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REPORT OF THE

# Secretary of the Smithsonian Institution

FOR THE YEAR ENDING JUNE 30

1907



(No. 1737)

WASHINGTON  
GOVERNMENT PRINTING OFFICE

1907





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REPORT  
OF THE  
SECRETARY OF THE SMITHSONIAN INSTITUTION,  
CHARLES D. WALCOTT,  
FOR THE YEAR ENDING JUNE 30, 1907.

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*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, 1907, 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, the Regional Bureau of the International Catalogue of Scientific Literature, and the excavations on the Casa Grande Reservation.

In the body of this report there is given a general account of the affairs of the Institution, while the appendix presents a more detailed statement by those in direct charge of the different branches of the work. Independently of this the operations of the National Museum and the Bureau of American Ethnology are fully treated in separate volumes. The scientific work of the Astrophysical Observatory, covering its researches for the past five years, will be described in Volume II of the Annals of the Observatory.

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."

As organized on June 30, 1907, the establishment consisted of the following ex officio members:

THEODORE ROOSEVELT, *President of the United States.*

CHARLES W. FAIRBANKS, *Vice-President of the United States.*

MELVILLE W. FULLER, *Chief Justice of the United States.*

ELIHU ROOT, *Secretary of State.*

GEORGE B. CORTELYOU, *Secretary of the Treasury.*

WILLIAM H. TAFT, *Secretary of War.*

CHARLES J. BONAPARTE, *Attorney-General.*

GEORGE VON L. MEYER, *Postmaster-General.*

VICTOR H. METCALF, *Secretary of the Navy.*

JAMES R. GARFIELD, *Secretary of the Interior.*

JAMES WILSON, *Secretary of Agriculture.*

OSCAR S. STRAUS, *Secretary of Commerce and Labor.*

#### THE BOARD OF REGENTS.

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

The following appointments and reappointments of Regents were made during the year: By appointment of the Speaker, December 3, 1906, Representative James R. Mann in place of Representative R. R. Hitt, deceased; by joint resolution of Congress approved January 21, 1907, the Hon. George Gray to succeed himself; by appointment of the Vice-President on March 4, 1907, Senator S. M. Cullom and Senator A. O. Bacon to succeed themselves. On January 23, 1907, the Hon. John Dalzell was elected a member of the executive committee to fill the vacancy created by the death of Mr. Hitt.

It is with deep regret that I have to record the death of Representative Robert R. Hitt on September 20, 1906. Mr. Hitt was a member of the Board of Regents on the part of the House of Representatives for more than thirteen years.

The membership of the Board at the end of the fiscal year was as follows: The Hon. Melville W. Fuller, Chief Justice of the United States, Chancellor; the Hon. Charles W. Fairbanks, Vice-President of the United States; Senator S. M. Cullom; Senator Henry Cabot Lodge; Senator A. O. Bacon; Representative John Dalzell; Representative James R. Mann; Representative W. M. Howard; Dr. James B. Angell, of Michigan; Dr. Andrew D. White, of New York; the Hon. J. B. Henderson, of Washington, D. C.; Dr. A. Graham Bell, of Washington, D. C.; the Hon. Richard Olney, of Massachusetts; and the Hon. George Gray, of Delaware.

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

*Resolved,* That in addition to the prescribed meeting held on the fourth Wednesday in January, regular meetings of the Board shall be held on the



Tuesday after the first Monday in December and on the 6th day of March, unless that date falls on Sunday, when the following Monday shall be substituted.

In accordance with this resolution, the Board met on December 4, 1906; January 23, 1907, and March 6, 1907. The proceedings of the Board at these meetings will be found in its annual report to Congress.

#### GENERAL CONSIDERATIONS.

It is with a deep sense of responsibility that I have assumed the office of Secretary, and I greatly appreciate the honor conferred by the Regents in electing me to the position. Once before, as acting assistant secretary, I had administrative charge for nearly two years of a most important branch of the Institution's work, the United States National Museum. I have been associated with the scientific work of the Museum for almost a quarter of a century, and for many years have been in close personal contact with other important branches of the Institution's activities.

I fully recognize the obligation resting upon the man who holds the position which has been successively occupied by Joseph Henry, Spencer F. Baird, and Samuel P. Langley. By a wise and conservative policy, maintaining at once the independence of the Smithsonian fund and yet freely cooperating with the Government in securing aid in the development of its branches, the Institution has reached a position of eminence far beyond what might have been expected from the comparatively small endowment which it possesses. It has, moreover, on numerous occasions conducted in its initial stages scientific work that has proven to be of great practical value, and when the experimental stage was passed and their economic utility had been demonstrated, the organizations and results obtained were turned over to the Government. Through one or another of its agencies the name Smithsonian Institution has been brought to the attention of scientific workers in this country and in other lands and to those educated people generally who, though without special training in science, desire to keep abreast of the progress of the world. It has abandoned projects which other institutions had undertaken, on the theory that there was plenty of work for all to do, and it has aided investigators throughout the United States and indeed in foreign lands as heartily as it has supported the work of its own staff.

In other words, I feel that I have come to an establishment unselfish in its aims and willing to help all men in furtherance of the objects for which it was founded—an institution devoted fully to the progress and spread of knowledge in every field without limitation to one branch of science or to all science, but having within its purview the elevation of mankind through the increase and spread of knowledge. The heads of the Institution thus far have been specialists



trained in different branches of knowledge. Henry was a physicist, Baird a naturalist, Langley an astronomer and physicist. While they were carrying on the general affairs of the Institution each of these men pursued particular investigations. No one of them, however, allowed his judgment to be biased by the limitations of his own specialty. I hope to follow in the footsteps of these men. In addition to guiding the affairs of the Institution, I expect to carry on research work in geology and paleontology, and to prepare some memoirs on these subjects which have occupied a large part of my life. Such research work produces a greater sympathy and understanding of the special work of others; as in the past, it will in no wise tend to alter the universal character of the Institution or to limit my interest in all departments of research.

My predecessors have so wisely and so economically administered the affairs of the Institution that I have come to a well-equipped establishment with its traditions and its policy founded upon right principles, and they do not appear to be susceptible of material improvement. I shall, however, through special agencies created from time to time, carefully study the workings of the Institution and of all of its branches with the purpose of satisfying myself as to existing conditions and methods, and in order to retain a practical and high standard of administration.

Speaking for the Institution proper, it appears to me that it has been developed to the full extent possible under its present endowment. It can not have escaped the attention of observers that, in the sixty years and more in which the Smithsonian Institution has existed, few additions have come to its funds. While money has been freely given for the enlargement of existing institutions of learning and research and even more has been forthcoming for the establishment of new ones, the fund of this Institution remains at about \$1,000,000, but a little over double what it was at its foundation. The generous men and women who have supported science and art in this country have possibly not considered the fact that there is necessarily a waste in the founding of a new organization. Moreover, a much greater amount of good can often be accomplished by financially aiding an existing institution than by creating a new one of the same type. That this Institution has popularity can not be doubted, but it has seemed to suffer from one of its greatest advantages, namely, its connection with the Government. Being a ward of the nation, it is thought by the public to be a recipient of generous Congressional appropriations. While this is in a measure true for the branches in charge of the Institution, yet no provision is made by Congress for carrying on the activities of the Institution proper. I think this is a very sound condition, but feel that it should be made



sufficiently clear to all who may be interested or become interested in the Institution and its work.

There are numerous projects actually awaiting systematic development that can not properly receive support from the Government and which from their nature might be advantageously conducted under the charge of the Institution; these include, among others, the scientific exploration of large areas of Central and South America; the investigation of various problems connected with the deposition of ores; investigations in regard to the production of petroleum by artificial means; the study upon a large scale of anthropological and ethnological problems having direct bearing on the future American people; the systematic study of seismological (earthquake) phenomena. Although it may be held that the practical demonstration of these problems will be provided for elsewhere, it must be borne in mind that few scientific activities are without some ultimate relation to practical affairs and that researches bearing directly upon the activities of the people and natural productions must be carried on from the scientific point of view.

In order to further develop, if possible, that part of the Institution's programme which has to do with the diffusion of knowledge, I have tentatively initiated a plan which will greatly enlarge the scope of the Institution's work in this respect. The carefully selected general appendix to the Smithsonian Annual Report is the principal means, aside from the International Exchange Service, whereby the Institution diffuses knowledge. Some 10,000 copies of these Reports are printed, a large majority of which are placed in public libraries, where they are accessible to many readers, while but a small proportion can be sent to individuals. I have accordingly initiated a plan of having prepared, in popular language, abstracts of the publications of the Institution and sometimes special articles on the investigations in progress by the Institution. These have been distributed to the daily newspapers, which, in the main, have made use of them. In this way the material in the Reports and other publications of the Institution, as well as the knowledge of current investigations, have been rendered accessible to millions of readers.

Although I assumed the office of Secretary on the 31st of January, 1907, I continued, at the request of the President, the direction of affairs of the Geological Survey, with which, however, my connection as Director terminated on April 30.

In order that my time might be as free as possible for the affairs of the Institution and for research work, I considered the question of severing my relationship with the Carnegie Institution of Washington, of which I am a member of the board of trustees and of the

executive committee. After conferring, however, with my colleagues on that committee and with the members of the Board of Regents, it was considered on all hands desirable and as productive of harmonious and useful cooperation between two kindred institutions that I should retain my membership of the board of trustees and of the executive committee of the Carnegie Institution.

During the year the Smithsonian Institution cooperated with and received the aid of most of the Government Departments, though I may especially mention the Departments of State, Agriculture, Interior, and Commerce and Labor, and the valuable advice and assistance received from the Department of Justice. Through its Exchange Service, its publications, its collections, and in many other ways, the Institution continues in relation with most of the important scientific establishments and universities in this country and other lands, thus aiding the progress of science and preventing waste. With the consent of the Regents I have tendered to the National Academy of Sciences and the American Association for the Advancement of Science office accommodations in the Smithsonian building, which have been accepted by the officials of both of these important national organizations. The Institution continues its cooperation with the American Historical Association in accordance with the provisions of the act incorporating that society. In general I deem it one of the important functions of the Institution that it should freely place its administrative machinery and opportunities at the service of all the great national learned societies in the hope that the work of all of them will be aided and duplication of labor and waste of energy avoided.

#### ADMINISTRATION.

In the administration of the Institution the Secretary has the valued aid of experienced officers and a well-trained staff. The Museum is in the immediate charge of Mr. Richard Rathbun, an Assistant Secretary of the Institution, and the Exchange Service, the Library, and the Regional Bureau for the International Catalogue of Scientific Literature are under the supervision of Dr. Cyrus Adler, an Assistant Secretary. Mr. W. H. Holmes is Chief of the Bureau of American Ethnology, Dr. Frank Baker is Superintendent of the National Zoological Park, and Mr. C. G. Abbot is Director of the Astrophysical Observatory.

A system in vogue of conferences between the Secretary and these officers on all subjects pertaining to the different branches has been maintained. The Secretary, as executive officer of the Board of Regents, deems the administration of the parent Institution his first



care, but fully recognizes the importance of the branches supported by the Government, many of which are inherent in the organic act of the Institution, and desires, in cooperation with the Board and the Congress, to administer and develop these important charges of the Institution.

The duties of the Secretary from the date of the death of Mr. Langley up to the end of January, 1907, when I was appointed to that office, were performed with ability and fidelity by Mr. Richard Rathbun, an Assistant Secretary of the Institution, by designation of the Chancellor under authority of the act of May 13, 1894, providing for the appointment of an Acting Secretary.

It is gratifying to report that the current business of the Institution was conducted in a prompt and efficient manner, and that no arrearages in the work of the Government branches under its direction had to be noted in the quarterly statements made to the President and the annual statement made to Congress in accordance with law.

In view, however, of the recent examination by a commission appointed by the President into the business methods of all of the Government Departments, not including the branches under the charge of the Smithsonian Institution, I thought it wise to appoint a committee for the purpose of examining into the business methods of the Institution and its several branches, with a view to suggesting, if found desirable, improvements in the business methods of the Institution and its various branches, and in the transaction of business between them and the Institution.

Mr. H. W. Dorsey, who had been for many years connected with the Institution, was on March 29 appointed chief clerk.

Several amendments affecting the operation of the civil-service law and rules in their bearing on the personnel of the branches of the Government service under the direction of the Smithsonian Institution were promulgated by Executive order during the year. The only change in the rules, however, which affects the branches of the Institution specifically is that announced in the Executive order of April 15, 1907. This provides that the paragraph in the legislative act approved June 22, 1906 (prohibiting the transfer of any employee in the classified service from one Executive Department to another until the employee shall have served for a term of three years in the Department from which transfer is desired), may be waived in proposed transfers to or from the Smithsonian Institution and certain independent bureaus or offices of the Government, when in the judgment of the Civil Service Commission the interests of the service so require.

## 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
	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
	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
	986, 918. 69

The balance of the residuary legacy of the late Thomas G. Hodgkins, exclusive of accumulated interest, consisted of United States registered 4 per cent bonds of the par value of \$7,850 maturing July 1, 1907. These bonds were sold by order of the Board of Regents, and the gross proceeds aggregating \$7,918.69 were deposited in the Treasury of the United States to the credit of the permanent fund.

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 \$64,444.41, was derived as follows: Interest on the permanent fund, \$57,900; proceeds from claims in litigation, \$1,292.56; interest of Hodgkins residuary fund, \$235.50, and miscellaneous sources, \$5,016.35; 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 \$10,184.13, on July 1, 1906, the total resources for the fiscal year amounted to \$74,628.54. The disbursements, which are given in detail in the annual report of the executive committee, amounted to \$49,936.53, leaving a balance of \$24,692.01. Of this



amount \$100 was advanced for work yet incomplete and \$24,592.01 was on deposit in the Treasury of the United States.

The Institution was charged by Congress with the disbursement of the following appropriations for the year ending June 30, 1907:

International Exchanges .....	\$28, 800
American Ethnology .....	40, 000
Astrophysical Observatory .....	14, 000
United States National Museum:	
Furniture and fixtures.....	20, 000
Heating and lighting.....	18, 000
Preservation of collections.....	180, 000
Books .....	2, 000
Postage .....	500
Rent of workshops.....	4, 580
Building repairs .....	15, 000
New building for National Museum.....	500, 000
National Zoological Park.....	95, 000
International Catalogue of Scientific Literature.....	5, 000
Protection and excavation, ruin of Casa Grande, Arizona.....	3, 000
<b>Total .....</b>	<b>925, 880</b>

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, 1908, are shown in the following table:

	Estimates.	Appropriations.
International exchanges.....	\$32, 000	\$32, 000
American Ethnology.....	50, 000	40, 000
Astrophysical Observatory.....	14, 000	13, 000
National Museum:		
Furniture and fixtures.....	20, 000	20, 000
Heating and lighting .....	18, 000	18, 000
Preservation of collections.....	190, 000	190, 000
Books .....	2, 000	2, 000
Building repairs.....	15, 000	15, 000
Rent of workshops.....	4, 580	4, 580
Postage.....	500	500
Sunday and night opening.....	11, 728	.....
New building for National Museum.....	1, 250, 000	1, 250, 000
National Zoological Park:		
National Zoological Park .....	100, 000	95, 000
Repairing roadways and walks.....	15, 000	15, 000
Readjustment of boundaries.....	60, 000	.....
International Catalogue of Scientific Literature.....	5, 000	5, 000
Protection and excavation, ruin of Casa Grande, Arizona.....	3, 000	3, 000
<b>Total .....</b>	<b>1, 790, 808</b>	<b>1, 703, 080</b>

## EXPLORATIONS AND RESEARCHES.

## STUDY OF OLDER SEDIMENTARY ROCKS.

During the past twenty years I have been studying the older sedimentary rocks of the North American Continent from Newfoundland to Alabama on the eastern side and from southeastern California to northern Montana on the western. In the interior, east of the Rocky Mountains, studies were carried on in Texas, South Dakota, Minnesota, and Wisconsin.

Three important sections remained to be examined—one of the Lower Cambrian in western Nevada, one in northern Montana, and another of the lower Paleozoic Rocks of the main range of the Rocky Mountains in the vicinity of the Canadian Pacific Railroad.

The latter was selected for examination during the field season of 1907, and although the work did not begin until after the close of the fiscal year I will here briefly recount some of its results. Early in July, a camp outfit was secured at Field, British Columbia, and work begun on Mount Stephen. Subsequently sections were studied and measured at Castle Mountain, west of Banff, Alberta; at Lake Louise, south of Laggan, Alberta, and on Mount Bosworth on the Continental Divide near Hector, British Columbia.

Upwards of 20,000 feet of strata were carefully examined and measured, and collections of fossils and rocks made from many localities. It was found that the Cambrian section included over 12,000 feet of sandstones, shales, and limestones, and that the three great divisions of the Cambrian—the Lower, Middle, and Upper—were represented in the section of Bow River series and the Castle Mountain group. Characteristic fossils were found in each division.

## ALASKAN EXPEDITION.

In continuation of work already satisfactorily begun, the Secretary authorized, in April of the present year, an expedition for the collection of the remains of large extinct vertebrates, particularly mammals, in Alaska. Although fragmentary materials have been secured there from time to time by various exploring parties and mining expeditions, the country is still, to a considerable extent, a virgin field, and the recent great development of the mining industry makes the present time particularly favorable for the work proposed, especially on account of the facilities for transportation thus rendered available.

The expedition has been placed in charge of Mr. C. W. Gilmore, a member of the staff of the National Museum, who will have the services of a guide trained in the methods of the work to be accomplished and thoroughly familiar with the regions to be explored.



The research is an important one and it is hoped by means of it to increase our knowledge of the extinct fauna of the country, and to add valuable and interesting specimens to the collection of the Museum.

#### FOSSIL FISHES OF BRAZIL.

A moderate grant was approved for the preparation of an illustrated article, to be prepared in collaboration by Dr. David Starr Jordan and Dr. J. C. Branner, on a unique collection of fossil fishes from the Barra do Jardim, a locality near Ceará, Brazil.

About 1834 a collection of these fossil fishes was received by Louis Agassiz, and from it he described seven new species, some of which have never been seen since his time. Some species from the same locality are now in the British Museum, and Stanford University has recently received nodules containing specimens of all those heretofore described and probably several additional ones not before noted. Doctors Jordan and Branner are thus enabled to give information supplementary to any heretofore recorded in regard to this interesting species of fossil fishes. An article describing the research will be submitted to the Institution for publication when completed.

#### ARIZONA METEORITES.

In April, 1907, Dr. George P. Merrill, head curator of geology in the National Museum, received a limited grant for the purpose of examining the remarkable craterform depression known as Coon Butte, near Canyon Diablo, Arizona, with a view to determining whether it was caused by explosive volcanic action, as assumed by some investigators, or due to the impact of a mass of meteoric iron, as asserted by others. In conducting the research a general survey was made of the amount and distribution of meteoric irons and associated materials of the locality.

Two preliminary papers, one describing a hitherto unrecognized type of meteoric iron, and the other a peculiar form of metamorphism in the siliceous sandstone of the Butte, have been submitted and published in the Proceedings of the National Museum and the Smithsonian Miscellaneous Collections. The entire investigation will be reported on in detail after the results are collated and arranged.

At the conclusion of the work at Coon Butte, Doctor Merrill visited the fossil forest, near Adamana, Ariz., under the authorization of the Department of the Interior, and made collections of the silicified woods for the purpose of supplying the numerous applications received from schools and colleges for such materials.

#### GEOLOGY OF THE ALPS.

The problem of the structure of the Alps, always a question of intense interest, has been the subject of more than usual attention

and discussion, especially in Europe, during the last five years. The topic being one of vast importance in general geology also, it was decided to make it the subject of special study during the summer of 1907, and Mr. Bailey Willis, a geologist prepared for the work by previous experience and training, was detailed for the purpose, under a grant from the Institution.

It is hoped that this investigation, the results of which will be issued in one of the Smithsonian publications, will aid in solving questions of great importance in general geology.

#### SEISMOLOGICAL INVESTIGATIONS.

The great earthquake at San Francisco brought prominently to the attention of scientific men and establishments the importance of seismological study, and when on August 16, 1906, the earthquake in Chile took place, it seemed desirable that a competent investigator should be sent to that country to make a study on the spot in order that the disturbance in Chile might be compared with that in California, and utilized for the furtherance of knowledge of this important subject.

Through the courtesy of the Department of State cable communication was had with the American minister in Chile, and it was ascertained that the Government of Chile had appointed a commission consisting of competent astronomers and geologists and that there was no need of sending an observer from the Institution. The American minister in Chile and Mr. Heber D. Curtis, of the Lick Observatory Station, at Santiago, kept the Institution informed as to the progress of the investigation. In general it seems to be determined that there had been some elevation of the coast of Chile and that on the other hand there had been found no traces of a rift such as caused the earthquake at San Francisco. Brief abstracts from the communications received have been published from time to time in the Smithsonian Quarterly.

Meanwhile the importance of seismological investigation, both national and international, has received attention, and plans have been considered for establishing stations in this country, but the Institution is without funds to further the object, and attempts to secure special means or endowment for the purpose have as yet not met with satisfactory results.

In connection with this subject it should be said that the frequent reports of observations of earthquakes at sea which reach the Hydrographic Office of the Navy Department are, through the courtesy of that Department, regularly transmitted to the Institution and are made known to students interested in this subject with the hope that all the data when correlated may prove of advantage in the study of these great destructive phenomena.



## AERODROMIC RESEARCHES.

Although the experimental work in aerodromics begun by Secretary Langley is not now being carried on at the Institution, it can not but be gratifying to note the fact that this subject, which was placed upon a solid foundation by the research work of Mr. Langley, is more and more engaging the attention of physicists and engineers, military establishments, and students throughout the world, and that the impetus given to it by my predecessor is everywhere recognized. This Institution has by no means abandoned its interest in the subject, and the collection of books and pamphlets brought together here is maintained as a separate collection and rendered accessible to students. I have made a special grant to Mr. C. M. Manly, who was associated with Mr. Langley in this work, for the completion of a memoir bringing the experiments up to 1905, and another for the preparation of a bibliography on the subject, which it is hoped may be useful to students.

Dr. Alexander Graham Bell, a Regent of the Institution, and a distinguished student of many natural problems, is engaged upon aerodromic experiments which it is expected will prove useful and important. He and others have used, it is hoped with profit, the material in the collections gathered here. The prominence of the Institution in this subject has made the National Museum the natural place of deposit for the original types of different forms of flying machines, and there is no doubt but that the most important types of models of the early attempts to solve this great subject will be found in the collections here.

The engine of the large aerodrome was displayed in New York at the exhibition of the Aero Club in December, 1906.

## INVESTIGATIONS UNDER THE HODGKINS FUND.

## STUDY OF ATMOSPHERIC AIR IN RELATION TO MANKIND.

Investigations on subjects of general hygienic interest, such as have been promoted since the beginning of the administration of the Hodgkins fund, continue to receive encouragement. Publications are issued in this connection, and communications addressed to the Institution on subjects which the fund may properly aid, do not fail to receive attention. The Hodgkins gold medal, which is bestowed for important contributions to our knowledge of the nature and properties of atmospheric air, or for practical applications of our existing knowledge of them to the welfare of mankind, is a testimonial not only to the wishes of the founder of the fund, but also an expression of the interest of the Institution in this regard.

Among other topics, the question of the effective ventilation of buildings has been given attention, and initiative steps have been taken to learn what investigators are making a serious study of this important subject. The vitiation of the exterior atmosphere in closely settled localities is also recognized as a question of great importance to the dwellers in cities, and an effort is making through the publications of the Hodgkins fund to disseminate the results of late noteworthy investigations in this connection.

The application of atmospheric air to therapeutics has received consideration, and while no research having for its object the direct use of the atmosphere as a curative agent has, as yet, been aided, the work furthered by the fund, excepting that which deals almost exclusively with the mechanics of the atmosphere, is closely related to medicine and hygiene. Consequently the reports of investigations and experiments prosecuted in widely separated localities, such as London, South Africa, Paris, and the cities of our own country, have been followed with interest, in common with all classes of research which make broader the way for the practical utilization of our knowledge of the nature and properties of atmospheric air for the welfare of mankind.

#### ABSOLUTE MEASURE OF SOUND.

The research of Dr. A. G. Webster, of Clark University, on the absolute measure of sound, which was aided again during the present year by a moderate grant from the Hodgkins fund, is reported as advancing satisfactorily toward completion. The instruments prepared especially for use in this research are expected to prove of service in solving many practical questions relating to sound, such, for instance, as the testing of sound-proofing materials, or of audible signals. In conducting the investigation many delicate points in the theory of such instruments have been settled by actual experiment, so that, in some particulars, the experimental knowledge is in advance of the present mathematical theory.

The manuscript describing the methods and results of this research will be submitted to the Institution for publication when completed.

#### PROPERTIES OF MATTER AT VERY LOW TEMPERATURES.

The investigation of the properties of matter at very low temperatures, involving the use of liquid air, in aid of which a grant was approved in 1906, from the Hodgkins fund of the Institution on behalf of Prof. E. L. Nichols, of Cornell University, has been steadily progressing. The research is now to enter on a careful study of the index of the refraction of gases, and gaseous mixtures and vapors, over extreme ranges of pressure of temperature. The effect on the



physical properties of carbon of the remarkable absorption of gases at low temperatures is to be investigated, and two methods of determining the specific heat of gases have been perfected. The investigation of the properties of matter at the temperature of liquid hydrogen will also be continued and the results recorded.

#### STUDY OF THE UPPER ATMOSPHERE.

The meteorological experiments of Mr. A. Lawrence Rotch with registering balloons, conducted from St. Louis as the starting point, have been again aided by a grant from the Hodgkins fund. Before the close of similar experiments by Mr. Rotch from the same point in 1906, the extreme height of nearly 10 miles was attained, and a temperature of  $-76^{\circ}$  F. was once recorded somewhat below 7 miles.

This final series of ascensions aided by the Institution is intended to supply data for the season of the year in which observations of the upper air have heretofore been the least frequent, and it is hoped that the endeavor to ascertain the annual variation of temperature at great heights in the free air above the American continent will thus be materially furthered.

A summary of the results of the meteorological research conducted by Mr. S. P. Fergusson, mentioned in the previous Report as having been aided by a moderate grant from the Hodgkins fund of the Institution, has been submitted.

