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REPORT OF THE SECRETARY OF THE SMITHSONIAN INSTITUTION

FOR THE YEAR ENDING JUNE 30

1919



(Publication 2547)

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

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THE SMITHSONIAN
INSTITUTION

FOR THE YEAR ENDING 1872
1873



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REPORT
OF THE
SECRETARY OF THE SMITHSONIAN INSTITUTION

CHARLES D. WALCOTT

FOR THE YEAR ENDING JUNE 30, 1919.

To the Board of Regents of the Smithsonian Institution.

GENTLEMEN: I have the honor to submit herewith an annual report on the activities and condition of the Smithsonian Institution and its branches during the year ending June 30, 1919. The activities of the Institution proper are reviewed in the first part of the report, together with a brief summary of the affairs of each of the several branches. In the appendices will be found more detailed accounts of the work of the National Museum, the Bureau of American Ethnology, the International Exchange Service, the National Zoological Park, the Astrophysical Observatory, the Smithsonian Library, the International Catalogue of Scientific Literature, and an account of the publications of the Institution and its branches. The reports of the Museum and Bureau of Ethnology are published in greater detail in separate volumes.

THE SMITHSONIAN INSTITUTION.

THE ESTABLISHMENT.

The Smithsonian Institution was created by act of Congress, in 1846, according to the terms of the will of James Smithson, of England, who in 1826 bequeathed his property to the United States of America "to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men." In receiving the property and accepting the trust Congress determined that the Federal Government was without authority to administer the trust directly, and therefore constituted an "establishment," whose statutory members are "the President, the Vice President, the Chief Justice, and the heads of the executive departments."

THE BOARD OF REGENTS.

The business of the Institution is conducted by a Board of Regents composed of "the Vice President, the Chief Justice of the United States, and three Members of the Senate, and three Members of the

House of Representatives, together with six other persons other than Members of Congress, two of whom shall be resident in the city of Washington and the other four shall be inhabitants of some State, but no two of them of the same State." The regents elect one of their number as chancellor, usually the Chief Justice, who is the presiding officer of the board, and elect a suitable person as secretary of the Institution, who is also secretary of the board and the executive officer and director of the Institution's activities.

The changes in personnel of the board during the year were the appointment of George Gray, citizen of Delaware, to succeed himself; the appointment of Robert S. Brookings, citizen of Missouri, to fill the vacancy caused by the death of Charles W. Fairbanks. The roll of regents on June 30, 1919, was as follows: Edward D. White, Chief Justice of the United States, chancellor; Thomas R. Marshall, Vice President of the United States; Henry Cabot Lodge, Member of the Senate; Charles S. Thomas, Member of the Senate; Scott Ferris, Member of the House of Representatives; Lemuel P. Padgett, Member of the House of Representatives; Frank L. Greene, Member of the House of Representatives; Alexander Graham Bell, citizen of Washington, D. C.; George Gray, citizen of Delaware; Charles F. Choate, jr., citizen of Massachusetts; John B. Henderson, citizen of Washington, D. C.; Henry White, citizen of Maryland; and Robert S. Brookings, citizen of Missouri.

The board held its annual meeting on December 12, 1918. The proceedings of that meeting, as also the annual financial report of the executive committee, have been printed, as usual, for the use of the regents, while such important matters acted upon as are of public interest are reviewed under appropriate heads in the report of the secretary. A detailed statement of disbursements from the Government appropriations under the direction of the Institution for the maintenance of the National Museum, the National Zoological Park, and other branches will be submitted to Congress by the secretary in the usual manner in compliance with the law.

GENERAL CONSIDERATIONS.

In addition to the usual activities and routine duties, the scientific staff of the Institution continued, until the day of the signing of the armistice, to assist the Government in every way possible toward the successful prosecution of the war. The Museum staff were in constant touch with Army and Navy officials, furnishing much technical information, and the staff of the Astrophysical Observatory conducted numerous valuable researches. Mr. L. B. Aldrich, of the observatory, carried out successful experiments on the pressure exerted by the wind upon projectiles, at the request of the Coast Artillery Station at Fortress Monroe. Assistant Secretary Abbot and Mr.

Aldrich together worked on the problem of searchlights for Army use, and, after numerous experiments, they were able to improve the existing searchlights, both by diminution of size and increase in lighting power. The new form of searchlight was constructed and used in France several months before the close of hostilities.

At the time of the signing of the armistice several valuable devices were being perfected by Dr. Abbot and the observatory staff, among them a recoilless gun devised by Dr. R. H. Goddard, of Clark College, which was a development of work being done by him for the Institution on a multiple-charge rocket intended to reach great heights for meteorological observations; an instrument for determining geographical positions from an airplane or a ship at sea without reference to landmarks, whether celestial or terrestrial; and a rotating projectile constructed on the turbine principle to be fired from a smoothbore gun, which would have been specially valuable for use in trench mortars.

On December 16, 1918, Dr. C. G. Abbot, Director of the Astrophysical Observatory, was appointed assistant secretary of the Institution to fill the vacancy caused by the death of Dr. F. W. True some years ago. In addition to his administrative duties in connection with the Institution, Dr. Abbot will be in charge of the Smithsonian Library, the International Exchange Service, and the Astrophysical Observatory.

The work of the National Research Council, of which your secretary was first vice chairman, was continued under the war organization during the first part of the year. After the signing of the armistice every effort was concentrated on the organization of the council upon a peace basis, and this was accomplished very successfully before the close of the year under a definite plan in accordance with an Executive order from the President of the United States requesting the National Academy of Sciences to perpetuate the National Research Council.

The secretary of the Institution was also chairman of the executive committee of the national advisory committee for aeronautics, which performed work of great value to the Government on airplane production and improvements.

An important peace-time event was the organizing just before the close of the year of an extensive exploring expedition to the heart of Africa. The material collected will come to the Institution to be used for purposes of comparison in working up the results of various expeditions to the Dark Continent by Col. Roosevelt, Paul Rainey, and others.

Bequests.—An important bequest was made to the Institution during the year by Mrs. Virginia Purdy Bacon, of New York, which will do much toward extending our knowledge of the fauna of the

world. That portion of Mrs. Bacon's will relating to the Institution reads as follows:

(f) To Smithsonian Institute the sum of fifty thousand dollars (\$50,000), to be used in establishing a traveling scholarship, to be called the Walter Rathbone Bacon Scholarship for the study of the fauna of countries other than the United States of America; the incumbents to be designated by said Institute under such regulations as it may from time to time prescribe and to hold such scholarships not less than two years, and while holding such scholarship to conduct for said Institute investigations in the fauna of other countries under the direction of said Institute.

The terms of the will had not been executed at the close of the year.

FINANCES.

The invested funds of the Institution are as follows:

Deposited in the Treasury of the United States under authority of Congress----- \$1,000,000.00

CONSOLIDATED FUND.

Brooklyn Rapid Transit 5 per cent notes, due July 1, 1918-----	3,528.44
American Telephone & Telegraph Co. 4 per cent collateral trust bonds, due July 1, 1929-----	15,680.00
Province of Manitoba 5 per cent gold debentures, due Apr. 1, 1922--	1,935.00
West Shore Railroad Co. guaranteed 4 per cent first mortgage bonds, due Jan. 1, 2361-----	37,275.00
Cleveland Electric Illuminating Co. first mortgage 5 per cent gold bonds, due 1939-----	5,670.00
United States first Liberty loan-----	200.00
United States second Liberty loan-----	100.00
United States third Liberty loan-----	10,150.00
United States fourth Liberty loan-----	50.00
United States war-savings stamps, series of 1918-----	100.00
Adjustments -----	105.94
Total -----	1,074,794.38

The sum invested for each specific fund and the manner in which the several investments were made is given in the following statement:

	United States Treasury.	Consolidated fund.	Total.
Smithson fund.....	\$727,640.00	\$984.00	\$728,624.00
Habel fund.....	500.00		500.00
Hamilton fund.....	2,500.00		2,500.00
Hodgkins general fund.....	116,000.00	37,275.00	153,275.00
Hodgkins specific fund.....	100,000.00		100,000.00
Rhees fund.....	590.00	74.00	664.00
Avery fund.....	14,000.00	14,824.45	28,824.45
Addison T. Reid fund.....	11,000.00	1,348.00	12,348.00
Lucy T. and George W. Poore fund.....	26,670.00	2,819.00	29,489.00
George K. Sanford fund.....	1,100.00	142.00	1,242.00
Chamberlain fund.....		10,000.00	10,000.00
Bruce Hughes fund.....		7,327.93	7,327.93
Total.....	1,000,000.00	74,794.38	1,074,794.38

The Brooklyn Rapid Transit Co. was placed in the hands of receivers on July 1, 1918.

For the \$5,000 in 5 per cent gold notes which failed of redemption on the above date, \$1,500 was subsequently paid to the Institution in cash and the balance of \$3,500 is held by the receivers pending final adjustment.

A single piece of real estate bequeathed to the Institution by the late Robert Stanton Avery, and located in the District of Columbia, 326 A Street SE., was sold and the sum of \$3,046.50 was realized therefrom. Several lots of unimproved land located near Lowell, Mass., and forming a part of the bequest known as the Lucy T. and George W. Poore fund, were also sold and the sum of \$520.50 was realized, making a total of \$3,567 derived from the sale of real estate during the year.

Income not required for current expenditures continues to be placed with local banks on time deposit; the interest so earned during the year amounted to \$1,048.10.

The income of the institution during the year, amounting to \$144,100.53, was derived as follows: Interest on permanent investments and other sources, \$64,466.94; repayments, rentals, publications, etc., \$34,723.33; contributions from various sources for specific purposes, \$26,343.26; bills receivable, \$15,000; proceeds from sale of real estate, \$3,567.

Adding the cash balance of \$1,289.90 on July 1, 1918, the total resources for the year amounted to \$145,390.43.

Mr. B. H. Swales, honorary custodian, section of birds' eggs, has contributed \$300 to the Institution for the purchase of specimens.

The disbursements which are described in the annual report of the executive committee amounted to \$143,267.65, leaving a balance on deposit with the Treasury of the United States in cash and in bank of \$2,122.78.

The Institution was charged by Congress with the disbursement of the following appropriations for the year ending June 30, 1919:

International exchanges.....	\$35,000
American ethnology.....	42,000
International catalogue of scientific literature.....	7,500
Astrophysical observatory.....	13,000
National Museum.....	
Furniture and fixtures.....	15,000
Heating and lighting.....	55,000
Preservation of collections.....	300,000
Building repairs.....	10,000
Books.....	2,000
Postage.....	500
National Zoological Park.....	115,000
Increase of compensation (indefinite).....	
Total.....	595,000

In addition to the above, there was included under the general appropriation for printing and binding an allotment of \$76,200, to cover the cost of printing and binding the Smithsonian annual report and reports and miscellaneous printing for the Government branches of the Institution.

RESEARCHES AND EXPLORATIONS.

The institution every year sends out or cooperates in expeditions to various parts of the world for the purpose of gathering all the information possible on the inhabitants, the fauna and flora, and other features of little-known regions, and thus carries out one of its primary objects—"the increase of knowledge." While the war conditions prevailing during the first half of the year blocked certain projects, several expeditions of importance to science were undertaken, and a few of these are briefly summarized here. The annual Exploration Pamphlet issued by the institution and the reports of the various branches describe these and other researches more in detail.

GEOLOGICAL EXPLORATIONS IN THE CANADIAN ROCKIES.

The geological explorations which have been conducted in the Canadian Rockies by your secretary for a number of years were continued during the summer season of 1918, chiefly for the purpose of determining the geological structure of the upper Bow Valley north of Lake Louise, Alberta, and also at the headwaters of the Cascade River, at Sawback Lake. Another aim of the investigation was to locate any possible occurrences of unusual beds of fossils in the regions visited.

Leaving the Canadian Pacific Railway at Lake Louise Station, the Bow Valley extends to the northwest parallel to the Continental Divide, which forms its southwestern side. Bow Lake at the head of the valley is a beautiful sheet of water hemmed in by bald mountain slopes and cliffs on the west and north and by the mass of Mount Molar on the east. From the west numerous glaciers drain into the lake. The first one encountered is Crowfoot, which flows from the great Wauputek snow field along the Continental Divide.

Bow Pass, 4 miles north of the head of Bow Lake, has been eroded by glacial action into a broad, park-like area, so that the passage over into the valley of the Mistaya River of the Saskatchewan River drainage is scarcely realized until steep slopes indicate the approach toward Lake Peyto. This beautiful lake, with a glacier at its head, drains into the Mistaya River. The bold escarpment on the north side of the lake is continued to the north down the Mistaya River to the Saskatchewan. Several sections were examined along this front,

which were found to be similar to the section at the head of Bow Lake.

The broad canyon valleys that unite the headwaters of the Saskatchewan River are all carved by erosion out of the same type of Cambrian rocks as those exposed in the vicinity of Bow Lake, and also in the Bow Valley south of Lake Louise Station.

At the close of the season a fine pair of mountain sheep, a black bear, one mule deer, a mountain goat, and a wolverine were collected, the skins and skulls being shipped to the National Museum.

GEOLOGICAL WORK IN THE MIDDLE ATLANTIC STATES.

During the field season of 1918 the members of the geological staff were chiefly occupied in collecting material for the museum exhibition series, most of the work being done in Virginia, Maryland, New Jersey, Pennsylvania, and New York. Sufficient material illustrating the weathering and decay of rocks was obtained by Dr. J. C. Martin, assistant curator of geology, United States National Museum, to make up 100 sets for distribution to those agricultural and other colleges which give instruction in rock weathering and soil formation. Dr. Martin also visited several localities in Pennsylvania, New Jersey, and New York for the purpose of filling certain gaps in the ore and rock collections.

In continuance of the search begun in recent years for large exhibition museum specimens to illustrate the various phases of structural geology and stratigraphic paleontology, Drs. Bassler and Resser, of the division of paleontology, report as follows:

Field work was begun with an investigation of the Cretaceous rocks of western New Jersey, where the prime object was to secure suitable exhibits of such economically important rocks of organic origin as glauconite, or greensand, and calcareous marl. The green sand area in the vicinity of Vincentown, N. J., afforded the best results in fossil and rock specimens for both study and exhibition. The very incoherent greensand could not be obtained in masses of a size suitable for exhibition, but by use of shellac a large piece was hardened sufficiently to be shipped to Washington without breakage. In the marl pits unusually well-preserved fossils were found scattered through an unconsolidated sand formation. Here specimens abound literally by the millions, and large numbers were collected by passing quantities of the sand through a fine-meshed sieve, the residue in this process usually consisting of nothing but well-preserved fossils.

They then proceeded to the Lancaster Valley of Pennsylvania, where they were fortunate enough to secure intact a large mass of finely banded, crinkled limestone. This illustrates, on a small scale, the folding to which the earth's crust has been subjected, and forms a much-needed addition to the exhibits.

On the east front of the Allegheny Mountains Dr. Bassler obtained exhibition specimens illustrating faulting and its accompanying phenomena. In western Maryland a fault passes through a Silurian conglomerate composed of small, rounded pebbles of pure white quartz, forming an interesting educational ob-

ject, and along the fault zone the conglomerate has been broken into angular fragments and recemented together into a hard rock. In one case this recementation had been caused by silica and in another by iron ore. Large examples of both kinds of this fault breccia were collected. Photographs of these specimens in situ were secured so that explanatory exhibition labels can be illustrated.

THE COLLINS-GARNER FRENCH CONGO EXPEDITION.

In December, 1916, an expedition known as the "Collins-Garner Expedition in the interests of the Smithsonian Institution" sailed from New York for Bordeaux and from there to Africa, with the object of procuring a general collection of vertebrates and especially the great apes. The expedition encountered many difficulties and delays owing to the war, but by the summer of 1918 they had established permanent headquarters near Fernan Vaz, French Congo. A letter from Mr. R. L. Garner, who has the general management of the expedition, states in part:

Our domicile is located on the edge of a vast plain, traversed here and there by belts and spurs of forest. In those plots of bush live great numbers of chimpanzees, and for the first time in my long experience among them I have seen whole families of them out on the open plain. Frequently they cross the plain from one belt of bush to another, in some places a mile or so in width, and not a tree or bush in that distance to shelter them from attack. They often come within 200 to 300 yards of my house and sometimes manifest deep interest in trying to find out what this new thing is set up in their midst. I have seen as many as four or five different groups of them in the same day, and one of these contained 11 members.

Mr. Aschemeier has collected well on to 2,000 specimens, and nearly all of them he has killed with his own gun. Some of these specimens are exceedingly rare and valuable. When you recall the fact that he came as taxidermist of the expedition and not as chasseur, he was not expected to provide the specimens that he was to preserve.

We have forwarded six consignments of specimens to the Museum and have a seventh well on the way; but we find great difficulty in getting the steamers to take them from Port Gentil (Cap Lopez), because they are all under the direction of the French military authorities. Two of our last shipments were still at Port Gentil last month, where one of them has been lying since last January and all steamers declined to take it. Once both shipments were taken aboard the steamer and bill of lading signed when the captain changed his mind and sent the whole lot back on shore, with the accumulated charges of 40 francs for embarkation and debarkation.

We have sent 12 or 13 specimens of buffalo, several specimens and species of antelope, and two or three fine specimens of the "red river hog," beside a large collection of monkeys, representing six or seven species of both sexes and various ages. I think in all we have sent over 1,500 up to this time. Of course, this includes birds, etc., not insects, and we have on hand a goodly number.

War conditions seriously interfered with the shipment of the material collected, but later on a large number of interesting specimens were received by the Museum.

THE SMITHSONIAN AFRICAN EXPEDITION.

Shortly before the close of the fiscal year a collecting expedition to Africa was organized, to be known as the Smithsonian African Expedition, under the direction of Edmund Heller, in conjunction with the Universal Film Manufacturing Co. The expedition sailed from this country a few days after the close of the year for Cape Town, Africa, from which city arrangements were to be made for the plunge into the interior of the continent. The expedition is to collect animals, plants, and other material for uses of comparison in working up the collections made in Africa by Col. Theodore Roosevelt, Paul Rainey, and others, already in the National Museum. Representatives of the Universal Film Manufacturing Co. accompanied the expedition to make extensive motion pictures of life in the mysterious interior. The expedition will explore the jungles, deserts, lakes, and rivers and will be out at least a year.

Exploration is contemplated in various parts of the Cape region, the great Victoria Falls of the Zambesi River, and western Rhodesia. From there the expedition will cross to the sources of the Congo in Belgian Congo, then turn east toward Lake Tanganjika, following, to some extent, the trails of Livingston and Stanley in this region. From the town of Ujiji, on the eastern shore of the lake, the temporary headquarters of the expedition, excursions will be made into the former German East Africa and the Uganda Protectorate, especially the Ryvenzori Mountain region.

The primary purpose of the expedition is to secure additional specimens of plants and animals, chiefly from the interior and from South Africa, in which the Museum is rather deficient. These will prove a welcome supplement to the magnificent collections brought home by Col. Theodore Roosevelt and others and on which monographic reports are desired, but which can not be worked up intelligently and satisfactorily until more material is obtained. The experienced collectors, Mr. H. C. Raven, representing the institution, and Dr. H. L. Shantz, of the Department of Agriculture, will undoubtedly send back to this country much material of value concerning the little-known parts of the "Dark Continent" which have puzzled scientists and laymen for a long time.

BOTANICAL EXPLORATIONS IN ECUADOR.

As a part of a cooperative plan for an investigation of the flora of northern South America, organized by the United States National Museum, the New York Botanical Garden, and the Grey Herbarium, Dr. J. N. Rose, associate curator in the division of plants of the Museum, spent three months making botanical collections in Ecuador. A large quantity of desired material, including 6,000 botanical speci-

mens, 100 jars of fruit seeds and plant products preserved in formalin, a number of wood specimens, and samples of bark, was collected. It is expected that this and other proposed botanical researches in this region will be of much value to the agricultural and horticultural interests in this country.

In the course of Dr. Rose's work in Ecuador two sections were made of the coast across the western range of the Andes to the interior Andean Valley; one in the south from Santa Rosa to Loja, and the other near the center of the country from Guayaquil to Riobamba. A longitudinal section was made down the Andean Valley from San Antonio to Loja. This last section was over the route followed by Alexander von Humboldt at the beginning of the eighteenth century. Many of the plants collected by him on this memorable journey were re-collected.

CINCHONA BOTANICAL STATION.

With the consent of the governor of Jamaica the three-years' lease of the Cinchona Botanical Station, held by the institution, was canceled during the period of war, as it was found impracticable to undertake any botanical research there during the unsettled conditions prevailing. The lease was terminated, however, with the hope that it could be taken up again with the return of normal conditions, and a few days after the close of the fiscal year a letter was received from Prof. Duncan S. Johnson, chairman of the committee of subscribers to the maintenance of the station, at that time in Jamaica, stating that he had begun negotiations with the Government to renew the lease, beginning January, 1920.

ANTHROPOLOGICAL WORK IN PERU AND BOLIVIA.

Mr. Philip A. Means, honorary collaborator in American archeology, United States National Museum, spent some months during the year in archeological work in Peru and Bolivia. The region around Lima, according to Mr. Means, is undoubtedly one of the richest in South America from the archeological standpoint. After visiting a number of the ancient ruins in this section, considerable time was spent in examining the archeological collections of several South American scientists. In an account of his work, Mr. Means says:

Two of the least known places visited were Maranga and Pando. They are very close together, and are about 6 miles northwest of Lima. In its prime, Maranga had four fine terraces, with a spacious terreplein at the top. At the bottom the pyramid is about 450 feet square and the summit terreplein is about 250 feet by 350. The material of construction is adobe. This pyramid is probably of Inca construction; it is much like the Inca-built Temple of the Sun at Pachacamac and has yielded many Inca artifacts.

