your midst, and finally to the Government and people of Chile for the warm-hearted hospitality which we have enjoyed.

The social features of the congress were most noteworthy. The President of the Republic, besides giving the usual official reception, entertained the foreign delegates at dinner, invitations being extended to a limited number each day during the congress. Receptions were given under government auspices at the principal social clubs. The American minister, the French, Brazilian, and Argentine ministers, and numerous prominent citizens entertained the delegates. Members of the American and other delegations were guests at a number of charming haciendas in the vicinity of Santiago; and the American delegation entertained at dinner members of the organization committee, chairmen of various national delegations, and others. Visits were made to institutions of learning, museums, art galleries, hospitals, and manufacturing establishments, and no effort was spared by the officials of the congress to make the visit of the foreign delegates enjoyable and profitable. The writer wishes to express his personal appreciation of these courtesies and attentions, and to say that he approached South America somewhat oppressed by the thought that he should find himself a stranger in a strange land, but that, on the contrary, there was not a day of the two months spent in the Latin-American countries on which he was not made to feel entirely at home and among appreciative and generous friends.

The universal feeling at the close of the congress was that the meeting had fully justified the plans of its projectors; and the story is not entirely told when it is stated that the elaborate programme, covering nearly every branch of science, was successfully carried out. The more thoughtful find in this and in kindred assemblages much that is of significance for the future of the American republics. This congress was a decided step in the direction of bringing about a better understanding among the nations represented. It was a step toward a fuller appreciation of the common interests of each and every American nation. It was an appreciable forward step in the development of the means and methods of promoting the common interests of the continent. It was a step toward making the experience and the accumulated wisdom of each people represented the experience and wisdom of all. In the section of pedagogy the best that has been developed in the theory and practice of teaching was made the common property of all the American republics. In the section of sanitary and medical science the latest achievements of each nation in the battle with disease were made familiar to every participant. In the section of agriculture and zootechnics steps were taken in the direction of properly utilizing and conserving the resources of the continent in these important realms. In the section of engineering the best methods of overcoming the various physical obstacles to progress and of winning the riches of the earth were explained for the benefit of all America. In the section of government and law the principles of statecraft and the administration of justice were discussed for the benefit of every American government. In the section of the fiscal sciences practical methods of conducting the monetary affairs of the nations were presented and

explained. And in every other branch of science, practical and abstract, the various forces and agencies that contribute toward progress and enlightenment were in a measure the subject of serious attention. The congress was an initial step toward making the best of all the peoples of the Western Hemisphere. It was an initial step in making the best, for to-day and for all time, of the resources of the continent. It was an initial step which in many ways must make for the peace and prosperity of the continent. It was a noteworthy step in conformity with manifest destiny as expressed in the phrase "America for Americans."

The success of the congress of 1912 depends upon the interest displayed in it by the scientific world, and on the support accorded by the Pan-American governments. The time is ample, and the appointment of an organization committee representative of a wide range of scientific interests is the first step in making the Washington meeting an event worthy of the nation and its capital.

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