Stations for these experiments were established on the summit of Mount Washington, 1,916 meters above sea level, and at Twin Mountain, 1,500 meters lower and 15 miles distant. Louvred shelters were built for the proper exposure and protection of the instruments at these stations, and the anemometer was erected on the old Tip Top House, the highest point on the summit of Mount Washington. Records were made at the stations, as nearly as possible continuous, of pressure, temperature, humidity, and wind velocity, while the meteorographs recording the same elements were sustained by kites in the free air for as long a time as possible during the research. Observations of the formation of clouds on the mountain and in the free air were also made.

While the apparatus used in this research was the same in principle as that heretofore employed, it is hoped that certain devices which were suggested by the conditions, and successfully adopted, will prove advantageous in later experiments. The time available for this research was necessarily limited, but the kites on several different occasions carried the meteorograph sufficiently high for comparison with the records obtained on Mount Washington. On the 6th of September the instrument was kept at approximately the same height in the free air and on the summit of Mount Washington for eight hours between noon and 10 o'clock p. m.

In view of the short time, practically about three weeks, during which the climatic conditions rendered it possible to prosecute this research, its results as reported by Mr. Fergusson may be considered satisfactory.

#### MECHANICS OF THE EARTH'S ATMOSPHERE.

There was published by the Institution several years ago a volume, entitled "Mechanics of the Earth's Atmosphere," which consisted of translations of articles by various eminent meteorologists. Arrangements have been made with Prof. Cleveland Abbe, editor of the first volume, for the preparation of a second volume on the same topic.

#### THE ORGANS OF FLIGHT.

An additional grant has been approved this year on behalf of Dr. R. von Lendenfeld, of the University of Prague, for an investigation of the organs of flight of the best representative flyers of the insect orders—Lepidoptera, Hymenoptera, and Diptera. A detailed account of this research will be submitted on its conclusion for publication by the Institution if desired.

Previous researches of Doctor von Lendenfeld have been described in articles prepared under his supervision by Drs. Leo Walter and Bruno Müller. Doctor Walter's article, already published, was referred to in the previous report. The paper by Doctor Müller on the air sacs of the pigeon is now in course of publication.

#### SMITHSONIAN TABLE AT NAPLES ZOOLOGICAL STATION.

In July, 1906, the renewal of the lease of the Smithsonian table in the Naples Zoological Station for a term of three years from January 1, 1907, was decided on, and the director so informed. Doctor Dorhn, with his usual ready courtesy, at once notified the Institution of his willingness to arrange for a double occupancy by extending the time of an appointee then conducting an important research at Naples, although the seat had already been assigned for the period in question to another investigator.

It is the intention of the Institution to interfere in no way with the regular assignment of the table, and the desire of the Director to maintain the international character of the station by encouraging the action of the various countries in supporting individual tables is fully appreciated. Nations widely separated, at least geographically, meet there on the common ground of interest in science, and thus, as an appointee of the Smithsonian seat expressed in his report to the Institution, an international peace congress, the importance of which can not be overestimated, is always in session at the Naples Zoological Station.

Several appointments to the Smithsonian table at Naples were ratified for the period between June 30, 1906, and June 30, 1907, the



entire occupation of the seat for the year being eleven months. Since inquiries as to available dates are frequently received a year or even two years in advance of the time desired, it may be well to repeat that in the interest of all applicants it is not customary to approve a request for the seat more than six months in advance of the period desired.

By extension of his appointment, Dr. Stewart Paton, of Johns Hopkins University, occupied the Smithsonian seat until the end of June, 1906. His work at Naples dealt principally with the problems hitherto unsolved in connection with the nervous system and its relations to the action of the heart. As before noted, the results of this interesting research will be published on completion.

The occupation of the Smithsonian seat at Naples by Dr. Maynard M. Metcalf, formerly of the Woman's College in Baltimore, and now of Oberlin College, began before the close of the final session of Doctor Paton. Doctor Metcalf reports that on beginning his term at the station he continued his study of the parasites of frogs prosecuted at Würzburg and designed for publication in connection with work done there.

There being apparently some doubt as to whether or not the advantages of the Smithsonian seat at Naples are available to hitherto unknown investigators, it may be well to state again that the application of any student, who is suitably recommended to the Institution as prepared to undertake original work in embryological, histological, or other fields, will not fail to receive prompt consideration.

The continued prompt and helpful action of the advisory committee in reporting on questions relating to appointments, etc., is appreciated. I am glad to say that the personnel of the committee remains the same as mentioned in the report of last year.

#### PUBLICATIONS.

It is mainly through its publications that that vital principle of the Institution, "the diffusion of knowledge among men," is carried out. The Institution proper maintains three regular series of publications, the Smithsonian Contributions to Knowledge, the Smithsonian Miscellaneous Collections, and the Annual Reports, while under its auspices are issued the Annual Reports, Proceedings, and Bulletins of the National Museum, the Reports and Bulletins of the Bureau of American Ethnology, and the Annals of the Astrophysical Observatory, the whole presenting a fund of information covering a wide range of human knowledge in both a specialized and general form.

The Smithsonian Contributions to Knowledge, now in their thirty-fifth volume, are restricted to the publication of positive additions to human knowledge resting on original research, all unverified speculation being rejected. The Smithsonian Miscellaneous Collections are designed to contain reports on the present state of our knowledge in particular branches of science, instructions for collecting and digesting facts and materials for research, lists and synopses of species of the organic and inorganic world, reports of explorations, and aids to bibliographical investigations. This series is now in its fiftieth volume, and in the quarterly issue provision has been made for the early publication of short papers descriptive of new discoveries or containing information of current interest in all departments of science.

In the Smithsonian Contributions to Knowledge several important works are in press. One of these is a memoir on "Glaciers of the Canadian Rockies and Selkirks," by Dr. William H. Sherzer, of the Michigan State Normal College, which is a final report on the Smithsonian expedition of 1904. A preliminary report on this expedition was published in the quarterly issue of the Smithsonian Miscellaneous Collections in 1905. There is also a work by Prof. E. A. Andrews, of Johns Hopkins University, on "The young of the crayfishes *astacus* and *cambarus*," giving the results of long and careful observation of the growth of these common animals.

Prof. Hubert Lyman Clark, of the Museum of Comparative Zoology at Cambridge, Mass., who has been at work for some time classifying and describing the specimens of Apodous Holothurians, or sea cucumbers, in the National Museum—a collection numbering over a thousand specimens from the shores of North and South America—has submitted a report embracing the result of his study on the families Synaptidæ and Molpadiidæ which will appear some time during the next year. Other memoirs for the series of Contributions are in preparation.

The quarterly issue of the Smithsonian Miscellaneous Collections, which was temporarily suspended in 1905, was resumed in September, 1906. Since then parts 3 and 4 of Volume III, and part 1 of Volume IV, have been completed. Among the recent papers published in this series is a "Letter of Dr. Diego Alvarez Chanca," dated 1494, relating to the second voyage of Columbus to America, which was translated and annotated by Dr. Fernandez de Ybarra. This letter is notable as being the first "written document of the natural history, ethnography, and ethnology of America."

In the regular series of Smithsonian Miscellaneous Collections there has been completed a second paper on the "Attainment of very low temperatures" dealing with the "self-intensive process of liquefying gases." This paper is a report on researches carried on under a



Hodgkins grant by Dr. Morris W. Travers, of the University College, Bristol, England.

Two other papers are very nearly completed. One is a "Report on the Crustacea of the North Pacific Exploring Expedition of 1853-1856," by the late Dr. William Stimpson. This manuscript has been in hand since 1872, but for various reasons could not heretofore be published. The whole work was carefully gone over by Miss Mary J. Rathbun, Assistant Curator of Marine Invertebrates in the National Museum, who says in her preface:

The . . . report has been treated as an historical document, and is published substantially as it was written by the author, the only additions being the references to his preliminary descriptions, and the footnotes giving the current or accepted name where it differs from that used by Doctor Stimpson. It is hoped that the value of the descriptions will more than compensate for the antiquated nomenclature . . . there are very few students who have not felt the need of more light on those rare genera and species known only from brief Latin diagnoses.

Another publication is a "Catalogue of Earthquakes on the Pacific Coast from 1897 to 1906," compiled by Mr. Alexander G. McAdie, as a supplement to the list of earthquakes from 1769 to 1896, compiled by Dr. E. S. Holden, and published in the Smithsonian Miscellaneous Collections in 1898.

A new edition of the Smithsonian Meteorological Tables to meet the continued demand for this work is in press. The plates have been considerably revised by Prof. Cleveland Abbe to meet present requirements.

The Annual Report of the Board of Regents to Congress, which is printed at the Government Printing Office, has been the chief medium through which the Institution has been enabled to disseminate scientific information to the world at large. Besides the official account of the operations of the Institution, this report has for over half a century included a general appendix giving a record of the progress in different branches of knowledge, compiled largely from journals in foreign languages and the transactions of scientific and learned societies throughout the world. The considerable number of copies of this publication placed by Congress at the disposal of the Institution has rendered possible a wide distribution to important libraries and institutions of learning, but the allotment is wholly insufficient to supply more than a small fraction of the individual requests, and the popular demand for the volume has so constantly increased that the entire edition of each year's report is exhausted within a few months of its appearance.

The Institution proper distributed during the year a total of 32,921 volumes and separates of Smithsonian Contributions to Knowl-

edge, Miscellaneous Collections, Annual Reports, publications not included in the regular series, and publications not Smithsonian.<sup>a</sup>

The Proceedings of the United States National Museum, the first volume of which was issued in 1878, are intended as a medium for the publication of original papers based on the collections of the Museum, setting forth newly acquired facts in biology, anthropology, and geology, or containing descriptions of new forms and revisions of limited groups. A volume is issued annually or oftener for distribution to libraries and scientific establishments, and in view of the importance of the more prompt dissemination of new facts a limited edition of each paper is printed in pamphlet form in advance. The dates at which these separate papers are published are recorded in the table of contents of the volume. The Museum Bulletin, publication of which was begun in 1875, comprises a series of more elaborate papers issued separately, and, like the Proceedings, is based chiefly, if not wholly, on the collections of the Museum. A quarto form of the Bulletin, known as the "Special Bulletin," has been adopted in a few instances in which a larger size of page was deemed indispensable. Since 1902 the volumes of the series known as "Contributions from the National Herbarium," and containing papers relating to the botanical collections of the Museum, have been published in the Bulletin series.

The Annual Report of the Museum is printed as a separate volume of the report of the Board of Regents to Congress.

The publications of the Bureau of American Ethnology, consisting of annual reports and bulletins, relate to the operations of the Bureau in its various branches of exploration and research. Part I of the Handbook of American Indians (A to M) was issued in March and the main portion of Part II is in type. The Twenty-fourth Annual Report has been published and much progress made on the Twenty-fifth Report. Several Bulletins have been issued.

The Annual Report of the American Historical Association for the year 1905 was transmitted to Congress in May, 1906, under the requirements of the act of incorporation of the association, but only one of the two volumes had been completed at the close of the fiscal year. The Smithsonian Institution is by law allowed a number of copies of reports of this association, which are distributed in exchange for the publications of various foreign and American historical societies.

There was also forwarded to Congress on February 25, 1907, the ninth report of the National Society of the Daughters of the American Revolution, in accordance with the act of incorporation of that organization.

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<sup>a</sup> Contributions to Knowledge, 775; Miscellaneous Collections, 10,059; Reports, 18,490; publications not in regular series, 2,890; publications not Smithsonian, 709.



In accordance with the act of Congress approved March 30, 1906, providing that the cost of printing and binding for the Executive Departments and Government bureaus shall be charged to specific appropriations for the Departments and bureaus, and the further provision in the sundry civil act of June 30, 1906, that no appropriations except those specifically for printing and binding shall be used for such purpose, special allotments have been made to the Institution and its branches for the year ending June 30, 1908, 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, and 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.....	33,000
For the annual report and bulletins of the Bureau of American Ethnology .....	21,000
For miscellaneous printing and binding:	
International exchanges.....	200
International Catalogue of Scientific Literature.....	100
National Zoological Park.....	200
Astrophysical Observatory (including the publishing of results of researches, not exceeding 1,500 copies).....	2,000
Annual report of the American Historical Association.....	7,000
Total .....	73,500

The allotments to the Institution and its branches under the head of public printing and binding during the past fiscal year were as far as practicable expended prior to June 30. It was, however, difficult to determine the actual balances available at any particular date, for the reason that the actual cost of publications in press could not be ascertained until their completion. The estimates not being accurate enough to serve as a basis for calculation, the transmission of new works was in some cases delayed so long that their completion was impracticable before the appropriation had expired. In the case of the allotment of \$10,000 for the Smithsonian Reports it was thus possible to expend only \$8,127.98; of \$21,000 allotted to the Bureau of American Ethnology, \$19,831.76 was expended, and of the \$39,000 allotted for the National Museum and the American Historical Association there was expended \$38,980.47.

#### ADVISORY COMMITTEE ON PRINTING AND PUBLICATION.

The advisory committee on printing and publication appointed by the Acting Secretary on February 7, 1906, in order that the practice of the Institution in the supervision of its publications might correspond with that of the Executive Departments as prescribed in the

President's order of January 24, 1906, held twenty-six meetings during the year and reported on one hundred and one manuscripts submitted for publication, besides numerous blank forms for use in the bureaus of the Institution.

Dr. Leonhard Stejneger, of the National Museum, has been added to the committee, which consists of the following members: Dr. Cyrus Adler, Assistant Secretary, chairman; Dr. F. W. True, of the United States National Museum; Mr. F. W. Hodge, of the Bureau of American Ethnology; Dr. Frank Baker, of the National Zoological Park; Mr. C. G. Abbot, of the Astrophysical Observatory; Mr. W. I. Adams, of the International Exchanges; Mr. A. Howard Clark, of the Smithsonian Institution, and Dr. Leonhard Stejneger, of the United States National Museum.

The printing committee has had under consideration the advantage of a uniform system of abbreviation of works cited by naturalists in their publications. A preliminary list of abbreviations has been prepared for the criticism of the scientific staff of the Institution and its branches.

*Dating of publications.*—Among the questions considered by the printing committee was the dating of publications, particularly such papers as contain descriptions of new genera or species in natural history, and upon the recommendation of the committee the Institution has adopted the rule that "whenever fifty copies of any paper shall have been mailed or distributed by messenger, the paper shall be regarded as having been published, it being understood that the date of such mailing or distribution shall coincide with the date of record in the Smithsonian document rooms and with the date printed upon the publication."

*Durable book paper.*—The introduction of a very large portion of wood pulp and ground wood in book paper to the exclusion of cotton or linen rags formerly used in its manufacture has been found greatly to decrease the durability of modern publications. The printing committee, after considering this problem, concluded that paper hereafter used in Smithsonian publications should be composed of not less than 50 per cent of rag stock and be free from injurious chemicals. Definite specifications as to the composition of paper will later be formulated, in cooperation with the Executive Departments.

#### THE LIBRARY.

The total accessions during the year to the Smithsonian library aggregated in volumes and parts 34,382. The major part of these was placed in the Smithsonian deposit in the Library of Congress, but these accessions include the libraries of the Secretary's office, the National Museum, the Astrophysical Observatory, and the National

Zoological Park. There were also numerous additions to the library of the Bureau of American Ethnology, which is separately administered. It is estimated that the equivalent of 11,000 volumes were transmitted to the Library of Congress besides public documents and other gifts to that Library transmitted through the International Exchange service, and such public documents as were presented to the Institution and sent direct to the Library. Two hundred and fifty new periodicals were added to the receipts and some 600 defective series were partially or entirely filled up. The work of the International Catalogue has brought a considerable number of authors' separates to the Library. Efforts have been made to increase the series of address books in the office of the International Exchanges service. The estate of S. P. Langley turned over to the Institution his scientific library, which has been divided up among the various divisions. The Gen. Watts de Peyster library of Napoleon and other subjects was increased about 288 volumes. It is with regret that I record the death of General de Peyster, who was a well-known collector and had been for many years a generous donor to the Institution.

The quarters of the library both in the Institution and Museum are entirely inadequate, and no relief seems possible until the completion of the new building for the National Museum, when it is hoped that a large part of the main floor of the Smithsonian building can be devoted to library purposes, forming a central library for the Institution and all its branches, though of course the sectional library system will be continued as heretofore.

#### PRESERVATION OF ARCHEOLOGICAL SITES.

The Institution has for many years taken a deep interest in preserving archeological objects on the public domain from vandals and relic hunters and making them accessible under proper regulations to scientific institutions and colleges. A law covering this subject was approved on June 8, 1906. Under the terms of this act uniform regulations for its administration were to be prepared by the Secretaries of the Interior, War, and Agriculture. At the request of the Departments, the Institution participated in several conferences of representatives of the three Departments looking to the preparation of such rules, which were promulgated on December 28, 1906. A little later some dissatisfaction was expressed with these regulations by archeologists, and at their request I invited the three Departments to reconsider the regulations. Accordingly, further conferences were held by representatives of the Departments, of the Institution, and of the Archeological Institute of America, resulting in the understand-



ing that the present regulations should have a reasonable trial before any amendment be considered. The regulations are as follows:

UNIFORM RULES AND REGULATIONS PRESCRIBED BY THE SECRETARIES OF THE INTERIOR, AGRICULTURE, AND WAR TO CARRY OUT THE PROVISIONS OF THE "ACT FOR THE PRESERVATION OF AMERICAN ANTIQUITIES," APPROVED JUNE 8, 1906 (34 STAT. L., 225.)

1. Jurisdiction over ruins, archeological sites, historic and prehistoric monuments and structures, objects of antiquity, historic landmarks, and other objects of historic or scientific interest, shall be exercised under the act by the respective Departments as follows:

By the Secretary of Agriculture over lands within the exterior limits of forest reserves, by the Secretary of War over lands within the exterior limits of military reservations, by the Secretary of the Interior over all other lands owned or controlled by the Government of the United States, provided the Secretaries of War and Agriculture may by agreement cooperate with the Secretary of the Interior in the supervision of such monuments and objects covered by the act of June 8, 1906, as may be located on lands near or adjacent to forest reserves and military reservations, respectively.

2. No permit for the removal of any ancient monument or structure which can be permanently preserved under the control of the United States *in situ*, and remain an object of interest, shall be granted.

3. Permits for the examination of ruins, the excavation of archeological sites, and the gathering of objects of antiquity will be granted, by the respective Secretaries having jurisdiction, to reputable museums, universities, colleges, or other recognized scientific or educational institutions, or to their duly authorized agents.

4. No exclusive permits shall be granted for a larger area than the applicant can reasonably be expected to explore fully and systematically within the time limit named in the permit.

5. Each application for a permit should be filed with the Secretary having jurisdiction, and must be accompanied by a definite outline of the proposed work, indicating the name of the institution making the request, the date proposed for beginning the field work, the length of time proposed to be devoted to it, and the person who will have immediate charge of the work. The application must also contain an exact statement of the character of the work, whether examination, excavation, or gathering, and the public museum in which the collections made under the permit are to be permanently preserved. The application must be accompanied by a sketch plan or description of the particular site or area to be examined, excavated, or searched, so definite that it can be located on the map with reasonable accuracy.

6. No permit will be granted for a period of more than three years, but if the work has been diligently prosecuted under the permit, the time may be extended for proper cause upon application.

7. Failure to begin work under a permit within six months after it is granted, or failure to diligently prosecute such work after it has been begun, shall make the permit void without any order or proceeding by the Secretary having jurisdiction.

8. Applications for permits shall be referred to the Smithsonian Institution for recommendation.

9. Every permit shall be in writing and copies shall be transmitted to the Smithsonian Institution and the field officer in charge of the land involved. The permittee will be furnished with a copy of these rules and regulations.

10. At the close of each season's field work the permittee shall report in duplicate to the Smithsonian Institution, in such form as its Secretary may prescribe, and shall prepare in duplicate a catalogue of the collections and of the photographs made during the season, indicating therein such material, if any, as may be available for exchange.

11. Institutions and persons receiving permits for excavation shall, after the completion of the work, restore the lands upon which they have worked to their customary condition, to the satisfaction of the field officer in charge.

12. All permits shall be terminable at the discretion of the Secretary having jurisdiction.

13. The field officer in charge of land owned or controlled by the Government of the United States shall, from time to time, inquire and report as to the existence, on or near such lands, of ruins and archeological sites, historic or prehistoric ruins or monuments, objects of antiquity, historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest.

14. The field officer in charge may at all times examine the permit of any person or institution claiming privileges granted in accordance with the act and these rules and regulations, and may fully examine all work done under such permit.

15. All persons duly authorized by the Secretaries of Agriculture, War, and Interior may apprehend or cause to be arrested, as provided in the act of February 6, 1905 (33 Stat. L., 700), any person or persons who appropriate, excavate, injure, or destroy any historic or prehistoric ruin or monument, or any object of antiquity on lands under the supervision of the Secretaries of Agriculture, War, and Interior, respectively.

16. Any object of antiquity taken, or collection made, on lands owned or controlled by the United States, without a permit, as prescribed by the act and these rules and regulations, or there taken or made, contrary to the terms of the permit, or contrary to the act and these rules and regulations, may be seized wherever found and at any time, by the proper field officer or by any person duly authorized by the Secretary having jurisdiction, and disposed of as the Secretary shall determine, by deposit in the proper national depository or otherwise.

17. Every collection made under the authority of the act and of these rules and regulations shall be preserved in the public museum designated in the permit and shall be accessible to the public. No such collection shall be removed from such public museum without the written authority of the Secretary of the Smithsonian Institution, and then only to another public museum, where it shall be accessible to the public; and when any public museum, which is a depository of any collection made under the provisions of the act and these rules and regulations, shall cease to exist, every such collection in such

public museum shall thereupon revert to the national collections and be placed in the proper national depository.

WASHINGTON, D. C., *December 28, 1906.*

The foregoing rules and regulations are hereby approved in triplicate and, under authority conferred by law on the Secretaries of the Interior, Agriculture, and War, are hereby made and established, to take effect immediately.

E. A. HITCHCOCK,  
*Secretary of the Interior.*

JAMES WILSON,  
*Secretary of Agriculture.*

WM. H. TAFT,  
*Secretary of War.*

The Institution has promptly acted upon all requests for advice, either through the Bureau of Ethnology when archeological sites were concerned or through the National Museum when paleontological collections were desired.

The national domain possesses priceless treasures for the archeologist and for the public generally, and this regulation of excavation is in the interest not only of science but of the whole people.

#### CASA GRANDE RUIN IN ARIZONA.

As was stated in the previous report, Congress appropriated \$3,000, to be expended under the supervision of the Secretary, for the protection of the Casa Grande ruin, in Pinal County, near Florence, Ariz., and for excavation on the reservation. This work was placed in the immediate charge of Dr. J. Walter Fewkes, of the Bureau of American Ethnology, an experienced archeologist, and the results reached have been beyond expectations entertained. All the mounds on the reservation have been opened and about three-fifths of the compound excavated. In the course of the work there was found a wall which not only surrounds Casa Grande but also 43 large rooms. The newly discovered walls have been repaired and protected, and when completed there will be restored for posterity a representative prehistoric settlement of the desert of southern Arizona.

A preliminary report of the first year's work has been prepared, and since the close of the fiscal year has appeared in the Smithsonian Miscellaneous Collections. Congress granted a second appropriation to complete the work, which will, as in the previous year, be carried on under the direction of Doctor Fewkes. The very interesting collections which have incidentally been found have been deposited in the National Museum.

The appropriation for the protection and excavation at Casa Grande was made two years ago at the recommendation of the Department of the Interior, but the work was placed under the



direction of the Institution at the initiative of the Committee on Appropriations, without any suggestion from the Institution itself. The plans for the work were submitted to the authorities of the Interior Department and approved by it, and a synoptic report of the year's operations was transmitted to the Secretary of the Interior.

#### CORRESPONDENCE.

The correspondence of the Institution shows that there is even in the more remote parts of this country and abroad, a widespread knowledge that one of the primary purposes of the Smithsonian Institution is the diffusion of knowledge, although the public at large does not always possess a very definite idea of the exact scope of the Institution's functions. Hence there are received annually hundreds of letters asking for information covering practically every field of science, from a simple inquiry concerning the identity of some natural-history specimen to a request for an explanation of some problem in astronomy or physics, which may require quite exhaustive study on the part of a member of the staff. All legitimate requests for scientific information are cheerfully responded to as far as practicable, and by this means much useful knowledge is disseminated, although the preparation of these communications consumes a considerable part of the time of both the scientific and clerical staff. It may be well to state in this connection, however, that the Institution does not undertake to maintain a "question bureau," such as is frequently conducted by newspapers and magazines, nor does it furnish information of a commercial nature, which could as readily be obtained from a professional advisor upon the payment of a fee.

In addition to this general correspondence, there is carried on by the several branches of the Institution—the National Museum, the Bureau of American Ethnology, the National Zoological Park, the International Exchanges, and the Astrophysical Observatory—a considerable correspondence relating to the respective activities of each. All matters affecting questions of policy, and all appointments, however, receive the personal consideration of the Secretary.

The practice of press-copying outgoing letters in books has been abandoned during the year, and the use of carbon copies substituted in its stead. Other changes have also been instituted in the method of filing, by which the papers on any given subject are made more readily accessible for reference.

#### EXPOSITIONS, CONGRESSES, AND CELEBRATIONS.

*Jamestown Exposition.*—Out of an appropriation of \$200,000 for the Government display at the Jamestown Exposition, \$16,000 was allowed for the preparation of exhibits by the Smithsonian Institu-

tion and the National Museum, and a separate building—Annex B—about 60 by 100 feet, was provided for the installation and care of the exhibit. Mr. W. de C. Ravenel, administrative assistant of the United States National Museum, represented the Smithsonian Institution and the National Museum on the Government board, and was assisted in the preparation of the exhibits by an advisory committee consisting of Dr. Cyrus Adler, Assistant Secretary of the Smithsonian Institution; Mr. W. H. Holmes, chief of the Bureau of American Ethnology; and Mr. A. Howard Clark, Curator of History, United States National Museum. The exhibit is entirely historical in character and mainly has to do with the development of the United States along various lines, such as in land transportation, firearms, photography, medicine, and other branches.