Lying somewhat north and northwest of Maranga are the ruins of Pando. These cover an immense amount of ground, and consist of several pyramids

even larger than Maranga, but not so well preserved. The old city at this place was inclosed in a massive wall, with easily defended gateways. These latter were narrow, and, at either side, sunk in the thickness of the wall, there was a raised platform or niche where possibly a guard could stand and effectually oppose ingress.

At the western side of Pando there are the remains of a fine, though small, palace or temple. Although it is only about 85 feet square, this little building is remarkable on account of the attractive arabesque patterns made in the stucco coating of the walls. The western end of the main room was provided with a platform, raised some 3 feet above the rest of the floor. Behind this there was a passage which led to other apartments. It is not now possible to know exactly what sort of roof there was, for the wind has eroded the tops of the walls and signs of roof beams or joists are no longer visible.

THE PROPOSED ROOSEVELT MEMORIAL.

On January 29, 1919, a bill was introduced in the House of Representatives by Congressman F. C. Hicks, providing for the erection of a museum of history and of the arts as a memorial to Theodore Roosevelt. It was intended that the proposed museum would contain the extensive collections already in the National Museum of relics and mementoes of illustrious patriots of our country and of the events conspicuous in its history. The bill provides that the building should be planned and erected under the direction of the Regents of the Smithsonian Institution, and, when completed, would be administered by them. The site selected is the north side of the Mall, on a line with the present beautiful structure of the Natural History Building of the National Museum.

The memorial museum would contain also collections relating to arts and industries, including the great divisions of mechanical and mineral technology, such as objects and models illustrating the development of the electric telegraph and telephone; the phonograph; transportation by land, water, and air; musical instruments, from primitive to present forms; printing, illustrating, and bookmaking; photography, from the earliest invention to the modern moving-picture apparatus; ores and minerals, their natural occurrence, processes of extraction and manufacture, from the native state to the finished product; textiles; drugs; foods; and animal and vegetable products.

Provision would also be made for the present National Gallery of Art, in the development of which President Roosevelt took an active and timely interest. The collections of the National Gallery now approximate \$1,000,000 in value, and would grow more rapidly if adequate installation were insured.

In my letter to Congressman Hicks regarding the memorial, I stated, in part, as follows:

The proposed museum would not be a dead memorial, but a virile living tribute to Roosevelt that for ages would serve to educate and stimulate all classes of Americans. Its educational value would be great to the child, the

youth, and mature men and women. It would stimulate the historian, artist, designer, manufacturer, and artisan, and bring to the American people in the most realistic manner the extent and character of their historical and industrial development, and place side by side with the American many of the developments in art and science of other lands. I can not conceive of a more powerful influence for good that could take the form of a memorial to Roosevelt.

We have the great monument to Washington, the great mausoleum to Lincoln, and if on the same great parkway between the Capitol and the Potomac this tribute to Roosevelt could be erected it would be a tribute worthy of what he himself stood for in the life and thought of our country.

The bill providing for this memorial to Theodore Roosevelt was not brought up before the Congress for action during the session at which it was introduced, but it was reintroduced on May 21, 1919, during the first session of the Sixty-sixth Congress, and at the close of the fiscal year was still in committee.

RESEARCH CORPORATION.

The Research Corporation, mentioned in several previous reports, is the outgrowth of the gift to the Smithsonian Institution by Dr. F. G. Cottrell of his patents covering the electrical precipitation of suspended particles.

The process is now in successful operation in a number of smelting and refining plants in which the precipitation of fumes is an important item. From the income of these applications there was established a fellowship, amounting to \$2,500 each year, for research along technical lines.

POPULAR SCIENTIFIC LECTURES.

In furthering one of the purposes of the Institution, "the diffusion of knowledge," a series of popular scientific lectures, illustrated by lantern slides, was instituted during the year, and given in the auditorium of the National History Building of the Museum. These lectures were open to the public and were all well attended, showing the interest of the people of Washington in scientific matters. Eight lectures were given in the series, on alternate Saturday afternoons, as follows:

1. Photographing in the Canadian Rockies, by Charles D. Walcott.
2. Sun Rays in Many Lands, by C. G. Abbot.
3. The Indian as a Stone Mason, by J. Walter Fewkes.
4. Meteorites and Shooting Stars, by George P. Merrill.
5. The Story of Our Local Aboriginies, Historic and Prehistoric, With Demonstrations of Their Instrument Making, by William H. Holmes.
6. Harmful and Beneficial Insects, and How the National Museum Helps in Their Study, by L. O. Howard.
7. The Story of Silk, by Frederick L. Lewton.
8. Why the Wild Flowers Are So Wild, by Frederick V. Coville.

It is intended to continue these lectures during the coming year.

CONGRESS OF AMERICANISTS.

The twentieth international congress of Americanists which was to have been held at Rio de Janeiro in June, 1919, was postponed until the following year, when more favorable conditions may be expected.

PUBLICATIONS.

The institution and its branches issued during the year 98 volumes and separate pamphlets. The total distribution was 161,288 copies which includes 404 volumes and separate memoirs of Smithsonian Contributions to Knowledge, 15,603 volumes and separate pamphlets of Smithsonian Miscellaneous Collections, 13,885 volumes and separates of the Smithsonian Annual Reports, 118,332 volumes and separates of the National Museum publications, 11,483 publications of the Bureau of American Ethnology (all series), 1,444 special publications, 10 volumes of the Annals of the Astrophysical Observatory, 69 reports of the Harriman Alaska Expedition, and 58 reports of the American Historical Association.

An unusually large number of publications were in press at the close of the year, owing to the overcrowded condition of the Government Printing Office during the war.

Allotments for printing.—The allotments for the year for the printing of the Smithsonian report and the various publications of the branches of the Institution were practically used up and the allotments for the year ending June 30, 1920, are as follows:

For the Smithsonian Institution: For printing and binding the annual reports of the Board of Regents, with general appendices, the editions of which shall not exceed 10,000 copies.....	\$10,000
For the annual reports of the National Museum, with general appendices, 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 morocco or material not more expensive, scientific books and pamphlets presented to or acquired by the National Museum Library.....	37,500
For the annual reports and bulletins of the Bureau of American Ethnology and for miscellaneous printing and binding for the bureau....	21,000
For miscellaneous printing and binding:	
International exchanges.....	200
International Catalogue of Scientific Literature.....	100
National Zoological Park.....	200
Astrophysical Observatory.....	200
For the annual report of the American Historical Association.....	7,000

Committee on printing and publication.—All manuscripts offered for publication by the Institution or its branches are considered by

the Smithsonian advisory committee on printing and publication. Thirteen meetings were held during the year and 79 manuscripts were acted upon. The membership of the committee is as follows: Dr. Leonhard Stejneger, head curator of biology, National Museum, chairman; Mr. N. Hollister, superintendent of the National Zoological Park; Dr. George P. Merrill, head curator of geology, National Museum; Dr. J. Walter Fewkes, chief of the Bureau of American Ethnology; and Mr. A. Howard Clark, editor of the Institution and secretary of the committee until his death in December, 1918, when Mr. Webster P. True succeeded him as editor and secretary of the committee.

LIBRARY.

The library of the Smithsonian Institution is maintained for the purpose of assembling a collection of periodicals and publications of a scientific nature, as well as the journals and other publications of scientific institutions of the world, the whole forming a library of reference and research. In addition to the main bulk of titles housed in the Library of Congress, and known as the Smithsonian Deposit, there are 35 sectional technical libraries and 4 branch libraries—the National Museum library, the Bureau of American Ethnology library, the Astrophysical Observatory library, and the National Zoological Park library.

The number of accessions during the year which were added to the previous collection of over half a million titles numbered 7,502. Of these 2,077 were for the Smithsonian Deposit, 639 for the Smithsonian office, Astrophysical Observatory, and National Zoological Park, and 4,786 for the National Museum.

Seventy-eight titles have been added during the year to the institution's collections of aeronautical publications, in which continued interest has been shown by aeronautical research workers in the Army, Navy, and scientific institutions. Author cards for 1,722 titles of books in the De Peyster Collection have been made, and the 869 volumes on French history have been made accessible.

In the Museum library the most important acquisition was a set of catalogues of the J. Pierpont Morgan art collection, presented by J. Pierpont Morgan, jr. The technological library added 346 volumes, and the books in the sectional library, division of plants, have been revised and all available works on botanical subjects brought together and rendered accessible. The collection in the art room, statuary, as well as books, has been carefully gone over and put in thorough order.

NATIONAL MUSEUM.

The National Museum suffered the loss at the beginning of the year of the assistant secretary in charge, Mr. Richard Rathbun, who died July 16, 1918. His duties devolved upon Mr. W. de C. Ravenel, the administrative assistant, whose title was changed to administrative assistant to the secretary, and on November 1 was also designated director of arts and industries.

The scope of the National Museum embraces many subjects, which may be classed under the following headings:

1. Natural history.
2. Applied science and art (Arts and Industries).
3. The fine arts (the National Gallery of Art).
4. American history.

These various departments are combined under one administration, which insures greater economy and efficiency in management.

During the war the Museum furnished the Bureau of War Risk Insurance with 138,600 square feet of space for its offices. Members of the Museum staff in all departments continued to render service to the various governmental agencies until the signing of the armistice, and their work was successful in bringing the Museum into closer relationship with the executive departments.

The total number of accessions received during the year was 526,-845, classified and assigned as follows: Department of Anthropology, 12,333; Zoology, 442,383; Botany, 40,357; Geology and Mineralogy, 4,750; Paleontology, 26,050; Textiles, etc., 884; Mineral Technology, 62; and National Gallery of Art, 26. Three thousand and ninety-six articles were loaned for exhibition, mainly for the divisions of history and American archeology and the Gallery of Art. Purchases were made from the Frances Lea Chamberlain funds and the Henry Ward Ranger funds.

During the year the Museum began the collection of a most valuable and interesting series of war relics. One of the most instructive features of this collection is an exhibit showing the development of the airplane, from the original Langley models to the first Government-owned aeroplane of the world, purchased by the United States from the Wright Brothers in 1909. Through the director of military aeronautics, Bureau of Aircraft Production, two types of planes used by the French at the front in 1917 were received, and a Curtiss training plane of the model used at flying fields all over the United States, as well as the first battle plane constructed in this country for the United States Government—the DH-4—made by the Dayton-Wright Airplane Co. in 1917. This machine was flown over 100,000 miles.

The Department of Anthropology received exceptionally large additions relating to the war with Germany. They include the Combined Order of Battle Map, corrected to November 11, 1918, with its accessories, as used by Gen. Pershing and his staff at Chaumont, France, throughout the progress of the American military movements; a collection of German military paraphernalia captured by American troops during various engagements; collections of the equipment of the various branches of the American Army; and an almost complete series of uniforms, insignia, decorations, and medals of the Army and Navy, as well as a collection of relics of Lieut. Benjamin Stuart Walcott, United States Army, who entered the French air service as a member of the Lafayette Flying Corps, and who was killed in aerial combat on December 12, 1917.

Another interesting addition consists of a large series of costumes and accessories worn by the late Richard Mansfield in his extensive repertoire of historic characters, presented by Mrs. Mansfield.

The chief addition in the Department of Biology was a collection of Antillean land mollusks, aggregating 400,000 specimens, donated by Mr. John B. Henderson, a regent of the Smithsonian Institution. The final installment of Dr. Abbott's Celebes collections was received likewise. The collections in the National Herbarium were enriched by a donation of 12,000 plants from Mexico, 9,600 from the Philippines, and many from the South American countries.

The Division of Textiles received for exhibition purposes from the office of the Surgeon General of the United States Army a collection consisting of apparatus, hospital appliances, and field equipment used by the Medical, Dental, and Sanitary Corps in the war. This included examples of all kinds of equipment of a thousand-bed hospital overseas. The food exhibits were continued and an arrangement was made with the States Relations Service of the Department of Agriculture, whereby regular demonstrations of the value, use, preparation, and conservation of foods were given. Over 2,100 persons attended the lectures and various demonstrations.

Work on the Freer Building progressed satisfactorily, and it is expected that the structure will be completed early in 1920. The National Gallery of Art acquired from Mr. Ralph Cross Johnson a rare gift of 24 paintings, which comprises selections from the work of 19 of Europe's foremost masters.

The most pressing needs of the Museum are a separate building for the National Gallery of Art, which has long since outgrown its present temporary quarters, and also one for American history. It is likewise imperative to increase the scientific and technical staff in order that the Institution may keep pace with the rapid development of the country.

The total distribution of Museum publications during the year aggregated 118,332 copies. Over 4,000 volumes, pamphlets, and unbound papers were added to the library, which now contains 54,685 volumes and 87,109 pamphlets and unbound papers.

BUREAU OF AMERICAN ETHNOLOGY.

The usual activities of the Bureau of American Ethnology, defined by law as "ethnological researches among the American Indians, including the excavation and preservation of archeologic remains," have been carried on during the year under the direction of Dr. J. Walter Fewkes, chief. Intensive studies were made of the dying languages of the numerous Indian tribes in order to discover the relationship of the various stocks of the aborigines and to gain a clearer insight into the origin, history, and migration of man on this continent. The continued study of the material culture of the Indians also has its practical value, while another instructive line of work relates to the history of the Indians both before and after the advent of Europeans.

Field researches include, in addition to those mentioned above, the excavation and preservation of archeological remains. A few of these researches are mentioned very briefly here in order to show the nature of the work. A somewhat more detailed account of these and other undertakings of the bureau during the year will be found in an appendix hereto. Valuable work was done by Dr. Fewkes in the McElmo and tributary canyons in Colorado and in Utah as far west as Montezuma Canyon, on the aboriginal castles and towers of that region, and through his efforts the Aztec Spring Ruin was presented by the owner, Mr. Henry van Kleeck, of Denver, to the National Park Service, and accepted by the Secretary of the Interior.

Dr. J. R. Swanton, ethnologist, devoted much of his time to the collection of material from published sources for a study of the economic background of the life of the American Indians north of Mexico. He has also continued his study of the languages of the Indians of the lower Mississippi Valley and of the social systems of the Choctaw and Chickasaw Indians.

Mr. J. N. B. Hewitt, ethnologist, prepared for the press the Onondaga version of the Myth of the Beginnings, the Genesis Myth of the Iroquoian peoples, and continued his previous study of the league.

Mr. Francis LaFlesche, ethnologist, is now completing for publication his notes on the rite of the chiefs, the tribal rite of the Osage people. In this ritual is embodied the story of the four stages of the development of the tribal government, including both the military

and the civil forms, beginning with the chaotic state of the tribal existence.

Mr. J. P. Harrington, ethnologist, has obtained important corroborative evidence of the validity of his discovery that there is a close genetic relationship between Tanoan pueblo dialects of New Mexico and the Kiowa. The bearings of this discovery on theories of the origin of modern Pueblos is very significant.

Special research work was done among the Salish Tribes, the Pawnee, and Chippewa. Dr. Walter Hough, curator of ethnology, United States National Museum, undertook archeological work in the White Mountain Apache Reserve, Arizona, and Mr. Neil M. Judd, curator of American archeology, United States National Museum, successfully investigated five prehistoric ruins in the Cottonwood Canyon caves. Dr. Aleš Hrdlička, curator of physical anthropology, United States National Museum, was detailed to make an examination of the remains of southwestern Florida, especially of the shell heaps along the coast south of Key Marco. Mr. Gerard Fowke has made careful detailed study of the numerous caves in the Ozark region of central Missouri, and also transmitted a valuable collection of relics to the Museum.

The number of publications distributed was 11,483, an increase of 4,139 over the number sent out last year. The library accessioned 380 new books and 210 pamphlets.

INTERNATIONAL EXCHANGES.

The total number of packages handled by the International Exchange Service during the year was 270,860, an increase over the number for the previous year of 3,914. Although it has not yet been possible to put the service on a prewar basis as far as the shipment of consignments abroad is concerned, shipments in boxes are being made as frequently as present conditions will permit to all countries except Austria, Bulgaria, Germany, Hungary, Montenegro, Roumania, Russia, Serbia, and Turkey.

The exchange service has continued its policy of international helpfulness in procuring publications desired by governmental and scientific establishments both abroad and at home. As an instance of this service, sets as nearly complete as possible of posters relating to the war were assembled and transmitted to the British Museum at their request, a similar service having been rendered to the French Government the previous year. Owing to the excessive charges on ocean freight, many packages were sent by mail.

Late in the fiscal year shipments to Belgium and the northern neutrals were resumed. The chief of the Belgian Service of International Exchanges said, in part, in a letter to the office here:

I should fail most lamentably in my duty, Mr. Secretary, if I did not add to this reply warm thanks in the name of the Belgian Government, in the name of our scientific establishments and institutions, and in my own name, for the extreme kindness you have shown us in reserving for us until the present time all the numerous "series" and "collections" (one and all of inestimable value) which the war has prevented you from transmitting to us at the proper time.

THE NATIONAL ZOOLOGICAL PARK.

The National Zoological Park continues in popularity as a means of natural history education and as a place of recreation and amusement for the people of Washington.

The total number of animals in the park at the close of the fiscal year was 1,336, including 528 mammals, 71 reptiles, and 737 birds. Among the more important additions were two young Sumatran elephants, purchased at a cost of \$5,000, for the children of Washington by a number of their friends and donated to the institution. At the time of their arrival they were about 2½ years old and were the first of their kind to be exhibited in Washington. Other important additions were a fine capybara, from the Hon. Henry D. Baker, Trinidad, British West Indies; a great white heron of southern Florida, from Dr. Paul Bartsch; and a pair of Florida bears from Mrs. A. V. N. Stroop.

Visitors to the park during the year numbered 1,964,715—a daily average of 5,383. Ninety-eight schools and classes visited the collection for instruction purposes.

Among the recent improvements are exterior cages for leopards, jaguars, and hyenas, and a new chimney for the central heating plant. A part of the creek-side drive was rebuilt, some animal houses were painted, and small improvements in the animal houses and yards were likewise effected.

The need of a new house for the exhibition of birds continues to become more urgent from year to year. An increased appropriation for the expenses of the park is also badly needed, as well as one sufficient for the purchase and transportation of animals, so that the park may take advantage from time to time of opportunities to obtain rare and conspicuous animals not before exhibited. The purchase of a frontage of over 600 feet on Connecticut Avenue, urged for several years by the superintendent, but which has not yet been considered favorably by Congress, would satisfy all the needs of the park as regards necessary expansion and better service to the public on the west side; and it becomes more and more important to secure this land, as the probability of losing the opportunity increases every year. It is also desirable to purchase a small strip of privately owned land between the park and the important highway of Adams Mill Road, because of improvements being made

at that point by the District government. The incorporation of this land within the park is of very great interest to the public.

The slight increase in the annual appropriation granted by Congress scarcely more than covered the increased cost of maintenance of the park, even by practicing the strictest economy. Lack of funds for grading banks and filling ravines has prevented the completion of work begun three years ago for the purpose of obtaining new level spaces for yards and inclosures.

ASTROPHYSICAL OBSERVATORY.

Several important investigations relating to the war, begun last year, were continued by the staff of the Astrophysical Observatory under the general direction of Dr. C. G. Abbot, in addition to the regular work of the observatory. These researches are mentioned elsewhere in this report under the heading "General considerations."

At Washington work on solar radiation computations has gone on steadily, and progress has been made with the preparation of a new medium, potassium iodide, for the investigation of the rays beyond where rock salt is transmissible. A new instrument, based upon the principle of the perfect radiator, or "absolutely black body," was constructed for the purpose of measuring nocturnal radiation, such as the earth sends out to space. At the close of the year this instrument was reported as operating successfully on Mount Wilson.

In view of the fact that the total eclipse of the sun of May 29, 1919, would be visible at La Paz, Bolivia, which is not very far from the Smithsonian solar constant observing station at Calama, Chile, a successful expedition was undertaken by Dr. Abbot, with the double purpose of observing the eclipse and visiting the Calama station. Good photographs of the phenomenon and also pyranometric observations by Mr. A. F. Moore of the brightness of the sky were obtained during the progress of the eclipse. A conference was held with officials of the Argentine Government, which is likely to prove of great value in the future, in that it concerned the employment of solar-radiation measurements for weather forecasting by the Argentine meteorological service. At Calama, Chile, Dr. Abbot, in cooperation with the Smithsonian observers there, Messrs. Moore and Leonard Abbot, devised a new method of reducing solar radiation observations, so as to determine the solar constant of radiation with at least equal precision to that obtained by the older method, the advantages of the new method being (1) its independence of the variability of atmospheric transparency; (2) the time required is only one-fifth of the former period.

On Mount Wilson Mr. Aldrich continued the observations of the solar constant of radiation, and in September, 1918, made an interesting observation in cooperation with the Army Balloon School at Arcadia, Calif., on the measurement of the reflection of sun and sky radiation from layers of fog, which led him to conclude that a great horizontal fog bank reflects to space 78 per cent of the radiation of the sun falling upon it.

The preparation of Volume IV of the Annals of the Astrophysical Observatory has been in the hands of Dr. Abbot since February; it includes the results of measurements from the year 1913. Mr. Fowle has continued the work of revising the Smithsonian Physical Tables, in which he has received valuable aid from the various scientific departments of the Government and from individuals in colleges and industrial corporations.

INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

The United States Regional Bureau of the Catalogue, supported by congressional appropriation under the direction of the Smithsonian Institution, undertakes to list and index all scientific articles appearing in the United States each year. These titles are forwarded to the Central Bureau in London, where they are incorporated with the lists from all other countries in a comprehensive catalogue of the year's scientific work of the world. The war and the chaotic conditions in Europe since the war, have greatly hampered the work of the catalogue and it has been recognized for several years that a general reorganization will be necessary when conditions become more settled.