*Bordeaux Exposition.*—The United States exhibit at the International Maritime Exposition, opened at Bordeaux, France, May 1, 1907, was collected and installed by the Smithsonian Institution at the request of the Department of State. Mr. Ravenel, administrative assistant of the United States National Museum, was designated by the Secretary to prepare and install this exhibit.

*Congress of Americanists.*—The fifteenth annual Congress of Americanists was held in Quebec September 10–15, 1906. Mr. W. H. Holmes, chief of the Bureau of American Ethnology, was unable to accept the designation of delegate which was tendered to him, but his place was filled by Dr. Walter Hough, of the Division of Anthropology in the National Museum, who represented the Smithsonian Institution, the National Museum, and the Bureau of American Ethnology.

*International Geological Congress.*—The Tenth International Geological Congress was held in the City of Mexico September 6–14, 1906. Prof. S. F. Emmons, of the United States Geological Survey, acted as representative for the Smithsonian Institution.

*Linnæus celebrations.*—The two hundredth anniversary of the birthday of Linné was celebrated at New York May 4, 1907, by the New York Academy of Sciences. Dr. Theodore Gill represented the Smithsonian Institution on that occasion. Professor Farlow, of Harvard University, represented the Institution at the Linnæus celebration of the Royal Swedish Academy of Sciences at Upsala on May 25.

*Dedication of engineering building.*—Mr. George C. Maynard, of the National Museum, represented the Smithsonian Institution at the dedication of the new building for the engineering department of the University of Pennsylvania, September 26, 1906.

*Memorial to Louis Agassiz.*—At the unveiling of the memorial to Louis Agassiz, in the Hall of Fame at Columbia University, New York, on May 30, 1907, the Secretary of the Smithsonian Institution

presented a brief tribute to that great man of science which was afterwards published in the Smithsonian Miscellaneous Collections.

*Aberdeen anniversary, etc.*—Prof. F. W. Clarke represented the Institution on the occasion of the four hundredth anniversary of the Aberdeen University, October 20, 1906. At the request of the Department of State, the Institution recommended as delegates of the Government to the International Zoological Congress, to be held in Boston in August, 1907, Mr. Richard Rathbun, Dr. Theodore Gill, Dr. W. H. Dall, Dr. F. W. True, Mr. Leonhard Stejneger, and Dr. Harrison G. Dyar. The Secretary attended the inauguration of the Carnegie Institute at Pittsburg, April 11–13, 1907. Mr. Arnold Hague was appointed to represent the Institution at the centenary of the Geological Society of London, to take place September 19, 1907, and Prof. Simon Newcomb has accepted the designation to represent the Institution at the Fourth International Congress of Mathematicians, to be held at Rome April 6–11, 1908.

*Prize essay on fisheries.*—In response to an invitation from the International Fishery Congress, the fourth session of which is to be held in Washington in September, 1908, an allotment of \$200 has been made from the Smithsonian fund as a prize for the best article on the international regulation of the fisheries of the high seas, their history, objects and results. It is announced that any person, association, or company may compete for the various prizes to be awarded in connection with this congress by complying with the published conditions which govern the competition, as issued from the office of the general secretary of the congress, Dr. H. M. Smith, of the United States Bureau of Fisheries, Washington, D. C.

#### MISCELLANEOUS.

*Improvement and maintenance of Smithsonian grounds.*—The sundry civil act approved March 4, 1907, contained an appropriation of \$3,000 for the improvement, care, and maintenance of the Smithsonian grounds, and also an appropriation of \$5,000 for resurfacing the asphalt roadways in the grounds.

*California Academy of Sciences.*—As stated in the previous report, the good offices of the Institution were tendered and accepted by the California Academy of Sciences for the purpose of aiding it in replacing its library and collection destroyed by the earthquake and fire of April, 1906. In the report of the Bureau of International Exchanges it is noted that upward of 7,000 valuable publications were secured abroad and forwarded to the academy, and not all of the correspondents of the academy have yet responded to the circular. The Institution also forwarded without cost to the academy very considerable collections of books from individuals and institutions in the



United States, as well as collections of specimens. The academy has expressed its grateful appreciation of the generous attitude of foreign and American societies and of the aid offered by the International Exchange Service of the Smithsonian Institution in rehabilitating its library and collections.

### NATIONAL MUSEUM.

The overcrowding of the present Museum building has necessarily continued, so that in many places it presents almost the aspect of a storehouse. Nevertheless, the collections can be viewed by visitors, although not to the advantage which a freer installation would render possible. Meanwhile the roof of the present building is being repaired and various exhibition halls have been isolated with a view to obtaining greater fire protection. Exclusive of the subject of the fine arts, the additions to the Museum during the year consisted of about a quarter of a million of specimens representing all the subjects embraced in the Museum collections. Several expeditions for collecting and observation were made by members of the staff. Many of the collections were reclassified and numerous papers published. Of duplicate specimens separated from the collections about 16,000 were distributed in 208 sets to educational establishments in different parts of the United States. The principal labor of representing the Institution and the Museum at the Jamestown Exposition, and the Government, the Institution, and the Museum at the Bordeaux Exposition, fell upon the staff of the Museum. Mr. W. de C. Ravenel, the administrative assistant of the Museum, acted as representative of the Institution for both these expositions with great ability and success.

### NEW BUILDING FOR THE NATIONAL MUSEUM.

Although the new building for the National Museum has not progressed so rapidly as had been expected, due almost exclusively to delays in the delivery of the granite, these conditions have now been overcome, and it is confidently expected that the building will be under roof by the spring of 1908 and be ready for occupancy by the beginning of 1909, consuming a period of time not excessive in view of the great size of the building and of the solid and monumental character of its construction.

As the new building approaches completion certain questions connected with the future administration of the Museum necessarily press for consideration. It has been reasonably well determined that the new building will be devoted to the scientific and historical collections, and the present Museum building will be employed for the development of the department of arts and industries; that the upper exhibition hall of the Smithsonian building will be utilized to the

fine-art collection and the lower hall to a library, but carrying with it certain exposition series, such as are appropriate to a library. The appropriation for the construction of the new building did not provide for its equipment, and to commence this work I have included in the estimates to Congress a request for \$200,000 to begin the construction of cases and furnishings for the new building.

The purpose of the Museum is, and must continue to be, the custody of the national collections, by which is meant the preservation, classification and exhibition, and work incident thereto. The main purpose of the Museum must never be lost sight of. It is but natural and proper that in the course of classification and arrangement skilled scientific men engaged in this work should make discoveries of importance to science and that the Museum should publish them. In this way the Museum, in all the departments which its collections represent, is a great research institution as well, but this research work is a by-product rather than the fundamental purpose of the Museum. Happily enough, the relationship of the Museum to the Institution is of such a nature that there is no waste of energy, and researches which may be initiated through the study of collections, which for some reason or other can not be pursued without field work and further studies, can be carried on either by the parent Institution or by some other branch of it. From this point of view the fact that the Institution, Museum, and Bureau of Ethnology are in one organization has produced most useful results, and it is not improbable that in the future other combinations which may be of great advantage to the scientific work of the Government and the advancement of science generally, can be effected without in any way interfering with the fundamental purpose of the Museum.

#### NATIONAL GALLERY OF ART.

The brief history of the inception of the National Gallery of Art, of the tender and acceptance of the Freer collection and of the decree of the supreme court of the District of Columbia, resulting in the securing of the Harriet Lane Johnston collection, is given in the report for the previous year. As described more in detail in the report on the National Museum, these collections have been temporarily installed in the lecture hall of the Museum, and, in spite of the fact that the place was not designed for a collection of art, have been viewed by a large number of visitors. Twenty-one paintings of merit from the Lucius Tuckerman collection have been received on deposit, and gifts have been received, among others, from the Hon. J. B. Henderson, the chairman of the executive committee of the Board of Regents, and from Miss Eleanor Blodgett, of New York.

A most considerable gift, especially gratifying in view of the fact that it furnishes an index of real recognition of the importance of

the National Gallery on the part of a distinguished collector, was the donation by Mr. William T. Evans, of Montclair, N. J., of 52 paintings in oil by American artists of established reputation. No space was available for the installation of this really exceptional collection in the buildings of the Institution or Museum, and, through the courtesy of the trustees of the Corcoran Gallery of Art, the paintings have been temporarily hung in that gallery.

With a view to providing space for the National Gallery for a period of years and until a proper building is secured, I have included in the estimates for the coming fiscal year an item for adapting the large second story of the main part of the Smithsonian building, a hall 200 feet long and about 50 feet wide, for this purpose. It will require some changes to make it suitable for the hanging of pictures, and improvements must be made in the approaches, which are now inconvenient for the public. I trust that Congress may see its way to grant this appropriation at its forthcoming session.

The tender of the deposit of 13 paintings by Edward Moran, illustrating American history, made by Mr. Theodore Sutro, of New York, was accepted, and in September, 1907, this interesting historical collection was hung on screens especially built for the purpose.

The responsibility assumed by the Institution for the nation in bringing together a worthy gallery of art has created widespread interest and comment in magazines and journals on the part of artists and art critics and with hardly an exception has been cordially received. The Institution recognizes the deep responsibility entailed by this new movement and fully appreciates that the art world and the public have a right to expect that the future gallery shall be worthy of the nation. Mr. Rathbun has taken deep interest in the promotion of the gallery and has given a great amount of personal attention to it, and Mr. W. H. Holmes, a member of the staff, and himself a professional artist, has given valuable advice in the matter of selection and installation. It will of course be a considerable time before the Institution can command the services of a staff experienced in the fine arts. But there seems to be no reason why the principles which have for years guided the Institution in administering upon scientific matters should not be applied with equal success to the fine arts. The Secretaries have never relied exclusively upon their own judgment, nor even upon the judgment of the very able staff, to pass upon scientific memoirs or to administer funds for scientific purposes, but they have been aided by committees composed of the most distinguished specialists throughout the country. Hardly a single scientific man through the course of more than half a century has ever declined to act upon such a committee, and it would seem feasible to carry out the suggestion informally made to the Board of Regents by Mr. Rathbun nearly a year ago, that the acceptance of paintings and



indeed the general policy of the National Gallery of Art should have the advice of a committee composed of the most distinguished artists, sculptors, and students of art in the country, which body might, for purposes of administration, be divided into subcommittees to deal with the various aspects of the National Gallery. Steps have already been taken to organize such a committee, and conferences have been held looking to that end, and I hope before very long to bring a definite plan for its constitution to the attention of the Regents.

### BUREAU OF AMERICAN ETHNOLOGY.

The Bureau of American Ethnology has been engaged in investigations among the Indian tribes of the country for upward of a quarter of a century. The object of these investigations has been twofold—to preserve a record of the native races of this country, and to place at the disposal of the General Government information which would enable it successfully to deal with the tribes. For this latter work the first requisite is a working knowledge of the tribes, and the Bureau has collected data relating to some 60 families of linguistic stocks, and upward of 300 tribes. It has located and classified these, and has made progress in the study of their history, relationships to one another and to the whites, their needs as wards of the Government, and their capacities for and adaptability to civilization. For this purpose it was deemed necessary to give attention to the culture of the tribes, especially their languages, social organization and government, systems of belief, religious customs, and arts and industries, as well as to their physical and mental characteristics.

It has not been possible to study all of the tribes in detail, but only to investigate a sufficient number as types to stand for all. The results of the work heretofore accomplished are embodied in published reports, and in many manuscripts preserved in the archives of the Bureau. It has been deemed advisable to take stock, as it were, and to issue a summary of our present knowledge of the tribes. This has taken the form of a handbook of American Indians, the first volume of which has appeared and received much favorable comment. No effort will be spared to push this work to a conclusion, and as much force and time as are necessary for this purpose will be employed during the year. In order to keep this summary within the compass of an easily consulted handbook, many important subjects have been treated merely in outline.

The next special subject to which a publication will be devoted will be the languages and their dialects, for which a handbook in at least two volumes is in progress, the first being now ready for publication. It is the work of our first American philologist, assisted by

a score of the ablest students of this branch in the United States. The arts and industries will also be treated in a separate handbook now under way, and other branches are likewise in preparation for publication. These include treaties and land sessions, sign language and pictography, religions, social systems and government, physical and mental characteristics, archeology, and other subjects.

This work of studying and recording the Indian tribes is not only of national importance, but urgent. It can never be repeated. It will constitute the only systematic record of the red race that can ever be made. The native race, one of the four races of men, is disappearing, and the processes of obliteration are irresistible and swift. A language or culture of any race, once destroyed, can never be recovered. The work is worthy of a great nation, and is one that can be carried on systematically only by the Government. The Government has two great obligations which the Bureau is rapidly fulfilling: (1) To know the Indian for practical purposes of government and in the interests of humanity; (2) to preserve to the world an adequate record of the race which is so rapidly disappearing.

With the object of assisting the departments of the Government having custody of the public domain in the preservation of antiquities, the work of compiling a descriptive catalogue of antiquities has been continued, and several bulletins relating to this work have been published.

Uniform rules and regulations have been adopted by the three departments in control of the public domain in carrying out the recently enacted law for the preservation of antiquities. Under this law three important archeological sites were declared national monuments, as follows: Chaco Canyon in New Mexico, including several important ruined pueblos; El Moro, New Mexico, commonly known as Inscription Rock, and Montezuma Castle, in Arizona, an important cliff ruin.

#### INTERNATIONAL EXCHANGES.

The work of the International Exchange Service continues to increase from year to year, until the number of packages annually passing through the hands of the service now amounts to nearly 200,000, and the weight to over 200 tons. During the past year nearly 2,000 packing boxes were required in transmitting exchanges to other countries. These figures serve to convey some idea of the magnitude of the operations of the service and make apparent the need of increased appropriations from time to time in order to keep the work up to the high standard of efficiency which has been attained. A larger appropriation was therefore requested for carrying on the service during the coming year, and it is gratifying to state that Congress granted \$32,200, an increase of \$3,400 over the sum

allowed for the year now closed. This additional amount will permit further improvements in the service and renewed exertions to procure larger returns of government publications from abroad for the Library of Congress and the several Departments and Bureaus of the Government.

The Smithsonian Institution, through its system of exchanges, is in correspondence with 58,107 establishments and individuals, 46,514 of which are exterior to the borders of the United States. As will be seen from a perusal of the table in the full report on the exchanges in the appendix, these correspondents are scattered throughout the world, and it may be said that there is no place, however remote, which does not profit by the service.

Under the Congressional resolutions of March 2, 1867, and March 2, 1901, setting apart a certain number of documents for exchange with foreign governments, there are now sent regularly to depositories abroad 53 full sets of United States official publications and 30 partial sets, the governments of Ecuador, Panama, and Alberta, Canada, having been added to the depositories of partial sets during the past year.

In order to prevent loss of publications intended for Government establishments, special attention has been given to foreign consignments of books arriving at the various United States custom-houses incorrectly or insufficiently addressed. During the past year these efforts have resulted in the clearing of a number of consignments which might otherwise have gone astray.

The work of increasing the office collection of directories and other books of addresses has continued during the year, and has resulted in the accumulation of a very creditable assemblage of such publications.

I am gratified to state that through the efforts of Dr. Eypaldo Bassier, a member of the Greek Parliament, an arrangement has been effected whereby all exchanges for Greece may now be forwarded to the National Library at Athens for distribution, instead of limiting the consignments, as formerly, to publications intended for Government institutions or individuals connected with them. This arrangement will enable the Institution to make more frequent transmissions.

Recently a communication was received from Dr. F. Bonola Bey, secretary-general of the Khedivial Geographical Society in Cairo, stating that on account of absence from Egypt it would be necessary for him to discontinue the distribution of exchanges for the Institution; adding, however, that the director-general of the survey department at Cairo would take charge of the work. A letter from the director-general has since been received placing the services of the department at the disposal of the Institution. Consignments will therefore be sent to the survey department in the future.

Transmissions to Bulgaria, which were temporarily suspended on account of the death of Dr. Paul Leverkühn, who attended to the



distribution of exchanges for that country, have been resumed. The Prince of Bulgaria, in response to a request of the Institution, has designated the Scientific Institutions and Library of Sofia to act as the exchange intermediary between Bulgaria and the United States.

As Hawaii, the Philippine Islands, and Porto Rico are under the jurisdiction of the United States, the Institution feels that exchanges with them can no longer be termed "international," and has therefore discontinued the acceptance of packages from domestic sources for these territories.

The International Exchange Service, in its efforts to aid the California Academy of Sciences in the rehabilitation of its library and collections, destroyed by the earthquake and fire of April, 1906, sent circulars to all the foreign correspondents of the academy soliciting contributions. I am gratified to state that a most liberal response has been made, the number of exchanges received aggregating 6,370 packages and publications, which were forwarded to San Francisco. It may be noted in this connection that this is the first time since its organization that the Exchange Service has sent out a circular of this character in behalf of any establishment.

### NATIONAL ZOOLOGICAL PARK.

By act of Congress approved April 30, 1890, the National Zoological Park was established "for the advancement of science and the instruction and recreation of the people," and in pursuance of this authorization the collection of living animals has increased from year to year, it being the purpose to exhibit living species of the various types of animal life for the instruction and entertainment of the public.

In carrying out the first of the objects stated in the act of organization, namely, the advancement of science, the original design contemplated the establishment of methods of scientific research, but lack of means, and the more important necessities of the park, have prevented this from being realized. Plans for a laboratory are in hand. The varied zoological collection now assembled affords material of great value for studying the habits of animals, and for physiological and pathological research, subjects of practical importance and utility.

Much care and attention has also been devoted to preserving the natural beauty of the surroundings and to the enhancing of the attractiveness of the park to visitors.

With a single exception, no especial appropriation has been made for the erection of buildings for the animals in the park since its inception. They were originally housed in wooden sheds which have been gradually replaced by fireproof structures, as the appropriations

permitted. This plan will be continued. It has not been carried forward as rapidly as the necessities demand, owing to the fact that the appropriation granted, for a number of years, has been but little more than sufficient for the maintenance of the park.

Attention has before been called to the desirability of securing for the park the narrow tracts of land lying between its boundaries and the recently established highways on the southeast and west. The highways were located by the Engineer Commissioner of the District as close to the park as the topography would permit, in order to reduce these tracts to a minimum. It is estimated that the land in question can be acquired by condemnation for \$40,000, and an item for this purpose is submitted in the estimates.

The collection of animals at the close of the fiscal year numbered 1,193. The small mammal house, which has been under construction for several years, was opened to the public on November 15. To it were transferred the collection of monkeys, as there had always been a difficulty in keeping these animals in the proper condition of health in their previous quarters. Work upon two additional bear yards has been contracted for and considerable repairs made to some of the older cages. The Adams Mill road was overhauled and resurfaced during the autumn of 1906, and the planting of trees was carried on at suitable times as far as the available fund permitted. Five of the more important buildings were heated from the central heating plant, installed during the previous year. The specialists of the Department of Agriculture were offered opportunities for pathological studies when animals died, and such dead animals as might be useful to the national collections were sent to the National Museum.

### ASTROPHYSICAL OBSERVATORY.

The work of the Astrophysical Observatory, carried on under the supervision of Mr. C. G. Abbot, who was appointed director March 1, 1907, has consisted of observations at the Mount Wilson Observatory and at Washington, and the preparing of Volume II of the Annals of the Observatory. About seventy days on Mount Wilson were devoted to observations of the "solar constant" of radiation, on which the staff of the observatory had been at work for some years. The results were generally excellent. A new continuous recording pyrheliometer is in course of construction for this work, of different dimensions and construction from the one at present in use. Much attention was paid to the observation of the intensity of light reflected from clouds, with a view to the determination of the albedo or total reflection of the earth. The quality and amount of the light of the sky was also measured on several days.

Measurements for the determination of the "solar constant" were also made at Washington whenever atmospheric conditions permitted. These are of great value as supplementary data to the Mount Wilson observations.

Volume II of the Annals is in press, and includes an account of the work of the observatory from 1900 to 1907. Speaking broadly, the energy of the observatory has been devoted to an investigation of the intensity of the rays of the sun and the dependence of the earth's temperature upon the radiation.

The investigations have resulted in apparently definitely fixing the approximate average value of the "solar constant" at 2.1 calories per square centimeter per minute, and in showing decisively that there is a marked fluctuation about this mean value, sufficient in magnitude to influence very perceptibly the climate, at least of inland regions, upon the earth.

The observatory buildings, although temporary, have been kept in good repair by a small expenditure. Plans have been made and contracts have been awarded for the installation of electrical lighting and power to replace the present inadequate facilities, and some additions have been made to the research equipment and library.

#### INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

The International Catalogue of Scientific Literature is a classified author's and subject catalogue of all original scientific papers published throughout the world. The organization consists of bureaus, established in each of the civilized countries, whose duty it is to furnish references to the scientific publications issued within their several regions, these references being assembled, edited, and published in seventeen annual volumes by a central bureau in London.

The cost of printing and publishing is met by the subscribers to the Catalogue; and American universities, libraries, and scientific societies alone have shown their appreciation of the work by making advance subscriptions amounting to over \$30,000. The cost of collecting and indexing the material for the Catalogue is in each case borne by the countries taking part in the work, and is for the most part derived from direct governmental grants.

The Regional Bureau for the United States was organized in 1901 by the Smithsonian Institution, and was maintained by funds of the Institution until it was placed on a firm footing by an appropriation made by Congress of \$5,000, which became available for use July 1, 1906. A further grant of \$5,000 became available July 1, 1907.

Each regional bureau collects, indexes, and classifies the current scientific literature published within the country it represents, and furnishes the material to the central bureau in London for publication.



The citations are secured by regularly going through all of the journals listed for examination, by a daily search through the publications which are received by the Smithsonian Institution, and by examination of all available sources. Lists of all papers indexed are also from time to time submitted for revision directly to the authors whose names appear on the records. The authors are requested to send separates of their work for the use of the Catalogue, a practice which results incidentally in considerable accessions to the library.

It has been hoped that the material collected by the Bureau could be printed separately as a current classified index of American Scientific Literature, which would make it available for American men of science probably a year before the International Catalogue was published, but since the printing would have to be done at the expense of the fund of the Institution, it was decided after thorough consideration that the outlay could not at present be justified.

### NECROLOGY.

During the year the Institution has suffered the loss of a Regent and of three able members of its staff. The Hon. R. R. Hitt, distinguished for his services in the diplomatic corps and as a Member of Congress, where he ably served for many years as chairman of the Committee on Foreign Affairs, a man of cultivation and broadly interested in science and art, passed away on September 20, 1906. He was appointed a Regent on August 11, 1893, and served continuously until his death and acted since 1901 as a member of the executive committee. In the Proceedings of the Board of Regents, printed in another place, there will be found an appropriate tribute to his memory by his colleagues.

One of the oldest members of the administrative staff of the Institution, William Jones Rhees, died March 18, 1907. Mr. Rhees was born March 13, 1830. In 1852 he became chief clerk of the Institution, and in that capacity, and later as keeper of the archives, served it with a brief interruption until the time of his death. His knowledge of the affairs of the Institution was wide, and with him there passed away the principal human repository of its history, for he had been connected with it almost since its inception and had served during the greater part of the administrations of Secretaries Henry, Baird, and Langley. He was a methodical man, and in addition to his administrative labors issued publications valuable to the librarians of the country and others of importance on the history of the Institution and its founder. He was a public-spirited citizen, and his deep devotion to the Institution is evidenced by a bequest from his modest estate.

Albert S. Gatschet, a distinguished linguist and for many years connected with the Bureau of American Ethnology, died on March

16, 1907. An appreciative account of his career will be given in the annual report on the Bureau of American Ethnology.

Paul Edmond Beckwith, Assistant Curator of History in the National Museum, died on June 27, 1907. A sketch of his career is given in the report on the Museum.

#### LANGLEY MEMORIAL MEETING.

On December 3, 1906, a meeting in memory of the late Secretary Samuel P. Langley, was, in accordance with a resolution of the Board of Regents, held in the lecture hall of the National Museum. The Chancellor of the Institution, the Hon. Melville W. Fuller, Chief Justice of the United States, presided, and after preliminary remarks introduced the speakers: The Hon. Andrew D. White, who presented the memoir on behalf of the Board of Regents; Prof. E. C. Pickering, director of Harvard College Observatory, who described Mr. Langley's contributions to astronomy and astrophysics; and Octave Chanute, esq., of Chicago, who spoke on Mr. Langley's contributions to aerodynamics.

The addresses delivered on that occasion, together with a bibliography of the published works of Mr. Langley, have been issued by the Institution in the series of Smithsonian Miscellaneous Collections, and also in a special edition.

Respectfully submitted.

CHAS. 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, 1907:

The most noteworthy feature of the year was the decided advance made in the subject of the fine arts, so marked indeed as to call for immediate action in providing at least a temporary home for the national gallery, whose nucleus already gathered has received much favorable comment. While the erection of the new building for the Museum has been retarded by delays in the delivery of granite, the work has proceeded steadily and otherwise satisfactorily. The collections were increased by about a quarter of a million specimens, including a large amount of material of exceptional importance. The classification and arrangement of the additions were carried forward as rapidly as possible under the present limitations as to means and space, and the collections as a whole have been maintained in good condition.

#### NATIONAL GALLERY OF ART.

The Congressional act of 1846, founding the Smithsonian Institution, provided that all objects of art belonging to the United States should be delivered into the custody of that establishment whenever suitable arrangements could be made from time to time for their reception. The formation of a national gallery of art thus intrusted to the Institution received early and favorable consideration by the Board of Regents and was embodied in the plan of organization. It was the sentiment of the Board that the gallery should include both paintings and sculpture as well as engravings and architectural designs, that studios for young artists should be provided, and, as it was expected that the collections would accumulate slowly, that the gallery should be partly used during the winter for loan exhibitions.

In the Smithsonian building, which was immediately put in course of erection, two rooms were especially designed for the collections of art, the west hall and connecting range on the main floor. These quarters were so used for a time in conjunction with the library and reading room, but the accommodations thus afforded proved so inadequate that it became necessary to also devote to the same purpose a part of the large upper hall now occupied by the collection of prehistoric archeology.

Examples of art were among the very first acquisitions by the Institution, and from time to time thereafter additions of one kind and another were received, but any sum that might have been spared for this purpose from the Smithsonian income would have been wholly insufficient to make any pronounced or systematic advance in this direction. In the National Museum, however, certain branches of art have been fostered for over a quarter of a century and are now fairly well represented.

The first collection purchased by the Institution was the valuable series of prints assembled by the Hon. George P. Marsh, containing examples of the work of nearly every etcher and engraver of celebrity from the early masters to the middle of the last century. It was recognized as the choicest collection of its kind then in this country. Later accessions included, besides engravings,



a number of paintings, reproductions of celebrated pieces of sculpture, busts of distinguished individuals, and many important books on art.

The early exhibition in the upper Smithsonian hall consisted mainly of the unique collections of Indian portraits and scenes by J. M. Stanley, C. B. King, and others, but in the fire of 1865 this section of the gallery with its contents was entirely destroyed. The objects on the lower floor escaped injury and were subsequently deposited for safe-keeping in the Library of Congress and the Corcoran Gallery of Art, where they remained until about ten years ago. Since that time one of the rooms in the eastern part of the Smithsonian building has been utilized for the prints, books, and various other works of art, but the larger part of the collection has been provided for in the National Museum.

Such, briefly, was the history of the art exhibits up to January, 1906, when the acceptance by the Board of Regents of the large and notable collection of Mr. Charles L. Freer marked the beginning of a new epoch in the affairs of the gallery of art. In the following July a further advance was made through the acquisition of the valuable collection of the late Harriet Lane Johnston, based upon a decision of the supreme court of the District of Columbia, essentially reaffirming the intent of the fundamental act, already referred to, that the custodianship of the national gallery of art was vested in the Smithsonian Institution. This collection is especially noteworthy in that it contains paintings by several celebrated masters, besides other pieces of merit and of historical importance. It was delivered to the Institution in the early part of August, 1906, and was at once installed in the reception room in the Smithsonian building, the only place then available.

The necessity of securing more extensive quarters without delay led to the selection and temporary fitting up of the lecture hall in the Museum building for the purposes of the gallery and especially for the paintings. On the completion of these changes in the latter part of November, 1906, the Harriet Lane Johnston collection and other paintings were transferred there, and these, with several loans and donations, fully occupied the existing wall space. Among the loans should be mentioned 21 paintings from the Lucius Tuckerman collection, and among the gifts, one by the Hon. J. B. Henderson, of Washington, and one by Miss Eleanor Blodgett, of New York.

During the latter part of the winter the gallery received a most substantial and gratifying recognition from Mr. William T. Evans, of Montclair, N. J., the well-known connoisseur and patron of art, whose contribution, made without solicitation, consisted of 52 paintings in oil by American artists of established reputation. Unfortunately no place could be found in the Museum building for this valuable collection, and it was necessary to provide elsewhere for its temporary keeping. This has been accomplished through the courtesy of the trustees of the Corcoran Gallery of Art, where the pictures are now hung, filling the greater part of the large atrium.

Leaving out of consideration the Freer collection, which is to remain at the home of its generous donor during his lifetime, the national gallery now has in its possession valuable paintings and other art objects for whose exhibition under suitable conditions it is important to arrange without delay. For this purpose there is no better place in the existing buildings than the second story of the main part of the Smithsonian building, a hall 200 feet long by 50 feet wide. It will require some changes to adapt it to the hanging and lighting of pictures, and some improvement in its approaches which are now inconvenient for the public, involving an expenditure greater than is possible from the current appropriation, but it is hoped that Congress may provide for this work at its forthcoming session.

## BUILDINGS.

At the beginning of the last fiscal year, work on the new building for the Museum had progressed to the extent of completing the basement walls and piers and the steel framework and brick arches resting upon them, except at the south and north pavilions. The court walls of the main story had also been started. From that time onward the construction of the building would have advanced more rapidly but for delays in the delivery of the granite. Instead, therefore, of being ready for the roofs at the end of the fiscal year, as had been expected, the outer walls have been carried only to the height of the lintels at the top of the second story on the eastern section of the building, and not so high on the western section. The two entrance pavilions have only reached the top of the basement floor, but the steel work and arches of the second floor are in place and the basement lecture hall has been inclosed and partly vaulted and tiled. With the receipt of the final shipment of the white Bethel granite all troubles in the matter of construction should be ended, as there have been no delays in the fulfillment of all other contracts for supplies, and the stone for the upper story has been on hand for several months.

The retardation in the erection of this building has rendered difficult the administration of the Museum, since the overcrowding of the present buildings and outside rented quarters by the immense and invaluable collections has introduced several elements of danger which can only be obviated by the occupancy of the new structure.

The rebuilding of the roofs of the present Museum building, without serious derangement of the collections, was successfully continued. Contracts have been made for the replacement of four additional roofs during the new year, leaving only the roof of the central rotunda to be provided for thereafter.

Progress was also made in the isolation of the several exhibition halls with the view of obtaining greater fire protection, this work consisting in the filling in of the large arched openings between the halls with fireproof materials, a plan which should be continued each year to the extent possible with the funds available.

## ADDITIONS TO THE COLLECTION.

The number of accessions received during the year, not including the subject of the fine arts, was 1,398, comprising a total of about 250,000 specimens, of which nearly 4,000 were anthropological, 145,000 biological, and over 100,000 geological and paleontological.

The principal additions in ethnology came from the Congo region of Africa and the Philippine Islands. Among the more notable smaller ones were baskets and lace of Malacca workmanship, rare Chilcootin baskets, and examples of rich old embroideries. The most important accessions in prehistoric archeology comprised several hundred implements, vessels, examples of fabrics and basket work, and skeletal remains, obtained during excavations at Casa Grande, Arizona, under the direction of the Smithsonian Institution, and a large number of earthenware and stone objects of various kinds and uses from Panama, Costa Rica, Guatemala, Honduras, Mexico, and the State of Tennessee. Of European origin were stone implements and fragments of Romano-British urns from near Norfolk, England, and flint implements from La Quina, France. Examples of Greco-Egyptian papyri and other interesting objects were secured for the division of historic archeology. The additions in physical anthropology consisted chiefly of a large series illustrating the principal types of normal variations in the human skeleton, a number of skulls of the extinct Huron Indians, and many specimens of the brains of various animals prepared for comparative purposes.

The division of technology was especially enriched in the subject of firearms, mainly through the courtesy of the War Department. This division now possesses the finest historical collection in existence of the rifles, muskets, carbines, pistols, etc., of the colonial period and the military service of the National Government. The collection is supplemented by extensive data gathered as a basis for a comprehensive study of the subject. Other noteworthy contributions to the division included a series of models from the Department of the Interior, representing important historical inventions, the earliest dating from before the Christian Era; a number of pieces of apparatus devised by Mr. Emile Berliner, illustrating important early steps in the development of the telephone; and the Santos Dumont airship No. 9. The division of ceramics received many fine specimens of pottery from Japan and the United States; the division of graphic arts, examples of binding by the St. Hubert Guild of Art Craftsmen and of color photography; the section of musical instruments, one of the earliest church organs brought to this country; and the section of medicine, a series of enlarged photographs of the more eminent of American physicians and surgeons.

The historical collections were increased by a number of important gifts and loans, the most noteworthy consisting of some of the early physical apparatus devised by the late Secretary Langley, and the many medals and diplomas awarded him for his distinguished services in the advancement of science, all of which have been installed in an appropriate case in the hall of history. The principal additions to the division of historic religions consisted of two loans, comprising a collection of lamps, amulets, and embroideries used in Jewish religious life, and a large series of Chinese and Japanese rosaries.

The transfers from the Bureau of Fisheries constituted in the aggregate the principal accession to the department of biology. They comprised a large collection of marine fishes and invertebrates, with some land animals, from the *Albatross* cruise of 1906 in the North Pacific Ocean and Okhotsk Sea; extensive collections of Japanese fishes and Hawaiian corals and hydroids, including many rare and recently described species; over 3,000 specimens of fishes from the fresh waters of West Virginia, and other valuable material. Maj. E. A. Mearns, surgeon, U. S. Army, who has been stationed in the Philippine Islands, forwarded an extensive series of mammals, birds, reptiles, fishes and mollusks, obtained mainly on certain of the smaller and less known islands, and containing some new genera and many new species.

Noteworthy contributions of mammals were received from Venezuela, Cuba, and the Kan-su Province of China; of birds and birds' eggs from Costa Rica and elsewhere; of reptiles and batrachians from Europe, Patagonia, Cuba, and Virginia; and of fishes from Australia and the Philippines, the latter through the Philippine Commission to the St. Louis Exposition. The total number of specimens of fishes acquired was about 25,000. The division of mollusks obtained some 600 species from the Philippines and Eastern Asia, many being cotypes of species described by Mollendorf; a large collection of fresh-water forms from the vicinity of Wilmington, N. C., including a good series of the rare *Planorbis magnificus*; and many interesting land shells from Central America. The additions in entomology comprised about 44,000 specimens, including 20,000 of Hemiptera from Dr. P. R. Uhler, of Baltimore; 8,000 of Lepidoptera from Mr. William Schaus, and over 6,000, representing various groups, from the Department of Agriculture. Besides the transfers from the Bureau of Fisheries, the division of marine invertebrates received extensive series of corals from Hawaii and French Somaliland, and 238 microscopic slides of deep-sea sponges from Doctor Von Lendenfeld. The helminthological collection was increased by over 500 specimens from the Bureau of Animal Industry and the Public Health and Marine-Hospital Service.



The division of plants received about 47,000 specimens, mainly from the following sources: The West Indies, and especially Cuba, over 6,000 specimens; Central America, about 1,400 specimens; Mexico, 2,200 specimens; the Philippine Islands, 5,571 specimens; District of Columbia, about 5,000 specimens; from different localities, through the Department of Agriculture, over 4,000 specimens; the private herbarium of Mrs. J. N. Milligan, of Jacksonville, Ill., comprising about 2,200 specimens; and the collection of the late Prof. T. A. Williams, numbering about 4,400 specimens.

One of the most noteworthy accessions in geology consisted of a large amount of material obtained by the head curator during an investigation of Coon Butte, Arizona. The Geological Survey transmitted a large number of rocks and ores from Wyoming, Colorado, Washington, Arizona, and Maine, and material of the same character as well as minerals were obtained from other sources. The collection of meteorites was increased by seven specimens.

The additions in paleontology were exceptionally large and valuable, the more important comprising about 45,000 specimens from the Pre-Cambrian, Cambrian, and Ordovician horizons in the United States, transferred by the Geological Survey; the Pate collection of about 50,000 specimens from the Paleozoic rocks of the Mississippi Valley, and several hundred specimens from the Devonian of Missouri, both presented by the Hon. Frank Springer; the Nettleroth collection, containing practically all of the many types figured in that author's Kentucky Fossil Shells; and an especially fine representation of the Silurian and Devonian faunas of Indiana and Kentucky.

#### EXPLORATIONS.

While no extensive field work was carried on directly by the Museum, several expeditions, both for collecting and observation, were made by members of the staff, as follows: Doctor True in Maryland, Doctor Stejneger in Virginia, Doctor Bartsch in North Carolina, Mr. Bean in Florida, Mr. Hahn in Indiana, Doctor Dyar and Mr. Caudell in California, Doctor Rose in Mexico, Mr. Maxon in Cuba, and Doctor Merrill in Arizona. Mr. Charles W. Gilmore, of the department of geology, was sent by the Smithsonian Institution to Alaska to search for the remains of large fossil mammals, while Doctor Bassler and Doctor Peale were detailed to field work in conjunction with the Geological Survey. The explorations by which the Museum was mainly benefited were, as heretofore, those of the Geological Survey, the Department of Agriculture, the Bureau of Fisheries, and the Bureau of American Ethnology. Mention should also be made of the personal field work in the Philippines of Doctor Mearns, of the Army, and in Malaysia of Dr. W. L. Abbott; and also of the excavations by Doctor Fewkes at Casa Grande, Arizona, under a special act of Congress.

#### CARE AND CLASSIFICATION OF THE COLLECTIONS.

The reorganization of the osteological collection in physical anthropology, which comprises parts of about 8,000 skeletons, was completed during the year. Doctor Hrdlička, the assistant curator in charge of this division, has carried on investigations relating to the crania and skeletons of Indians and the orang, and to the brain in the higher vertebrates, including man. An extension of storage space has permitted the classified arrangement of a much greater number of objects of ethnology than heretofore. Professor Mason and Doctor Hough were mainly occupied in working up the ethnological collections from Malaysia, and the latter also continued the preparation of his report on the Museum-Gates expedition of 1905 in Arizona, and on the Pueblo collections in the Museum. Doctor Casanowicz has begun a descriptive account of the exhibi-

bition of Jewish religious rites and ceremonials, which is probably the finest in the country.

Some changes and improvements are to be noted in the storage and classification of several groups of mammals and birds. The systematic arrangement of the reserve series of fishes has been continued, and fair progress has been made in the installation of the new system of steel racks and hard-wood drawers for insects. The labeling and registering of marine invertebrates has kept pace as nearly as possible with the receipt of material, and much has been done toward completing the card catalogue of identified specimens. In April, 1907, two assistants were detailed to the Yale University Museum to engage in separating the large collection of marine invertebrates from the earlier Fish Commission explorations, which have remained in the charge of Prof. A. E. Verrill. The first set of duplicates will become the property of Professor Verrill, the reserve series and other duplicates coming to the National Museum.

The researches by members of the zoological staff and others were extensive and varied, the principal subjects being briefly as follows: Fossil cetaceans, by Doctor True; the birds of North and Middle America, by Mr. Ridgway; and those of Malaysia and the China Sea, by Mr. Oberholser; the reptiles of Japan, the Philippines, West Indies, and Costa Rica, by Doctor Stejneger; fishes from Argentina, the Philippines, and the west coast of North America, by Professor Evermann; from the Philippines, by Mr. Bean and Mr. Seale; and from the Pacific region generally by Doctor Jordan and Doctor Gilbert; a monograph of the mosquitoes by Doctor Dyar; the Pyramidellidae of Oregon, by Doctor Dall and Doctor Bartsch; crabs of North America, the North Pacific Ocean, and the Gulf of Siam, by Miss Rathbun; isopods of the North Pacific Ocean, by Doctor Richardson; the entire Museum collection of stalked barnacles, by Doctor Pilsbry; the crinoids from the North Pacific Ocean and elsewhere, by Doctor Clark.

The systematic rearrangement of the herbarium, which has been in progress for several years, was nearly completed, and experiments were carried on looking to the construction of fireproof herbarium cases for the new building. Doctor Rose continued studies on Mexican plants and the cacti, Mr. Maxon on American ferns, and Mr. Painter on water lilies.

The principal routine work in the department of geology comprised the systematizing of the petrographic material recently received, the separation of duplicates from the reserve series, the renovation of the exhibition series of minerals and gems, the arrangement of the Pate and Ulrich collections of fossil invertebrates, and the working out of specimens, and the designation of types and illustrated specimens of fossil vertebrates. Doctor Merrill, in collaboration with Mr. Tassin, made studies upon meteorites and associated phenomena, and many specimens of minerals were identified. The investigations by Doctor Bassler related mainly to the bryozoa and ostracoda of several geological horizons, and those of Mr. Gidley and Mr. Gilmore to both mammalian and reptilian forms.

#### EXHIBITION COLLECTIONS.

The crowded condition of the public halls has rendered it impossible for several years past to make any material additions to the exhibition collections, and practically nothing more can be done in this direction until the new building has been completed. During the past year, however, an interesting series of specimens has been made accessible to the intelligent visitor in the laboratory of physical anthropology. A group of Roumanian peasants has been installed in the west hall, and a number of recently acquired antiquities have been provided for in the hall of archeology. The entire collection of firearms has been brought together in the east hall, in which also one of the original Lillenthal

flying machines has been suspended from the roof. The additions in zoology have consisted mainly of mammals and insects, and in geology of fossil vertebrates, rocks, and minerals. As explained elsewhere, the lecture hall is now temporarily occupied by the National Gallery of Art.

## MISCELLANEOUS.

Of duplicate specimens separated from the collections in the course of recent investigations, about 16,000 were distributed in 208 sets to educational establishments in different parts of the United States and about 25,000 were used in making exchanges with other establishments and with individuals. Over 6,000 specimens were lent to specialists for study.

The publications issued during the year were the annual reports for 1905 and 1906: volumes 31 and 32 of the Proceedings; the second volume of Bulletin 53, completing the catalogue of type and figured specimens in the department of geology; Part I of Bulletin 56, on the mammals of the Mexican boundary of the United States; Bulletin 57, on the families and genera of bats; a supplement to Bulletin 51, being a list of the publications of the Museum from 1901 to 1906; Volume XI of the Contributions from the National Herbarium, consisting of a single paper entitled "The Flora of the State of Washington," and three parts of Volume X of the same series, relating mainly to the botany of Mexico, Central America, and the Philippine Islands. The following bulletins were in print at the close of the year, but were not issued until early in July: Part IV of Bulletin 50, the Birds of North and Middle America; Bulletin 58, Herpetology of Japan and Adjacent Territory, and Bulletin 59, "Recent Madrepora of the Hawaiian Islands and Laysan." A number of short papers based on collections in the Museum were also printed in the quarterly issue of the Smithsonian Miscellaneous Collections and elsewhere.

The additions to the library of the Museum comprised 2,581 books and 3,567 pamphlets and periodicals. The total number of pieces recorded in the library at the close of the year was 30,307 volumes, 47,642 unbound papers, and 108 manuscripts.

At the Jamestown Ter-Centennial Exposition, which opened on April 26, 1907, the subject assigned to the Museum, namely, the aboriginal, colonial, and national history of America, has been as fully illustrated as the means and space permitted. The collection comprises prehistoric Indian implements; representations of the native arts of Alaska, Porto Rico, Hawaii, Samoa, and the Philippine Islands; pictures, relics, and models illustrating the different historic periods of the country, land and water transportation, the invention of the telegraph and telephone, and the firearms used by the United States Army. The central feature is a life-sized group, depicting Capt. John Smith and his men in a small sailboat trading for corn and skins with the Powhatan Indians at the mouth of the James River.

The Museum has also taken part in the International Maritime Exposition at Bordeaux which opened on May 1, although the exhibit of the United States was not finally installed until about the 1st of July. The objects supplied by the Museum consist of a number of models illustrating the water craft used by the aborigines of the Western Hemisphere and illustrations and models of the earlier steamboats, including those of John Fitch and Robert Fulton.

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: I have the honor to submit the following report on the operations of the Bureau of American Ethnology for the fiscal year ending June 30, 1907:

#### SYSTEMATIC RESEARCHES.

The operations of the Bureau of American Ethnology, conducted in accordance with the act of Congress making provision for continuing researches relating to the American Indians under direction of the Smithsonian Institution, have been carried forward in conformity with the plan of operations approved by the Secretary July 19, 1906.

Systematic ethnological researches have been prosecuted by the scientific staff of the Bureau, assisted by a number of collaborators who have been invited to conduct investigations for which they were especially qualified. The Bureau's scientific staff is restricted to a small number of investigators whose field of labor is necessarily limited, and it has always been the policy of the Bureau to widen its scope by enlisting the aid of specialists in various important branches. While thus seeking to cover in the fullest possible manner the whole field of American ethnology, it has sought with particular care to pursue only such branches of research as are not adequately provided for by other agencies, public or private. The result sought by the Bureau is the completion of a systematic and well-rounded record of the tribes before the ever-accelerating march of change has robbed them of their aboriginal characteristics and culture.

During the year researches have been carried on in New Mexico, Arizona, Oklahoma, Louisiana, Mississippi, Florida, New York, and Ontario. The field work has, however, not been so extensive as during most previous years, for the reason that a number of the ethnologists had to be retained in the office to assist in the completion of the Handbook of American Indians and in the proof reading of reports passing through the press.

The Chief of the Bureau remained on duty in the office during nearly the entire year. Administrative duties occupied much of his time, but during the winter and spring months he was called upon to assist in the preparation of the exhibit of the Smithsonian Institution at the Jamestown Exposition, and in April in installing this exhibit. The completion of numerous articles for the Handbook of American Indians, the revision of various manuscripts submitted for publication, and the proof reading of reports and bulletins claimed his attention. Aside from these occupations his duties as honorary curator of the department of prehistoric archeology in the National Museum and as curator of the National Gallery of Art absorbed a portion of his time. The chief was also called upon to assist in formulating the uniform rules and regulations required by the Departments of the Interior, Agriculture, and War in carrying out the

provisions of the law for the preservation of antiquities, to pass upon various applications for permits to explore among the antiquities of the public domain, and to furnish data needful in the selection of the archeological sites to be set aside as national monuments. In addition he was able to give some attention to carrying forward the systematic study of aboriginal technology and art, on which he has been engaged for several years, as occasion offered.

At the beginning of the year Mrs. M. C. Stevenson, ethnologist, was in the Indian village of Taos, New Mexico, continuing her studies of the arts, habits, customs, and language of this tribe begun during the previous year. Although the field was new and the traditional conservatism of the tribe made investigation in certain directions difficult or impossible, much progress was made, and, when the work is completed, results of exceptional value will doubtless have been obtained.

In November Mrs. Stevenson visited Santa Clara pueblo for the purpose of making studies of the people and their culture for comparative purposes, and observations were made of the social customs and religious observances of the people. Afterwards, several days were spent in Santa Fé, examining the old Spanish records preserved in the archives of the Historical Society of New Mexico, with the view of learning something of the early relations of the local tribes with the Spanish invaders and with their Spanish-speaking neighbors of later times. Late in November Mrs. Stevenson visited the pueblo of Zuñi, the site of her former extended researches, and spent some weeks in completing her studies on certain phases of the native ritual and worship, on religious symbolism as embodied in pictography and ceramic and textile decoration, and in the revision of her list of plants employed for food, medicine, and dyes. Numerous photographs and sketches of ceremonials and ceremonial objects were made. A number of changes were noted in the dramas and other ceremonies since her last visit, and Zuñi, heretofore presenting at night the quiet somberness of an aboriginal village, has now, when the dusk falls, the appearance of an eastern town, with many lighted windows. Mrs. Stevenson notes that changes are creeping steadily into all the pueblos, Taos perhaps excepted, and is led to express the earnest hope that the work of investigating the town-building tribes of the Southwest be carried forward with all possible energy.

On April 1 Mrs. Stevenson returned to the office, where, during the remainder of the year, she has been engaged in the preparation of reports on her field researches.

Dr. Cyrus Thomas, ethnologist, has been employed the greater portion of the year in assisting Mr. Hodge on the Handbook of American Indians, not only in the preparation of separate articles, but also in assisting the editor on certain lines of proof reading relating to omissions, uniformity in names, etc. Such time as could be spared from these duties was devoted to the preparation of a Catalogue of Books and Papers relating to the Hawaiian Islands. For this purpose the Congressional and other libraries in Washington were consulted and a short trip to Worcester and Boston, Massachusetts, was made for the purpose of examining the libraries of those cities, which are the chief depositories in the United States of the early publications of the missionaries in Hawaii. The number of titles so far obtained is about 2,000. Doctor Thomas assisted also with the official correspondence on subjects with which he is particularly familiar, his attainments as a student of ancient Mexican writings having proved of special value in the examination of certain manuscripts in the Cakchikel language submitted by the Librarian of the American Philosophical Society of Philadelphia.

During the latter part of the previous fiscal year, in pursuance of his linguistic studies, Dr. John R. Swanton, ethnologist, was engaged in preparing an English-Natchez and Natchez-English analytical dictionary, embodying all the published and unpublished material available—that is, about two thousand words and phrases; he also copied on cards all the words and phrases collected by the late Doctor Gatschet from the Attacapa, Chitimacha, and Tunica Indians. At the beginning of the fiscal year Doctor Swanton was engaged in compiling a dictionary of the Tunica language similar to that made for the Natchez. In the field of general ethnology he excerpted and, when necessary, translated, all the available material bearing on the tribes of the lower Mississippi Valley, and arranged for publication that portion dealing with the Natchez.

On April 3 he left Washington to make investigations among the tribal remnants of Louisiana and Oklahoma, and visited the members of the Houma, Chitimacha, Attacapa, Alibamu, Biloxi, Tunica, and Natchez tribes, and was able definitely to establish the relationship of the Houma to the Choctaw and to identify the Ouspie—a small people referred to by the early French writers—with the Offagoula. From the Tunica and Chitimacha he collected several stories which will be of importance in the endeavor to restore the mythology of the tribes of this area, now almost a blank. In the Cherokee Nation (Oklahoma), contrary to expectation, Doctor Swanton found several persons who still speak the Natchez language. This discovery will necessarily delay the publication of the Natchez material already referred to, but if prompt measures are taken, will insure the preservation of that language in its completeness. At Eufaula (Creek Nation) he made a slight investigation into the social organization of the Creeks—enough to determine that much work still remains to be done in that tribe entirely apart from language. Doctor Swanton returned to the office June 7, and during the remainder of the year was engaged in arranging and collating the material collected by him.

Dr. J. Walter Fewkes, ethnologist, was employed in the office during the first month of the year reading proofs of his articles on *The Aborigines of Porto Rico and Neighboring Islands* and on *Antiquities of Eastern Mexico*, for the Twenty-fifth Annual Report of the Bureau. Part of August and all of September were devoted to the preparation of a bulletin on the *Antiquities of the Little Colorado*. He spent seven months in Arizona, leaving Washington on October 15 and returning the middle of May. During four months he superintended the work of excavation, repair, and preservation of the Casa Grande Ruin, in Pinal County, Arizona, and in March and April visited a number of little-known and undescribed ruins along Canyon Diablo and Grapevine Canyon, gathering material for his bulletin on *The Antiquities of the Little Colorado Valley*. During May and June he was employed in the office, devoting his time to the preparation of an account of the excavations at Casa Grande. The explorations at Casa Grande were conducted under a special appropriation disbursed directly by the Smithsonian Institution, and Doctor Fewkes's preliminary report has been submitted to the Secretary. It is anticipated that a final report on the work when completed will be published by the Bureau of American Ethnology.

Mr. J. N. B. Hewitt was occupied during the earlier months of the year in preparing and correcting matter for the *Handbook of American Indians*, devoting special attention to the articles on the Iroquoian family, Iroquois, Mohawk, Montour, Mythology, Nanabozho, Neutrals, Oneida, Onondaga, and Ottawa, and to the lists of towns formerly belonging to the Iroquois tribes.