The Central Bureau has published during the year 8 volumes of the Thirteenth Annual Issue, completing that issue, and 12 of the 17 volumes of the Fourteenth Issue have appeared. The United States Bureau has continued to gather and index the scientific titles in this country, and in some of the sciences, notably zoology, the titles have been classified far in advance of the published volumes.

It has been recently announced by the Royal Society of London, the principal sponsor of the catalogue since its inception, that after the completion of the Fourteenth Annual Issue a new financial arrangement will be necessary in order to continue the work, and scientific establishments and academies throughout the world have been asked to offer suggestions as to the best method of accomplishing this end.

NECROLOGY.

I may here express for myself and on behalf of the staff of the Institution and the National Museum the deep sense of loss caused by the death during the year of Mr. Richard Rathbun, assistant secretary in charge of the National Museum, and Mr. A. Howard Clark, editor of the Smithsonian Institution. These two men, through long connection with the Institution, contributed much to its development and their passing leaves a deep feeling of personal loss among their associates.

RICHARD RATHBUN.

Richard Rathbun, assistant secretary of the Smithsonian Institution, was born in Buffalo, N. Y., January 25, 1852, and died July 16, 1918. He received his education at Cornell University, specializing in geology and paleontology. Here he was associated with Charles Fred Hartt, professor of geology, who assigned to Mr. Rathbun the task of working up for publication a collection of fossils from Brazil, which resulted in the publication of Mr. Rathbun's first paper on the "Devonian Brachiopoda of Erere, of the Province of Para, Brazil." During this work he had occasion to visit the Museum of Comparative Zoology at Cambridge, where the environment proved so congenial that he remained here for two years. During the summer months he served as a volunteer assistant under Spencer F. Baird in marine explorations on the New England coast. Through his association with Prof. Baird his connection with the Smithsonian Institution began.

In 1875 he was appointed geologist to the Geological Commission of Brazil, and for the following three years he studied the geological features of that country. On returning to the United States he was appointed a scientific assistant in the United States Fish Commission, in which service he remained until 1896.

During this period several papers from his pen appeared in "The Fisheries and the Fish Industry of the United States." During these years also he was involved in the fur seal investigation. The most important international commission to the Fur Seal Islands was the one sent out in 1896, and Mr. Rathbun was named chief advisor to Mr. Hamlin in immediate charge of the case.

In 1896 Mr. Rathbun came to the Smithsonian Institution and at the beginning of 1897 took up the duties as assistant in charge of office and exchanges, later being named assistant secretary. The following year, holding this same title, he was given charge of the National Museum, which position he held until his death.

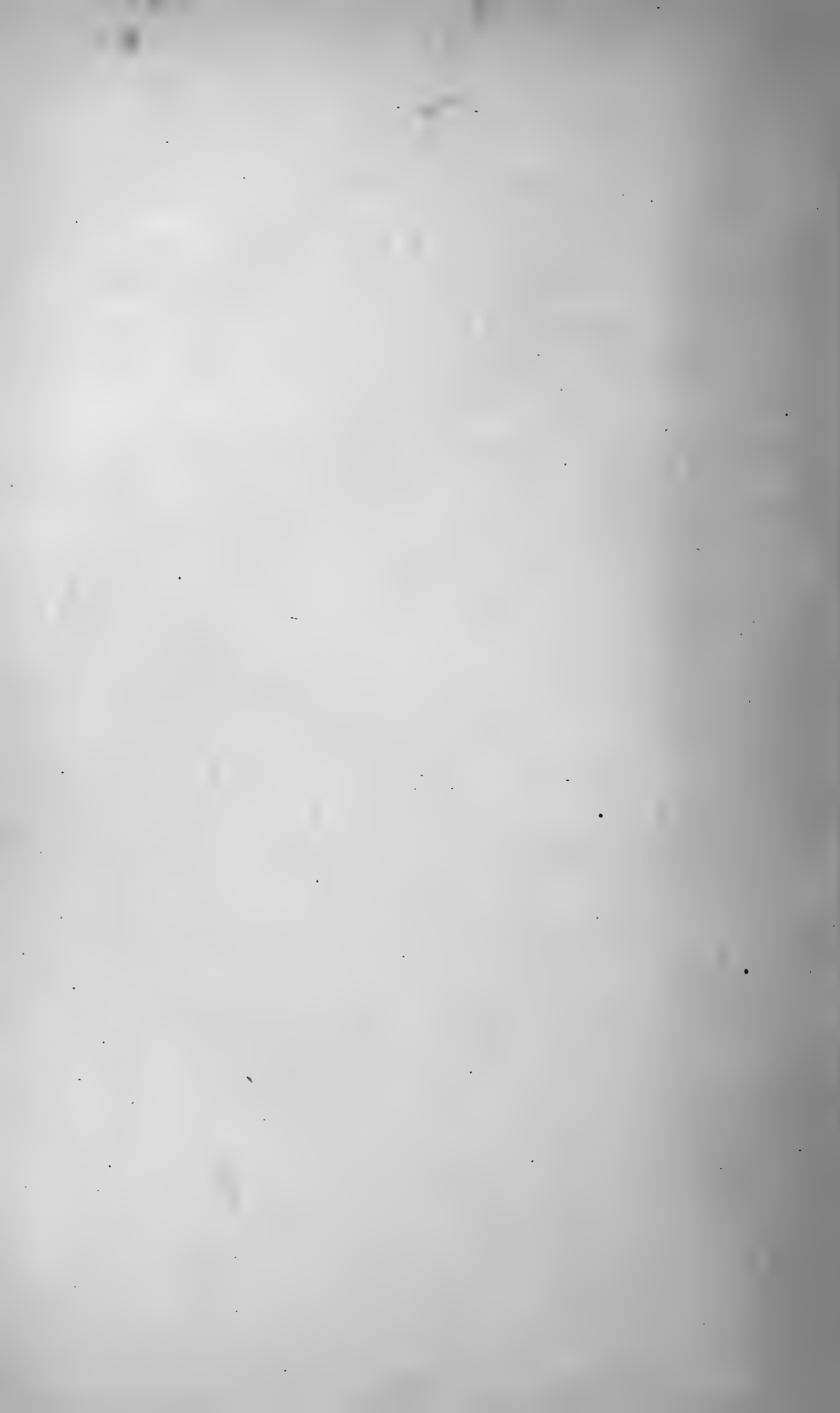
One of the most important events during his administration of the Museum was the appropriation for and the construction of the

new Natural History Building, in which he took a deep interest, and for which he was in large part responsible. He also undertook the development of the National Gallery of Art, a feature of the Smithsonian which is mentioned first in the act creating the Institution, but which had remained dormant for lack of adequate facilities.

Mr. Rathbun was a member of many scientific societies, including several foreign connections. His bibliography contains nearly 100 titles, including the numerous papers written during his connection with the Fish Commission, and his official reports as administrator of the National Museum.

ALONZO HOWARD CLARK.

Alonzo Howard Clark, editor of the Smithsonian Institution, was born in Boston April 13, 1850, and was educated at Wesleyan University, receiving an honorary degree of M. A. in 1906. Mr. Clark's first connection with the Government service was in 1879, when he was put in charge of the United States Fish Commission Station in Gloucester, Mass. In 1881 he was made curator of the division of history of the United States National Museum, and later editor of the Smithsonian Institution, which position he held until his death on December 31, 1918. Mr. Clark was also affiliated with a number of patriotic and historical societies, being secretary and registrar general of the Sons of the American Revolution, and an officer of the Society of Mayflower Descendants and of the Society of Colonial Wars. Matters of patriotic and historical interest were Mr. Clark's chief delight, and it was through his efforts that were begun the present great historical collections in the Museum. He was especially fitted for his position as curator of this division through his wide experience in historical and genealogical work and his many connections with organizations of that nature. Mr. Clark also held a prominent place in the activities of the American Historical Association, being secretary of this organization from 1889 to 1908, and curator from 1889 until the time of his death.



APPENDIX 1.

REPORT ON THE UNITED STATES NATIONAL MUSEUM.

SIR: It is with profound sorrow that I record the death at his home in this city on July 16, 1918, of Richard Rathbun, assistant secretary of the Smithsonian Institution since 1897, and, as such, in charge of the United States National Museum since 1898.

Out of respect to his memory the flags on the buildings of the Institution were carried at half-mast until after the interment of his remains in Rock Creek Cemetery on July 18. Business was suspended in the offices and the public exhibition halls were closed on the day of his funeral.

This is not the place to give an adequate review of the work of Mr. Rathbun as a man of science, or to recall his contributions to the upbuilding of the institution with which he was so long connected. I may be permitted, however, to express here my sense of bereavement in the passing of a man whose friendship and personal and official confidence I was permitted to enjoy.

During Mr. Rathbun's disability, and after his decease, the administration of the Museum devolved upon me as next in authority.

On November 1, 1918, the position of assistant secretary of the Smithsonian Institution in charge of the United States National Museum was discontinued, and I, as directed by you, assumed charge of the administrative affairs of the Museum, with the title of administrative assistant to the secretary. In addition to the general duties of the above assignment, I was designated director of arts and industries.

Introduction.—The scope of the National Museum embraces many subjects, which may be classed under the following headings:

1. Natural history, comprising zoology, botany, geology, mineralogy, paleontology, physical anthropology, ethnology, and archeology.
2. Applied science and art (Arts and Industries).
3. The fine arts (National Gallery of Art).
4. American history.

At the capitals of the principal countries abroad there are generally several separate Government museums for these various classes, notably in London and Paris, resulting from the independent origin of the different collections. In London, for example, the subjects combined in the United States National Museum are distributed between two sections of the British Museum (Bloomsbury and South

Kensington), the Victoria and Albert Museum, the Science Museum, the Museum of Practical Geology, Bethnal Green Museum, the Wallace Collection, the several national galleries of art, and others. In Washington, on the contrary and very fortunately, the entire museum scheme has, by law, been essentially combined under one administration, which not only insures greater economy in management, but permits of a more logical classification and arrangement, the elimination of duplication, and a consequent reduction in the relative amount of space required.

The national collections of the United States are not yet to be compared as a whole with those of certain European countries, though in natural history they are probably not surpassed there. In respect to the fine arts, the Freer collection comprises the most important representation of oriental art in the world. However, in the fine arts generally and in the useful or industrial arts the National Museum has a great task before it, possible of accomplishment only when requisite facilities are supplied.

Steps were taken during the year looking to the more definite organization of the department of arts and industries. Elaborate classifications have been proposed from time to time, but none of these have been strictly followed in the arrangement of the collections, due mainly to the limitation of space. Work is being chiefly centered at present on those subdivisions which are most prominent in relation to current industrial affairs, but there are other subdivisions with important collections which are not represented by experts on the staff on account of lack of funds for their employment. As at present constituted the Department of Arts and Industries may be considered to consist of the Division of Mineral Technology, the Division of Textiles, the Section of Wood Technology, the Section of Foods, the Division of Medicine, and the Division of Mechanical Technology.

War activities.—In the last report the action of the Board of Regents of the Institution at the request of the President of the United States in closing the natural history building to the public on July 16, 1918, was noted, enabling the Museum to furnish the Bureau of War Risk Insurance of the Treasury Department with 138,600 square feet of space for office purposes on the ground and the two exhibition floors. This was done with the understanding that the Museum would be vacated upon the completion of the building then being erected for the bureau at the corner of Vermont Avenue and H Street, and that the Museum space would be turned back to the Museum authorities in the same condition in which it was received by the bureau. Late in March the bureau moved to its own structure, but its funds were then so depleted that it was unable to carry

out the agreement as to renovating the building. It was therefore unfortunately necessary to reopen the natural history building without making the needed repairs, the first floor being opened to visitors on April 11 and the second floor on April 22.

Advantage was taken of the closing of the exhibition halls to give additional attention to classifying, arranging, labeling, and otherwise putting in shape the study series in the various departments. In the department of geology this also afforded opportunity to thoroughly clean and to some extent rearrange the exhibition series, so that when reopened to visitors the halls were more interesting than ever.

From the beginning of the fiscal year until the signing of the armistice on November 11, members of the Museum staff in all departments continued along the same general lines as last year to render service to the various governmental agencies more directly engaged in prosecuting America's part in the great conflict. Much valuable assistance was thus given, and the cooperation of the Museum in this work has resulted in bringing it into even closer relationship with the executive departments with beneficial results.

War collections.—Early in the fiscal year, in cooperation with the War and Navy Departments, the Museum undertook the assembling and installation of a collection of materials relating to the late war, which will probably form one of the most important collections ever undertaken by it, and may, ultimately, need a separate building. It is proposed to perpetuate the part taken by the United States in the World War by preserving and exhibiting objects graphically illustrating the military, naval, and aerial activities, not only of our own side of the conflict but of our opponents as well.

The value of such a collection can not be overestimated from the popular or scientific standpoint, not only forming a fitting and serviceable supplement to the written and printed records relating to the history of the war, but constituting a most notable memorial to the patriotic forces represented by the individuals who have contributed to the preservation of civilization. It will be of the highest value for historical and scientific research.

The scope of this exhibit includes not only the general military equipment, such as tanks, field and machine guns, and other objects used by military organizations, naval equipment, including models of ships, naval guns, docks, yards, etc., airplanes, battle planes, but accessories of all kinds; individual military and naval equipment of the various branches of the service, such as clothing, arms, and other paraphernalia, military and naval decorations and medals, commemorative medals of notable events, mementos, trophies, pictures, paint-

ings, photographs, maps, books, pamphlets, manuscripts, and other objects of the same character relating to the progress of the war.

As the natural history building was closed and every available foot of space in it assigned to the Treasury Department, it became necessary to install the material received during the year for the war collections in the arts and industries building, and to place the large and heavy objects in the open to the west of this building. At the close of the year material for the war collections was coming in steadily, and it had become necessary also to assign to this subject all of the central portion of the ground story and the rotunda of the natural history building—space usually reserved for special exhibitions.

The Museum is particularly fortunate in having a very excellent series of objects showing the development of the airplane, beginning with the Langley models, which have been in its possession for a number of years, and the first Government-owned aeroplane of the world purchased by the United States from Wright Brothers in 1909. Through the director of military aeronautics, Bureau of Aircraft Production, two types of planes used by the French at the front in 1917 were received during the past year, and a Curtiss training plane, such as used at all the training fields in the United States, and the first battle plane constructed in this country for the United States Government—the DH-4, made by the Dayton-Wright Airplane Co. in 1917. This plane has flown over 100,000 miles and been in the air over 1,000 hours.

Through arrangement with the Army and Navy the Museum is planning to exhibit examples of every plane, engine, radio apparatus, and other accessory in production in the United States at the time of the armistice, and has secured for this exhibit the temporary metal structure erected on the Smithsonian grounds in 1917 by the War Department for the use of the Air Service.

Immediate needs of the Museum.—As pointed out in the report of three years ago, the pressing needs of the Museum are those for additional space for the accommodation of collections and for increase in the scientific and technical staff. It is clearly manifest that these needs must be met if the institution, with its numerous departments, is to keep reasonable pace with the development of the country as a whole. The space congestion especially becomes more pronounced and embarrassing with each passing day.

The natural history collections and the laboratories connected therewith require for their reasonable accommodation and administration the entire natural history building, a structure erected especially for this particular purpose. To-day, however, large areas in the building are assigned—and that from necessity—to the rap-

idly growing collections of the National Gallery of Art, and in larger measure even to the great accumulations of historical material relating to the late war which are just now demanding adequate attention. The older building, designed to accommodate the nationally important department of arts and industries, although not adequate in space to serve this purpose, is from absolute necessity half filled with a great body of unrelated exhibits, representing history, anthropology, and art.

The National Gallery of Art, now for the first time taking an enviable place among the galleries of the country, is crowded into the natural history building without possibility of expansion, and many liberally inclined collectors of art works who seek a permanent home for their treasures, and who may be favorably disposed toward Washington, are necessarily met with the statement that additional collections, if acquired, must go into storage. These possible benefactors of the national collection are thus turned to other institutions or to the auction room. The Nation is thus deprived of the possibility of building up, even by gift and bequest, collections of art, such as are highly prized and fully provided for by civilized nations generally. The sooner a building devoted to the fine arts, including all departments, is provided the more quickly will the American people find themselves in the forefront in all that characterizes the highest level of civilization.

American history, one of the most essential and vital of the departments of museum activity, is not better provided for than art. There is no provision for it save in the present overcrowded buildings. A building of an order commensurate with a great national purpose is an absolute essential, and its erection should be provided for with the least possible delay.

COLLECTIONS.

The total number of specimens acquired during the year was approximately 526,845. Received in 1,198 separate accessions, they were classified and assigned as follows: Department of anthropology, 12,333; zoology, 442,383; botany, 40,357; geology and mineralogy, 4,750; paleontology, 26,050; textiles, woods, medicines, foods, and other miscellaneous animal and vegetable products, 884; mineral technology, 62; and National Gallery of Art, 26. As loans for exhibition, 3,096 articles were also obtained, mainly for the divisions of history and American archeology and the gallery of art.

Material to the extent of 539 lots was received for special examination and report.

During the year the Museum made its first purchases from the Frances Lea Chamberlain funds, adding to the Isaac Lea collection

of gems and to the Isaac Lea collection of mollusks, respectively. Through the generosity of Mr. B. H. Swales, a member of the staff, a small fund which has been given the donor's name was established during the year for the purchase of additions to the collection of birds.

The council of the National Academy of Design inaugurated purchases from the Henry Ward Ranger fund by acquiring a landscape by Bruce Crane entitled "December Uplands." Under the conditions prescribed by the will of Mr. Ranger this painting was assigned to the Syracuse Museum of Art and can be reclaimed by the National Gallery of Art at any time during the five-year period beginning 10 years after the artist's death.

Anthropology.—The additions to the historical collections during the past year have been exceptionally large and are especially interesting on account of the fact that so many of them relate to the recent war with Germany. They also include, however, many objects of note connected with the history of the United States prior to that momentous conflict. Of special note in connection with the collection received relating to the war are many mementos of persons and events, battle-field trophies, military and naval uniforms, insignia, and field equipment. These include the Combined Order of Battle Map corrected up to November 11, 1918, with its accessories, as used by Gen. Pershing and his staff at Chaumont, France, throughout the progress of the American military movements, showing locations of all United States divisions and exact location at the signing of the armistice, with the same information as to armies of the Allies and enemies, besides a large amount of other information; a most interesting collection of German military paraphernalia captured during the various engagements in which the American troops participated and assembled in France by Maj. Gen. H. L. Rogers, United States Army, while serving as chief quartermaster of the American Expeditionary Forces; two French military airplanes used on the western front and the first battle plane built in America; collections of infantry, artillery, cavalry, air service, and chemical warfare equipment of the type used during the war; a practically complete series of the uniforms, insignia, decorations, and medals of the Army and Navy; a notable collection of relics of Licut. Benjamin Stuart Walcott, United States Army, who entered the French air service as a member of the Lafayette Flying Corps, was killed in aerial combat, and fell within the German lines December 12, 1917; also loan collections of uniforms worn by French officers. The war collections already received will be supplemented by others until the Museum possesses a complete representation of the vast amount of paraphernalia required in the prosecution of a modern war, including repre-

sentative series of objects actually used during the recent conflict by the United States, the Allies, and the enemy countries.

The most notable collection not connected with the war received by the division of history during the past year consists of a very large and interesting series of costumes and accessories worn by the late Richard Mansfield in his extensive repertoire of historic characters, presented by Mrs. Mansfield. Many other historical relics were received, among them the gold medal awarded by act of Congress to Capt. Thomas Truxtun, United States Navy, in recognition of the defeat of the French ship *Vengeance*, February 1, 1800, lent by Mr. Thomas Truxtun Houston; a silver-mounted telescope owned by Thomas Jefferson, lent by Brig. Gen. Jefferson Randolph Kean, Medical Corps, United States Army; and a jeweled sword presented to Maj. Gen. John R. Brooke, United States Army, by American and Cuban friends in 1899.

The operations of the curators of the divisions of ethnology and archeology in Arizona have added considerably to the collections in archeology, and Dr. W. L. Abbott has supplemented the material generously contributed by him in previous years from Celebes with a large series of costumes, ornaments, and implements collected by Mr. H. C. Raven. Especially interesting are the decorative designs on the bark cloth used for costumes on these islands.

In physical anthropology very important accessions from the ancient pueblo region were received through Mr. F. W. Hodge, as a gift from the Museum of the American Indian, and as a gift from Dr. Edwin Kirk valuable crania and other physical remains from the territory occupied by the Haida and Tlingit tribes of Alaska.

Biology.—The number of specimens received during the year by the department of biology, totaling about 482,740, vastly exceeded the number accessioned last year. This great increase was chiefly due to the incorporation of the unrivaled collection of Antillean land mollusks, aggregating approximately 400,000 specimens, which was donated by Mr. John B. Henderson, a regent of the Smithsonian Institution. It is one of the most complete and extensive collections of its kind in existence not only because it contains nearly all the known West Indian species but because of the large number of types and authentic specimens which it includes. Among the many other important collections received, it may be well to mention the final installment of Mr. Raven's Celebes collections, which we owe to Dr. W. L. Abbott's generosity, and the interesting material from the Collins-Garner Expedition to the French Congo, containing as it does, besides a large number of birds and smaller mammals, three gorillas and several chimpanzees. Secretary Walcott, during his explorations in British Columbia, collected several large mammals for the Museum,

including a mule deer, Rocky Mountain goat, and Rocky Mountain sheep, which made a valuable addition to our collections.

Among the additions to the National Herbarium may be particularly mentioned about 12,000 plants, chiefly from Mexico, donated by Brother G. Arsène and representing the result of eight years' botanical collecting by himself and associates among the Christian Brothers. The collection of Philippine plants was greatly increased by the addition of two lots, aggregating more than 9,600 specimens, one received in exchange from the Bureau of Science, Manila, the other acquired by purchase. The South American series was also augmented considerably by the donation of 1,761 Venezuelan plants by Dr. H. Pittier and 1,077 specimens exchanged with the Museu Goeldi in Para, Brazil, besides the Museum's share of about 2,000 specimens from the Ecuadorean Andes collected by Dr. J. N. Rose on an expedition undertaken jointly with the New York Botanical Garden and the Gray Herbarium; while exchanges with the last-mentioned institution added approximately 1,450 more South American plants.