From the 20th of January to the 23d of March, 1907, he was engaged in field work among the Iroquois tribes in New York and in Ontario, Canada. The entire period was devoted to collecting texts in the Onondaga and Mohawk



dialects, embodying the basic principles and the civil and political structure and organization of the League of the Iroquois and data relating thereto. The Onondaga texts aggregate about 26,955 words and the Mohawk texts about 1,480 words, making a total of 27,435 words. The following captions will indicate sufficiently the subject-matter of these texts: The Constitution of the League, the Powers of the *T'hadoda'ho'*, Amendments, Powers and Rights of the Chiefs, Powers and Rights of the Women, Powers of the Women Chiefs, Procedure on Failure in Succession, Powers and Restrictions of "Pine Tree" Chiefs, Procedure in Case of Murder, Address of Condolence for Death in a Chief's Family, Forest-edge Chanted Address of Welcome, The Chant for the Dead, Interpretation of the Fundamental Terms, Peace, Power, and Justice.

Mr. Hewitt also continued his duties as custodian of the collection of linguistic manuscripts of the Bureau, the completion of the catalogue of which was entrusted to Mr. J. B. Clayton, head clerk. He has also been called upon to furnish data for the correspondence of the office, more particularly that part relating to the Iroquoian tribes.

Mr. F. W. Hodge, ethnologist, has been engaged during the entire year on the Handbook of American Indians, the editorial work of which has proved extremely arduous and difficult. This work is in two parts: Part I, A—M, was issued from the press in March last, and the main body of Part II was in type at the close of the fiscal year, though progress in proof reading was exceedingly slow on account of the great diversity of the topics treated and the difficulty of bringing up to date numbers of articles relating often to obscure tribes and subjects.

During the entire fiscal year Mr. James Mooney, ethnologist, remained in the office, occupied chiefly on the Handbook of American Indians and in the classification of the large body of material previously obtained relating to the tribes of the Great Plains. His extended article on Indian Missions, written for the Handbook, has been made the subject of a special reprint, a small edition of which was issued by the Bureau. Mr. Mooney has also given valuable assistance in the correspondence of the Bureau, more especially that portion relating to the languages of the Algonquian stock.

#### SPECIAL RESEARCHES.

For a number of years Dr. Franz Boas, assisted by a large corps of linguists, has been engaged in the preparation of a work on the American languages, to be published as a bulletin of the Bureau, entitled "Handbook of American Languages," and it is expected that the manuscript of the first part of this work will be submitted for publication at an early date. Sections relating to the languages of the Eskimo and the Iroquois alone remain incomplete. During the summer of 1906 Mr. Edward Sapir was engaged in collecting data for the handbook on the language of the Takelma tribe, located on the Siletz Agency, Oregon, and toward the close of the year Mr. Leo J. Frachtenberg began similar studies among the Tutelo remnant on the Tuscarora Reservation, Ontario, Canada.

Reports of the discovery of fossil remains of men of extremely primitive type in the vicinity of Omaha, Nebraska, led to the assignment of Dr. Aleš Hrdlička, curator of physical anthropology in the National Museum, to the duty of visiting the University of Nebraska, at Lincoln, where the remains are preserved, and also the site of their exhumation. The examinations were made with the greatest care, and the results are embodied in Bulletin 33 of the Bureau, which was in press at the close of the fiscal year. The conclusion reached by Doctor Hrdlička with respect to the age and character of these remains is that they are not geologically ancient, belonging rather to the mound-

building period in the Mississippi Valley, and that, although a number of the crania are of low type, this was a characteristic frequently appearing among comparatively recent mound-building tribes.

At the beginning of the fiscal year the Bureau was fortunate enough to enter into arrangements with Prof. Herbert E. Bolton, of the University of Texas, for recording the history of the Texan tribes. During the early historical period the French controlled and came into intimate relations with the northern Caddo, hence the early history of this group is to be found chiefly in French records; but with this exception it is mainly in Spanish records, scattered and almost wholly unprinted. These facts make the task in every sense a pioneer one.

The Spanish manuscript sources available to Professor Bolton and upon which, aside from the printed French sources, he has thus far mainly drawn, consist of (1) the B exas archives, a rich collection of perhaps 300,000 pages of original manuscripts that accumulated at San Antonio during the Spanish occupancy, and now in the University of Texas; (2) the Nacogdoches archives, a similar but much smaller collection that accumulated at Nacogdoches and which are now in the State Historical Library; (3) the Lamar papers, a small collection of Spanish manuscripts, now in private hands; (4) mission records preserved at the residence of the Bishop of San Antonio; (5) copies of documents from the Archivo General of Mexico, belonging to the University of Texas and to Professor Bolton; and (6) the various Mexican archives. From these have been extracted a great many notes, but much material yet remains to be examined.

During the year Professor Bolton's efforts have taken three principal directions: (1) He has systematically and fully indexed, on about 10,000 cards, a large amount of the early material, including tribal, institutional, linguistic, historical, and other data on the whole Texas field. (2) From this material as a basis he has written many brief articles on tribes and missions for the Handbook of American Indians, aggregating about 20,000 words. (3) While in the analysis of the materials and the making of the index cards he has covered the whole field, in the final work of construction he has begun the Caddoan tribes of eastern Texas, with the design of treating them separately. In this work Professor Bolton has made commendable progress. He has already written a detailed description, consisting of about 40,000 words, of the location, social and political organization, economic life, religion, and ceremonial of the Hasinai, commonly designated "Texas," as known and described by the earliest European chronicles, accompanied with a map.

The task of writing a history of the Texas tribes is a great one, and can be performed only by long and painstaking effort, but its successful accomplishment promises an important addition to our knowledge of the native Americans.

#### PRESERVATION OF ANTIQUITIES.

With the object of assisting the departments of the Government having custody of the public domain in the initiation of measures for the preservation of the antiquities of the country, the compilation of a descriptive catalogue of antiquities has been continued, and the preparation of bulletins having the same end in view has also received every possible attention. Bulletin 32, Antiquities of the Jemez Plateau, by Edgar L. Hewett, was published and distributed during the year, and Bulletin 35, Antiquities of the Upper Gila and Salt River Valleys in Arizona and New Mexico, by Dr. Walter Hough, was in page form at the close of the year, while bulletins by Dr. J. Walter Fewkes, on the Antiquities of the Little Colorado Valley, and Edgar L. Hewett, on the Antiquities of the Mesa Verde, Colorado, were in course of preparation.

The sum of \$3,000, appropriated by Congress for the excavation, repair, and preservation of Casa Grande Ruin, in Arizona, was disbursed by the Smithsonian Institution, Dr. J. Walter Fewkes, of the Bureau of American Ethnology, having charge of the work. A brief preliminary report on the first year's operations will appear in the Quarterly Issue of the Smithsonian Miscellaneous Collections. A second appropriation of \$3,000 is provided for continuing the work during the coming year.

During the year uniform rules and regulations intended to serve in carrying out the recently enacted law for the preservation of national antiquities were formulated and adopted by the three departments having control of the public domain. Under these, on recommendation of the Secretary of the Smithsonian Institution, permits were issued for conducting explorations on Indian reservations and national forests in Idaho and Wyoming, by the American Museum of Natural History, New York, and among the ancient ruins on the public lands in Navaho and Apache counties, Arizona, by the University of California. Arrangements were also made with the Interior Department for carrying on explorations at Casa Grande Ruin, Arizona, by the Smithsonian Institution. Under the same law during the year three important archeological sites were declared national monuments by the President of the United States. They are as follows: Chaco Canyon, in New Mexico, including several important ruined pueblos; El Moro, New Mexico, commonly known as Inscription Rock; and Montezuma Castle, in Arizona, an important cliff ruin.

#### CATALOGUE OF LINGUISTIC MANUSCRIPTS.

The archives of the Bureau contain 1,626 manuscripts, mainly linguistic, of which only a partial catalogue had previously been made. In January Mr. J. B. Clayton, head clerk, began the preparation of a card catalogue, which was completed at the close of the year. The manuscripts were jacketed in manila envelopes of uniform size, except where bulk prevented, and were numbered from 1 to 1626.

The catalogue comprises about 14,000 cards which give, as completely as available data permit, the names of stock, language, dialect, collector, and locality, as well as the date of the manuscript. It was not possible in every instance to supply all the information called for under these heads, but the card has been made as complete in each case as the information permitted. The cards have been arranged in one alphabetical series, the names of the languages not only under these languages in their proper alphabetical place, but also alphabetically under their stocks. Under the name of each collector his manuscripts are indexed under stocks, languages, and dialects. The data in regard to "place" are very defective, and quite a number of the manuscripts are from anonymous sources.

#### EDITORIAL WORK.

Mr. Joseph G. Gurley, who was appointed to the position of editor for a probationary period during the previous year, was permanently appointed on August 16, 1906.

The editorial work of the year may be summarized briefly as follows: The proof reading of the Twenty-fourth Annual Report was completed and the work advanced to publication. At the close of the year the Twenty-fifth Annual was practically finished, with the exception of the presswork, while the Twenty-sixth Report was in page form, so that the work was practically ready for printing. Bulletin 32 was completed and published early in the year, and Bulletin 36 also has been issued. Bulletins 33, 34, and 35 are in type, and



the proof reading on Bulletins 33 and 35 has progressed so far that they can be put on the press at an early day.

For about three months the Bureau has had the efficient services of Mr. Stanley Searles, who was courteously detailed for the purpose from the proof reading force of the Government Printing Office. The editor has assisted to some extent in the proof-reading of the Handbook of American Indians, Bulletin 30, which is in charge of Mr. F. W. Hodge.

#### PUBLICATIONS.

During the year the Twenty-sixth Annual Report and Bulletins 33, 34, 35, and 36 were forwarded to the Public Printer. Bulletins 31 and 32 were published in July. Part I of the Handbook of American Indians (Bulletin 30) appeared in March and the Twenty-fourth Annual Report in May. One thousand copies of the List of Publications of the Bureau (Bulletin 36) and 500 copies of a special article on Indian missions were issued in June. Fifteen hundred copies of the Twenty-fourth Annual Report and the same number of Bulletin 30, Part I, and Bulletin 32 were sent to regular recipients. About 1,500 copies of Bulletin 30, Part I, and 200 copies of the Twenty-fourth Annual, as well as numerous bulletins and separates, were distributed in response to special requests, presented for the most part by Members of Congress.

The distribution of publications was continued as in former years. The great increase in the number of libraries in the country and the multiplication of demands from the public generally have resulted in the almost immediate exhaustion of the quota of volumes (3,500) allotted to the Bureau. Few copies of any of the reports remain six months after the date of issue.

#### LIBRARY.

The library remains in charge of Miss Ella Leary, who was able to bring the accessioning and cataloguing of books, pamphlets, and periodicals up to date. In all, there have been received and recorded during the year 760 volumes, 1,200 pamphlets, and the current issues of upward of 500 periodicals, while about 500 volumes have been bound at the Government Printing Office. The library now contains 13,657 volumes, 9,800 pamphlets, and several thousand copies of periodicals which relate to anthropology. The purchase of books and periodicals has been restricted to such as relate to anthropology and, more especially, to such as have a direct bearing on the American aborigines.

#### COLLECTIONS.

The collections of the year comprise large series of objects obtained by Dr. J. Walter Fewkes, in his excavations at Casa Grande Ruins, Arizona, conducted under the immediate auspices of the Smithsonian Institution, and by Mrs. M. C. Stevenson in Zuñi and Taos pueblos, New Mexico.

Some of the minor collections are a cache of stone knife blades from the vicinity of Tenleytown, District of Columbia, obtained through the kindness of Mr. C. C. Glover; a series of relics (fragments of pottery) from the temple of Diana at Caldecote, presented by Mr. Robert C. Nightingale; relics from the shell heaps of Popes Creek, Maryland, presented by Mr. S. H. Morris, of Faulkner, Maryland; and a number of stone implements and unfinished soapstone utensils from the ancient quarries on Connecticut avenue extended, Washington, District of Columbia, collected by Mr. W. H. Gill.

## ILLUSTRATIONS.

The division of illustrations was, as heretofore, in charge of Mr. De Lancey Gill, who was assisted by Mr. Henry Walther. One hundred and fifty-nine illustrations were prepared for Bulletins 30, 33, 34, and 35, and a large number of proofs of illustrations for the various volumes were read and revised. The photographic work included the making of 277 negatives required in the illustration work and 160 portraits of Indians of visiting delegations. Negatives developed for ethnologists returning from the field numbered 96. During the year a total of 11,078 photographic prints was made.

Albert Samuel Gatschet, a distinguished philologist and ethnologist, for many years connected with the Bureau, died at his home in Washington, District of Columbia, March 16, 1907. A suitable notice of his career will be found in the Annual Report of the Bureau.

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 the following report on the operations of the International Exchanges during the fiscal year ending June 30, 1907:

The Exchange Service, whose existence is almost coeval with that of the Institution, was originally designed for the purpose of exchanging Smithsonian publications for those of learned societies and universities. Through the action of Congress and a treaty negotiated with various foreign countries, to which many nations have since adhered, it has become an important international agency for the exchange of governmental, scientific, and literary publications, and is intended to benefit institutions in this country and abroad, serving as one of the most important means for carrying out a fundamental purpose of the Institution, "the diffusion of knowledge among men."

The service conducts its operations on behalf of all branches of this Government, and reciprocally receives the cooperation of most of the Departments and Bureaus at Washington. I desire, however, especially to mention the valued cooperation of the Department of State, which unfailingly, when requested, takes action, through our representatives abroad, on behalf of the service; and of the Treasury Department, which, by its instructions to collectors of customs, greatly facilitates the exchange work.

Its operations have been zealously carried on during the year by the experienced staff that has been gathered together. Details of the regular work are given below, to a considerable extent in tabular form, but before proceeding to them certain exceptional matters are briefly discussed.

The amount appropriated by Congress for the expenses of the service during the fiscal year 1907 was \$28,800, and the sum collected on account of repayments during the same period was \$4,568.25, making the total available resources for carrying on the system of International Exchanges \$33,368.25.

The estimate submitted to Congress for conducting the service during the year 1908 was \$32,200, an increase of \$3,400 over the current appropriation. It is gratifying to state that this amount has been allowed.

The improvements and changes in the electric wires which furnish light for the Exchange Service, referred to in the last report, have been completed. The wires were placed in metal pipes, and the liability of fire from this source is now reduced to a minimum. The appearance of the office rooms has been much improved by the painting of the walls, woodwork, and floors, and the hanging of new shades.

When it is considered that nearly 2,000 boxes have been shipped during the year to every quarter of the globe, the statement that the service has not suffered the loss of any of its consignments is noteworthy.

A close supervision has been kept over entries of foreign consignments of books at the Georgetown custom-house and over the auction sales of all the principal ports of the United States, in order to prevent, if possible, the going astray of exchanges from abroad which are not properly addressed, and which, therefore, fail to reach the Smithsonian Institution. During the past year



these efforts have resulted in the clearing of a number of consignments for the Smithsonian Institution and the Library of Congress which might otherwise have miscarried. Whenever, during the visits to the custom-house, any exchange consignment addressed to a scientific establishment has been found unclaimed, steps have been taken to notify the proper persons regarding the matter. In such cases the sender has been informed of the channels through which exchanges should be forwarded to insure their prompt and safe delivery.

Complaints of delays in the transmission of exchanges are becoming fewer each year. Every endeavor has been made to improve the service so that the cause of complaint may be entirely eliminated, and each complaint is carefully traced in order that the cause of delay may be ascertained. It should be stated, however, that, with the exception of the countries in which the Institution has paid agents, the responsibility of the Institution for outgoing shipments necessarily ceases after they have been shipped, as the distribution in foreign countries is conducted by the government bureaus of the respective countries, over which the Smithsonian Institution, of course, has no control. In special cases, and usually upon the request of government establishments where the publications are of such a nature that their value largely depends upon the promptest possible delivery, and to addresses in countries to which shipments are very infrequent, packages are now sent by mail.

It has been the established rule to make shipments in boxes of standard size, bearing a weight of about 200 pounds each, and not to make a transmission to any country until a sufficient number of publications to fill at least one such box had accumulated. This has caused no delay in shipments to any of the larger countries, but has rendered them less frequent to those places with which the exchange is not very considerable. It is proposed during the coming year to employ smaller cases for such countries, thus making more frequent shipments possible.

Regarding the charge made by the consuls of certain South and Central American countries for certifying bills of lading, it is a pleasure to state that in nearly every instance the consuls have consented to waive such fees in the future.

Within recent years Hawaii, Porto Rico, and the Philippine Islands came under the jurisdiction of the United States. Prior to this they had been subject to foreign jurisdiction and thus came within the purview of the exchange service, but under the existing circumstances it appeared that this construction must be abandoned, and the Institution has discontinued the acceptance of packages from domestic sources for these territories, since exchanges with them no longer come within the designation "international."

Special attention continues to be given to increasing the office collection of directories and other books of addresses.

In the last report reference was made to the steps that were being taken through the Department of State to have the Government of the Argentine Republic designate one office to assume charge of the distribution of exchanges in that country, in order that the practice of sending to five different establishments might be discontinued. In response to the communication of the Department of State, the Argentine minister of foreign affairs stated that a section of exchanges was already established under the direction of the National Library of Buenos Aires, and requested that future consignments be sent in care of that library. Transmissions to Argentina have accordingly been made in this manner since January, 1907.

As was reported last year, all transmissions to Bulgaria were temporarily suspended owing to the death of Dr. Paul Leverkühn, who attended to the

distribution of exchanges in that country. It is gratifying to state that shipments have now been resumed, the Prince of Bulgaria having been good enough, in response to the request of the Institution, to designate the scientific institutions and library at Sofia to act as the exchange intermediary between Bulgaria and the United States.

The final arrangement of details concerning the shipment of Government documents to China has not been perfected, and therefore the first consignment of official publications to that country has not yet been made.

During the latter part of the present fiscal year a communication was received from Dr. F. Bonola Bey, secretary-general of the Khedivial Geographical Society in Cairo, announcing that as he was about to leave Egypt for some time he felt it would be necessary for him to give up the work which he had been conducting for the Smithsonian Institution for a number of years, and that, at his request, the director-general of the survey department at Cairo had offered to take charge of the distribution of exchanges. A letter was also received from the director-general placing the services of his department at the disposal of the Institution. Consignments will, therefore, be sent to the survey department in the future. The grateful acknowledgments of the Institution are due to Dr. Bonola Bey for the valuable services which he has rendered during the past seventeen years in the distribution of exchanges to correspondents in Egypt.

Under the arrangement which has existed for a number of years with the national library at Athens, the Smithsonian Institution has been permitted to forward to that library packages intended for distribution only to Government institutions and officials connected therewith, it being necessary to forward all other exchanges for Greece in care of the American School of Classical Studies at Athens. On account of this division of consignments it was often necessary to hold packages here for a considerable length of time before a sufficient number accumulated to constitute a shipment. The national library, however, through the good offices of Dr. Eypaldo Bassier, member of the Greek Parliament, has finally been prevailed upon to distribute exchanges for all addresses in Greece, which greatly increases the efficiency of the service between that country and the United States. In this connection it should be stated that the services which the American School of Classical Studies rendered the Institution in the distribution of exchanges for miscellaneous addresses in Greece have been eminently satisfactory, and the thanks of the Institution are due the officers of that school for their promptness in forwarding packages to their destinations.

Dr. Julius Pikler, who was temporarily appointed agent for Hungary on July 1, 1906, to fill the vacancy caused by the death of Dr. Joseph von Körösy, was, on February 7, 1907, permanently appointed.

No response has yet been received from the Korea branch of the Royal Asiatic Society at Seoul regarding the request of the Institution that the society act as the exchange medium through which packages to and from Korea may be forwarded. The Institution is, therefore, still without means of forwarding packages to Korea, transmissions to which country were suspended during the late Russo-Japanese war.

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

The total number of packages handled by the International Exchange Service during the past year was 189,830, an increase over the number for the preceding year of 17,947. The weight of these packages was 469,536 pounds, a decrease

from 1906 of 2,023 pounds. The statement which follows shows in detail the number of packages exchanged between the United States and other countries:

*Statement of packages received for transmission through the International Exchange Service during the year ending June 30, 1907.*

Country.	Packages.		Country.	Packages.	
	For.	From.		For.	From.
Abyssinia .....	1		Grenada .....	13	
Algeria .....	122	64	Great Britain and Ireland...	20,123	7,982
Angola .....	5		Greece .....	1,252	
Antigua .....	42		Greenland .....	2	
Arabia .....	28		Guadeloupe .....	2	
Argentina .....	3,062	676	Guatemala .....	218	
Austria-Hungary .....	6,682	3,756	Haiti .....	975	
Azores .....	29		Hawaiian Islands .....	52	3
Bahamas .....	53		Honduras .....	248	
Barbados .....	104		Hongkong .....	146	
Beira .....	14		Iceland .....	51	
Belgium .....	3,840	2,623	India .....	2,580	783
Bermudas .....	36		Italy .....	6,601	2,454
Bismarck Archipelago .....	1		Jamaica .....	248	
Bolivia .....	138		Japan .....	3,435	656
Bombay .....	4		Java .....	252	517
Borneo .....	5		Kongo .....	1	1
Brazil .....	2,043	1,056	Korea .....	48	
British America .....	6,110	309	Lagos .....	6	
British Burma .....	8		Liberia .....	63	
British East Africa .....	15		Lourenço Marquez .....	82	
British Central Africa .....	4		Luxemburg .....	98	1
British Guiana .....	85		Macao .....	1	
British Honduras .....	51		Madagascar .....	27	
British West Africa .....	2		Madeira .....	18	
Bulgaria .....	178	1	Malta .....	106	
Canary Islands .....	17		Martinique .....	15	
Cape Colony .....	1,510	23	Mauritius .....	66	
Ceylon .....	220		Mexico .....	1,677	512
Chile .....	1,686	75	Mombasa .....	1	
China .....	546	25	Montenegro .....	3	
Colombia .....	1,161	8	Morocco .....	5	
Cook Islands .....	1		Natal .....	221	2
Costa Rica .....	1,149	39	Netherlands .....	2,889	1,458
Cuba .....	1,152	189	Nevis .....	8	
Curaçao .....	16		Newfoundland .....	153	
Cyprus .....	14		New South Wales .....	2,410	698
Denmark .....	1,761	384	New Zealand .....	1,552	3
Dominica .....	46		Nicaragua .....	261	
Dutch Guiana .....	39		Norfolk Islands .....	13	
Ecuador .....	585	13	Norway .....	1,922	449
Egypt .....	335	58	Orange River Colony .....	111	
Falkland Islands .....	15		Panama .....	424	
Fiji Islands .....	30		Paraguay .....	173	
France .....	12,061	4,687	Persia .....	51	
French Cochin China .....	45		Peru .....	1,430	5
German East Africa .....	1		Philippine Islands .....	232	1
Germany .....	21,875	7,937	Porto Rico .....	2	
Gibraltar .....	15		Portugal .....	1,481	104
Gold Coast .....	2		Queensland .....	1,382	



*Statement of packages received for transmission through the International Exchange Service during the year ending June 30, 1907—Continued.*

Country.	Packages.		Country.	Packages.	
	For.	From.		For.	From.
Reunion.....	11		Spain.....	2,196	284
Rhodesia.....	47		Straits Settlements.....	202	
Roumania.....	376	134	Sudan.....	6	
Russia.....	4,842	2,594	Sumatra.....	3	
St. Helena.....	20		Sweden.....	2,679	1,018
St. Kitts.....	25		Switzerland.....	3,477	1,072
St. Lucia.....	6		Tasmania.....	1,129	5
St. Martin.....	14		Transvaal.....	1,176	
St. Pierre and Miquelon.....	17		Trinidad.....	94	
St. Thomas.....	17		Tunis.....	36	4
St. Vincent.....	2		Turkey.....	1,270	
Samoa.....	21		Turks Islands.....	17	
San Salvador.....	173		United States.....	43,555	146,719
Santo Domingo.....	35		Uruguay.....	1,355	90
Sarawak.....	3		Venezuela.....	1,127	
Servia.....	97	2	Victoria.....	2,824	138
Seychelles Islands.....	1		Western Australia.....	1,234	50
Siam.....	193		Zanzibar.....	15	
Sierra Leone.....	22				
Society Islands.....	16		Total.....	189,830	189,830
South Australia.....	1,418	168			

During the year there were sent abroad 1,833 boxes, 265 of which contained full sets of United States Government documents for authorized depositories, and 1,568 consisted of departmental and other publications for miscellaneous correspondents. The decrease in the number of boxes sent abroad as compared with the previous year is due, in part, to the fact that a great many more packages were forwarded directly by mail than formerly, and, in part, to the reduction in size of Government publications. The number of boxes of miscellaneous exchanges sent to each country is given below:

Argentina.....	20	Greece.....	5
Austria.....	64	Guatemala.....	4
Belgium.....	52	Haiti.....	1
Bolivia.....	2	Honduras.....	4
Brazil.....	19	Hungary.....	28
British colonies.....	14	India.....	33
British Guiana.....	2	Italy.....	78
British Honduras.....	1	Jamaica.....	3
Cape Colony.....	18	Japan.....	45
China.....	4	Liberia.....	2
Chile.....	11	Lourenço Marquez.....	2
Colombia.....	8	Natal.....	1
Costa Rica.....	4	New South Wales.....	25
Denmark.....	18	Netherlands.....	34
Ecuador.....	10	New Zealand.....	14
Egypt.....	7	Nicaragua.....	3
France and colonies.....	153	Norway.....	15
Germany.....	278	Panama.....	4
Great Britain and Ireland.....	308	Paraguay.....	2

Peru .....	9	Switzerland .....	40
Portugal .....	11	Syria .....	1
Queensland .....	5	Tasmania .....	4
Russia .....	65	Transvaal .....	4
Salvador .....	3	Trinidad .....	1
Santo Domingo .....	1	Turkey .....	3
Siam .....	3	Uruguay .....	6
South Australia .....	10	Venezuela .....	3
Spain .....	19	Victoria .....	18
Sweden .....	52	Western Australia .....	14

## EXCHANGE OF GOVERNMENT DOCUMENTS.

The number of packages sent abroad through the International Exchange Service by United States Government institutions during the year was 100,114, an increase over those forwarded during the preceding twelve months of 33,086; the number received in exchange was 11,641, a decrease of 15,127. The increase in the number sent is due partly to the addition of three new depositories of partial sets of official documents and partly to the greater number of publications received from Government establishments for distribution abroad. The decrease does not signify an actual reduction in the number of publications from foreign countries, and is accounted for by the fact that all packages for the Library of Congress have, at the request of the Librarian, been delivered intact, so that, in the case of the receipts for the Library, one package sometimes represents a whole box of publications.

The exchange on account of the various branches of the Government is shown in detail in the following table:

*Statement of United States Government exchanges during the year ending  
June 30, 1907.*

Name of bureau.	Packages.		Name of bureau.	Packages.	
	Received for—	Sent by—		Received for—	Sent by—
American Historical Association .....	11	19	Bureau of Public Health and Marine-Hospital Service ..	25	1,152
Astrophysical Observatory ..	17	.....	Bureau of Statistics, Department of Commerce and Labor .....	126	6,186
Auditor for the State and other Departments .....	.....	361	Bureau of Steam Engineering .....	1	.....
Bureau of American Ethnology .....	275	2,107	Civil Service Commission ...	3	.....
Bureau of the American Republics .....	39	3	Coast and Geodetic Survey ..	169	454
Bureau of the Census .....	71	2,183	Commissioner of Internal Revenue .....	.....	17
Bureau of Education .....	168	43	Commissioners of the District of Columbia .....	9	43
Bureau of Fisheries .....	103	768	Comptroller of the Currency ..	9	140
Bureau of Immigration .....	.....	1	Department of Agriculture ..	510	262
Bureau of Insular Affairs .....	.....	3	Department of Commerce and Labor .....	5	1
Bureau of Labor .....	74	4,043	Department of the Interior ..	28	208
Bureau of Manufactures .....	38	6,925	Department of Justice .....	1	.....
Bureau of the Mint .....	8	404	Department of State .....	11	1
Bureau of Navigation, Navy Department .....	4	.....	Engineer School of Application .....	3	.....
Bureau of Navigation, Department of Commerce and Labor .....	.....	20			

*Statement of United States Government exchanges during the year ending June 30,  
1907—Continued.*

Name of bureau.	Packages.		Name of bureau.	Packages.	
	Received for—	Sent by—		Received for—	Sent by—
Entomological Commission	3		Office of the Chief of Engineers	38	5
General Land Office	3		Office of the Chief of Staff	3	21
Geological Survey	723	3,261	Office of Indian Affairs	6	
House of Representatives		1	Ordnance Office, War Department	1	
Hydrographic Office	55	204	Patent Office	347	1,926
Hygienic Laboratory	1		Senate Library	3	
Interstate Commerce Commission	26	444	Smithsonian Institution	3,548	7,466
Library of Congress	4,009	57,727	Steamboat Inspection Service		1
Life-Saving Service	1	68	Superintendent of Documents		4
Light-House Board	2	144	Surgeon-General's Office	190	327
National Academy of Sciences	126	57	Treasury Department	7	4
National Bureau of Standards	36		War Department	52	110
National Herbarium	3		Weather Bureau	120	1,439
National Museum	403	634	Total	11,641	100,114
Nautical Almanac Office	57	166			
Naval Observatory	165	757			
Navy Department	5	4			

As will be seen from the foregoing statement, the number of documents sent abroad by the Departments and Bureaus of this Government is, in most instances, much greater than the quantity of similar works received in exchange. While this may partly be due to the fact that few governments publish so extensively as the United States, yet it seems unlikely that the fullest possible exchange has been attained, and it is proposed during the coming year to use a part of the increase in the exchange appropriation in the employment of an additional clerk to assist in carrying on the work of completing and increasing the number of foreign government publications received by American governmental establishments.

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 53 full sets of United States official publications and 30 partial sets. During the past year the Librarian of Congress, in accordance with the discretion vested in him by the act of 1901, directed that the legislative library at Edmonton, Alberta, the national library at Quito, Ecuador, and the Panama department of foreign affairs at Panama be added to the list of depositories of partial sets. 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 : Königl. Hof- und Staats-Bibliothek, Munich.
- Belgium : Bibliothèque Royale, Brussels.
- Brazil : Bibliotheca Nacional, Rio de Janeiro.
- Canada : Parliamentary Library, Ottawa.
- Cape Colony : Government Stationery Department, Cape Town.
- Chile : Biblioteca del Congreso Nacional, Santiago.
- Colombia : Biblioteca Nacional, Bogotá.
- Costa Rica : Oficina de Depósito y Canje de Publicaciones, San José.
- Cuba : Department of State, Habana.
- Denmark : Kongelige Bibliothek, Copenhagen.
- England : British Museum, London.
- England : London School of Economics and Political Science, London.
- France : Bibliothèque Nationale, Paris.
- France : Préfecture de la Seine, Paris.
- Germany : Deutsche Reichstags-Bibliothek, Berlin.
- Greece : National Library, 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 : Storthingets Bibliothek, Christiania.
- Ontario : Legislative Library, Toronto.
- Peru : Biblioteca Nacional, Lima.
- Portugal : Bibliotheca Nacional, Lisbon.
- Prussia : Königl. Bibliothek, Berlin.
- Quebec : Legislative Library, Quebec.
- Queensland : Parliamentary Library, Brisbane.
- Russia : Imperial Public Library, St. Petersburg.
- Saxony : Königl. Oeffentliche Bibliothek, Dresden.
- South Australia : Parliamentary Library, Adelaide.
- Spain : Depósito de Libros, Cambio Internacional y Biblioteca General del Ministerio de Instrucción Pública y Bellas Artes, Madrid.
- Sweden : Kongliga Biblioteket, Stockholm.
- Switzerland : Bibliothèque Fédérale, Berne.
- Tasmania : Parliamentary Library, Hobart.
- Transvaal : Government Library, Pretoria.
- Turkey : 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 : Königl. Landesbibliothek, Stuttgart.

## DEPOSITORIES OF PARTIAL SETS.

- Alberta: Legislative Library, Edmonton.  
 Austria-Hungary: Bürgermeister der Haupt- und Residenz-Stadt, Vienna.  
 Bolivia: United States Minister, La Paz.  
 British Columbia: Legislative Library, Victoria.  
 Bulgaria: Minister of Foreign Affairs, Sofia.  
 Ceylon: United States Consul, Colombo.  
 Ecuador: Biblioteca Nacional, Quito.  
 Egypt: Bibliothèque Khédiviale, Cairo.  
 Germany: Grossherzogliche Hof-Bibliothek, Darmstadt.  
 Germany: Senatskommission für die Reichs- und Auswärtigen Angelegenheiten,  
     Hamburg.  
 Germany: Kommission für Reichs- und Auswärtige Angelegenheiten, Bremen.  
 Guatemala: Secretary of the Government, Guatemala.  
 Honduras: Secretary of the Government, Tegucigalpa.  
 Jamaica: Colonial Secretary, Kingston.  
 Lourenço Marquez: Government Library, Lourenço Marquez.  
 Malta: Lieutenant-Governor, Valetta.  
 Newfoundland: Colonial Secretary, St. Johns.  
 New Brunswick: Legislative Library, St. John.  
 Natal: Colonial Governor, Pietermaritzburg.  
 Nicaragua: Superintendente de Archivos Nacionales, Managua.  
 Nova Scotia: Legislative Library, Halifax.  
 Northwest Territories: Government Library, Regina.  
 Orange River Colony: Government Library, Bloemfontein.  
 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, Bukharest.  
 Salvador: Ministerio de Relaciones Exteriores, San Salvador.  
 Straits Settlements: Colonial Secretary, Singapore.  
 Siam: Department of Foreign Affairs, Bangkok.

## CORRESPONDENTS.

The record of exchange correspondents at the close of the year contained 58,107 addresses, being an increase of 1,793 over the preceding year. The following table gives the number of correspondents in each country, and also serves to illustrate the scope of the service, whose utility is becoming every year better and more widely appreciated.

Number of correspondents of the International Exchange Service in each country on June 30, 1907.

Country.	Correspondents.			Country.	Correspondents.		
	Libraries.	Individuals.	Total.		Libraries.	Individuals.	Total.
<b>AFRICA.</b>				<b>West Indies;</b>			
Algéria .....	27	55	82	Anguilla .....	1	1	
Angola .....	1	2	3	Antigua .....	9	8	17
Azores .....	7	15	22	Bahamas .....	4	17	21
Beira .....		1	1	Barbaços .....	12	28	40
British Central Africa .....	1	3	4	Bermuda .....	6	29	35
British East Africa .....	1	4	5	Bonaire .....		1	1
Canary Islands .....	2	8	10	Cuba .....	84	150	234
Cape Colony .....	69	127	196	Curiaçao .....	3	7	10
Cape Verde Islands .....		5	5	Dominica .....	2	8	10
Egypt .....	52	109	161	Green Turtle Cay .....		1	1
French Kongo .....		2	2	Grenada .....	3	6	9
Gambia .....		1	1	Guadeloupe .....	2	7	9
German East Africa .....	5		5	Haiti .....	38	23	61
Gold Coast .....	1	4	5	Jamaica .....	20	51	71
Kongo .....		5	5	Martinique .....		3	3
Lagos .....	3	6	9	Montserrat .....		3	3
Liberia .....	3	12	15	Nevis .....		1	1
Lourenço Marquez .....	1	6	7	Porto Rico .....	11	36	47
Madagascar .....	6	11	17	St. Bartholomew .....		2	2
Madeira .....	3	4	7	St. Christopher .....	2	9	11
Mauritius .....	11	13	24	St. Croix .....	1	4	5
Morocco .....		15	15	St. Eustatius .....		1	1
Mozambique .....		1	1	St. Lucia .....	3	6	9
Natal .....	24	35	59	St. Martin .....		2	2
Orange River Colony .....	3	6	9	St. Thomas .....	2	5	7
Reunion .....	4	2	9	St. Vincent .....	1	2	3
Rhodesia .....	11	17	28	San Domingo .....	5	16	21
St. Helena .....	3	2	5	Tobago .....		2	2
Senegal .....	1	5	6	Trinidad .....	17	17	34
Sierra Leone .....	2	6	8	Turks Islands .....	3	6	9
Southern Nigeria .....	1		1	Virgin Islands .....		1	1
Sudan .....	2	4	6	<b>AMERICA (SOUTH).</b>			
Transvaal Colony .....	38	69	107	Argentina .....	171	297	468
Tunis .....	9	12	21	Bolivia .....	24	22	46
Zanzibar .....	2	5	7	Brazil .....	165	240	405
<b>AMERICA (NORTH).</b>				British Guiana .....	20	17	37
Canada .....	405	734	1,139	Chile .....	104	144	248
Central America:				Colombia .....	40	66	106
British Honduras .....	6	18	24	Dutch Guiana .....	6	4	10
Costa Rica .....	29	56	85	Ecuador .....	27	35	62
Guatemala .....	44	76	120	Falkland Islands .....		8	8
Honduras .....	15	46	61	French Guiana .....	1	2	3
Nicaragua .....	20	56	76	Panama .....	5	25	30
Salvador .....	22	16	38	Paraguay .....	22	16	38
Greenland .....	3		3	Peru .....	57	113	170
Mexico .....	181	275	456	Uruguay .....	57	48	105
Newfoundland .....	18	40	58	Venezuela .....	43	69	112
St. Pierre-Miquelon .....	2	2	4				
United States of America .....	3,843	7,750	11,593				



Number of correspondents of the International Exchange Service in each country on June 30, 1907—Continued.

Country.	Correspondents.			Country.	Correspondents.		
	Libra-ries.	Indi-vidu-als.	Total.		Libra-ries.	Indi-vidu-als.	Total.
ASIA.				EUROPE.			
Arabia .....		7	7	Austria-Hungary .....	846	1,575	2,421
Baluchistan .....		1	1	Belgium .....	429	630	1,059
Burma .....	14	8	22	Bulgaria .....	17	25	42
Ceylon .....	33	30	63	Denmark .....	127	292	419
China .....	63	164	227	France .....	1,968	3,836	5,804
Cyprus .....	4	4	8	Germany .....	2,774	5,818	8,592
Hong India .....	1	1	2	Gibraltar .....	1	7	8
Hongkong .....	14	41	55	Great Britain .....	2,454	7,520	9,974
India .....	329	385	714	Greece .....	45	71	116
Indo-China .....	10	14	24	Iceland .....	26	14	40
Japan .....	224	574	798	Italy .....	957	1,462	2,419
Korea .....	5	15	20	Luxemburg .....	14	10	24
Macao .....	1	1	2	Malta .....	13	16	29
Malaysia:				Montenegro .....	3	1	4
Borneo .....		1	1	Netherlands .....	248	489	737
British New Guinea .....		2	2	Norway .....	151	255	406
British North Borneo .....	1	2	3	Portugal .....	118	118	236
Celebes .....		3	3	Roumania .....	47	91	138
Java .....	24	43	67	Russia .....	637	1,283	1,920
New Guinea .....		4	4	Servia .....	22	18	40
Philippine Islands .....	27		27	Spain .....	230	359	589
Sarawak .....	1		1	Sweden .....	209	520	729
Sumatra .....	1	13	14	Switzerland .....	418	873	1,291
Persia .....	4	11	15	Turkey .....	56	119	175
Portuguese India .....	1		1	POLYNESIA.			
Siam .....	9	29	38	Fiji Islands .....	2		2
Straits Settlements .....	22	31	53	German New Guinea .....	1		1
AUSTRALASIA.				Guam .....		1	1
New South Wales .....	95	225	320	Hawaii .....	30	82	112
New Zealand .....	101	185	286	Marshall Islands .....		5	5
Queensland .....	59	77	136	New Caledonia .....		2	2
South Australia .....	46	94	140	New Hebrides .....	1		1
Tasmania .....	28	37	65	Samoa .....	1	5	6
Victoria .....	137	309	446	Seychelles Islands .....		1	1
Western Australia .....	38	55	93	Tahiti .....		9	9
				Tonga .....		3	3
				International .....	43		43
				Total .....	19,031	39,076	58,107

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

## LIST OF BUREAUS OR AGENCIES THROUGH WHICH EXCHANGES ARE TRANSMITTED.

- Algeria: Via France.  
 Angola: Via Portugal.  
 Argentina: Sección de Depósito, Reparto y Canje de Publicaciones, Biblioteca Nacional, 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.  
 Brazil: Serviço de Permutações Internacionais, Bibliotheca Nacional, Rio de Janeiro.  
 British colonies: Crown Agents for the Colonies, London.<sup>a</sup>  
 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: Universidad de Chile, Santiago.  
 China: Zi-ka-wei Observatory, Shanghai.  
 Colombia: Oficina de Canjes Internacionales y Reparto, Biblioteca Nacional, Bogotá.  
 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, Cairo.  
 France: Service des Echanges Internationaux, Paris.  
 Friendly Islands: Sent by mail.  
 Germany: Karl W. Hiersemann, Königsstrasse 3, Leipzig.  
 Great Britain and Ireland: Messrs. William Wesley & Son, 28 Essex street, Strand, London.  
 Greece: Bibliothèque Nationale, Athens.  
 Greenland: Via Denmark.  
 Guadeloupe: Via France.  
 Guatemala: Instituto Nacional de Guatemala, Guatemala.  
 Guinea: Via Portugal.  
 Haiti: Secrétairerie d'État des Relations Extérieures, Port au Prince.  
 Honduras: Biblioteca Nacional, Tegucigalpa.

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<sup>a</sup> This method is employed for communicating with a large number of the British colonies with which no route is available for forwarding exchanges direct.

- Hungary: Dr. Julius Pikler, Municipal Office of Statistics, City Hall, Budapest.
- Iceland: Via Denmark.
- India: India Store Department, 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: Care of American Colonization Society, Washington, D. C.
- Lourenço Marquez: Government Library, Lourenço Marquez.
- Luxemburg: Via Germany.
- Madagascar: Via France.
- Madeira: Via Portugal.
- Mexico: Sent by mail.
- Mozambique: Via Portugal.
- Natal: Agent-General for Natal, London.
- Netherlands: Bureau Scientifique Central Néerlandais, Bibliothèque de l'Université, Leyden.
- Newfoundland: Sent by mail.
- New Guinea: Via Netherlands.
- New Hebrides: Sent by mail.
- New South Wales: Board for International Exchanges, Sydney.
- New Zealand: Colonial 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: Bibliotheca Nacional, Lisbon.
- Queensland: Board of Exchanges of International Publications, Brisbane.
- Roumania: Via Germany.
- Russia: Commission Russe des Échanges Internationaux, Bibliothèque Impériale Publique, St. Petersburg.
- St. Christopher: Sent by mail.
- Salvador: Museo Nacional, San Salvador.
- Santo Domingo: Sent by mail.
- Servia: Via Germany.
- 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 Échanges Internationaux, Bibliothèque Fédérale Centrale, Berne.
- 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.

The earthquake in San Francisco in April, 1906, and the great fire which followed destroyed the buildings of the California Academy of Sciences, together with their entire contents. The Smithsonian Institution has in various ways been aiding the Academy in the rehabilitation of its library and collections. As a part of this general effort the International Exchange Service sent a circular to the foreign correspondents of the Academy soliciting contributions, and to this a most liberal response has been received, aggregating in all 6,370 packages of publications, which have been received from abroad and forwarded from Washington to San Francisco. All the correspondents of the Academy have not yet responded to the circular from the Institution, and it is anticipated that still further contributions will be received. It may be added that this is the first time since its organization that the Exchange Service has sent out a circular of this character in behalf of any establishment. The foregoing remarks refer only to the foreign part of the work, which the Smithsonian Institution has undertaken in behalf of the California Academy of Sciences, the domestic part being attended to by the institution proper.

Mr. F. V. Berry, who has been connected with the service nearly a quarter of a century, and has been acting chief clerk of the International Exchanges since the transfer of Mr. W. I. Adams to the position of disbursing agent of the Smithsonian Institution in 1905, was in recognition of his faithful and capable services appointed to the post of chief clerk, to take effect July 1, 1907. Mr. Adams, whose experience in the office and knowledge of conditions abroad are most helpful, will continue to give his advice and cooperation.

In conclusion, mention should be made of the valuable services which are rendered the Institution by those correspondents abroad who give their personal attention and doubtless often expend private means in furthering the interests of the international exchange service. The thanks of the Smithsonian Institution are also due Mr. Charles A. King, deputy collector of customs at the port of New York, for his constant assistance in clearing exchange consignments from abroad.

Respectfully submitted.

CYRUS ADLER,

*Assistant Secretary, in Charge of Library and Exchanges.*

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 operations of the National Zoological Park for the fiscal year ending June 30, 1907:

The amount appropriated by Congress for the park during the year amounted to \$95,000, and at the beginning of the year there was prepared the following scheme of operations:

Regular maintenance expenses.....	\$78, 630
Collecting, purchase, and transportation of animals.....	4, 600
Work on small mammal house.....	3, 000
Work on heating plant.....	1, 000
Repairs to animal inclosures.....	1, 500
Repairs to aquarium.....	300
Repairs to shop building.....	270
Planting shade trees and shrubs.....	500
Provisionally assigned to laboratory and hospital.....	5, 200
Total.....	95, 000

The expenditures for the year practically followed this scheme, excepting in the case of the amount reserved for a laboratory and hospital building. Conditions that arose made it necessary to apply this sum as follows:

Bear yards.....	\$2, 400
Repairing Adams Mill road.....	1, 100
Survey of park.....	645
Purchase of animals.....	500
New roof on llama house.....	280
Painting flying cage.....	150
Repairing office.....	125
Total.....	5, 200

#### HOUSE FOR SMALL MAMMALS.

The small mammal house which has been under construction for several years was finally opened to the public on November 15. It is found to be much the most satisfactory of the buildings erected at the park, being easily warmed, quite sanitary, and free from drafts. The method of lighting is unusual, there being skylights formed of glass tile in the roof which admit light directly over the cages, the central corridor in which the public are admitted being lighted indirectly. Screens of ribbed glass protect the animals from the cold air which descends from the roof. The cages are readily ventilated by tilting these screens. A plan of this building was published in the report of 1904.

The outside cages required for this house were not wholly completed at the end of the year, owing to the difficulty of obtaining some of the necessary material. Work upon them was, however, well advanced.

As there has always been great difficulty in keeping the monkeys at the park in a proper condition of health, it was decided to transfer all specimens of quadrumana to this building and to add such others as would serve to represent the order. Funds were lacking for purchasing any of the larger or anthropoid apes, but there is a fair collection of specimens of both New World and Old World monkeys, which attracts great attention, and is appreciated by the public.

The grounds about the building have been graded, improved, and planted, and contracts let for a concrete walk along two sides.

#### ADDITIONAL BEAR YARDS.

Contracts were made for the floors and steel work of two additional yards in the series already begun. These yards will each have a width of 40 feet at the front and a depth of 32 to 40 feet. They will be similar in all respects to those already built, now occupied by polar bears and Alaskan brown bears.

A concrete walk, with a width of 12 feet, will be constructed at the same time that the pavement is put in for the yards.

#### IMPORTANT REPAIR WORK.

The flying cage was repainted throughout, a new roof was put on the llama house, the aquarium roof was repaired, new supports put in for the tanks, and other necessary repairs made; the temporary building used for blacksmith and carpenter shop and in which also the boilers of the central heating plant are located was repaired and the walls ceiled on the inside, so that the building might be kept at a reasonably warm temperature during the winter.

Several of the old outdoor cages, which had become unsafe through decay, were replaced by new ones. A considerable part of the wire fencing around the American bison paddock had to be renewed and a large amount of other fence repairs had to be made. The deer shed, which was so badly weakened by decay that it was no longer safe, was removed. The site of this shed in the hillside near the creek was so damp that it was found to be unhealthy for the animals.

#### ADAMS MILL ROAD.

Heavy, torrential rains almost completely denuded of surface layer the steep portion of this road, about 1,700 feet in length, and the larger stone became so loosened that the road was hardly safe for use. As this is one of the principal driveways of the District, much used for pleasure driving, it was considered imperative that it should be put in a safe condition at once. It was thoroughly overhauled and resurfaced during the autumn of 1906.

A new walk was built to connect the log bridge, by way of a picturesque ravine, with the more important animal buildings. A rock work was built with boulders at the head of the ravine and the waste water from the aquarium tanks and hydraulic pump carried there to form a cascade.

#### PLANTING.

Planting was carried on at suitable times throughout the year, as far as available funds permitted. The whole park should be carefully gone over and the forest be properly thinned so that the trees can have an opportunity to develop. At present much of it is too thickly wooded.



## CENTRAL HEATING PLANT.

The central heating plant which had been installed during the previous year was operated throughout the winter of 1906-7 and five of the more important buildings were heated from it. Steam is used for the present, as there was not a sufficient amount available for the plant to put in a hot-water system with forced circulation. All mains, however, are of suitable size for hot water and it is expected that it will ultimately be converted into a hot-water system. It has worked very satisfactorily and there has been practically no loss of heat from the outdoor conduits. The buildings formerly heated by individual boilers, and now supplied from the central heating plant, are free from dirt and dust, and the new arrangement is in every way a great improvement. Thanks are due to the Supervising Architect for advice and assistance and for detailing an expert heating engineer to plan and supervise this work.

## SURVEY OF THE PARK.

The detailed topographic survey of the park, which was carried on in 1904-5 and 1905-6, was finally completed during this year, about 107½ acres being carefully plotted. This survey extends to the line of the new highways on the southeastern and western sides of the park. The resulting map is on a scale of 50 feet to the inch and shows contours at elevations of 2 feet, also all prominent objects and the underground drains and water pipes.

## ACCESSIONS AND LOSSES.

*Gifts.*—The following animals were received by gift:

From E. H. Plumacher, United States consul, Maracaibo, Venezuela, 1 capybara, 1 crab-eating dog, 1 king vulture, 1 macaw.

From C. H. Jones, Campeche, Mexico, 2 ocelots, 6 Mexican curassows, 1 Chapman's curassow, 3 chachalacas.

From O. J. Field, chief clerk, Department of Justice, 1 cinnamon bear.

From Victor J. Evans, Washington, District of Columbia, 2 mangabey monkeys.

From Mrs. Geo. R. Shanton, Ancon, Canal Zone, Panama, 2 Panama curassows.

*Exchanges.*—The more important animals secured in this manner during the year were: One leucoryx, from the New York Zoological Park; 2 American marten; 1 victoria crowned pigeon.

*Purchases.*—Among the purchases were the following: Two American bison, 2 South American jaguars, 1 Mexican jaguar, 1 tigress, 1 black leopard, 1 pair of ocellated turkeys, 1 pair of California sea lions.

*Births.*—Among the births were: Two American bison, 6 American elk, 3 mule deer, 1 Barasingha deer, 2 red deer, 1 Cuban deer, 3 Barbary sheep, 1 llama, 3 peccaries, and 11 wild turkeys, besides a number of species of heron, ibis, cormorant, etc., nested in the flying cage.

*Important deaths.*—The more important deaths were as follows:

Young lion presented to the President by the King of Abyssinia, from chronic arthritis.

Black bear, from an extreme case of infestation with *Ascaris transfugæ*; the duodenum was perforated in several places.

Bactrian camel, female, from peritonitis and secondary pneumonia.

Llama, male, from pneumonia.

Moose, from catarrhal enteritis and fatty degeneration of liver.

Great gray kangaroo, from pulmonary tuberculosis.

Fifteen blue foxes, most of them from nephritis and fatty degeneration of liver, although the pathologists have not been able to ascertain the cause of this condition.

California condor, from gastro-enteritis.

The deaths also included 1 mule deer, 2 beavers, 1 Columbian black-tailed deer, 1 tahr, 1 markhor, 1 young tapir, a number of monkeys (mostly those recently received from dealers), and 1 ocellated turkey, just received.

Gastro-enteritis was still the most frequent cause of death, and pneumonia second, except with the newly received monkeys, several of which died from tuberculosis.