The exhibition collections were closed most of the year on account of the space having been turned over to the Bureau of War Risk Insurance. However, toward the end of the year the halls on the first floor, containing mostly the mammals and birds, including the great biological groups, were reoccupied by the Museum and opened to the public, after certain additions and improvements in the installation had been made.

Geology.—The additions to the collections in this department during the year were but 135 lots, aggregating an approximate total of nearly 31,000 specimens. This number, although somewhat less than that of the preceding year, is, in part, compensated for by the unusual value of sundry individual specimens. Among these may be mentioned examples of tungsten minerals both from domestic and foreign sources, including a magnificent specimen of scheelite presented by Dr. J. Morgan Clements, of New York City, and upward of 16.5 kilograms of the extraordinary meteorite which fell at Cumberland Falls, in Whitley County, Ky., on the 9th of April, 1919.

The availability of the Frances Lea Chamberlain fund has enabled the department to begin once more a systematic building up of the Isaac Lea gem collection. A 7-gram kunzite, a 16-gram black opal from Nevada, and 5 beautiful examples of Australian opals of a variety heretofore unrepresented in the collections are among the more important additions.

The Middle Cambrian collections obtained by Secretary Walcott from Burgess Pass in British Columbia number nearly 7,000 individual specimens, and form an addition of unusual value. The

same is true of a collection including both fossil invertebrates and plants, mainly from Carboniferous and Silurian rocks of Indiana, and especially rich in beautifully preserved crinoids. This collection, comprising not less than 10,000 specimens, was a gift of Mr. Alva Schaefer, of Brazil, Ind.

Excellent exhibition materials in the line of vertebrate fossils, including part of a skeleton with a skull of the curious amphibial *Diplocaulus copei* from the Permian of Texas; a skull of *Monoclonius*; a skull, partial skeleton, and two hind paddles of *Tylosaurus*; and an articulated series of caudal vertebræ of *Platycarpus* are among the more important accessions. Mention should be made of the addition to the exhibition series of the mounted skeleton of *Dimetrodon gigas*, which was secured some few years ago. This forms the most complete restoration of this extraordinary animal that has thus far been secured by any museum in the world.

Museum work, as in other departments, suffered through interruptions, including the closing of the exhibition halls, incidental to the war, the head curator himself being engaged a part of the time in procuring for the National Research Council important materials needed in newly devised apparatus. Continual demands were made upon the department throughout the entire period of the war for materials for experimental purposes, and it is felt that the department fully justified itself in its capacity for supplying that which was needed.

Advantage was taken of the relief from all exhibition work caused by the closing of the halls, to complete the records and attend to other work such as had heretofore suffered more or less neglect through pressure of other duties.

Incidental mention may be made of the preparation of 100 lots in sets comprising 21 specimens each, illustrating the secular decay of rocks and intended primarily for distribution to the agricultural schools. Considerable progress was also made in the preparation of 100 sets of upward of 80 specimens each of ores and minerals which are intended for distribution as occasion may demand. This is a work which is ordinarily done at odd moments, as no funds are directly available for the purpose.

Textiles.—To the collections under the charge of the curator of textiles, which, besides textiles, embrace wood technology, medicine, food, and animal and vegetable products, the most important addition was the collection received by transfer from the Office of the Surgeon General of the War Department, consisting of apparatus, hospital appliances, and field equipment used by the medical, dental, and sanitary corps in the war with Germany, including examples of all kinds of equipment of a thousand-bed hospital overseas. At the

end of the year this was being made ready for the public in connection with the war collections on the ground floor of the natural history building.

Among the gifts were medicinal plants, pharmaceutical products, pile fabrics, novelty dress fabrics, leather cloth, and other waterproof textiles extensively used during the war, knitting and crocheting yarns with examples of pattern stitches, an extensive collection illustrating the production, classification, and conservation of foods, with many such from the Department of Agriculture and the United States Food Administration, and an exhibit illustrative of neglected sources of supply of fats and oils for food purposes.

In making the food exhibits as useful as possible a cooperative arrangement was entered into with the States Relations Service of the Department of Agriculture whereby regular demonstrations on the value, use, preparation, and conservation of foods were given at the Museum by experts of the department. A large room in the arts and industries building was fitted up as a demonstration kitchen and space provided for displaying foods, models, and household equipment. This work soon broadened into a household consultation center, with lectures and demonstrations covering a wide range of subjects. There were lectures on the Business of the household; Food for the family on \$2 per day; Direct marketing; What becomes of the consumer's dollar; What to give your children to eat; Milk, its nutrition and use; Meat substitutes; Housekeeper's use of market schedules; and Influence of weave structure upon the durability of fabrics. The demonstrations included labor-saving appliances for the kitchen; the fireless cooker; the pressure cooker, the electric washing machine; preserving eggs; cooking dinner in 30 minutes; the one-dish meal; invalid cookery; dried milk powder; Christmas sweets; sugarless candies; and fruit juices in summer drinks. By classes and demonstrations for housekeepers in the mornings and afternoons and special classes for war workers at 5 p. m., over 2,100 persons were reached during the year.

Mineral technology.—In mineral technology the customary work of the division was shelved in favor of special activities with a more direct bearing on the national emergency. As the war progressed the call for specialization on the part of its technical staff increased. While the country was still actively involved on a basis of war, scarcely a day passed without bringing calls from some governmental agency for assistance with reference to one or another industrial issue up for consideration on an emergency rating, the questions ranging from determining a fair price for mica to determining the likelihood of a paralyzing petroleum shortage. As the year advanced, however, two absorbing lines of special investigation developed to such a degree that during the latter half of the year they

largely engrossed the attention of the staff. Their general nature may be gathered from the titles under which the results were issued. One, "A Report on the Political and Commercial Control of the Nitrogen Resources of the World," represents an effort to unravel the complexities of the nitrogen situation left behind in the passing of the war. The other, "The Energy Resources, a Field for Reconstruction," coordinates and summarizes the work of several years.

THE NATIONAL GALLERY OF ART.

The National Gallery of Art is fortunate in the acquirement of art works of exceptional importance during the year. Among these the most noteworthy is a gift by Mr. Ralph Cross Johnson of 24 paintings, which comprises selections from the brushes of 19 of Europe's foremost masters. The Gallery is thus more fully assured of a worthy position among the galleries of the Nation. The extension of the Gallery's activities to wider fields than heretofore is marked by the acquirement by gift of an installment of a rich collection of art works of European origin from Rev. A. D. Pell, of New York.

Notwithstanding the prevailing labor conditions much progress was made during the year on the building being erected by the Institution at the expense of Mr. Charles L. Freer, on the southwestern corner of the Smithsonian reservation, to house the Freer collections of American and oriental art. The building was entirely inclosed at the end of the year, the exterior granite and marble walls and the roofs being completed. Work on the interior is now progressing satisfactorily, and it is expected that the structure will be entirely finished this autumn.

MEETINGS.

Shortly after the armistice was declared and as soon as the auditorium, which had been vacated late in November, could be repainted and the chairs replaced, there was inaugurated a series of popular lectures, under the auspices of the Institution, on alternate Saturday afternoons, between the hours of 4.45 and 5.30, commencing January 18, 1919. The lecturers and subjects are noted in the report of the secretary.

The meeting facilities afforded by the auditorium and committee rooms were also availed of, as follows:

By the United States Employment Bureau of the Department of Labor, for lectures by Dr. Meeker on the gathering and interpretation of statistics, and by Dr. Prosser on training of the handicapped; by the Children's Bureau for a conference on child's welfare, with an illustrated lecture; by the Ordnance Bureau of the War Depart-

ment for an illustrated lecture by Lieut. Col. G. M. Barnes on battle scenes in the World War; by the Artillery Division of the Army for an illustrated lecture on the method in camouflaging used by that division during the war; by the Public Health Service of the Treasury Department for a moving picture, "Fit to win," before the faculties and students of the departments of medicine and dentistry of the Georgetown University, with remarks by Asst. Surg. Gen. Pierce and by Dr. George E. Kober and Dr. Bruce L. Taylor; by various divisions of the Bureau of War Risk Insurance on numerous occasions for various purposes; by the American Society of Mammalogists; by the Wild Flower Preservation Society; by the Biological Society of Washington; by the Louisiana Society of Washington, with an illustrated lecture by Hon. M. F. Alexander, State commissioner of conservation, on the work accomplished by the Alabama Conservation Commission during the past 10 years; by the National Women's Trade Union League for a lecture by Miss Margaret Bondfield, of England, on the new spirit of British labor; by the Minimum Wage Board of the District of Columbia for a conference; by the District of Columbia Chapter of the Sigma Xi for its annual meeting and an illustrated lecture by Maj. R. M. Yerkes on the relationship of Army tests to education and vocational guidance; and by the scientific and technical Federal employees for the purpose of forming an organization with a view to joining the Federal Employees Union.

The main hall, range, and chapel of the Smithsonian building proving inadequate for the annual meeting of the National Academy of Sciences in April, the sessions of the last two days were transferred to the Museum auditorium. The auditorium was also used two days for a conference on the American merchant marine, the Hon. Joseph E. Ransdell presiding.

MISCELLANEOUS.

The distribution of duplicates for educational purposes, chiefly to schools and colleges, aggregated 3,441 specimens, while over 5,000 more were used in procuring additions to the collections through exchanges. Material sent for study to collaborators of the Museum and other specialists amounted to 19,851 specimens, mainly zoological.

During the approximate three months that the natural history building was open the attendance of visitors was 94,240 for week days and 38,619 for Sundays, an average of 1,149 for week days and 2,758 for Sundays. From November 10 to April 6 the opening of the arts and industries building was extended to include Sundays as well as week days, the attendance there for the year being 225,927 on week days and 40,605 on Sundays, a daily average of 721 for the

former and 1,845 for the latter. At the Smithsonian building the total attendance was 101,504, with a daily average of 324 persons.

The publications of the year consisted of two annual reports, those for 1917 and 1918, two volumes of proceedings, four bulletins, and 71 separate papers. The total distributions of Museum publications during the year aggregated 118,332 copies.

The Museum library was increased by 2,172 volumes and 2,614 pamphlets and unbound papers, mainly procured by gift or exchange. Among the more important acquisitions was a set of catalogues of the art collections of J. Pierpont Morgan, presented by J. Pierpont Morgan, jr., the valuable library of Dr. Richard Rathbun, relating to the museums of the world and to natural history subjects, the gift of his heirs, and the 12 volumes of its Humanistic Series, donated by the University of Michigan. The library now contains 54,685 volumes and 87,109 pamphlets and unbound papers.

Respectfully submitted.

W. DE C. RAVENEL,
Administrative Assistant to the Secretary
in charge U. S. National Museum.

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

AUGUST 25, 1919.

APPENDIX 2.

REPORT ON THE BUREAU OF AMERICAN ETHNOLOGY.

SIR: In response to your request I have the honor to submit the following report on the researches and other operations of the Bureau of American Ethnology during the fiscal year ended June 30, 1919, conducted in accordance with the act of Congress approved July 1, 1918, making provision for sundry civil expenses of the Government, and following a plan submitted by the chief and approved by you as Secretary of the Smithsonian Institution. The act referred to contains the following item:

American ethnology: For continuing ethnological researches among the American Indians and the natives of Hawaii, including the excavation and preservation of archæologic remains, under the direction of the Smithsonian Institution, including necessary employees and the purchase of necessary books and periodicals, \$42,000.

The ethnological and archeological researches of the staff which are considered in the following report being by law restricted to the American Indians thus from necessity are more or less limited in scope, but notwithstanding this limitation and the intensive work that has been done in the past there is no indication that this field has been sufficiently cultivated or is approaching exhaustion. It is evident that aboriginal manners and customs are rapidly disappearing, but notwithstanding that disappearance much remains unknown, and there has come a more urgent necessity to preserve for posterity by adequate record the many survivals before they disappear forever.

The remnants of languages once spoken by large populations have dwindled to survivals spoken by one or more centenarians, and when they die these tongues, if not recorded, will be lost forever. Such a fate nearly happened with an Indian tongue in California last year on account of a contagious disease, but fortunately, through the field work of one of our staff, it was rescued before its extinction.

The continued study of the material culture of the Indians has a practical economic value. Certain food plants, like maize, and fibers, like henequen, have already been adopted from our aborigines, and there are others of vast economic value which await investigation. Ethnological studies of our Indians along these lines are being made by the members of the staff.

Another instructive line of work the past year relates to the history of the Indians both before and after the advent of the Europeans.

Such studies tend to a broader appreciation of racial character and have special value when we reflect how rapidly the Indian population is merging into American life. The excavation and repair of prehistoric monuments in our Southwest is enlarging our knowledge of history as well as attracting more and more tourists and replacing threadbare prejudices with saner ideas of Indian possibilities in many lines.

The logical results of the events of the last years appear in the calls for information made on the staff for accurate knowledge of other races besides the American Indian. It needs no prophet to predict that the future will demand an extension of the bureau work to other races. The calls for ethnological information on the Indian during the past year have been many and varied and considerable time of the ethnologists has been taken up in answering the many requests of this nature that are made. The chief has given much time to administration and routine work.

In addition to administrative duties the chief has been able to devote considerable time to research work in the field and has prepared for publication several scientific articles, the largest of which will soon be published as Bulletin No. 70. These field researches are in accordance with the above-mentioned act of Congress, which includes the excavation and preservation of archeological remains. In September he took the field, continuing his explorations of the castles and towers of the McElmo and tributary canyons in southwestern Colorado, extending his studies westward into southeastern Utah as far as Montezuma Canyon. The object was to determine the western horizon of the area of the pure type of pueblos and cliff dwellings, and to investigate the remains of antecedent peoples from which it sprung in order to obtain data bearing on the question of the origin of the San Juan drainage culture. The country traveled through is especially rich in prehistoric towers and castellated buildings, but contains also many clusters of mounds formed by fallen walls of large communal buildings, many of which were wholly or partially unknown to science. The work was largely a reconnoissance and no extensive excavations or repair work was attempted. Special attention was paid to the structure and probable use of towers which are combined with cliff houses like Cliff Palace, or great villages like those of the Mummy Lake and upper San Juan and its tributaries. Among the most significant new towers discovered were two found in McLean Basin, near the old Bluff City trail not far from the State line of Utah and Colorado. The McLean Basin ruin has a rectangular shape, with a round tower on one corner and one of semi-circular form on the diagonally opposite angle, each 15 feet high. The building on which these towers stand must have presented a very exceptional appearance in prehistoric times before its walls

had fallen. Another ruin found in a cave in Sand Canyon is instructive on account of its being the only one yet found with a single kiva of the unit type. It was probably a ceremonial cave, the room showing scanty evidence of having been inhabited.

One of the discoveries made was the recognition that the buildings on McElmo Bluff had a crude masonry characterized by stones set on edge, the walls being made of adobe and logs. The stones of one or more rooms on this site were large, indicating megalithic stone houses. All the data assembled indicate that they antedated the fine horizontal masonry of the pueblos and cliff dwellings.

While in the field the chief carried on a correspondence with Mr. Van Kleeck, of Denver, owner of the Aztec Spring Ruin, which led to that ruin being presented to the National Park Service and later accepted by the Secretary of the Interior. The presentation of this interesting ruin to the Government is important and it is to be hoped that it will later be excavated and repaired and thus present an additional attraction to tourists and an important aid to the archeologist in the interpretation of this type of southwestern ruin.

In May the chief visited Austin, Tex., and inaugurated work on the antiquities of that State, the archeology of which has been neglected. This work is now being prosecuted by Prof. J. E. Pearce, of the University of Texas, and bids fair to open up a most instructive chapter in a field of which we know comparatively little. Important discoveries have been made in the aboriginal workshops and village sites at Round Rock and near Austin, where fine flint implements are very abundant. The work will be continued into the timbered region of eastern Texas, where we find pottery related to that of Louisiana and Arkansas and evidences of a radically different prehistoric culture from that of central Texas.

Mr. James Mooney, ethnologist, at the beginning of the fiscal year was at his former field of labor among the Kiowa and associated tribes of western Oklahoma, where several months were devoted to the collection and revision of material and observations of ceremonies among the Kiowa, Comanche, Kiowa Apache, Cheyenne, Arapaho, Caddo, and Wichita in continuation of studies of their aboriginal heraldry, social and military organization, and religion.

Since his return to Washington in November he has been employed chiefly in the coordination of material obtained in the field and in the compiling of data for reply to current letters of ethnologic inquiry.

Dr. John R. Swanton, ethnologist, devoted a considerable part of his time during the past year to the collection of material from published sources for a study of the economic background of the life of the American Indians north of Mexico. This involves an exami-

nation of the sources, location, and quantity of food supplies and of new materials used in the industrial life of the various tribes—materials of wood, stone, bone, shell, etc. In this way it is hoped that a more complete understanding of the density and distribution of the prehistoric population may be reached, and the location and significance of trade routes established. A clearer idea is also sought of the shifts in population undoubtedly brought about by the introduction of corn. Without some study of the kind no proper estimate of the social and religious institutions of the people of prehistoric America is possible.

His work on the languages of the Indians of the lower Mississippi Valley has been continued, and at the end of the year it was directed particularly to the preparation of a grammatical sketch of the Natchez language from materials collected by him during the last 10 years from one of the three surviving speakers of that tongue.

In April Dr. Swanton visited Oklahoma in order to collect additional information regarding the little understood and now almost forgotten social systems of the Choctaw and Chickasaw Indians. Although small in bulk, the material obtained in the course of the investigation is valuable. It has already been incorporated into a manuscript paper on the social organization and social customs of the Indians of the Muskogean stock. During the trip he also secured the services of an educated Chickasaw in writing texts in his native tongue, and one of these has already been received.

Before his return to Washington, Dr. Swanton visited Anadarko, where he learned that the language of the Kichai Indians is on the point of extinction, and began the collection of a vocabulary. He has made arrangements for more extended work upon this language in the fall.

He has submitted two papers for publication during the year, first a philological paper entitled "A Structural and Lexical Comparison of the Tunica, Chitimacha, and Atakapa Languages," which is being published as Bulletin 68, in which he believes he has shown the relationship of what had hitherto been classed as three independent stocks; and, second, an extended historical study of the Creek Indians and their neighbors.

Mr. J. N. B. Hewitt, ethnologist, on his return from field work, July 5, 1918, took up the final reading of the proofs of his report in the Thirty-second Annual Report of the Bureau of American Ethnology. These proofs were sent to the Printing Office November 9, 1918, and the printed report was ready for distribution May 12, 1919.

At this time he also took up the work of preparing for the press the texts, with free and interlinear translations, of an Onondaga version of the Myth of the Beginnings, the Genesis Myth of the

Iroquoian peoples, as the second part of Iroquoian Cosmology, the first part having been printed in the Twenty-first Annual Report of the bureau. The copying of the pencil text was completed, aggregating 316 typewritten pages. This includes the supplementary myth of much later date than the accompanying version of the Myth of the Beginnings. The most interesting feature of the supplementary myth is the naive description of one of the most remarkable figures developed by the cosmic thinking of Iroquoian poets. This potent figure, in whose keeping are life and the endless interchange of the seasons, is most striking in his external aspect—one side of his body being composed of living flesh and the other of crystal ice. In the longer preceding myth, to which this is supplemental, the Master of Life is an independent personage, and so also is his noted brother, the Master of Winter, the Winter God, whose body is composed of crystal ice. The Life God, or Master of Life, controlled the summer, and his brother, the Winter God, controlled the winter. So in this peculiar figure there appears the inceptive fusing together of two hitherto independent gods who were brothers because they dwelt together in space and time.

This remarkable figure is, in fact, the symbol of the absorption of the personality—the functions and activities—of the Master of Winter (the Winter God) by the Master of Life and his powerful aids, manifested in the power of the Master of Life (the Life God) to save and to protect from dissolution and death his many wards, all living things that comprise faunal and floral life. This fact emerges from the experience of the human race from year to year. This submergence of one divine personality in that of another is a process of cosmic thinking encountered in the mythic philosophy of other races. This figure, as described in this text, is worthy of intensive study by the student of comparative mythology and religion. The pencil texts of these myths aggregate 1,057 pages and the typewritten 316 pages. The tentative draft of the free translations of these texts aggregates 250 pages of typewriting. Some work was also done in supplying the first text with a literal interlinear translation. This will be ready for the press at an early date.

Mr. Hewitt also continued work on his league material, in which he completed the copying of the corrected and amended native text of the tradition of the founding of the Iroquois League, or Confederation by Deganawida, making 189 typewritten pages, and also the amended and corrected text of the Chant of the Condoling and Installation Council, detailing some of the fundamental laws of the league; this occupies 13 pages.

Upon request, Mr. Hewitt also submitted an article on the League of the Iroquois and Its Constitution for the Annual Report of the Smithsonian Institution; it occupies 30 typewritten pages.

Mr. Hewitt has also attended the meetings of the United States Geographic Board, on which he represents the Smithsonian Institution.

As custodian of manuscripts, Mr. Hewitt has charged out and received back such items as were required by collaborators.

Mr. Hewitt also spent much time and study in the preparation of matter for official replies to letters of correspondents of the bureau or to those which have been referred to the bureau from other departments of the Government.