*Statement of animal collection.*

Accessions during the year :

Presented .....	64
Loaned .....	15
Purchased and collected.....	179
Received in exchange.....	6
Born in National Zoological Park.....	78
Captured in National Zoological Park.....	1
Total .....	343

There was considerable loss of birds during the year, especially among the smaller species. Several hundred birds which had been procured for the exhibit of the park at the Louisiana Purchase Exposition were brought to Washington at its close, and they added materially to the interest and attractiveness of the collection here. The only place available for them during winter, however, has been the temporary bird house, where the cage accommodations have been altogether inadequate. The loss has not been greater than must be expected under such conditions, but has reduced the number of birds in the collection by about 100, as it did not seem advisable to replace these birds until permanent and suitable accommodations could be provided. The number of mammals in the collection is slightly greater than at the close of the previous year, while the number of reptiles remains practically unchanged.

*Animals presented during the fiscal year ending June 30, 1907.*

Name.	Donor.	Number.
Sooty mangabey .....	Victor J. Evans, Washington, District of Columbia.....	2
Common macaque .....	Capt. J. L. Brooks, United States Army.....	1
White-throated capuchin .....	Lieut. R. Y. Rhea, United States Marine Corps.....	1
"Weeper" capuchin .....	Mr. Lutz, Washington, District of Columbia.....	1
Ocelot .....	Charles H. Jones, Campeche, Mexico.....	2
Crab-eating dog .....	Hon. E. H. Plumacher, American consul, Maracaibo, Venezuela.	1
Red fox .....	H. S. Knight, Takoma Park, District of Columbia.....	1
Do.....	H. D. Hughes, Washington, District of Columbia.....	1
Black bear .....	Robert Allen, Washington, District of Columbia .....	1
Cinnamon bear .....	O. J. Field, Washington, District of Columbia.....	1
Bactrian camel.....	Barnum & Bailey Shows, Bridgeport, Connecticut.....	1
Thirteen-lined spermophile.....	Donor unknown .....	1
Prairie dog .....	Dr. L. Wilson, Washington, District of Columbia.....	5
Woodchuck .....	W. E. Calladay, Stoughton, Wisconsin.....	2
Capybara.....	Hon. E. H. Plumacher, American consul, Maracaibo, Venezuela.	1
Wax-bill finch .....	Miss Foster, Washington, District of Columbia.....	2
Java sparrow.....	Dr. M. F. Thompson, Washington, District of Columbia.....	1
Do.....	F. W. Jackson, Washington, District of Columbia .....	1
Canary .....	Capt. W. W. Somerville, Washington, District of Columbia ..	1
Do.....	Mrs. Price, Washington, District of Columbia.....	1
Red and blue macaw.....	Hon. E. H. Plumacher, American consul, Maracaibo, Venezuela.	1
Amazon parrot .....	Henry Seymour, Washington, District of Columbia.....	1
Lory.....	Mrs. Guy Norman, Washington, District of Columbia.....	2
Barred owl .....	D. W. Adams, Herndon, Virginia.....	1
Do.....	Dr. C. B. Robinson, Washington, District of Columbia.....	1
Barn owl.....	Sexton, Church of the Ascension, Washington, District of Columbia.	1
Sparrow hawk.....	Donor unknown .....	1
Do.....	Wm. Lawrence Tanner, Washington, District of Columbia..	2
Swainson's hawk.....	Master Howard Maurin, jr., Washington, District of Columbia.	2
Turkey vulture.....	Jesse Hand, jr., Belleplain, New Jersey.....	1
King vulture .....	Hon. E. H. Plumacher, American consul, Maracaibo, Venezuela.	1
Ring dove .....	Dr. J. R. Spangler, York, Pennsylvania.....	3
Chachalaca.....	Charles H. Jones, Campeche, Mexico .....	3
Mexican curassow.....	do .....	6
Chapman's curassow .....	do .....	1
Panama curassow .....	Mrs. G. R. Shanton, Ancon, Canal Zone, Panama .....	2
Ocellated turkey .....	Charles H. Jones, Campeche, Mexico.....	1
American bittern.....	Miss Brewster, Washington, District of Columbia .....	1
Alligator .....	Miss Stephenson, Washington, District of Columbia.....	1
Diamond rattlesnake (with 13 young).	Dr. E. H. Sellards, Gainesville, Florida.....	1
Copperhead .....	D. B. Wheeler, Washington, District of Columbia .....	1
Emperor boa .....	W. B. Honey, Culebra, Canal Zone, Panama.....	1
Hog-nosed snake .....	Donor unknown .....	1



## SUMMARY.

Animals on hand July 1, 1906	1,272
Accessions during the year	343
Total	1,615
Deduct loss (by exchange, death, and returning of animals)	422
On hand June 30, 1907	1,193

Respectfully submitted.

FRANK BAKER,  
*Superintendent.*

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

## APPENDIX V.

### REPORT ON THE ASTROPHYSICAL OBSERVATORY.

SIR: I have the honor to present the following report on the operations of the Astrophysical Observatory during the fiscal year ending June 30, 1907:

During the past year the cost of the necessary repairs and repainting of the Observatory inclosure and buildings has been \$300. Plans have been prepared and contracts awarded, incurring a total liability of \$2,000, for the installation of electric lighting, power, and laboratory service currents, to replace the present inadequate facilities. These improvements are not as yet completed.

Apparatus for research has been procured at a cost of \$600.

The usual scientific periodicals have been continued, and books of reference purchased at a total cost to the Observatory of \$600.

No losses of property have occurred.

*Personnel.*—C. G. Abbot was promoted to be acting director July 1, 1906, and Director March 1, 1907.

F. E. Fowle was promoted to be aid March 1, 1907.

J. C. Dwyer was promoted to be messenger March 1, 1907.

L. R. Ingersoll served as temporary bolometric assistant from July 1 to September 10, 1906.

Miss C. V. Barber served as temporary computer January 2 to June 25, 1907.

P. R. Tavenner, fireman, was transferred to the Department of Agriculture June 15, 1907.

#### WORK OF THE OBSERVATORY.

The work of the Observatory has consisted as follows:

1. Observations at Mount Wilson and Washington.
2. Preparation of Volume II of the Observatory Annals.

#### OBSERVATIONS AT MOUNT WILSON.

The staff of the Mount Wilson expedition, mentioned in last year's report, continued observations for determining the "solar constant" of radiation until October 22, 1906, when the apparatus was packed and in part returned to Washington. During the stay of the expedition in 1906 about seventy days were devoted to "solar constant" observations, and with generally excellent results.

Much attention was paid to the observation of the intensity of light reflected from clouds, with a view to the determination of the albedo, or total reflection of the earth. The quality and amount of light of the sky was also measured on several days. Very successful trials were made with the continuously recording standard pyrheliometer mentioned in former reports, and the other instruments used on Mount Wilson were compared carefully with each other and with it. From these comparisons, made on different days and with widely differing conditions, it appears that the scale of values heretofore employed in the reduction of Mount Wilson observations is probably 1.5 per cent too high. But it has been decided not to make a correction for this until the completion and trial of a new continuously recording pyrheliometer, now partly done, of different dimensions and improved construction.

## OBSERVATIONS AT WASHINGTON.

Measurements for the determination of the "solar constant" of radiation were made whenever the atmospheric conditions permitted. These occasions are too infrequent to permit us to make at Washington a full record of the condition of the sun, but in connection with and supplementary to the Mount Wilson work, the Washington results are of very great value.

Measurements have been made frequently of the distribution of brightness over the solar disk, and the results of these measurements indicate, though perhaps not conclusively, that when the contrast in brightness between the center and edge of the solar disk is greater than usual, the intensity of solar radiation available to warm the earth is less than usual, and vice versa. This relation was suspected in former years.

## PREPARATION OF VOLUME II OF THE OBSERVATORY ANNALS.

The reduction and preparation for publication of the results of the thousands of bolographic records made in the research on solar radiation has involved measurements and computations requiring the recording of upward of 2,000,000 separate figures. The reductions have been chiefly in the care of Mr. Fowle, and he has been ably seconded by Miss Graves. Very useful and painstaking assistance has been rendered by Mr. Dwyer and by the temporary computers employed. The text and illustrations have been prepared under the care of the writer, in consultation with Mr. Fowle. The whole work was nearly completed at the conclusion of the fiscal year, and at this writing (September 15) is now ready for the press. As the story of the year's work is chiefly the story of this volume, it will not be out of place to give here a summary of its principal contents.

## SUMMARY OF THE FORTHCOMING VOLUME OF ANNALS.

The present volume is an account of the work of the Astrophysical Observatory from 1900 to 1907, with details of the investigations made, the apparatus and methods used, and the results obtained.

Speaking broadly, the investigation relates to the intensity of the rays of the sun, and the dependence of the earth's temperature thereon. The subject is here treated in three parts: First, the amount of the solar radiation as it would be found if measured outside the earth's atmosphere, at mean solar distance, or, as it is often termed, "The solar constant of radiation." Second, the dependence of the earth's temperature on the amount of solar radiation. Third, the difference in brightness between the center and edge of the sun's disk and its relation to the quantity of solar radiation received by the earth.

The work is not limited to a determination of constants of nature, for the possibility was early recognized that the radiation of the sun might be far from uniform, so that the "solar constant of radiation" might prove to be a mean value about which the intensity of the solar beam would be found to fluctuate very perceptibly from time to time. A principal aim of the work has therefore been to prove whether such fluctuations of the quantity of solar rays do exist, and, if so, what may be the magnitude of the changes, their effects on climate, and their causes. For these purposes the measurement of the intensity of solar radiation and of the distribution of brightness over the disk of the sun have been made as often as possible for several years, and a study of the variation of temperature for the last thirty years at about fifty stations scattered as widely as possible over the inland areas of the world has also been made.



A part of the measurements have been made in Washington, and therefore practically at sea level, and a part at Mount Wilson, in California, at about 1,800 meters, or nearly 6,000 feet elevation. The radiation of the sun has been studied, not only in the total, but also as dispersed into its spectrum, and not only in the part visible to the eye, but also in those portions whose wave lengths are too long or too short to affect the eye. For all these different rays the earth's atmosphere produces different degrees of absorption, or of diffuse reflection, and in the course of the work the transparency of the earth's atmosphere for many different rays has been extensively investigated. The reflecting powers of the clouds and the air have been measured, and also the quality of the sky light as regards the relative intensity of its rays of different colors.

We use as our unit of measurement that intensity of radiation which, when fully absorbed for one minute over a square centimeter of area, placed at right angles to the ray, would produce heat enough to raise the temperature of a gram of water 1° centigrade. This unit is termed 1 calorie per square centimeter per minute.<sup>a</sup>

The mean result of 130 measurements conducted on Mount Wilson in the summer and autumn months of 1905 and 1906 fixes the intensity of solar radiation outside the atmosphere at mean solar distance as 2.023 calories per square centimeter per minute.

The mean result of 41 measurements at Washington from 1902 to 1907 is 2.061 calories.

It is probable that the mean result of such measurements, if conducted for a long term of years, would be higher, and the probable mean value of the solar constant may be estimated in round numbers at 2.1 calories per square centimeter per minute.

Expressed in another way, the solar radiation is capable of melting an ice-shell, 35 meters (114 feet) thick, annually over the whole surface of the earth.

The results of Langley, while seemingly in contradiction of these, in reality support them. For, as he states on page 211 of the Report of the Mount Whitney expedition, his value (3 calories) for the "solar constant" depends upon an allowance which he made for an apparent "systematic error in high and low sun observations at one station," of such a nature as becomes manifest "by calculating at the lower station, from our high and low sun observations there, the heat which should be found at a certain height in the atmosphere, then actually ascending to this height, and finding the observed heat there conspicuously and systematically greater than the calculated one." As shown in Chapter VII, Part I, of the present volume, this seeming discrepancy arose from a misapprehension of the requirements of the calculations. In fact, there is no such systematic error, no correction for it should have been applied by Langley, and the best mean value of his experimental determination of the "solar constant" at Mount Whitney and Lone Pine is 2.14 calories per square centimeter per minute.

Substantial agreement as to the magnitude of the "solar constant" is therefore reached by observations at sea level, at 1,800 meters, and at 3,500 meters elevation.

The solar radiation is far from being constant in its intensity. The values determined on Mount Wilson range from 1.93 calories to 2.14 calories, and those in Washington from 1.89 calories to 2.22 calories. A change of the intensity of solar radiation of 3½ per cent, due to the decrease in solar distance, occurs from August to October, and this is readily discernible in the work done

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<sup>a</sup>As above stated, it is possible that the numerical results to be given in Vol. II of the Annals may be 1.5 per cent higher than they should be in these units.

on Mount Wilson, both in 1905 and 1906, so that there can be little question that the large changes noted there are really solar changes and not of atmospheric or accidental origin.

The reality of the supposed solar origin of the changes of radiation observed is attested by many other evidences stated in Chapter VI, Part I, and Chapter III, Part III.

The temperature of the earth is shown to be in good agreement with the assumed value of the "solar constant," 2.1 calories. Indeed, it is shown that unless the albedo, or reflection, of the earth exceeds 37 per cent (a value here determined for it and based on observations at Washington and Mount Wilson), then the mean value of the solar constant can not exceed 2.33 calories, else the earth must be a better radiator than the "absolutely black body" or perfect radiator.

It is shown that the surface of the earth can radiate only very slightly to space, on account of the interference of clouds and water vapor to terrestrial radiation; and that the substance which maintains the earth at nearly constant temperature, by emitting to space radiation equal to that received by the sun, is principally the water vapor layer at 4,000 to 5,000 meters in elevation, whose mean temperature is  $10^{\circ}$  or more below  $0^{\circ}$  C.

There is introduced the conception of an "hypothetical earth," similar in dimensions and motions to the real earth, but hollow and like a soap bubble in thickness of wall; perfectly absorbing for solar radiation, and a perfect radiator for long waves; perfectly conducting for heat along parallels of latitude, but perfectly non-conducting along meridians of longitude. The temperature of this "hypothetical earth" is calculated for all times of the year, and for all latitudes, by the aid of the known value of the "solar constant" and the laws of radiation of perfect radiators.

A comparison is made between the annual march of temperature of the "hypothetical earth" and the observed annual march of temperature for 64 stations on the real earth. It is thereby shown that a given fractional change of solar radiation running its cycle in a year produces one-fourth the given fractional change in the absolute temperature of the "hypothetical earth," one-fourteenth of the given fractional change in the temperature of most inland stations, one twenty-fifth for coast stations; and one-fiftieth for small islands in great oceans. For a fluctuation of 5 per cent in solar radiation having a period of about a year there would be produced a change of only about  $1^{\circ}$  C. in the mean temperature of inland stations and only about  $0.3^{\circ}$  C. for island stations. The effects of more rapid changes of solar radiation would be less readily discernible in their effects on mean temperatures, but may nevertheless be of meteorological importance as promoters of atmospheric circulation.

From a comparison extending over thirty years of the temperatures of 47 well-distributed inland stations it appears probable that changes of solar radiation do produce, not infrequently, well-marked and recognizable changes of temperature over the continental areas of the world. Such changes of temperature would be predictable if accurate measurements of the solar radiation were systematically continued at a few favorable stations.

Numerous measurements of the comparative brightness of the center and edge of the solar disk indicate that the observed changes in solar radiation are attended by a variation of the transparency of the solar envelope, and perhaps are caused by it.

Many results of observation not here enumerated, such as the mean transparency of the upper and lower strata of air, the reflecting power of the clouds, the probable temperature of the sun, and the quality of the radiation of sunspots, will be found set forth both in words and by charts; and also a full

description of the apparatus and methods employed for the various kinds of research, and the sources and magnitude of the errors attending their use.

The work thus summarized seems definitely to fix the approximate average value of the intensity of solar radiation at about 2.1 calories per square centimeter per minute, and to show decisively that there is a marked fluctuation about this mean value, sufficient in magnitude to influence very perceptibly the climate, at least of inland stations, upon the earth. This being so, there is good reason for making the series of measurements of solar radiation as complete and continuous as possible for some years to come, in order to determine more thoroughly the causes and limits of the solar changes, and their precise effects upon climate. The former part of the study will involve further solar measurements, and the latter part a more complete study of meteorological records in connection with the solar measurements. Thus far no other observatory has been so well equipped as this one for the special kinds of measurement involved, and it will naturally be our task for some time to come to continue the work along the lines stated.

Respectfully submitted,

C. G. ABBOT,

*Director of the Astrophysical Observatory.*

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, 1907:

In the accession book of the Smithsonian deposit, Library of Congress, there have been recorded 1,741 volumes, 16,567 parts of volumes, 6,565 pamphlets, and 613 charts, making a total of 25,486 publications. The accession numbers run from 475,179 to 482,316. As in the past these publications have been sent to the Library of Congress, with the exception of a few needed for the scientific work of the Institution, which have been held. In transmitting the publications to the Library of Congress 275 boxes were used which, it is estimated, contained the equivalent of 11,000 volumes, a number which does not include the public documents presented to the Smithsonian Institution and sent direct to the Library of Congress as soon as received, without stamping or recording; or the public documents and other gifts to the Library of Congress received through the International Exchange Service.

The libraries of the Office, Astrophysical Observatory, and National Zoological Park have received 480 volumes and pamphlets, 1,849 parts of volumes, and 70 charts, making a total of 2,349, and a grand total, including the publications for the Smithsonian deposit and the Watts de Peyster Collection, of 28,123.

The parts of serial publications that were entered on the card catalogue numbered 26,499. Three hundred slips for completed volumes were made and 491 cards for new periodicals and annuals were added to the permanent record from the periodical recording desk.

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

Baltimore (Johns Hopkins).	Lund.
Berlin.	Madison (Wisconsin).
Bern.	Marburg.
Bonn.	New York (Columbia).
Breslau.	Paris.
Erlangen.	Philadelphia (University of Pennsylvania).
Freiburg.	Rostock.
Glussen.	Strassburg.
Greifswald.	Toulouse.
Heidelberg.	Tübingen.
Helsingfors.	Upsala.
Kiel.	Utrecht.
Königsberg.	Würtzburg.
Leipzig.	
Louvain.	

The following technical high schools have also sent publications of the same character:

Berlin.	Darmstadt.	Karlsruhe.
Braunschweig.	Delft.	Munich.

In carrying out the plan to effect new exchanges and to secure missing parts to complete sets, 1,785 letters were written, resulting in 250 new periodicals

being added to the receipts, while about 600 defective series were partly or entirely completed. In addition to the letters referred to, 85 postal cards were sent and about 60 missing parts received in response.

The plan adopted by the International Catalogue of Scientific Literature of sending to authors lists of their scientific writings that have been indexed in the Catalogue, and requesting any that have not been cited, has been continued, with the result that nearly 500 authors' separates have been received, which will ultimately come to the library.

In the reading room there were withdrawn 40 bound volumes of periodicals and 3,485 parts of scientific periodicals and popular magazines, making a total of 3,525. The use of these publications, and those in the sectional libraries of the Institution, by persons from various bureaus of the Government has continued, but in the main the consultation has been by members of the staff.

The mail receipts numbered 34,500 packages, the publications contained therein being stamped and distributed for entry from the mail desk. About 5,000 acknowledgments were made on the regular form in addition to those for publications received in response to the requests of the Institution for exchange.

As the books formerly in the Secretary's library will no longer be kept separate from the general library, one change may be noted in the number of sectional libraries maintained in the Institution, there now being the office library and the employees' library, together with those of the Astrophysical Observatory, aerodromics, international exchanges, and law reference.

*The employees' library.*—The books added to the library numbered 40, 27 of which were presented by Mr. C. L. Pollard, and 80 volumes of magazines were bound. The number of books borrowed was 2,620, and the sending of a selected number of the books from this library to the National Zoological Park and the Bureau of American Ethnology each month has been continued.

*The estate of S. P. Langley.*—The estate of S. P. Langley turned over to the Institution his scientific library. These books have been stamped, entered, and placed in the divisions to which they relate.

*The Watts de Peyster collection.*—Gen. John Watts de Peyster continued, up to the time of his death, May 4, 1907, to present books relating to Napoleon Buonaparte and his time, together with volumes on other subjects for the Watts de Peyster collection in the Institution. There were received from this source during the year 288 volumes.

*The art room.*—The work of cataloguing the Marsh collection is progressing, and during the year 115 prints have been identified and cards made for them giving full information as to the engraver, the subject, the manner of execution, and the size of the print and plate.

Another important addition to the library was the receipt of three important series of publications from the Light-House Board; *Annales des Ponts et Chaussées*, 1831–1833, 152 volumes; *Annales de Chimie*, 1789–1815, 97 volumes, and *Annales de Chimie et de Physique*, 1816–1872, 139 volumes, which are a permanent transfer to the Institution.

In addition to the regular work in the library a partial bibliography of aeronautical literature, which included the papers by Langley, Chanute, Lillenthal, Herring, and Hargrave, and a bibliography of the writings of Dr. S. P. Langley were prepared for publication by the assistant librarian, Mr. Paul Brockett.

#### THE MUSEUM LIBRARY.

The Museum library has been fortunate in continuing to receive from Prof. O. T. Mason, Dr. W. L. Ralph, and Dr. C. A. White many scientific publications of importance in completing the sets and series in the Museum. Dr. C. W. Rich-

mond has continued to contribute to the library, and a number of rare scientific works not to be found elsewhere in the city have been received from him.

The library of the Museum has also benefited by the plan adopted by the International Catalogue of Scientific Literature of sending to authors lists of their scientific writings that have been entered in the catalogue and requesting any that have not been cited, as the larger number of the responses received are in the form of separates from periodicals, journals, etc., which are no longer desired for the Smithsonian deposit.

In the Museum library there are now 30,307 volumes, 47,642 unbound papers, and 108 manuscripts. The additions during the year consisted of 2,581 books, 3,567 pamphlets, and 111 parts of volumes. There were catalogued 1,301 books, of which 87 belonged to the Smithsonian library, and 3,567 pamphlets, of which 54 belonged to the Smithsonian library, and 13,215 parts of periodicals, of which 658 belonged to the Smithsonian library.

In connection with the entering of separates and periodicals, 721 memoranda were made reporting volumes and parts missing in the sets, together with a few titles of publications that were not represented in the library. The result of this work was the completing or partial filling up of 550 sets of publications.

Attention has been given to the preparation of volumes for binding, with the result that 1,020 books were sent to the Government bindery.

The number of books, periodicals, and pamphlets borrowed from the general library amounted to 34,859, including 9,397, 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.	Photography.
Administrative assistant.	Insects.	Physical anthropology.
Anthropology.	Mammals.	Prehistoric archæology.
Biology.	Marine invertebrates.	Reptiles.
Birds.	Materia medica.	Stratigraphic paleontol- ogy.
Botany.	Mesozoic fossils.	Superintendent.
Comparative anatomy.	Mineralogy.	Taxidermy.
Editor.	Mollusks.	Technology.
Ethnology.	Oriental archæology.	
Fishes.	Paleobotany.	
Geology.	Parasites.	

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

Smithsonian deposit in the Library of Congress.....	25,486
Office, Astrophysical Observatory, International Exchanges.....	2,349
Watts de Peyster collection.....	288
United States National Museum library.....	6,259
Total .....	34,382

Respectfully submitted.

CYRUS ADLER.

*Assistant Secretary, in Charge of Library and Exchanges.*

DR. CHARLES D. WALCOTT.

*Secretary of the Smithsonian Institution.*



## APPENDIX VII.

### REPORT ON THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE: REGIONAL BUREAU FOR THE UNITED STATES.

SIR: I have the honor to submit the following report on the operations of the regional bureau for the United States of the International Catalogue of Scientific Literature for the fiscal year ending June 30, 1907:

This work is carried on under the authority of Congress, in accordance with the following item in the sundry civil appropriation bill:

INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE: For the cooperation of the United States in the work of the International Catalogue of Scientific Literature, including the preparation of a classified index catalogue of American scientific publications for incorporation in the International Catalogue, the expense of clerk hire, the purchase of necessary books and periodicals, and other necessary incidental expenses, five thousand dollars, the same to be expended under the direction of the Secretary of the Smithsonian Institution.

The International Catalogue of Scientific Literature is a classified subject index of current scientific literature published in London in 17 annual volumes, the result of the combined cooperative work of regional bureaus established in all of the civilized countries of the world. All of the principal governments of the world are lending their aid to this important international undertaking. Each country collects, indexes, and classifies the current scientific literature published within its borders and furnishes to the central bureau in London the material thus prepared for publication in the annual volumes. The cost of preparation is borne by the countries taking part in the enterprise. The cost of printing and publishing is paid by the subscribers to the Catalogue. The enterprise was begun in 1901, and for the first five years of its existence the work in the United States was done through the Smithsonian Institution at the expense of its fund. For the present fiscal year Congress appropriated the sum of \$5,000 to continue the work thus begun, and it was carried on as heretofore. The persons in charge of the work up to that date had been employees of the parent Institution, and being entirely familiar with the work, and having shown intelligence and devotion in carrying it out, they were, upon request, included in the classified civil service by an Executive order dated July 14, 1906.

One volume a year is devoted to each of the following-named subjects: Mathematics, mechanics, physics, chemistry, astronomy, meteorology (including terrestrial magnetism), mineralogy (including petrology and crystallography), geology, geography (mathematical and physical), paleontology, general biology, botany, zoology, human anatomy, physical anthropology, physiology (including experimental psychology, pharmacology, and experimental pathology), and bacteriology.

The citations are secured by regularly going through all of the journals listed to be examined, by a daily search through the large number of publications received by the Smithsonian Institution, and by the examination of all available lists. Nevertheless, so diverse are the places of publication in the United States that even this careful scrutiny was not considered sufficient, and there was compiled from the authors records in this office a list of papers.

by authors, which list was submitted to them for verification, criticisms, and additions. At the same time each author was requested to supply his separates to the Institution especially for the purposes of the Catalogue.

This method of keeping in direct communication with the authors of scientific papers is very desirable for many reasons, as it not only renders it possible to publish a complete Catalogue, but also aids materially in the proper and satisfactory classification of the work done, which from the point of view of the users of the Catalogue is of as great importance as it is to have the Catalogue complete.

During the year there were 28,629 references to American scientific literature completed for the central bureau, as follows:

## Literature of—

1901 -----	384
1902 -----	511
1903 -----	862
1904 -----	5, 272
1905 -----	9, 022
1906 -----	12, 578
Total -----	28, 629

Thirteen volumes of the Catalogue were received and delivered to the subscribers in this country, as follows:

Fourth annual issue: Chemistry, meteorology, general biology, botany, zoology, human anatomy, physical anthropology, and physiology, completing the issue.

Fifth annual issue: Mathematics, astronomy, geology, geography, and paleontology.