On May 12, 1919, Mr. Hewitt left Washington on field duty. His first stop was on the Onondaga reservation, situated about 8 miles south of Syracuse, N. Y. There he was able to record in native text all of the doctrines of the great Seneca religious reformer, Skanyodaiyo ("Handsome Lake"). This is an important text, as it will serve to show just how much was original native belief and how much was added by the reformer from his impressions formed from observing the results of European intrusion. This text contains about 14,000 native terms. He also recorded the several remnant league rituals and chants which are still available on this reservation. But they are so much abbreviated and their several parts so confused and intermixed one with another that with these remains alone it would be absolutely impossible to obtain even an approximate view of their original forms and settings—a most disappointing situation for the recorder. Only the most elementary and superficial knowledge of the structure and constitution of the Iroquois League survives here.

Having completed his projected work at this reservation, Mr. Hewitt went, May 31, to the Six Nation's reservation on Grand River, Ontario, Canada. Here he resumed the analysis, correction, amendment, and translation of the league texts which he had recorded in previous years. Satisfactory progress was made in this work up to the time of the close of his field assignment.

During the year Mr. Francis LaFlesche, ethnologist, devoted a part of his time to the task of assembling his notes taken at the time of his visit among the Osage people in the month of May, 1918. These notes relate to the tribal rite entitled Ga-hi'-ge O-k'o^a, The Rite of the Chiefs. The ritual contains 27 wi'-gi-es (recited parts), 20 of which belong to individual gentes and 7 of which are tribal.

In this ritual is embodied the story of the four stages of the development of the tribal government, including both the military and the civil forms, beginning with the chaotic state of the tribal existence.

The securing of the information relating to this rite required considerable tact, patience, and time, because the men familiar with all the details still regard the ancient rites with reverence and supersti-

tious awe. The transcribing of the wi'-gi-es from the dictaphone records and the translation of the words from the Osage into the English language were laborious and tedious tasks. This rite will soon be entirely forgotten, as it has been abandoned now for a number of years, and the rescuing of it for preservation has been timely.

This rite, which will make the first part of the volume now being completed for publication, covers 182 typewritten pages without the illustrations, maps, and diagrams.

The office of hereditary chief has been abandoned and since 1881 has been elective.

Upon the completion of *The Rite of the Chiefs*, the work of arranging for publication the ritual entitled Ni'-ki Wa-thoⁿ, *Song of the Sayings of the Ancient Men*, was taken up. This ritual tells of the origin of the people of the Hoⁿ'-ga subdivision of the Hoⁿ'-ga great tribal dual division. The story of their descent from the sky to the earth and of their subsequent movements is put into wi'-gi-e form and recited at the initiatory ceremonies. Each gens has its own version of the story and has in it a proprietary right, a right that in olden times was not infringed upon by the others.

Mr. LaFlesche was fortunate in becoming acquainted with an Osage by the name of Xu-tha'-wa-toⁿ-iⁿ and of winning his friendship. This man belonged to the Tsi'-zhu Wa-noⁿ gens of the Tsi'-zhu great tribal dual division. Without the slightest hesitation he recited for Mr. LaFlesche the Ni'-ki Wi'-gi-e of his own gens, and he also gave with it some of the shorter wi'-gi-es that accompany certain ceremonial acts of the ritual.

These origin rituals when completed will cover more than 220 typewritten pages, to which two short wi'-gi-es of a like character, nearly ready, will be added. These pages added to those of *The Rite of the Chiefs* will bring the number of typewritten pages, without the illustrations, close to 430.

The Fasting Ritual, which was completed some time ago, and covers 492 pages, exclusive of the illustrations, and the two rituals above referred to, will make the first volume of a projected work on the Osage tribe.

On July 1, Dr. Truman Michelson, ethnologist, visited Tama, Iowa, and completed his field work on the grammatical analysis of the text of "*The Owl Sacred Pack of the Fox Indians.*" On his return to Washington he worked out a practically exhaustive list of verbal stems and submitted a manuscript for publication. He also observed mortuary customs under peculiarly fortunate conditions and obtained a number of texts written in the current syllabary on mortuary customs, eschatology, etc. He restored phonetically and translated, with a few exceptions, 310 personal names. He verified a previous discovery that certain gentes have their own peculiar names

for dogs and horses, and translated 127 of these names for a forthcoming paper on Fox sociology. Dr. Michelson finished the correction of Jones' Ojibwa Texts, part 2, which with part 1, previously corrected by him, will form the basis of a proposed sketch of Ojibwa grammar. During the fiscal year he also from time to time furnished data to answer official correspondence.

The beginning of the fiscal year found Mr. J. P. Harrington, ethnologist, at Taos, N. Mex., engaged in the correction and completion of his manuscript on the Tiwa language. The Taos material of the late Mrs. M. C. Stevenson, which is of considerable bulk and great value, was also checked up and made more complete, especially in its linguistic aspects. The close genetic relationship of the Tanoan dialects of New Mexico with Kiowa is remarkable, a very large number of stems and affixes having practically the same sound, while the grammar runs parallel throughout. Certain subtle and unusual phonetic hardenings occurring in these languages make it impossible to assume anything but common descent from a not very remote ancestral tongue. These discoveries open up far-reaching speculations and problems with regard to the origin of the Pueblo Indians.

In August Mr. Harrington proceeded to southern California, where he continued his studies of the Chumashan Indians, most of the time being devoted to the Ventureño, which was also the dialect most successfully studied. During the course of the work the last good informant on the language of La Purisima died. Important information was recorded on the ancient customs attending birth, marriage, and death, and some idea was gleaned of the manner of conducting primitive pre-Spanish fiestas. Data on native foods was also obtained, including detailed descriptions of the preparation of acorn and other vegetal foods in this region, information on these processes having never before been recorded. For example, in the preparation of acorns various species were employed, and also certain individual trees were noted for their preferable fruit, but the final palatableness of the acorn mush depended largely on the patience and skill of the woman who prepared it. A kind of acorn bread was also prepared by cooling the mush in small molds which were placed in running water. Certain other vegetal foods, as the pit of the islay or California wild cherry, required long and complicated preparation. As primitive beverages may be mentioned toasted chia or similar seeds stirred up with the fingers in cold water; a satisfying drink made by soaking the bark of the ash in water; blackberries crushed in water; and a drink prepared from the fruit of the manzanita. A delicious sugar was obtained from a species of reed, and the fruit of the juniper was ground into a sweet, yellowish food. Interesting snatches of information reveal the former plenitude of fish and game. Fishing paraphernalia was evi-

dently quite highly developed, both nets and harpoons having been in use, but the whale was not hunted, although the flesh of stranded whales was eagerly made use of.

Mr. Harrington returned to Washington at the close of May and spent the following month in the preparation of manuscript material.

SPECIAL RESEARCHES.

Dr. Franz Boas, honorary philologist, has been engaged in the correction of the proof of the Thirty-fifth Annual Report. Continued correspondence with Mr. George Hunt, of Fort Rupert, Vancouver Island, has added a considerable amount of new material to the original report.

Preparatory work for the discussion of the ethnology of the Kwakiutl Indians was also continued during the present year. A chapter on place names and another one on personal names and material for maps accompanying the chapters on place names has been submitted. Thanks are due to Dr. Edward Sapir, of the Geological Survey of Canada, through whose kindness the detailed surveys of the land office of British Columbia have been utilized. Other detailed maps showing the distribution of garden beds and charts illustrating the genealogies of a number of families have been prepared.

After the unfortunate death of Mr. Haerberlin, the work on the Salish material was transferred to Miss Helen H. Roberts, who, in the course of the year, completed the study of the basketry of the Salish Indians. A considerable amount of additional information, the need for which developed during the work, was supplied by Mr. James Teit, who, at Dr. Boas's request, and following detailed questions, reported on special aspects of the decorative art of the Thompson Indians. This work has been carried on with the continued financial support of Mr. Homer E. Sargent, whose interest in ethnological work in the Northwest has already furnished most important material. During the year the work on the map accompanying the discussion of the distribution of the Salish tribes was also completed.

Work on the second part of the Handbook of American Indian Languages also progresses. The completed sketches of the Alsea language, by Dr. Leo J. Frachtenberg, and that of the Paiute, by Dr. Edward Sapir, were received by the end of the preceding fiscal year, and the editorial work on these sketches has nearly been completed. These two sketches and that of the Kutenai, which has partly been written, will complete the second volume of the Handbook.

Dr. Walter Hough, curator of ethnology, was detailed to continue archeological work in the White Mountain Apache Reserve, Arizona,

on ruins reconnoitered in 1918. Dr. Hough was aided in his field work by Mr. and Mrs. S. W. Jacques, of Lakeside, by whom his work was much facilitated. Field work was especially devoted to the ruins called by the Apaches Nustegge Toega, "Grasshopper Spring," and clusters of sites in the near vicinity which form a very large group, indicating extensive intermingling of cultures. The main cluster stands in the open green valley and consists of two great heaps of stones covered with squaw bush, walnut, juniper, and pine, with occasional fragments of projecting walls, evidences of two large compact pueblos separated by Salt River draw. The west village (four or five stories high) has a court near the south end, 90 by 140 feet, connected with a small plaza, and covers more than an acre. The east village is more than half an acre in area. North of the west village is a plaza 300 feet long, flanked in part on the west by an isolated clan house of 18 rooms. The six ruins in the cluster that may be regarded as clan houses differ in size and arrangement of rooms and in general show considerable skill in construction. A third form of building west of the large village is indicated by large rectangular areas outlined with building stones scattered over the level ground. The foundations are of four or five courses, but never were buried more than 18 inches, indicating that they did not support a heavy superstructure. Two lenticular rubbish heaps, measuring 60 by 72 feet and 4 feet high, lie on the meadow 100 yards south of the walls of the large village. A feature of Pueblo masonry discovered here was retaining walls of quite large stone set on bedrock, apparently intended to counter lateral thrust of heavy walls. Several rooms were cleared out by Apache laborers under Dr. Hough's direction and many artifacts and some human skeletal material were obtained.

Mr. Neil M. Judd, curator of American archeology, prosecuted archeological field work in certain caves in Cottonwood Canyon which he had visited in 1915. He successfully investigated five prehistoric ruins in Cottonwood Canyon caves during the two weeks in which work was possible. Walls of houses were found to be built entirely of adobe, as well as the customary structures made of stone bound with clay mortar. Associated with these dwellings were rooms of still another type—houses whose walls consisted of vertical posts set at intervals and joined by masses of adobe. It will be noted that all three types closely resemble those structures exposed during the excavation of mounds in central Utah and previously reported.¹

The dwellings in "Kiva Cave" form the best preserved cliff village yet visited by Mr. Judd north and west of the Rio Colorado. Two of the four houses visited are practically intact; the ceremonial

¹ Smithsonian Misc. Coll., vol. 66, No. 3, pp. 64-69; No. 17, pp. 103-108; vol. 68, No. 12, p. 83.

chamber, from which the ruin takes its name, being in excellent condition, although constantly exposed to the snow and summer rains. After excavating this cave considerable restoration was attempted in order that walls weakened by action of the elements and by thoughtless visitors might be preserved for years to come. At the suggestion of Mr. B. A. Riggs a fence was constructed around the house to keep cattle from that portion of the cave.

Buildings with masonry walls were also found in "Ruin Cave," but in this case were built directly upon remains of other structures of an entirely different character. The latter are usually circular and their walls were formed of posts to which horizontal willows were bound at intervals of 7 or 8 inches; adobe mud was pressed between these posts and over the willows, but additional and larger supports were required to take the great weight of the roof. Although these structures lie generally beneath the stone houses, it is evident that both types were built by the same people and the occupancy of the cave was at no time long interrupted.

Prehistoric house remains were also found in each of the other three caves excavated, but they consisted chiefly of small rooms with walls constructed entirely of adobe. Still other ruins were discovered high up under the ledges that lie on either side of Cottonwood Canyon, but unusual conditions prevented examination of these.

Upright sandstone slabs invariably form the inner base of the walls in ruins throughout the region under consideration, a fact which connects them with the so-called "slab-house" people of the San Juan drainage. Whether there is, in fact, any justification for this term remains yet to be proven, but the cultural relationship of the prehistoric peoples in southwestern Utah with those south of the Rio Colorado is at last definitely established.

The bureau purchased from Miss Frances Densmore papers on "Chippewa Remedies and General Customs" and "Chippewa Art." The latter article has 164 pages, with 42 pages of old Chippewa designs and numerous photographs pertaining to industries, medicinal plants, customs, and toys of children, games, processes of weaving, tanning, and other industries. The lists of plants were identified by Mr. Paul C. Standley.

Miss Densmore likewise submitted much new manuscript material on the music of the Mandan, Hidatsa, and Pawnee. With this addition her account of the Mandan-Hidatsa music contains 340 pages, more than 40 illustrations, and two new forms of graphic representation of their progression. This article is now ready for publication.

An important field of aboriginal music thus far not sufficiently investigated is among the Pawnee. While engaged in the study of the music of this tribe at Pawnee, Okla., Miss Densmore witnessed a Hand Game, the Buffalo, Lance, and two Victory dances, and later

recorded on the phonograph the numerous songs sung at the three first gatherings. This material, with musical transcription tabulated and descriptive analyses, has been purchased by the bureau.

Dr. Aleš Hrdlička, curator of physical anthropology, was detailed to make an examination of the archeological remains of southwestern Florida, especially of the shell heaps along the coast south of Key Marco, a region very little explored by archeologists and one of the least known sections of that State. In spite of difficulties, Dr. Hrdlička's field work was successful. He visited several groups of shell heaps of large size as yet unrecorded and opened up a most instructive field for future exploration in a report which has been presented for publication. He also made highly important observations on physical features of the remnants of Indians that still inhabit the little known regions of Florida.

Mr. David I. Bushnell, jr., continued the preparation of manuscript for the Handbook of Aboriginal Remains East of the Mississippi, adding various notes to the manuscript. He likewise added about 30 pages to the manuscript entitled "Native Villages and Village Sites East of the Mississippi," now being printed as Bulletin 69. During the same period he completed a manuscript bearing the title "Native Cemeteries and Forms of Burial East of the Mississippi," which is to appear as Bulletin 71 of the bureau series.

With an allotment from the bureau Mr. Gerard Fowke has been engaged in special archeological investigations in the Ozark region of central Missouri. His careful detailed studies have been confined to the numerous caves in that region.

If "cave men," using this term to designate the predecessors of any race or tribe known to history, ever existed in the Mississippi Valley, we would find in no part of it natural features better adapted for his requirements than the Ozark Hills, but so far not the slightest trace of his presence has been revealed. Products of human industry have been reported as occurring under other conditions at great depths, even at the bottom of the loess, though in all such cases there is some uncertainty as to the correctness of the observations. On the contrary, whatever may be the depth of the deposit containing them, the artificial objects exhumed are uniform in character from top to bottom. The specimens found on the clay or solid rock floor are of the same class as those barely covered by the surface earth. Moreover, when they cease to appear they cease absolutely.

By careful search in the caves and rock shelters of which the Indian known to history availed himself extensive and interesting museum collections can be made. To find an earlier man it will be necessary to investigate caverns which he found suitable for occupancy and in which the accumulation of detritus, from whatever source, has been sufficient to cover his remains so deeply that they

can not be confused with those of a later period, and it may be necessary to discover with them bones of extinct animals. No examination of a cavern is complete unless a depth is reached where glacial deposits are undeniably of such age as to antedate the possible appearance of man upon the scene. The Ozark region promises important revelations in the study of prehistoric man in America.

Mr. Fowke has thoroughly investigated one of the caves in this region and has prepared an important report on his work which will later be published by the bureau. He has also transmitted to the National Museum a collection which is the largest yet obtained from this locality. The results of the work thus far are technical and can not be adequately stated in this place, but are not only very important additions to the archeology of the region investigated but also highly significant in comparative studies of ancient man in North America.

MANUSCRIPTS.

In addition to the manuscripts submitted for publication by the bureau there was also obtained by purchase an article by Mr. C. S. Simmons dealing with the Peyote religion.

EDITORIAL WORK AND PUBLICATIONS.

The editing of the publications of the bureau was continued through the year by Mr. Stanley Searles, assisted by Mrs. Frances S. Nichols. The status of the publications is presented in the following summary:

PUBLICATIONS ISSUED.

Thirty-second Annual Report.—Accompanying paper: Seneca Fiction, Legends, and Myths (Hewitt and Curtin).

Bulletin 59.—Kutenai Tales (Boas).

Bulletin 61.—Teton Sioux Music (Densmore).

Bulletin 64.—The Maya Indians of Southern Yucatan and Northern British Honduras (Gann).

Bulletin 65.—Archæological Explorations in Northeastern Arizona (Kidder and Guernsey).

Bulletin 66.—Recent Discoveries of Remains Attributed to Early Man in America (Hrdlička).

List of publications of the bureau.

Introduction to Seneca Fiction, Legends, and Myths (Hewitt).—From *Thirty-second Annual Report* (Hewitt and Curtin).

PUBLICATIONS IN PRESS OR IN PREPARATION.

Thirty-third Annual Report.—Accompanying papers: (1) Uses of Plants by the Indians of the Missouri River Region (Gilmore); (2) Preliminary Account of the Antiquities of the Region between the Mancos and La Plata Rivers in Southwestern Colorado (Morris); (3) Designs on Prehistoric Hopi Pottery (Fewkes); (4) The Hawaiian Romance of Laleikawai (Beckwith).

Thirty-fourth Annual Report.—Accompanying paper: Prehistoric island culture areas of America (Fewkes).

Thirty-fifth Annual Report.—Accompanying paper: Ethnology of the Kwakiuti (Boas).

Thirty-sixth Annual Report.—Accompanying paper: Early History of the Creek Indians and their Neighbors (Swanton).

Bulletin 40.—Part 2: Handbook of American Indian Languages (Boas).

Bulletin 60.—Handbook of Aboriginal American Antiquities: Part I, Introduction; The Lithic Industries (Holmes).

Bulletin 67.—Alesia Texts and Myths (Frachtenberg).

Bulletin 68.—Structural and Lexical Comparison of the Tunica, Chitimacha, and Atakapa Languages (Swanton).

Bulletin 69.—Native Villages and Village Sites East of the Mississippi (Bushnell).

Bulletin 70.—Prehistoric Villages, Castles, and Towers (Fewkes).

Bulletin 71.—Native Cemeteries and Forms of Burial East of the Mississippi (Bushnell).

DISTRIBUTION OF PUBLICATIONS.

The distribution of the publications has been continued under the immediate charge of Miss Helen Munroe, assisted by Miss Emma B. Powers.

Publications were distributed as follows:

Reports and separates.....	2,742
Bulletins and separates.....	8,440
Contributions to North American Ethnology.....	10
Introductions.....	10
Miscellaneous.....	281
	11,483

As compared with the fiscal year 1918, there was an increase of 4,139 publications distributed. This was doubtless due to the fact that whereas in the fiscal year 1918 only Bulletin 63 was distributed to the mailing list, during the fiscal year 1919 there were distributed to the list Bulletins 59, 61, 64, and 66, and the Thirty-second Annual Report. Fourteen addresses have been added to the mailing list during the year and 36 dropped, making a net decrease of 22.

ILLUSTRATIONS.

Mr. DeLancey Gill, with the assistance of Mr. Albert E. Sweeney, continued the preparation of the illustrations of the bureau and gave the usual time to photography of visiting Indians. A summary of this work follows:

Negatives for publication work.....	138
Negative films exposed in field.....	228
Photographic prints.....	603
Photostat copies.....	128
Drawings for publication.....	200
Illustrations made ready for engraving.....	2,000
Engraved proofs edited.....	310
Colored illustrations inspected at Government Printing Office.....	10,000

LIBRARY.

The reference library continued in the immediate charge of Miss Ella Leary, assisted by Mr. Charles B. Newman, who was absent a short time in the military service.

During the year 380 books were accessioned, of which 90 were acquired by purchase, 160 by gifts and exchange, and 130 by the entry of newly bound volumes of periodicals previously received. The periodicals currently received number about 760, of which 25 were received by subscription and 735 through exchange. In addition, the bureau acquired 210 pamphlets. The aggregate number of books in the library at the close of the year was 22,560; of pamphlets, about 14,248. In addition, there were many volumes of unbound periodicals. The publication of various European periodicals devoted to anthropology has either been suspended or has ceased.

The number of books bound during the year was 350. It has been almost exclusively work upon the current material—serials grouped into volumes and new accessions in paper covers.

Correspondence relative to new exchanges and missing parts of serial publications already in the library was carried on as in previous years. Considerable time was given to research work, which frequently calls for the preparation of bibliographic lists for correspondents.

In addition to the use of its own library, it was found necessary to draw on the Library of Congress from time to time for the loan of about 400 volumes. The Library of Congress, officers of the executive departments, and out-of-town students have made use of the library through frequent loans during the course of the year.

The need by the library of additional shelf room is becoming more and more acute. Each day the congestion increases. We have filled almost every available foot of shelf space and we are sorely in need of more room.

The recataloguing of books from the old author (card) catalogue to a new subject catalogue has continued, and as a result the year shows a marked increase in the total of cards filed in the catalogue records.

The Monthly Bulletin for the use of the bureau has been continued throughout the year.

COLLECTIONS.

The following collections acquired by members of the staff of the bureau, or by those detailed in connection with its researches, have been transferred to the United States National Museum:

Two skeletons with skulls, found on the property of the Roxana Petroleum Co. of Oklahoma, South Wood River, Ill., and presented by it to this bureau. (62630.)

Twelve prehistoric pottery heads found in Huastec mounds and presented to Dr. J. Walter Fewkes by Mr. John M. Muir, of Tampico, Mexico. (62931.)

Thirty-one archeological specimens obtained by Mr. F. W. Hodge at Hawikuh, N. Mex., in 1917, as part of the cooperative work of the Bureau of American Ethnology and the Museum of the American Indian (Heye Foundation). (63154.)

Forty archeological specimens and an Indian skull, from different localities in Arizona; collected for the bureau by Dr. Walter Hough in 1918. (63156.)

Two hundred and eighty-eight archeological specimens and two lots of skeletal material, from Gourd Creek, Mo.; collected by Gerard Fowke in 1918. (63157.)

A specimen of slag with embedded charred corn; collected by Dr. J. Walter Fewkes, from a ruin in Mancos Valley, 3 miles west of the bridge on the Cortez-Ship Rock Road, Colorado. (63174.)

Sandstone pipe found on Black Warrior River, Tuscaloosa County, Ala., and presented to the bureau by Mr. F. H. Davis, United States Engineer's Office, Little Rock, Ark. (63509.)

Pillar stone found at Cerro Cebadilla, Vera Cruz; gift of Dr. H. Adrian, Tampico, Mexico. (63523.)

Three well-made clay heads from the neighborhood of Panuco, Mexico; gift of Mr. John M. Muir. (63524.)

PROPERTY.

Furniture was purchased to the amount of \$128.76. The cost of typewriting machines was \$143.40, making a total of \$272.16.

MISCELLANEOUS.

Clerical.—The correspondence and other clerical work of the office, including the copying of manuscripts, has been conducted by Miss May S. Clark, clerk to the chief. Mrs. Frances S. Nichols assisted the editor.

There has been no change in the scientific or clerical force.

Respectfully submitted.

J. WALTER FEWKES, *Chief.*

DR. CHARLES D. WALCOTT.

Secretary Smithsonian Institution.

APPENDIX 3.

REPORT ON THE INTERNATIONAL EXCHANGES.

SIR: I have the honor to submit the following report on the operations of the International Exchange Service during the fiscal year ending June 30, 1919:

The institution submitted to Congress an estimate of \$35,000 for carrying on the service during the year. This amount was granted. In addition, Congress, at the request of the institution, reappropriated the unexpended balance of the 1918 appropriation, amounting to \$712.90, together with the additional sum of \$903.68, for payment of liabilities incurred in the maintenance of the service during the current fiscal year over and above the amount of the regular congressional appropriation. Congress also made the usual allotment of \$200 for printing and binding. The repayments from departmental and other establishments aggregated \$1,808.87, making the total available resources for carrying on the system of exchanges during the fiscal year 1919, \$38,625.45.

During the year 1919 the total number of packages handled was 270,860—an increase over the number for the preceding year of 3,914. The weight of these packages was 291,918 pounds—a gain of 109,093 pounds. This large increase in weight as compared with the small increase in the number of packages is accounted for, in part, by the consignments received for transmission to establishments in France and Belgium whose libraries were destroyed during the war, and, in part, by the accumulations of United States patent specifications received for Great Britain, Belgium, and the northern neutrals. The former were forwarded in boxes unopened, each box being counted as one package only, and the latter consisted entirely of heavy packages.

The publications sent and received by the exchange service are classified under three heads: (1) "Parliamentary documents"; (2) "Departmental documents"; (3) "Miscellaneous scientific and literary publications."

The term "parliamentary documents," as here used, refers to publications set aside by act of Congress for exchange with foreign governments, and includes not only documents printed by order of either House of Congress, but also copies of each publication issued by any department, bureau, commission, or officer of the Government. The Governments to which this class of publications are forwarded send to this country in exchange copies of their own official documents for deposit in the Library of Congress.

The term "departmental documents" embraces all of the publications delivered at the institution by the various governmental departments, bureaus, or commissions for distribution to their correspondents abroad, the publications received in return being deposited in the various departmental libraries.

The "miscellaneous scientific and literary publications" are received chiefly from learned societies, universities, colleges, scientific institutions, and museums in the United States for transmission to similar establishments in all parts of the world.

The number and weight of the packages of different classes are indicated in the following table:

	Packages.		Weight.	
	Sent.	Received.	Sent.	Received.
United States parliamentary documents sent abroad...	151,307		<i>Pounds.</i> 83,692	<i>Pounds.</i>
Publications received in return for parliamentary documents.....		1,335		3,100
United States departmental documents sent abroad.....	65,892		103,295	
Publications received in return for departmental documents.....		3,918		2,630
Miscellaneous scientific and literary publications sent abroad.....	40,188		82,267	
Miscellaneous scientific and literary publications received from abroad for distribution in the United States.....		8,220		16,934
Total.....	257,387	13,473	269,254	22,664
Grand total.....	270,860		291,918	

It should be stated in this connection that the disparity indicated by the foregoing statistics between the number of packages sent and those received is accounted for, in part, by the fact that packages transmitted abroad contain, as a rule, only one publication, while those received in return often comprise many volumes. In some instances, especially in the case of publications received in exchange for parliamentary documents, the term "package" is applied to large boxes containing many separate publications. Furthermore, many returns for publications sent abroad reach their destinations through the mail and not through the exchange service.

Under date of September 12, 1918, the Dutch Exchange Bureau reported that five boxes sent by the institution to that bureau in January, 1917, had been lost at sea when the steamship by which they were being forwarded was torpedoed by the enemy. So far as reported, this is the fourth instance in which consignments sent to foreign countries by the institution have been lost through hostile action.

It has not yet been possible to put the service on a prewar basis so far as the forwarding of consignments abroad is concerned. Ship-

ments in boxes are being made as frequently as present conditions will permit to all countries except Austria, Bulgaria, Germany, Hungary, Montenegro, Roumania, Russia, Serbia, and Turkey. It is not thought advisable to forward consignments to these until the peace treaties with the enemy countries are finally ratified by the United States Government and internal conditions become more settled. It is hoped that in the early part of the next fiscal year it will be possible to make shipments to all countries.

To some countries transmissions were not wholly suspended for any long period during the war. However, as was to be expected during such abnormal times, the institution met with many obstacles in its efforts to keep the exchanges open. The charge for ocean freight grew to great proportions. The rate to England, for instance, at one time reached \$5.80 per cubic foot. The charge on shipments to that country before the war was \$0.16 a cubic foot, thus making the increase more than thirty-sixfold. Such rates becoming too exorbitant, the sending of packages in boxes was discontinued, and the mails were resorted to. Late in the fiscal year, when shipments were resumed to Belgium and the northern neutrals, the office was almost swamped with packages which had been accumulating for those countries for many months.

The chief of the Belgian Service of International Exchanges, in reply to a letter addressed to him early in February asking if his bureau was in a position to resume the distribution of exchanges, stated that there were no longer any obstacles to the renewal of the relations which had been interrupted on account of the encirclement of iron and fire in which his country found itself during the war. He added:

I should fail most lamentably in my duty, Mr. Secretary, if I did not add to this reply warm thanks in the name of the Belgian Government, in the name of our scientific establishments and institutions, and in my own name, for the extreme kindness which you have shown us in reserving for us until the present time, all the numerous "series" and "collections," one and all of inestimable value, which the war has prevented you from transmitting to us at the proper time.

Applications for permission to forward publications abroad through the service are being received from time to time, both from new and long-established institutions. As an illustration of appreciation of the value of the service by such organizations, may be quoted the following extract from a communication from the New York State College of Forestry at Syracuse, acknowledging the receipt of the Institution's letter extending the exchange facilities to that college:

It will mean a good deal to us in developing the exchange of publications for the forest library of this college.

Reference was made in last year's report to the steps being taken by the institution to procure for the war library and museum of the French Government at Paris copies of American documents, and other material relating to the war, for deposit in a section of that library, to be devoted to the part taken by the United States in the conflict. A similar request for posters was received during the year from the British War Museum, and as complete sets of posters as it was possible to procure, have been transmitted to that museum. A number of requests for publications issued in this country were received from other foreign establishments, and in each instance the institution endeavored to comply therewith.

The secretary of the institution took special steps to assist in the rehabilitation of the library of the Society of Sciences, Lille, France, whose collections were destroyed during the war. As a result of his efforts, several hundred publications were received for transmission to that library through the Exchange Service.

During the fiscal year 1919, 803 boxes were forwarded to foreign agencies for distribution, being an increase of 360 over the preceeding 12 months. Notwithstanding this increase in the number of boxes sent, the total number is still far below the average for a normal year. This is due, in part, to the fact that shipments in boxes were suspended until the 1st of February. Up to that date packages were sent to their destinations by mail.

The dates of transmission of the 803 boxes forwarded to foreign countries are shown in the following table. Of these boxes 260 contained full sets of United States official documents for authorized depositories:

Consignments of exchanges for foreign countries.

Country.	Number of boxes.	Date of transmission.
Argentina.....	19	Apr. 8, 1919.
Belgium.....	72	Apr. 29, 1919.
Bolivia.....	2	Mar. 28, 1919.
Brazil.....	15	Feb. 8, Apr. 5, 1919.
British colonies.....	5	Apr. 29, June 12, 1919.
British Guiana.....	1	Mar. 27, 1919.
Canada.....	24	Sept. 26, 1918; Jan. 27, Mar. 25, Apr. 21, May 17, June 6, 1919.
Chile.....	9	Apr. 3, 1919.
China.....	8	Jan. 20, 1918; Feb. 28, Mar. 25, May 28, 1919.
Colombia.....	6	Mar. 31, 1919.
Costa Rica.....	8	Apr. 4, 1919.
Cuba.....	6	Sept. 26, 1918; Jan. 27, Mar. 25, Apr. 21, May 17, June 6, 1919.
Denmark.....	21	Feb. 19, 1919.
Ecuador.....	3	Mar. 4, 1919.
Egypt.....	14	Apr. 10, 1919.
France.....	57	Feb. 8, May 5, 1919.
Great Britain and Ireland.	196	Feb. 5, Mar. 12, 25, May 12, June 2, 12, 1919
Guatemala.....	2	Mar. 28, 1919.

Consignments of exchanges for foreign countries—Continued.

Country.	Number of boxes.	Date of transmission.
Haiti.....	5	Apr. 9, 1919.
Honduras.....	2	Mar. 4, 1919.
India.....	24	Feb. 12, June 19, 1919.
Italy.....	31	June 17, 1919.
Jamaica.....	4	Mar. 26, 1919.
Japan.....	20	Apr. 16, 1919.
Mexico.....	6	Sept. 26, 1918; Jan. 27, Mar. 25, Apr. 21, May 17, June 6, 1919.
Netherlands.....	54	Mar. 11, June 30, 1919.
Nicaragua.....	1	Mar. 28, 1919.
Norway.....	20	Feb. 19, 1919.
Paraguay.....	2	Mar. 28, 1919.
Peru.....	6	Apr. 2, 1919.
Queensland.....	8	Feb. 5, May 12, June 12, 1919.
Salvador.....	2	Mar. 28, 1919.
Spain.....	15	Apr. 22, 1919.
Sweden.....	53	Feb. 25, 1919.
Switzerland.....	25	June 30, 1919.
Tasmania.....	9	Feb. 5, May 12, June 12, 1919.
Union of South Africa.....	15	June 26, 1919.
Uruguay.....	7	Apr. 1, 1919.
Venezuela.....	5	Mar. 31, 1919.
Victoria.....	11	Feb. 13, 1919.
Western Australia.....	10	Feb. 5, May 12, June 12, 1919.

FOREIGN DEPOSITORIES OF UNITED STATES GOVERNMENTAL DOCUMENTS.

Ninety-one sets of United States governmental documents (55 full sets and 36 partial sets) were received for distribution in accordance with treaty stipulations and under the authority of the congressional resolutions of March 2, 1867, and March 2, 1901.

A complete list of the foreign depositories is given below. Consignments for those countries to which shipments were suspended on account of the war will be forwarded to the various depositories as soon as the peace treaties are ratified by the United States Government.

DEPOSITORIES OF FULL SETS.

ARGENTINA: Ministerio de Relaciones Exteriores, Buenos Aires.

AUSTRALIA: Library of the Commonwealth Parliament, Melbourne.

AUSTRIA: K. K. Statistische Zentral-Kommission, Vienna.

BADEN: Universitäts-Bibliothek, Freiburg. (Depository of the Grand Duchy of Baden.)

BAVARIA: Königliche Hof- und Staats-Bibliothek, Munich.

BELGIUM: Bibliothèque Royale, Brussels.

BRAZIL: Bibliotheca Nacional, Rio de Janeiro.

BUENOS AIRES: Biblioteca de la Universidad Nacional de La Plata. (Depository of the Province of Buenos Aires.)

CANADA: Library of Parliament, Ottawa.

CHILE: Biblioteca del Congreso Nacional, Santiago.

- CHINA: American-Chinese Publication Exchange Department, Shanghai Bureau of Foreign Affairs, Shanghai.
- COLOMBIA: Biblioteca Nacional, Bogotá.
- COSTA RICA: Oficina de Depósito y Canje Internacional de Publicaciones, San José.
- CUBA: Secretaria de Estado (Asuntos Generales y Canje Internacional), Habana.
- DENMARK: Kongelige Bibliotheket, Copenhagen.
- ENGLAND: British Museum, London.
- FRANCE: Bibliothèque Nationale, Paris.
- GERMANY: Deutsche Reichstags-Bibliothek, Berlin.
- GLASGOW: City Librarian, Mitchell Library, Glasgow.
- GREECE: Bibliothèque Nationale, Athens.
- HAITI: Secrétaire d'État des Relations Extérieures, Port au Prince.
- HUNGARY: Hungarian House of Delegates, Budapest.
- INDIA: Imperial Library, Calcutta.
- IRELAND: National Library of Ireland, Dublin.
- ITALY: Biblioteca Nazionale Vittorio Emanuele, Rome.
- JAPAN: Imperial Library of Japan, Tokyo.
- LONDON: London School of Economics and Political Science. (Depository of the London County Council.)
- MANITOBA: Provincial Library, Winnipeg.
- MEXICO: Instituto Bibliográfico, Biblioteca Nacional, Mexico.
- NETHERLANDS: Bibliotheek van der Staten-Generaal, The Hague.
- NEW SOUTH WALES: Public Library of New South Wales, Sydney.
- NEW ZEALAND: General Assembly Library, Wellington.
- NORWAY: Stortingets Bibliothek, Christiania.
- ONTARIO: Legislative Library, Toronto.
- PARIS: Préfecture de la Seine.
- PERU: Biblioteca Nacional, Lima.
- PORTUGAL: Bibliotheca Nacional, Lisbon.
- PRUSSIA: Königliche Bibliothek, Berlin.
- QUEBEC: Library of the Legislature of the Province of Quebec, Quebec.
- QUEENSLAND: Parliamentary Library, Brisbane.
- RUSSIA: Imperial Public Library, Petrograd.
- SAXONY: Königliche Oeffentliche Bibliothek, Dresden.
- SERBIA: Section Administrative du Ministère des Affaires Étrangères, Belgrade.
- SOUTH AUSTRALIA: Parliamentary Library, Adelaide.
- SPAIN: Servicio del Cambio Internacional de Publicaciones, Cuerpo Facultativo de Archiveros, Bibliotecarios y Arqueólogos, Madrid.
- SWEDEN: Kungliga Biblioteket, Stockholm.
- SWITZERLAND: Bibliothèque Fédérale Centrale, Berne.
- TASMANIA: Parliamentary Library, Hobart.
- TURKEY: Department of Public Instruction, Constantinople.
- UNION OF SOUTH AFRICA: State Library, Pretoria, Transvaal.
- URUGUAY: Oficina de Canje Internacional de Publicaciones, Montevideo.
- VENEZUELA: Biblioteca Nacional, Caracas.
- VICTORIA: Public Library of Victoria, Melbourne.
- WESTERN AUSTRALIA: Public Library of Western Australia, Perth.
- WÜRTTEMBERG: Königliche Landesbibliothek, Stuttgart.

DEPOSITORY OF PARTIAL SETS.

- ALBERTA: Provincial Library, Edmonton.
- ALSACE-LORRAINE: K. Ministerium für Elsass-Lothringen, Strassburg.
- BOLIVIA: Ministerio de Colonización y Agricultura, La Paz.

- BREMEN: Senatskommission für Reichs- und Auswärtige Angelegenheiten.
 BRITISH COLUMBIA: Legislative Library, Victoria.
 BRITISH GUIANA: Government Secretary's Office, Georgetown, Demerara.
 BULGARIA: Minister of Foreign Affairs, Sofia.
 CEYLON: Colonial Secretary's Office (Record Department of the Library), Colombo.
 ECUADOR: Biblioteca Nacional, Quito.
 EGYPT: Bibliothèque Khédiviale, Cairo.
 FINLAND: Chancery of Governor, Helsingfors.
 GUATEMALA: Secretary of the Government, Guatemala.
 HAMBURG: Senatskommission für die Reichs- und Auswärtigen Angelegenheiten.
 HESSE: Grossherzogliche Hof-Bibliothek, Darmstadt.
 HONDURAS: Secretary of the Government, Tegucigalpa.
 JAMAICA: Colonial Secretary, Kingston.
 LIBERIA: Department of State, Monrovia.
 LOURENÇO MARQUEZ: Government Library, Lourenço Marquez.
 LÜBECK: President of the Senate.
 MADRAS, PROVINCE OF: Chief Secretary to the Government of Madras, Public Department, Madras.
 MALTA: Lieutenant Governor, Valetta.
 MONTENEGRO: Ministère des Affaires Étrangères, Cetinje.
 NEW BRUNSWICK: Legislative Library, Fredericton.
 NEWFOUNDLAND: Colonial Secretary, St. John's.
 NICARAGUA: Superintendente de Archivos Nacionales, Managua.
 NORTHWEST TERRITORIES: Government Library, Regina.
 NOVA SCOTIA: Provincial Secretary of Nova Scotia, Halifax.
 PANAMA: Secretaria de Relaciones Exteriores, Panama.
 PARAGUAY: Oficina General de Inmigracion, Asuncion.
 PRINCE EDWARD ISLAND: Legislative Library, Charlottetown.
 ROUMANIA: Academia Romana, Bucharest.
 SALVADOR: Ministerio de Relaciones Exteriores, San Salvador.
 SIAM: Department of Foreign Affairs, Bangkok.
 STRAITS SETTLEMENTS: Colonial Secretary, Singapore.
 UNITED PROVINCES OF AGRA AND OUDH: Under Secretary to Government, Allahabad.
 VIENNA: Bürgermeister der Haupt- und Residenz-Stadt.

INTERPARLIAMENTARY EXCHANGE OF OFFICIAL JOURNALS.

The Governments named below have entered into the interparliamentary exchange of official journals with the United States and are listed to receive copies of the daily issue of the Congressional Record:

Argentine Republic.	France.	Prussia.
Australia.	Great Britain.	Queensland.
Austria.	Greece.	Roumania.
Baden.	Guatemala.	Russia.
Belgium.	Honduras.	Serbia.
Bolivia.	Hungary.	Spain.
Brazil.	Italy.	Switzerland.
Buenos Aires, Province of.	Liberia.	Transvaal.
Canada.	New South Wales.	Union of South Africa.
Costa Rica.	New Zealand.	Uruguay.
Cuba.	Peru.	Venezuela.
Denmark.	Portugal.	Western Australia.

FOREIGN EXCHANGE AGENCIES.

A letter was received in April, 1919, from the director of the National Library in Lisbon, stating that the general secretariat of the Library and National Archives had been abolished and that the Service of International Exchanges, created by the Brussels Convention of March 15, 1886, is now conducted under the direction of his library.

Below is given a complete list of the foreign exchange agencies or bureaus. Shipments to those countries marked with an asterisk were still suspended at the close of the fiscal year.

ALGERIA, *via* France.

ANGOLA, *via* Portugal.

ARGENTINA: Comisión Protectora de Bibliotecas Populares, Lavalle 1216, Buenos Aires.

AUSTRIA:* K. K. Statistische Zentral-Kommission, Vienna.

AZORES, *via* Portugal.

BELGIUM: Service Belge des Échanges Internationaux, Rue des Longs-Chariots 46, Brussels.

BOLIVIA: Oficina Nacional de Estadística, La Paz.

BRAZIL: Serviço de Permutações Internacionais, Bibliotheca Nacional, Rio de Janeiro.

BRITISH COLONIES: Crown Agents for the Colonies, London.

BRITISH GUIANA: Royal Agricultural and Commercial Society, Georgetown.

BRITISH HONDURAS: Colonial Secretary, Belize.

BULGARIA:* Institutions Scientifiques de S. M. le Roi de Bulgarie, Sofia.

CANARY ISLANDS, *via* Spain.

CHILE: Servicio de Canjes Internacionales, Biblioteca Nacional, Santiago.

CHINA: American-Chinese Publication Exchange Department, Shanghai Bureau of Foreign Affairs, Shanghai.

COLOMBIA: Oficina de Canjes Internacionales y Reparto, Biblioteca Nacional, Bogotá.

COSTA RICA: Oficina de Depósito y Canje Internacional de Publicaciones, San José.

DENMARK: Kongelige Danske Videnskabernes Selskab, Copenhagen.

DUTCH GUIANA: Surinaamsche Koloniale Bibliotheek, Paramaribo.

ECUADOR: Ministerio de Relaciones Exteriores, Quito.

EGYPT: Government Publications Office, Printing Department, Bulaq, Cairo.

FRANCE: Service Français des Échanges Internationaux, 110 Rue de Grenelle, Paris.

GERMANY: Amerika-Institut, Berlin, N. W. 7.

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 Varones, Guatemala.

GUINEA, *via* Portugal.

HAITI: Secrétaire d'État des Relations Extérieures, Port au Prince.

HONDURAS: Biblioteca Nacional, Tegucigalpa.

ICELAND, *via* Denmark.