The practice has gradually been gaining ground in some of the regional bureaus of including references to technical and industrial matters, which while of great general interest do not come strictly within the definition of the scope of the work, which was to refer only to original published contributions to the physical and natural sciences. This matter has had careful consideration here, and it was deemed not only necessary but wise to adhere strictly to the plan agreed upon, since it was felt that a rigid following of the plan was essential where so many different nations were concerned, and for the further reason that an index can readily become too cumbersome for easy reference. Ultimately it may be possible to embrace in this Catalogue all records of progressive human interest, but it would seem at present the wisest policy to limit the work strictly to the original purpose.

The regional bureau in the United States was so organized in the beginning that it could at any time be expanded to embrace any subject found advisable to include in the work, but the bureau is at the present time worked to the limit of its capacity with the funds now at its disposal.

Several of the regional bureaus, including those of Germany, France, and Poland, are printing in periodical form the matter indexed by them. It was for a time hoped that this could be done in this country, and for several months, beginning with January 1, 1907, all scientific matter was currently collected, indexed, classified, and prepared as printer's proof ready for publication by the Institution, either monthly or quarterly, as a much-needed current classified index to American scientific literature. This method of publication would promptly furnish references to all of the scientific literature of the country practically as soon as published and probably a year in advance of the permanent assembled volumes published by the central bureau. The two methods of

publication would in no way conflict; the first would be a check list of current national work, while the second is a permanent classified international record.

The actual cost of printing a sufficient number of such a periodical would, however, have to be met by the private fund of the Institution. After thorough consideration it was decided that the outlay would not be justified. It is sincerely to be hoped that the publication of this material in the form mentioned, or its equivalent, can be soon begun.

Congress in the sundry civil bill approved March 4, 1907, appropriated \$5,000 to carry on the work for the fiscal year ending June 30, 1908, it being the same amount as that appropriated for the past year.

I desire to acknowledge the zeal and fidelity of the staff who are under the immediate direction of Mr. Leonard C. Gunnell.

Very respectfully, yours,

CYRUS ADLER,

*Assistant Secretary, in Charge of Library and Exchanges.*

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 year ending June 30, 1907:

#### *I. Smithsonian Contributions to Knowledge.*

In the series of the Smithsonian Contributions to Knowledge three memoirs were in press at the close of the fiscal year and several manuscripts were in preparation.

1692. *Glaciers of the Canadian Rockies and Selkirks.* Report of the Smithsonian Expedition of 1904. By William Hittell Sherzer, Ph. D. Quarto. Pages xii, 135, with 42 plates. Part of Volume XXXV. In press.

The advertisement of this publication describes it as follows:

Dr. William H. Sherzer, professor of natural science at Michigan State Normal College, has brought together in the present memoir the results of an expedition undertaken by the Smithsonian Institution among the glaciers of the Canadian Rockies and Selkirks in the year 1904. The general objects of the research were to render available a description of some of the most accessible glaciers upon the American continent, to investigate to what extent the known glacial features of other portions of the world are reproduced in these American representatives, and to ascertain what additional light a study of similar features might shed upon glacier formation and upon some of the unsettled problems of Pleistocene geology.

A systematic survey was made of the Victoria and Wenkchemna glaciers in Alberta, and of the Yoho and Illecillewaet glaciers in British Columbia, located about 200 miles north of the boundary of the United States. The largest of these is the Yoho glacier, extending more than 3 miles below the névé field and 1 mile in width for two-thirds of its length. Doctor Sherzer investigated various surface features of each of these glaciers, the nature and cause of ice flow, the temperature of the ice at various depths and its relation to air temperature, the amount of surface melting, and the possible transference of material from the surface to the lower portion; their forward movement and the recession and advance of their extremities, and the general structure of glacial ice.

In summarizing the most important results Doctor Sherzer discusses the indicated physiographic changes in the region during the Mesozoic and Pleistocene periods; the question of precipitation of snow and rain, and the effect of climatic cycles on glacial movements, the structure of the ice as to stratification, shearing, blue bands, ice dykes, glacial granules, and the possible methods of their development. In discussing the theories of glacial motion the author expresses his conviction that the nature of the ice movement can be satisfactorily explained only upon the theory that under certain circumstances and within certain limits ice is capable of behaving as a plastic body—that is, capable of yielding continuously to stress without rupture—but the plasticity of ice, a crystalline substance, must be thought of as essentially different from that manifested by such amorphous substances as wax or asphaltum.

Doctor Sherzer also discusses the cause of the richness and variety of coloring of glaciers and glacial lakes.

1718. *The Young of the Crayfishes Astacus and Cambarus.* By E. A. Andrews. Quarto. Pages 79, with 10 plates. Part of Vol. XXXV. In press.

In this memoir there is described and illustrated the young of two kinds of crayfishes, one from Oregon and one from Maryland, representing the two most diverse forms in North America. The first, second, and third larval stages are determined, and there is described the hitherto unknown nature of successive mechanical attachments of the offspring to the parent.

1723. The Apodous Holothurians. A Monograph of the Synaptidæ and Molopadiidæ. Including a report on the representatives of these families in the collections of the United States National Museum. By Hubert Lyman Clark. Quarto. Pages 218+, with 13 plates. Part of Vol. XXXV. In press.

This memoir gives a summary of present knowledge of the two families of sea cucumbers, which lack tube feet.

The most important feature of the work is the recognition of the changes taking place in the maturing and senescence of individual holothurians, particularly in the family Molopadiidæ. As a result of this, radical changes in nomenclature have been necessary, but every effort has been made to have the system adopted accord with the most widely accepted codes, and thus be as stable as possible. Special attention has been given to geographical distribution, but the work in this line is chiefly of value as a summary of our present very inadequate knowledge. Artificial keys to genera and species have been freely used with the intention of making the work as useful as possible to all subsequent investigators, and the numerous figures, most of which are copied from other writers, are given with the same end in view.

#### 11. *Smithsonian Miscellaneous Collections.*

In the series of Smithsonian Miscellaneous Collections there were published 24 papers in the Quarterly Issue, Vol. III, Parts 3 and 4, and Vol. IV, Part 1, as follows:

1656. Smithsonian Miscellaneous Collections. Quarterly Issue. Vol. III, Part 3 (containing Nos. 1657-1664). Octavo. Pages 241-379, with plates LIX-LXIII.

1657. The Species of Mosquitoes in the Genus *Megarhinus*. By Harrison G. Dyar and Frederick Knab. Published September 27, 1906. Octavo. Pages 241-258.

1658. A Contribution to the Knowledge of some South American Hymenoptera, chiefly from Paraguay. By C. Schrottky. Published February 4, 1907. Octavo. Pages 259-274.

1659. Description of a New Squirrel of the *Sciurus prevostii* Group from Pulo Temaju, West Coast of Borneo. By Marcus Ward Lyon, jr. Published February 4, 1907. Octavo. Pages 275-276.

1660. The Squirrels of the *Sciurus vittatus* Group in Sumatra. By Marcus Ward Lyon, jr. Published February 4, 1907. Octavo. Pages 277-283.

1661. A study of the Butterfly Wing-Venation, with special regard to the radial vein of the front wing. By Thomas J. Headlee. Published February 4, 1907. Octavo. Pages 284-296, with plates LIX-LXIII.

1662. Some Noteworthy Extra-European Cyprinids. By Theodore Gill. Published February 4, 1907. Octavo. Pages 297-340.

1663. A review of the American Volutidæ. By William Healey Dall. Published February 4, 1907. Pages 341-373.

1664. Notes to Quarterly Issue. Vol. III. Part 3. Octavo. Pages 374-379.

1695. Smithsonian Miscellaneous Collections. Quarterly Issue. Vol. III, Part 4 (containing Nos. 1696-1701). Octavo. Pages 381-567, plates LXIV-LXX, and table of contents and index to Volume III of the Quarterly Issue.

1696. The breeding habits of the Florida alligator. By Albert M. Reese. Published May 4, 1907. Octavo. Pages 381-387, with plates LXIV-LXV.

1697. Life histories of Toadfishes (Batrachoidids), compared with those of Weavers (Trachinids) and Stargazers (Uranoscopids). By Theodore Gill. Published May 4, 1907. Octavo. Pages 388-427.

1698. The letter of Dr. Diego Alvarez Chanca, dated 1494, relating to the second voyage of Columbus to America (being the first written document on the natural history, ethnography, and ethnology of America). Translated, with notes, by A. M. Fernandez de Ybarra. Published May 4, 1907. Octavo. Pages 428-457, with plate LXVI.

1699. The origin of the so-called Atlantic animals and plants of western Norway. By Leonhard Stejneger. Published May 4, 1907. Octavo. Pages 458-513, with plates LXVII-LXX.

1700. Manners and customs of the Tagbanuas and other tribes of the Island of Palawan, Philippines. By Manuel Hugo Venturrello. Published May 4, 1907. Octavo. Pages 514-558.

1701. Notes to Quarterly Issue, Vol. III, Part 4. Octavo. Pages 559-562.

1702. Smithsonian Miscellaneous Collections. (Quarterly Issue. Vol. III), Vol. XLVIII. Octavo. Pages vii, 1-567, with plates I-LXX.

1703. Smithsonian Miscellaneous Collections. (Quarterly Issue), Vol. IV, Part 1 (containing Nos. 1704-1716). Octavo. Pages 1-131, with plates I-XIV.

1704. Notes on some Upper Cretaceous Volutidae, with descriptions of a new species and a revision of the groups to which they belong. By W. H. Dall. Published March 17, 1907. Octavo. Pages 1-23.

1705. Notes on some squirrels of the *Sciurus hippurus* group, with descriptions of two new species. By Marcus W. Lyon, jr. Published April 8, 1907. Octavo. Pages 24-29.

1706. A new Calamarine snake from the Philippine Islands. By Leonhard Stejneger. Published April 8, 1907. Octavo. Pages 30-31.

1707. Additional notes on Mexican plants of the genus *Ribes*. By J. N. Rose. Published May 1, 1907. Octavo. Page 32.

1708. *Morkillia*, a new name for the genus *Chitonia*; with description of a new species. By J. N. Rose and Joseph H. Painter. Published May 1, 1907. Octavo. Pages 33-34.

1709. The "Webster" ruin in Southern Rhodesia, Africa. By Edward M. Andrews. Published May 1, 1907. Octavo. Pages 35-47, with plates I-III.

1710. The Bororo Indians of Maço Grosso, Brazil. By W. A. Cook. Published May 1, 1907. Octavo. Pages 48-62, with plates IV, V.

1711. *Cactus Maxonii*, a new cactus from Guatemala. By J. N. Rose. Published June 15, 1907. Octavo. Pages 63-64, with plate VI.

1712. On the clasping organs attaching the hind to the fore wings in Hymenoptera. By Leo Walter. Published June 24, 1907. Octavo. Pages 65-87, with plates VII-X.

1713. Notes on Mammals collected at Mount Rainier, Washington. By M. W. Lyon, jr. Published June 27, 1907. Octavo. Pages 89-92.

1714. The Archaic monetary terms of the United States. By C. A. White. Published June 27, 1907. Octavo. Pages 93-104.

1715. Description of a collection of Kootanie plants from the Great Falls coal field of Montana. By F. H. Knowlton. Published June 27, 1907. Octavo. Pages 105-128, with plates XI-XIV.

1716. Notes to Quarterly Issue, Vol. IV, Part 1. Octavo. Pages 129-131.

Among the papers in press for the Quarterly Issue at the close of the fiscal year may be mentioned; The Air-Sacs of the Pigeon, by Bruno Müller; and Excavations at Casa Grande, Arizona, in 1906 and 1907, by J. Walter Fewkes.



There was also published in the regular series of the Smithsonian Miscellaneous Collections the following report of researches under a grant from the Hodgkins fund:

1654. Researches on the Attainment of Very Low Temperatures. Part II.—Further notes on the Self Intensive Process for Liquefying Gases. By Morris W. Travers (with A. G. C. Gwyer and F. L. Usher). Part of Vol. XLIX. Octavo. Pages 1-14.

There was in press at the close of the year additional copies of the Smithsonian Meteorological Tables in the form of a third edition of that work.

The following work was issued in continuation of the Catalogue prepared by Prof. Edward S. Holden, issued by the Smithsonian Institution in 1898, No. 1087.

1721. Catalogue of Earthquakes on the Pacific Coast, 1897 to 1906. By Alexander G. McAdie. Part of Volume XLIX. Octavo. Pages 64.

There was in press at the close of the year a work on crabs of the North Pacific under the following title:

1717. Report on the Crustacea (Brachyura and Anomura), collected by the North Pacific Exploring Expedition, 1853-1856. By William Stimpson. Octavo. Pages 240, with 26 plates. Part of Volume XLIX.

The work, written by Doctor Stimpson, who died in 1892, is edited by Miss Mary J. Rathbun. In the introductory note the editor thus describes the character of the report and the causes for delay in its publication:

The North Pacific Exploring Expedition was sent out by the Navy Department under an appropriation from Congress in 1852, for "building or purchase of suitable vessels, and for prosecuting a survey and reconnoissance, for naval and commercial purposes, of such parts of Behring Straits, of the North Pacific Ocean, and the China seas, as are frequented by American whale ships, and by trading vessels in their routes between the United States and China." The expedition set sail in June, 1853, and returned in 1856. Capt. C. Ringgold, U. S. Navy, was placed in command, but, being recalled to the United States in 1854, he was superseded by Capt. John Rodgers, U. S. Navy. William Stimpson acted as zoologist. After leaving Norfolk the five vessels in service touched at Madeira, and then proceeded to Hongkong via the Cape of Good Hope. On this passage the sloop *Vincennes* and the brig *Porpoise* took the more southerly route to Van Diemens Land, thence through the Coral Seas, and by the Caroline, Ladrone, and Bashee islands, while the steamer *John Hancock* and the other two vessels of the fleet traversed the straits of Sunda and Gaspar, the Carimata and Billeton passages, and the Sooloo Sea. Subsequently the expedition advanced northward, continuing work along the coasts of Japan and Kamchatka, in Bering Strait, on the coast of California, and at Tahiti, returning around the Cape of Good Hope.

Of the vast collections obtained, it was estimated that the Crustacea numbered 980 species.

A few years after his return to the United States, Dr. William Stimpson became director of the Chicago Academy of Sciences, and moved to that place nearly all of the invertebrate material obtained by the expedition and belonging to the United States Government. Several preliminary papers had been prepared and published by him in the Proceedings of the Academy of Natural Sciences of Philadelphia, when the collections with notes and drawings were destroyed by the memorable fire in 1871. In a statement of losses sustained, Doctor Stimpson enumerated the manuscript and drawings of the final report on the Crustacea Brachyura and Anomura. After his death in 1872, however, this report was discovered at the Navy Department and was sent to the Smithsonian Institution, where it has remained to the present time unpublished.

In the meantime there are few students of the higher Crustacea who have not felt the need of more light on those rare genera and species known only from brief Latin diagnoses.

The following report has been treated as an historical document, and is published substantially as it was written by the author, the only additions being the references to his preliminary descriptions and the footnotes giving the current or accepted name where it differs from that used by Doctor Stimpson. It is hoped that the value of the descriptions will more than compensate for the antiquated nomenclature.

There was also in press at the close of the year in the series of Smithsonian Miscellaneous Collections the following publication:

1720. Samuel Pierpont Langley, Secretary of the Smithsonian Institution, 1887-1906. Memorial meeting December 3, 1906. Addresses by Doctor White, Professor Pickering, and Mr. Chanute. Octavo. Pages 49. Part of Volume XLIX.

### III. *Smithsonian Annual Reports.*

The Annual Report for 1905 was distributed early in the fiscal year:

1667. 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, 1906. Octavo. Pages i-liv, 1-576, with 48 plates.

The following papers included in the Annual Report of the Board of Regents for 1905 were issued separately in pamphlet form:

1668. Journal of Proceedings of the Board of Regents of the Smithsonian Institution at Meetings of December 6, 1904, and January 25, and March 6, 1905. Report of Executive Committee. Acts and resolution of Congress. Octavo. Pages xi-liv.

1669. New Measurements of the Distance of the Sun. By A. R. Hinks. Octavo. Pages 101-118.

1670. Photographing Lightning with a Moving Camera. By Alex. Larsen. Octavo. Pages 119-127, with plates I-IV.

1671. The Tantalum Lamp. By W. von Bolton and O. Feuerlein. Octavo. Pages 129-140.

1672. Some Refinements of Mechanical Science. By Ambrose Swasey. Octavo. Pages 141-150.

1673. Progress in Radiography. By L. Gastine. Octavo. Pages 151-161, with plates I-VIII.

1674. History of Photography. By Robert Hunt. Octavo. Pages 163-192, with plates I-IV.

1675. The Genesis of the Diamond. By Gardner F. Williams. Octavo. Pages 193-209.

1676. A description of the Big Diamond recently found in the Premier Mine, Transvaal. By F. H. Hatch and G. S. Corstorphine. Octavo. Pages 211-213, with plates I, II.

1677. Gold in Science and Industry. By G. T. Beilby. Octavo. Pages 215-234.

1678. Submarine Navigation. By Sir William H. White. Octavo. Pages 235-245.

1679. Liberia. By Sir Harry Johnston. Octavo. Pages 247-264, with plates I-VII.

1680. Geographical Results of the Tibet Mission. By Sir Frank Younghusband. Octavo. Pages 265-277, with plates I-IV.

1681. The Development of Rhodesia and its Railway System in Relation to Oceanic Highways. Octavo. Pages 279-292, with plate I.

1682. The Ethics of Japan. By Baron Kencho Suyematsu. Octavo. Pages 293-307.

1683. Plague in India. By Charles Creighton. Octavo. Pages 309-338.

1684. The Fight against Yellow Fever. By A. Dastre. Octavo. Pages 339-350.

1685. Luminosity in Plants. By Hans Molisch. Octavo. Pages 351-362.

1686. Notes on the Victoria Lyre Bird (*Menura Victorix*). By A. E. Kitson. Octavo. Pages 363-374, with plates I-VI.

1687. The Influence of Physical Conditions in the Genesis of Species. By Joel A. Allen. Octavo. Pages 375-402.

1688. Parental Care Among Fresh-Water Fishes. By Theodore Gill. Octavo. Pages 403-531, with plate i.

1689. On the Relations between the United States of America and Germany, especially in the field of Science. By Wilhelm Waldeyer. Octavo. Pages 533-547.

1690. Walter Reed. A Memoir. By Walter D. McCaw. Octavo. Pages 549-556, with plate i.

1691. Rudolph Albert von Kölliker, M. D. By William Stirling. Octavo. Pages 557-562, with plate i.

The Acting Secretary's Report for 1906, forming a part of the Annual Report of the Board of Regents to Congress, was printed as usual in pamphlet form in November, 1906, for the use of the Board, and in January a larger edition was issued for public distribution, as follows:

1693. Report of the Acting Secretary of the Smithsonian Institution for the year ending June 30, 1906. Octavo. Pages 91.

There was also issued for the use of the Regents a small edition of the Proceedings of the Board.

1743. Proceedings of Board of Regents for the year ending June 30, 1906. Report of Executive Committee. Acts and Resolutions of Congress. Octavo. Pages XI-LI.

The full report for 1906 was in type, although not ready for distribution at the close of the fiscal year.

1742. Annual Report of the Board of Regents of the Smithsonian Institution, showing the Operations and Expenditures and Condition of the Institution for the year ending June 30, 1906. Octavo. Pages i-ii, 1-546, with 43 plates.

The contents of the General Appendix are as follows:

1744. The Smithsonian Institution. Octavo. Pages 97-102.

1745. Modern Theories of Electricity and Matter. By Madame Curie. Octavo. Pages 103-115.

1746. Radioactivity. By Franz Himstedt. Octavo. Pages 117-130.

1747. Recent Advances in Wireless Telegraphy. By G. Marconi. Octavo. Pages 131-145.

1748. Revisions of the Theory of Electrolysis. By H. S. Carhart. Octavo. Pages 147-160.

1749. Recent Progress in Astronomical Research. By C. G. Abbot. Octavo. Pages 161-171, with plates I, II.

1750. Astronomy on Mont Blanc. By H. Radau. Octavo. Pages 173-186.

1751. The Problem of the Metalliferous Veins. By James Furman Kemp. Octavo. Pages 187-206.

1752. Iron Ore Reserves. By Charles Kenneth Leith. Octavo. Pages 207-214.

1753. The Geology of the Diamond and Carbonado Washings of Bahia, Brazil. By Orville A. Derby. Octavo. Pages 215-221, with plates I, II.

1754. The Eruption of Vesuvius in April, 1906. By A. Lacroix. Octavo. Pages 223-248, with plates I-XIV.

1755. To the North Magnetic Pole and through the Northwest Passage. By Roald Amundsen. Octavo. Pages 249-273, with plates I-VI.

1756. Iceland: Its History and Inhabitants. By Herr Jon Stefansson. Octavo. Pages 275-294.

1757. The Recently Discovered Tertiary Vertebrata of Egypt. By C. W. Andrews. Octavo. Pages 295-307.



1758. Polyembryony and the Determination of Sex. By E. Bugnion. Octavo. Pages 309-320.

1759. A Contribution to the Morphology of the Mammoth, *Elephas primigenius* Blumenbach; with an explanation of my attempt at a restoration. By E. Pfizenmayer. Octavo. Pages 321-331, with plate 1.

1760. Heredity. By L. Cuénot. Octavo. Pages 335-344.

1761. The Bisons of the Caucasus. By A. Yermoloff. Octavo. Pages 345-353, with plates I, II.

1762. The Founding of Colonies by *Atta sexdens*. By Jakob Huber. Octavo. Pages 355-372, with plates 1-v.

1763. Quaternary Human Remains in Central Europe. By Hugues Obermaier. Octavo. Pages 373-397.

1764. The Origin of the Slavs. By Professor Zaborowski. Octavo. Pages 399-422.

1765. Scalping in America. By Georg Friederici. Octavo. Pages 423-438.

1766. Zoology and Medicine. By Raphael Blanchard. Octavo. Pages 439-452.

1767. The Rôle of Chemistry in Painting. By Eugene Lemaire. Octavo. Pages 453-458, with plate 1.

1768. Oils, Varnishes, and Mediums Used in the Painting of Pictures. By A. P. Laurie. Octavo. Pages 459-468, with plate 1.

1769. National Reclamation of Arid Lands. By C. J. Blanchard. Octavo. Pages 469-492, with plates 1-vii.

1770. International Science. By Arthur Schuster. Octavo. Pages 493-514.

1771. Samuel Pierpont Langley. By Cyrus Adler. Octavo. Pages 515-533.

#### IV. *Special Publications.*

There was issued during the year a special publication in the form of the Smithsonian Contributions to Knowledge, but it was not included in that series since only a limited number of copies of the accompanying plate were available. The work is entitled:

1694. Remarks on the Type of the Fossil Cetacean *Agorophius pygmaeus* (Müller). By Frederick W. True. City of Washington: Published by the Smithsonian Institution, 1907. Quarto. Pages 8, with 1 plate.

The author in the first paragraph of the work says:

Somewhat more than fifty years ago the Smithsonian Institution, then recently founded, undertook the publication of a number of memoirs by Prof. Louis Agassiz, and prepared some lithographic plates to accompany them. Before the work had proceeded very far, Professor Agassiz made other arrangements for the publication of his writings and the plates were never issued. One of these unpublished plates represents the type specimen of a very remarkable species of fossil cetacean, now known as *Agorophius pygmaeus* (Müller), and on account of circumstances which are detailed below it has been thought desirable to issue it, with a brief explanation as to its importance.

As a special publication, No. 1722, there was printed an octavo pamphlet of 38 pages entitled "Classified List of Smithsonian Publications available for Distribution April, 1907."

For general distribution to correspondents there was published, without bearing a serial number, a duodecimo pamphlet of six pages entitled "The Smithsonian Institution, at Washington, for the Increase and Diffusion of Knowledge among Men." This pamphlet gives a brief description of the functions of the Institution and its branches for the general information of the public.

*V. Publications of 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.

The publications issued during the year are enumerated in the Report on the National Museum. These included the Annual Reports for 1905 and 1906; volumes 31 and 32 of the Proceedings; volume 2 of Bulletin 53; Part 1 of Bulletin 56; Bulletin 57; a supplement to Bulletin 51; Volume XI of Contributions to the National Herbarium and three parts of Volume X of the same series. Three other bulletins were in press at the close of the year.

*VI. Publications of the Bureau of American Ethnology.*

The twenty-sixth annual report of the Bureau of American Ethnology and Bulletins 33, 34, 35, and 36 were sent to the printer during the year. Bulletins 31 and 32 were published in July. Part 1 of Bulletin 30, Handbook of American Indians, appeared in March, and the twenty-fourth annual report in May. A list of publications of the Bureau and a special article on Indian missions were issued in June. These publications are elsewhere described in detail in the report on the Bureau.

*VII. Report of the American Historical Association.*

The annual report of the American Historical Association for the year 1905 was sent to the printer in May, 1906, and Volume I was completed in November of that year. Volume II, however, comprising a complete bibliography of the publications of American historical societies for more than a century, had not been issued at the close of the fiscal year.

The manuscript of the report for 1906 was received in May, 1907, but was not forwarded to the printer until after the close of the fiscal year.

*VIII. Report of the Daughters of the American Revolution.*

The ninth report of the National Society of the Daughters of the American Revolution was received from the society in February, 1907, and submitted to Congress in accordance with law.

*IX. Smithsonian Committee on Printing.*

The editor has served 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, also those offered for printing in the Quarterly Issue of the Smithsonian Miscellaneous Collections. The committee has also passed upon blank forms for current use in the Institution and its branches. The committee considered and reported to the Secretary on various questions relating in general to printing and publication. Twenty-six meetings were held during the year and 101 manuscripts were reported upon.

*X. Press Abstracts of Publications.*

Beginning in March, 1907, an editorial assistant was assigned to the preparation of abstracts of such publications of the Institution and its branches as could be put in popular language for the use of newspapers throughout the

country. There has also been sent out a number of brief accounts of current investigations and longer descriptions of general work in the National Museum, the International Exchanges, the Astrophysical Observatory, the Zoological Park, and other branches of the Institution's work.

Respectfully submitted.

A. HOWARD CLARK,  
*Editor.*

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

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