- INDIA: Superintendent of Stationery, Bombay.
- ITALY: Ufficio degli Scaubi Internazionali, Biblioteca Nazionale Vittorio Emanuele, Rome.
- JAMAICA: Institute of Jamaica, Kingston.
- JAPAN: Imperial Library of Japan, Tokyo.
- JAVA, *via* Netherlands.
- KOREA: Government General, Keijo.
- LIBERIA: Bureau of Exchanges, Department of State, Monrovia.
- LOURENÇO MARQUEZ: Government Library, Lourenço Marquez.
- LUXEMBURG, *via* Germany.
- MADAGASCAR, *via* France.
- MADEIRA, *via* Portugal.
- MONTENEGRO:* Ministère des Affaires Étrangères, Cetinge.
- MOZAMBIQUE, *via* Portugal.
- NETHERLANDS: Bureau Scientifique Central Néerlandais, Bibliothèque de l'Université, Leyden.
- NEW GUINEA, *via* Netherlands.
- NEW SOUTH WALES: Public Library of New South Wales, Sydney.
- NEW ZEALAND: Dominion Museum, Wellington.
- NICARAGUA: Ministerio de Relaciones Exteriores, Managua.
- NORWAY: Kongelige Norske Frederiks Universitet Bibliotheket, Christiania.
- PANAMA: Secretaria de Relaciones Exteriores, Panama.
- PARAGUAY: Servicio de Canje Internacional de Publicaciones Sección Consular y de Comercio, 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: Serviço de Permutações Internacionais, Bibliotheca Nacional, Lisbon.
- QUEENSLAND: Bureau of Exchanges of International Publications, Chief Secretary's Office, Brisbane.
- ROUMANIA:* Academia Romana, Bucharest.
- RUSSIA: Commission Russe des Échanges Internationaux, Bibliothèque Impériale Publique, Petrograd.
- SALVADOR: Ministerio de Relaciones Exteriores, San Salvador.
- SERBIA:* Section Administrative du Ministère des Affaires Étrangères, Belgrade.
- SIAM: Department of Foreign Affairs, Bangkok.
- SOUTH AUSTRALIA: Public Library of South Australia, Adelaide.
- SPAIN: Servicio del Cambio Internacional de Publicaciones, Cuerpo Facultativo de Archiveros, Bibliotecarios y Arqueólogos, 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: Secretary to the Premier, Hobart.
- TRINIDAD: Royal Victoria Institute of Trinidad and Tobago, Port-of-Spain.
- TUNIS, *via* France.
- TURKEY:* American Board of Commissioners for Foreign Missions, Boston.
- UNION OF SOUTH AFRICA: Government Printing Works, Pretoria, Transvaal.
- URUGUAY: Oficina de Canje Internacional, Montevideo.
- VENEZUELA: Biblioteca Nacional, Caracas.

VICTORIA: Public Library of Victoria, Melbourne.

WESTERN AUSTRALIA: Public Library of Western Australia, Perth.

WINDWARD AND LEEWARD ISLANDS: Imperial Department of Agriculture,
Bridgetown, Barbados.

PERSONNEL.

With his appointment as assistant secretary of the Smithsonian Institution on December 16, 1918, Dr. Charles G. Abbot was assigned to general charge of the international exchanges and the library in addition to the directorship of the Astrophysical Observatory.

Respectfully submitted.

C. G. ABBOT,

Assistant Secretary,

In Charge of Library and Exchanges.

DR. CHARLES D. WALCOTT,

Secretary of the Smithsonian Institution.

APPENDIX 4.

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, 1919:

Recognizing the increased cost of maintenance, Congress allowed in the sundry civil bill the sum of \$115,000 for the expenses of the park, with an additional allotment of \$200 for printing and binding. This was an increase of \$15,000 over the appropriation for the preceding years. By the practice of great economy in all departments, a small amount was made available from this sum for minor permanent improvements, and some long-needed work was accomplished during the year. Several of the employees who were in the military or naval service during the war returned to their duties at the park near the close of the year, and there is at present no distinct shortage of help except in the buildings and grounds department. The popularity of the Zoological Park continues to increase, and the number of visitors admitted to the grounds greatly exceeded that of any previous year. An attendance of nearly 2,000,000 was recorded. Notwithstanding the scarcity of help during the first months of the year, the buildings have been kept in a fair state of repair and the grounds are in a very good condition. The collection has been kept near normal size, with even slight increase in the number of specimens, and with no serious gaps or empty quarters. This is due almost entirely to the constant and efficient care of the employees in the animal department, with the resulting good condition and low death rate among their charges. The embargo on living animals during the war virtually prohibited importations, and only a few animals were received directly from foreign ports.

ACCESSIONS.

Gifts.—Animals to the number of 74 were accessioned during the year as gifts from friends of the park, or were placed on indefinite deposit.

Two young Sumatran elephants received from the Smithsonian Institution were the most important and valuable additions to the collection. These were purchased at a cost of \$5,000 for the children of Washington by a number of their friends, and were donated to the institution. At the time of their arrival they were about 2 and

2½ years old and were 42 and 45 inches high. The Sumatran elephant had never before been exhibited in Washington. It is closely allied to the elephant of India, and differs from the African elephant in many characters, most conspicuous of which is the very small size of the ear. No specimen of this group of elephants has been in the collection since the death in March, 1917, of the old Indian elephant, "Dunk." The Sumatran elephant is said to average somewhat smaller than the elephant from British India, but the Dutch trader who accompanied these young animals from Sumatra reports having killed one which was 10 feet high at the shoulder. The baby elephants are already great favorites with the children and are growing rapidly. They are known by their Malayan names of "Hitam" (black) and "Kechil" (small).

Other particularly valuable donations were a fine capybara from Hon. Henry D. Baker, Trinidad, British West Indies, who has presented the park with other interesting specimens in past years; and a pair of Florida bears from Mrs. A. V. N. Stroop, Moore Haven, Fla. The capybara is an especially good specimen of this largest of all living rodents, and the Florida bear has never before been shown in the collection. The bears are still young, but will apparently grow to a much larger size than the common American black bears, as they are now considerably larger than Virginia specimens of approximately the same age, and the bears of Florida are known sometimes to exceed in size all other forms of the black bear.

Among the birds presented during the year the most important is an example of the great white heron of southern Florida, taken from the nest on one of the Newfound Harbor group of keys, Florida, May 12, 1919, by Dr. Paul Bartsch. This bird has developed splendidly and forms one of the unique exhibits of the bird department.

The complete list of donors and gifts is as follows:

- Hon. Henry D. Baker, Trinidad, British West Indies, capybara.
- Miss Marjorie Bandelauter, Washington, D. C., alligator.
- Dr. Paul Bartsch, Washington, D. C., great white heron.
- Mr. J. E. Boyle, Washington, D. C., horned toad.
- Mr. Morris K. Brady, Washington, D. C., alligator.
- Miss Eddie Capps, Schuyler, Va., alligator.
- Mr. Frederick Chester, Washington, D. C., alligator.
- Mr. E. R. Claud, Washington, D. C., horned toad.
- Mrs. V. Cook, Savannah, Ga., alligator.
- Mr. W. R. Coon, Washington, D. C., alligator.
- Miss Pauline Corson, Guinea Mills, Va., four gray foxes.
- Mr. Lee Cummins, Washington, D. C., two alligators.
- Mr. A. H. Davin, Palmyra, Va., five turtle doves.
- Miss Elisabeth T. Davison, Baltimore, Md., two grass paroquets.
- Mr. D. L. Du Pre, Washington, D. C., American barn owl.
- Mr. L. A. Ehrmantraut, Washington, D. C., chicken-guinea hybrid.

- Mr. W. H. Fairchild, Washington, D. C., red fox.
 Mr. J. F. E. Fields, Hancock, Md., banded rattlesnake.
 Mr. F. F. Gillen, Washington, D. C., three screech owls.
 Mrs. Lillie M. Glover, Washington, D. C., Isle of Pines parrot.
 Mrs. Gregory, Washington, D. C., Virginia opossum.
 Mrs. S. M. Heseey, Edinburg, Va., Cuban parrot.
 Mr. Charles P. Higgins, Washington, D. C., alligator.
 Mr. John B. Laing, Lewisburg, W. Va., black bear.
 Mr. Edward L. Latimer, Hyattsville, Md., great horned owl.
 Mr. Maynadiers, Washington, D. C., Virginia opossum.
 Mr. W. L. McAtee, Washington, D. C., rainbow snake.
 Mr. J. C. Meyer, Washington, D. C., three canary birds.
 Mr. H. D. Money, jr., Gulfport, Miss., two fox squirrels.
 Mr. James Mooney, jr., Washington, D. C., alligator.
 Mrs. C. P. Moore, Washington, D. C., alligator.
 Mr. Joseph G. Moore, Flint Hill, Va., two woodchucks.
 Mr. Charles A. Mosier, Hohnstead, Fla., moccasin snake.
 Mr. R. E. Otterback, Washington, D. C., black snake.
 Mr. A. J. Poole, Washington, D. C., water snake.
 Mr. G. R. Putnam, Washington, D. C., horned toad.
 Mr. T. M. Quill, Washington, D. C., alligator.
 Mr. E. S. Schmid, Washington, D. C., spider monkey.
 Dr. R. W. Shufeldt, Washington, D. C., water snake, garter snake, snapping turtle, Florida terrapin, and two gopher tortoises.
 Maj. Walter L. Simpson, Washington, D. C., badger.
 Smithsonian Institution, Washington, D. C., two Sumatran elephants.
 Mr. J. F. Stowell, Washington, D. C., alligator.
 Mr. Blanford Straughn, Washington, D. C., chameleon.
 Mrs. A. V. N. Stroop, Moore Haven, Fla., two Florida bears.
 Mrs. Griffin E. Taylor, Berryville, Va., double yellow-head parrot.
 Mr. Albert Thorn, Washington, D. C., alligator.
 Mr. Henry C. Vaden, Washington, D. C., peafowl.
 Mr. J. S. Warmbath, Washington, D. C., screech owl.
 Mrs. Sarah Wilber, Keshena, Wis., American badger.
 Mr. J. M. Willson, Kissimmee, Fla., sand-hill crane.
 Mr. H. F. Winn, Chevy Chase, D. C., peafowl.
 Mr. H. E. Wright, Point of Rocks, Md., alligator.
 Unknown donor, fish crow.

Births.—The number of births exceeds that of any previous year in the history of the park. Mammals to the number of 76 were born, and 83 birds were hatched during the year, making a total of 159 additions to the collection in this manner. This record includes only such animals as are reared to a reasonable age, no account being made in these published statistics of such as live but a few days. The births include 2 European bears, 2 Rocky Mountain sheep, 1 eland, 4 Indian antelopes, 1 yak, 6 American bison, 2 llamas, 1 Columbian black-tailed deer, 2 Manchurian deer, 2 Kashmir deer, 2 American elk, 2 barasingha deer, 1 hog deer, 4 Japanese deer, 1 fallow deer, 6 white-tailed deer, 6 European red deer, 1 yellow-haired porcupine, 4 raccoons, 6 coypus, 3 rhesus monkeys, 1 dusky

phalanger, 1 rufous-bellied wallaby, 1 great gray kangaroo, 4 red kangaroos, 8 opossums, and 2 brush-tailed rock kangaroos. The birds hatched are of the following species: Demoiselle crane, American coot, Florida cormorant, night heron, wild turkey, golden pheasant, peafowl, scaled quail, mute swan, Canada goose, mallard, black duck, and wood duck.

Exchanges.—There were received during the year 11 mammals and 70 birds in exchange for surplus animals born in the park. The mammals were 2 prong-horned antelopes, 2 Indian water buffaloes, 3 beavers, 3 spider monkeys, and 1 Burmese macaque. Many desirable water fowl, including coscoroba and black swans, Hutchins's geese, European widgeon, European teal, garganey teal, black-bellied tree ducks, and spur-winged geese, as well as numerous land birds needed for the collection, were received through exchange. Species new to the collection are the black-gorgeted laughing thrush, crimson tanager, blue tanager, thick-billed euphonia, diamond dove, bar-shouldered dove, short-keeled toucan, and a fine specimen of the remarkable Goliath heron from Africa.

Purchases.—Because of lack of funds only 38 mammals, birds, and reptiles were purchased during the year. A Malayan sun bear was obtained in San Francisco, a fallow deer buck was purchased for breeding, and a few small mammals were bought from time to time. Additions to the American waterfowl lake were 6 brants, 2 white-fronted geese, 10 black ducks, and an immature whistling swan. Two Florida sandhill cranes and a pair of bronze-wing pigeons, with some commoner hawks and owls, also were purchased.

Transfers.—Both the Biological Survey of the Department of Agriculture and the Bureau of Fisheries, Department of Commerce, contributed to the collection by the transfer of material collected by their agents in the field. From the Biological Survey was received an Apache grizzly bear and a mountain lion from New Mexico, a blue goose from Missouri, and two pigmy ground rattlers and a water snake from Florida. The Apache grizzly, new to the collection, is one of the recently defined species of the grizzly bear now nearing extinction. The specimen, a young male, was captured July 22, 1918, by T. J. McMullin and Bob Reid, 22 miles southeast of Taos, N. Mex., and was forwarded to the park by M. E. Musgrave, of the Biological Survey. It was apparently about 8 months old when received. A few turtles from Georgia were transferred from the Bureau of Fisheries.

Captured in the park.—A few birds captured in the park were added to the collection.

Deposited.—As usual, a number of desirable exhibition specimens were accepted on temporary deposit. These included for the

year 7 parrots of various species, 2 boa constrictors, a lion, and a kinkajou. Eight alligators were carried over the winter for the Pan American Union.

REMOVALS.

Surplus mammals and birds to the number of 37 were exchanged to other zoological collections, as follows: One European brown bear, 1 hippopotamus, 2 red kangaroos, 1 yak, 3 Indian antelopes, 1 fallow deer, 2 hog deer, 1 Japanese deer, 4 barasingha deer, 4 European red deer, 6 gray squirrels, 2 domestic geese, and 9 peafowl. A number of specimens on deposit were returned to owners.

While the death rate for the year has been comparatively small, there have been as usual some serious losses, especially among animals long in the park and of advanced age. The male Celebesian dwarf buffalo, or anoa (*Anoa depressicornis*), which has been a feature of the antelope house for nearly 13 years, died on July 24, 1918. This animal came to the collection December 12, 1905, then fully adult, had been showing extreme age for the past two years, and his death was not unexpected. Two female Congo harnessed antelopes (*Tragelaphus gratus*) were lost. One was purchased as a fully grown animal October 31, 1907, and died May 10, 1919. The other, born in the park July 4, 1912, died February 27, 1919. An old female American bison, purchased May 6, 1907, died of septic metritis on April 20, 1919. A female guanaco, received from the zoological gardens in Buenos Aires, December 29, 1904, died on August 22, 1918, of acute congestion of the lungs, after 13 years and 8 months of life in the park. An alpaca, also from the Buenos Aires gardens, received March 14, 1908, died from old age and parasitic invasion, October 11, 1918. A wild cat (*Lynx ruffus*), received September 3, 1907, died January 22, 1919; and a Canada lynx, received September 25, 1907, died from septicemia September 25, 1918, exactly 11 years from the date of its arrival in the zoo. Other losses of importance among the mammals were a leopard, from pneumonia, November 18, 1918, and a young Brazilian tapir, born in the park February 22, 1918, which died under anesthetic during an operation for prolapse of the rectum on June 3, 1919.

The most serious loss by death among the birds was a female trumpeter swan, which died of septicemia May 14, 1919, just after it had been successfully mated, after two years of effort, with the male trumpeter lent to the park by Judge R. M. Barnes, of Lacon, Ill. The eggs in the ovary were enlarged to the size of cherries, and there is every reason to believe that but for the untimely loss of this bird the swans would have been successfully bred. The African crowned hawk-eagle (*Spizaetus coronatus*) received from James Robert Spurgeon, United States Secretary of Legation, Monrovia,

Liberia, June 24, 1901, died from avian tuberculosis, March 26, 1919, after 17 years and 9 months of life in the bird house. Two wandering tree ducks (*Dendrocygna arcuata*), received from Carl Hagenbeck, September 25, 1903, died, probably of old age, on September 30 and December 16, 1918, both having thus lived over 15 years in the gardens. A snowy egret (*Egretta candidissima*), received from Texas, June 15, 1907, died July 10, 1918, over 11 years from the date of its arrival.

Post-mortem examinations were made by the pathological division of the Bureau of Animal Industry. The following list shows the results of autopsies, the cases being arranged by groups:

CAUSES OF DEATH.

MAMMALS.

- Marsupialia: Pneumonia, 2; tuberculosis, 1; peritonitis, 1; abscess in abdomen, 1.
- Carnivora: Pneumonia, 1; anemia, 1; septicemia, 1; abscess of jaw, 1.
- Rodentia: Pneumonia, 2; enteritis, 1; gastroenteritis, 1.
- Edentata: Adenomata, 1.
- Primates: Tuberculosis, 1; pleurisy, 1; enteritis, 1; gastroenteritis, 1; anemia, 1; sarcomatous tumor, 1; accident, 1; not determined, 1.
- Artiodactyla: Pneumonia, 3; tuberculosis, 3; congestion of lungs, 1; anemia, 1; septicemia, 2; septic metritis, 1; old age, 1; accident, 2.
- Perissodactyla: Anesthetic, during operation, 1.

BIRDS.

- Ciconiiformes: Tuberculosis, 1; not determined, 1; no cause found, 1.
- Anseriformes: Tuberculosis, 3; enteritis, 4; ptomaine poisoning, 1; septicemia, 1; necrosis of cæcum, 1; hemorrhage, 2; parasitism, 1; accident, 1; not determined, 2.
- Falconiformes: Tuberculosis, 1; aspergillosis, 1; not determined, 1.
- Galliformes: Aspergillosis, 1; enteritis, 2.
- Gruiformes: Tuberculosis, 1; enteritis, 1.
- Charadriiformes: Tuberculosis, 4; enteritis, 1; peritonitis, 1.
- Cuculiformes: Tuberculosis, 1; enteritis, 2; sarcomatosis, 1; no cause found, 1.
- Coraciiformes: Aspergillosis, 1.
- Passeriformes: Tuberculosis, 3; enteritis, 2; no cause found, 1.

Such animals, lost by death, as were of particular scientific importance, or needed for exhibition purposes, were transferred to the United States National Museum for preservation. These numbered 15 mammals and 25 birds.

ANIMALS IN THE COLLECTION JUNE 30, 1919.

MAMMALS.

MARSUPIALIA.

- Virginia opossum (*Didelphis virginiana*)----- 9
- Tasmanian devil (*Sarcophilus harrisii*)----- 2
- Phalanger (*Trichosurus vulpecula*)----- 3
- Dusky phalanger (*Trichosurus fuliginosus*)----- 5
- Brush-tailed rock kangaroo (*Petrogale penicillata*)----- 4
- Great gray kangaroo (*Macropus giganteus*)----- 3
- Red kangaroo (*Macropus rufus*)----- 9

- Kangaroo Island kangaroo (*Macropus melanops*)----- 2
- Wallaroo (*Macropus robustus*)----- 1
- Black-tailed wallaby (*Macropus ualabatus*)----- 1
- Rufous-bellied wallaby (*Macropus billardieri*)----- 4
- Parma wallaby (*Macropus parma*)----- 1
- Wombat (*Phascolomys mitchelli*)----- 1

CARNIVORA.

- Kadiak bear (*Ursus middendorffi*)----- 1
- Alaska Peninsula bear (*Ursus gyas*)-- 2
- Yakutat bear (*Ursus dalli*)----- 1

Kidder's bear (*Ursus kidderi*)----- 2
 European bear (*Ursus arctos*)----- 4
 Grizzly bear (*Ursus horribilis*)----- 2
 Apache grizzly (*Ursus apache*)----- 1
 Himalayan bear (*Ursus thibetanus*)-- 1
 Black bear (*Ursus americanus*)----- 3
 Kenai black bear (*Ursus americanus
 perniger*)----- 1
 Cinnamon bear (*Ursus americanus cin-
 namomum*)----- 2
 Florida bear (*Ursus floridanus*)----- 2
 Glacier bear (*Ursus emmonsii*)----- 1
 Sun bear (*Helarctos malayanus*)----- 1
 Sloth bear (*Melursus ursinus*)----- 2
 Polar bear (*Thalarctos maritimus*)-- 1
 Dingo (*Canis dingo*)----- 1
 Eskimo dog (*Canis familiaris*)----- 2
 Gray wolf (*Canis nubilus*)----- 10
 Southern wolf (*Canis floridanus*)----- 1
 Woodhouse's wolf (*Canis frustror*)-- 2
 Coyote (*Canis latrans*)----- 3
 Red fox (*Vulpes fulva*)----- 6
 Gray fox (*Urocyon cinereoargenteus*)-- 5
 Racomistle (*Bassariscus astutus*)-- 2
 Raccoon (*Procyon lotor*)----- 14
 Gray coatimundi (*Nasua narica*)----- 1
 Kinkajou (*Potos flavus*)----- 2
 Ferret (*Mustela furo*)----- 1
 Tayra (*Tayra barbara*)----- 1
 Skunk (*Mephitis nigra*)----- 1
 American badger (*Taxidea taxus*)----- 3
 European badger (*Meles meles*)----- 2
 Florida otter (*Lutra canadensis vaga*)-- 4
 African civet (*Viverra civetta*)----- 1
 Genet (*Gnetta genetta*)----- 1
 Spotted hyena (*Crocota crocuta*)----- 1
 Brown hyena (*Hyæna brunnea*)----- 1
 Striped hyena (*Hyæna hyæna*)----- 2
 African cheetah (*Acinonyx jubatus*)-- 2
 Lion (*Felis leo*)----- 4
 Bengal tiger (*Felis tigris*)----- 1
 Manchurian tiger (*Felis tigris longi-
 pillis*)----- 2
 Leopard (*Felis pardus*)----- 1
 East African leopard (*Felis pardus
 suahelica*)----- 1
 Jaguar (*Felis onca*)----- 1
 Mexican puma (*Felis azteca*)----- 3
 Mountain lion (*Felis hipolestes*)-- 3
 Canada lynx (*Lynx canadensis*)----- 2
 Bay lynx (*Lynx ruffus*)----- 5
 California lynx (*Lynx californicus*)-- 1
 Banded lynx (*Lynx fasciatus*)----- 1

PINNIPEDIA.

California sea-lion (*Zalophus californi-
 anus*)----- 2
 Harbor seal (*Phoca vitulina*)----- 1

RODENTIA.

Woodchuck (*Marmota monax*)----- 3
 Dusky marmot (*Marmota flaviven-
 tris obscura*)----- 1
 Prairie-dog (*Cynomys ludovicianus*)-- 12
 Fox squirrel (*Sciurus niger*)----- 2
 Albino squirrel (*Sciurus carolinensis*)-- 2

American beaver (*Castor canadensis*)-- 2
 Crested porcupine (*Hystria cristata*)-- 1
 Yellow-haired porcupine (*Erethizon
 epixanthum*)----- 2
 Coypu (*Myocastor coypus*)----- 7
 Paca (*Cuniculus paca*)----- 3
 Mexican agouti (*Dasyprocta mexi-
 cana*)----- 1
 Azara's agouti (*Dasyprocta azaræ*)-- 2
 Crested agouti (*Dasyprocta cristata*)-- 2
 Viscacha (*Lagostomus maximus*)----- 1
 Patagonian cavy (*Dolichotis patago-
 nica*)----- 1
 Peruvian guinea pig (*Cavia tschudii
 pallidior*)----- 4
 Guinea pig (*Cavia porcellus*)----- 23
 Capybara (*Hydrochærus hydrochæris*)-- 1

LAGOMORPHA.

Domestic rabbit (*Oryctolagus cuni-
 culus*)----- 28

PRIMATES.

Gray spider monkey (*Ateles geoffroyi*)-- 2
 White-throated capuchin (*Cebus capu-
 cinus*)----- 2
 Margarita capuchin (*Cebus margari-
 tæ*)----- 1
 Chacma (*Papio porcarius*)----- 1
 Hamadryas baboon (*Papio hamadryas*)-- 2
 Mandrill (*Papio sphinx*)----- 1
 Drill (*Papio leucophæus*)----- 1
 Moor macaque (*Cynopithecus maurus*)-- 1
 Brown macaque (*Macaca speciosa*)-- 2
 Japanese monkey (*Macaca fuscata*)-- 2
 Burmese macaque (*Macaca andama-
 nensis*)----- 1
 Pig-tailed monkey (*Macaca neme-
 strina*)----- 1
 Rhesus monkey (*Macaca rhesus*)----- 28
 Bonnet monkey (*Macaca sinica*)----- 1
 Java monkey (*Macaca mordax*)----- 1
Philippine macaque (*Macaca syrichta*)-- 1
 Sooty mangabey (*Cercocobus fuli-
 ginosus*)----- 2
 Green guenon (*Lasiopyga callitrichus*)-- 1
 Vervet guenon (*Lasiopyga pygerythra*)-- 2
 Mona (*Lasiopyga mona*)----- 3
 Roloway guenon (*Lasiopyga roloway*)-- 1
 Patas monkey (*Erythrocebus patas*)-- 1
 Chimpanzee (*Pan troglodytes*)----- 1

ARTIODACTYLA.

Wild boar (*Sus scrofa*)----- 1
 Wart-hog (*Phacochoerus æthiopicus*)-- 2
 Hippopotamus (*Hippopotamus amphib-
 ius*)----- 2
 Bactrian camel (*Camelus bactrianus*)-- 2
 Arabian camel (*Camelus dromedarius*)-- 2
 Guanaco (*Lama huanachus*)----- 4
 Llama (*Lama glama*)----- 11
 Alpaca (*Lama pacos*)----- 1
 Vicuña (*Lama vicugna*)----- 1
 Fallow deer (*Dama dama*)----- 3

Axis deer (<i>Axis axis</i>)-----	6
Hog deer (<i>Hyelaphus porcinus</i>)-----	6
Sambar (<i>Rusa unicolor</i>)-----	2
Luzon deer (<i>Rusa philippinus</i>)-----	1
Barasingha (<i>Rucervus duvaucelii</i>)-----	10
Japanese deer (<i>Sika nippon</i>)-----	12
Red deer (<i>Cervus elaphus</i>)-----	18
Kashmir deer (<i>Cervus hanglu</i>)-----	6
Bedford deer (<i>Cervus xanthopygus</i>)-----	6
American elk (<i>Cervus canadensis</i>)-----	7
Virginia deer (<i>Odocoileus virginianus</i>)-----	15
Mule deer (<i>Odocoileus hemionus</i>)-----	3
Black-tailed deer (<i>Odocoileus columbianus</i>)-----	4
Prong-horned antelope (<i>Antilocapra americana</i>)-----	2
Blesbok (<i>Damaliscus albifrons</i>)-----	1
White-tailed gnu (<i>Connochættes gnou</i>)-----	1
Defassa water-buck (<i>Kobus defassa</i>)-----	1
Indian antelope (<i>Antilope cercicapra</i>)-----	7
Nilgai (<i>Boselaphus tragocamelus</i>)-----	3
East African eland (<i>Taurotragus oryx livingstonii</i>)-----	3
Tahr (<i>Hemitragus jemlahicus</i>)-----	3
Aoudad (<i>Ammotragus lervia</i>)-----	1

Rocky Mountain sheep (<i>Ovis canadensis</i>)-----	7
Arizona mountain sheep (<i>Ovis canadensis gaillardi</i>)-----	1
Barbados sheep (<i>Ovis aries</i>)-----	5
Zebu (<i>Bos indicus</i>)-----	1
Yak (<i>Poëphagus grunniens</i>)-----	5
American bison (<i>Bison bison</i>)-----	23
Indian buffalo (<i>Bubalus bubälis</i>)-----	2

PERISSODACTYLA.

Brazilian tapir (<i>Tapirus terrestris</i>)--	2
Mongolian horse (<i>Equus przewalskii</i>)--	1
Grant's zebra (<i>Equus burchelli granti</i>)--	1
Grevy's zebra (<i>Equus grevyi</i>)-----	2
Zebra-horse hybrid (<i>Equus grevyi-caballus</i>)-----	1
Zebra-ass hybrid (<i>Equus grevyi-asinus</i>)--	1

PROBOSCIDEA.

Abyssinian elephant (<i>Loxodonta africana oxyotis</i>)-----	1
Sumatran elephant (<i>Elephas sumatranus</i>)-----	2

BIRDS.

RATITÆ.

South African ostrich (<i>Struthio australis</i>)-----	4
Somalliland ostrich (<i>Struthio molybdophanes</i>)-----	1
Rhea (<i>Rhea americana</i>)-----	2
Emu (<i>Dromiccius novæhollandiæ</i>)-----	2

CICONIIFORMES.

American white pelican (<i>Pelecanus erythrorhynchos</i>)-----	9
European white pelican (<i>Pelecanus onocrotalus</i>)-----	2
Roseate pelican (<i>Pelecanus roseus</i>)--	2
Australian pelican (<i>Pelecanus conspicillatus</i>)-----	2
Brown pelican (<i>Pelecanus occidentalis</i>)-----	3
Florida cormorant (<i>Phalacrocorax auritus floridanus</i>)-----	18
Great white heron (<i>Ardea occidentalis</i>)-----	1
Great blue heron (<i>Ardea herodias</i>)--	1
Goliath heron (<i>Ardea goliath</i>)-----	1
Snowy egret (<i>Egretta candidissima</i>)--	1
Black-crowned night heron (<i>Nycticorax nycticorax nævius</i>)-----	27
Boatbill (<i>Cochlearius cochlearius</i>)-----	2
White stork (<i>Ciconia ciconia</i>)-----	3
Black stork (<i>Ciconia nigra</i>)-----	1
Straw-necked ibis (<i>Carphibis spinicollis</i>)-----	1
Sacred ibis (<i>Threskiornis æthiopicus</i>)--	3
White ibis (<i>Guara alba</i>)-----	10
Scarlet ibis (<i>Guara rubra</i>)-----	2
Roseate spoonbill (<i>Ajaia ajaja</i>)-----	2
European flamingo (<i>Phænicopterus roseus</i>)-----	1

ANSERIFORMES.

Black-necked screamer (<i>Chauna torquata</i>)-----	1
Mallard (<i>Anas platyrhynchos</i>)-----	17
East Indian black duck (<i>Anas platyrhynchos var.</i>)-----	3
Black duck (<i>Anas rubripes</i>)-----	21
Gadwall (<i>Chaulelasmus streperus</i>)-----	1
European widgeon (<i>Mareca penelope</i>)--	10
Baldpate (<i>Mareca americana</i>)-----	7
Green-winged teal (<i>Nettion carolinense</i>)-----	9
European teal (<i>Nettion crecca</i>)-----	10
Blue-winged teal (<i>Querquedula discors</i>)-----	6
Garganey (<i>Querquedula querquedula</i>)--	1
Cinnamon teal (<i>Querquedula cyanoptera</i>)-----	1
Ruddy sheldrake (<i>Casarca ferruginea</i>)--	1
Pintail (<i>Dafila acuta</i>)-----	8
Wood duck (<i>Aix sponsa</i>)-----	14
Mandarin duck (<i>Dendronessa galericulata</i>)-----	21
Canvas-back (<i>Marila valisineria</i>)-----	2
Redhead (<i>Marila americana</i>)-----	7
Lesser scaup duck (<i>Marila affinis</i>)-----	6
Ring-necked duck (<i>Marila collaris</i>)--	1
Rosy-billed pochard (<i>Metopiana peposaca</i>)-----	1
Snow goose (<i>Chen hyperboreus</i>)-----	3
Greater snow goose (<i>Chen hyperboreus nivalis</i>)-----	2
Blue goose (<i>Chen caerulescens</i>)-----	6
White-fronted goose (<i>Anser albifrons</i>)--	3
American white-fronted goose (<i>Anser albifrons gambeli</i>)-----	3
Bar-headed goose (<i>Eulabeia indicus</i>)--	1
Canada goose (<i>Branta canadensis</i>)--	26

Hutchins's goose (<i>Branta canadensis hutchinsii</i>)-----	5	Short-winged weka (<i>Ocydromus brachypterus</i>)-----	2
Cackling goose (<i>Branta canadensis minima</i>)-----	2	Earl's weka (<i>Ocydromus earli</i>)-----	1
Brant (<i>Branta bernicla glaucogastra</i>)--	8	Whooping crane (<i>Grus americana</i>)-----	1
Barnacle goose (<i>Branta leucopsis</i>)----	3	Sandhill crane (<i>Grus mexicana</i>)-----	5
Spur-winged goose (<i>Plectropterus gambensis</i>)-----	3	White-necked crane (<i>Grus leucauchen</i>)--	1
Black-bellied tree duck (<i>Dendrocygna autumnalis</i>)-----	6	Indian white crane (<i>Grus leucogeranus</i>)-----	1
White-faced tree duck (<i>Dendrocygna viduata</i>)-----	3	Lilford's crane (<i>Grus lilfordi</i>)-----	2
Coscoroba (<i>Coscoroba candida</i>)-----	1	Australian crane (<i>Grus rubicunda</i>)----	1
Mute swan (<i>Cygnus gibbus</i>)-----	6	Demoiselle crane (<i>Anthropoides virgo</i>)--	8
Whistling swan (<i>Olor columbianus</i>)----	2	Crowned crane (<i>Balearica pavonina</i>)----	2
Trumpeter swan (<i>Olor buccinator</i>)-----	1	Cariama (<i>Cariama cristata</i>)-----	1
Black swan (<i>Chenopsis atrata</i>)-----	3		
FALCONIFORMES.			
South American condor (<i>Vultur gryphus</i>)-----	1	Great black-backed gull (<i>Larus marinus</i>)-----	1
California condor (<i>Gymnogyps californianus</i>)-----	3	Herring gull (<i>Larus argentatus</i>)-----	1
Turkey vulture (<i>Cathartes aura</i>)-----	4	Laughing gull (<i>Larus atricilla</i>)-----	2
Black vulture (<i>Coragyps urubu</i>)-----	2	Australian crested pigeon (<i>Ocyphaps lophotis</i>)-----	3
King vulture (<i>Sarcoramphus papa</i>)-----	2	Bronze-wing pigeon (<i>Phaps chalcoptera</i>)-----	1
Secretary bird (<i>Sagittarius serpentarius</i>)-----	1	Wonga-wonga pigeon (<i>Leucosarcia picta</i>)-----	9
Griffon vulture (<i>Gyps fulvus</i>)-----	2	Red-billed pigeon (<i>Chloranas flaviventris</i>)-----	1
Cinereous vulture (<i>Aegyptius monachus</i>)-----	2	White-winged dove (<i>Melopelia asiatica</i>)-----	1
Caracara (<i>Polyborus cheriway</i>)-----	3	Mourning dove (<i>Zenaidura macroura</i>)--	1
Wedge-tailed eagle (<i>Uroaëtus aodax</i>)--	2	Diamond dove (<i>Geopelia cuneata</i>)-----	2
Golden eagle (<i>Aquila chrysaëtos</i>)-----	2	Zebra dove (<i>Geopelia striata</i>)-----	10
Bald eagle (<i>Haliaëtus leucocephalus</i>)--	12	Bar-shouldered dove (<i>Geopelia humeralis</i>)-----	2
Alaskan bald eagle (<i>Haliaëtus leucocephalus alascanus</i>)-----	1	Inca dove (<i>Scardafella inca</i>)-----	3
Sparrow hawk (<i>Falco sparverius</i>)-----	1	Blue-headed quail-dove (<i>Starnænas cyanocephala</i>)-----	1
Red-tailed hawk (<i>Buteo borealis</i>)-----	2	Ringed turtle-dove (<i>Streptopelia risoria</i>)-----	15
Swainson's hawk (<i>Buteo swainsoni</i>)----	1		
GALLIFORMES.			
Mexican curassow (<i>Craux globicera</i>)----	2	PSITTACIFORMES.	
Daubenton's curassow (<i>Craux daubentoni</i>)-----	1	Grass paroquet (<i>Melopsittacus undulatus</i>)-----	2
Chicken-guinea hybrid (<i>Gallus</i> × <i>Nunida</i>)-----	1	Black-tailed paroquet (<i>Polytelis melanura</i>)-----	1
Wild turkey (<i>Meleagris gallopavo silvestris</i>)-----	2	Lesser vasa parrot (<i>Coracopsis nigra</i>)--	1
Peafowl (<i>Pavo cristatus</i>)-----	43	Gray parrot (<i>Psittacus erithacus</i>)-----	2
Peacock pheasant (<i>Polyplectron bicalcaratum</i>)-----	1	Haitian paroquet (<i>Aratinga chloroptera</i>)-----	1
Silver pheasant (<i>Gennæus nycthemerus</i>)-----	1	Blue-winged parrotlet (<i>Psittacula passerina</i>)-----	1
Lady Amherst's pheasant (<i>Chrysolophus amherstii</i>)-----	1	Cuban parrot (<i>Amazona leucocephala</i>)--	6
Golden pheasant (<i>Chrysolophus pictus</i>)--	9	Isle of Pines parrot (<i>Amazona leucocephala palmarum</i>)-----	1
Bobwhite (<i>Colinus virginianus</i>)-----	2	Yellow-shouldered parrot (<i>Amazona barbadensis</i>)-----	1
Scaled quail (<i>Callipepla squamata</i>)----	4	Festive parrot (<i>Amazona festiva</i>)-----	1
Gambel's quail (<i>Lophortyx gambelii</i>)----	2	White-fronted parrot (<i>Amazona albifrons</i>)-----	1
Valley quail (<i>Lophortyx californica vallicola</i>)-----	8	Orange-winged parrot (<i>Amazona amazonica</i>)-----	1
GRUIFORMES.			
American coot (<i>Fulica americana</i>)-----	9	Santo Domingo parrot (<i>Amazona ventralis</i>)-----	2
South Island weka rail (<i>Ocydromus australis</i>)-----	3	Yellow-headed parrot (<i>Amazona ochrocephala</i>)-----	3

Yellow-naped parrot (<i>Amazona auro-palliata</i>)-----	2	Hermit thrush (<i>Hylocichla guttata pallasi</i>)-----	1
Double yellow-head parrot (<i>Amazona oratrix</i>)-----	10	Australian gray jumper (<i>Struthidea cinerea</i>)-----	1
Yellow-cheeked parrot (<i>Amazona autumnalis</i>)-----	1	Green jay (<i>Xanthoura leucosa</i>)-----	1
Thick-billed parrot (<i>Rhynchopsitta pachyrhyncha</i>)-----	2	Australian crow (<i>Corvus coronoides</i>)--	1
Red-and-blue macaw (<i>Ara chloroptera</i>)-----	2	Fish crow (<i>Corvus ossifragus</i>)-----	1
Red-and-blue-and-yellow macaw (<i>Ara macao</i>)-----	7	European raven (<i>Corvus corax</i>)-----	1
Blue-and-yellow macaw (<i>Ara ararauna</i>)-----	1	Napolean weaver (<i>Pyromelana afra</i>)--	2
Sulphur-crested cockatoo (<i>Cacatoes galerita</i>)-----	2	Madagascar weaver (<i>Foudia madagascariensis</i>)-----	4
Great red-crested cockatoo (<i>Cacatoes moluccensis</i>)-----	1	Paradise widow bird (<i>Steganura paradisa</i>)-----	1
White cockatoo (<i>Cacatoes alba</i>)-----	2	Cut-throat finch (<i>Amadina fasciata</i>)--	1
Leadbeater's cockatoo (<i>Cacatoes leadbeateri</i>)-----	1	Zebra finch (<i>Taeniopygia castanotis</i>)--	6
Bare-eyea cockatoo (<i>Cacatoes gymnopsis</i>)-----	3	Black-faced Gouldian finch (<i>Poëphila gouldiæ</i>)-----	5
Roseate cockatoo (<i>Cacatoes roseicapilla</i>)-----	11	Red-faced Gouldian finch (<i>Poëphila mirabilis</i>)-----	1
Kea (<i>Nestor notabilis</i>)-----	5	Strawberry finch (<i>Amandava amandava</i>)-----	8
CORACIIFORMES.		Black-headed finch (<i>Munia atricapilla</i>)--	1
Giant kingfisher (<i>Dacelo gigas</i>)-----	2	Nutmeg finch (<i>Munia punctulata</i>)-----	10
Short-keeled toucan (<i>Ramphastos piscivorus brevicarinatus</i>)-----	1	Java finch (<i>Munia oryzivora</i>)-----	10
Concave-casqued hornbill (<i>Dichoceros bicornis</i>)-----	1	White Java finch (<i>Munia oryzivora</i>)--	1
Barred owl (<i>Strix varia</i>)-----	7	Vera Cruz red-wing (<i>Agelaius phœniceus richmondi</i>)-----	2
Screech owl (<i>Otus asio</i>)-----	6	Crimson tanager (<i>Ramphocelus dimidiatus</i>)-----	3
Great horned owl (<i>Bubo virginianus</i>)--	4	Blue tanager (<i>Thraupis cana</i>)-----	3
Western horned owl (<i>Bubo virginianus pallescens</i>)-----	1	Thick-billed euphonia (<i>Tanagra crasirostris</i>)-----	3
American barn owl (<i>Tyto peralta pratincola</i>)-----	2	Song sparrow (<i>Melospiza melodia</i>)--	1
PASSERIIFORMES.		Slate-colored junco (<i>Junco hyemalis</i>)--	4
Red-billed hill-tit (<i>Liothrix luteus</i>)--	3	White-throated sparrow (<i>Zonotrichia albicollis</i>)-----	3
Black-gorgeted laughing-thrush (<i>Garrulax pectoralis</i>)-----	4	Saffron finch (<i>Sicalis flaveola</i>)-----	3
		Canary (<i>Serinus canarius</i>)-----	4
		Green singing finch (<i>Serinus icterus</i>)--	1
		European chaffinch (<i>Fringilla cælebs</i>)--	1
		Red-crested cardinal (<i>Paroaria cucullata</i>)-----	1
		Cardinal (<i>Cardinalis cardinalis</i>)-----	3

REPTILES.

Alligator (<i>Alligator mississippiensis</i>)--	28	Blacksnake (<i>Coluber constrictor</i>)-----	1
Mona Island iguana (<i>Cyclura stejnegeri</i>)-----	1	Chicken snake (<i>Elaphe quadrivittata</i>)--	1
Gila monster (<i>Heloderma suspectum</i>)--	7	Water snake (<i>Natrix sipedon</i>)-----	5
Blue-tongued lizard (<i>Tiliqua scincoides</i>)-----	1	Garter snake (<i>Thamnophis sirtalis</i>)--	1
Chameleon (<i>Anolis carolinensis</i>)-----	1	Moccasin (<i>Agkistrodon piscivorus</i>)-----	1
Horned toad (<i>Phrynosoma cornutum</i>)-----	2	Ground rattler (<i>Sistrurus miliarius</i>)--	1
Rock python (<i>Python molurus</i>)-----	3	Duncan Island tortoise (<i>Testudo ephippium</i>)-----	1
Diamond python (<i>Python spilotes</i>)--	1	Albemarle Island tortoise (<i>Testudo vicina</i>)-----	1
Anaconda (<i>Eunectes murinus</i>)-----	2	Gopher tortoise (<i>Gopherus polyphemus</i>)-----	2
Boa constrictor (<i>Constrictor constrictor</i>)-----	6	Snapping turtle (<i>Chelydra serpentina</i>)	2
Rainbow snake (<i>Abastor erythrogrammus</i>)-----	1	Cooter (<i>Pseudemys scripta</i>)-----	1
		Florida terrapin (<i>Pseudemys floridana</i>)-----	1

STATEMENT OF THE COLLECTION.

ACCESSIONS DURING THE YEAR.

Presented :		Captured in National Zoological	
Mammals.....	19	Park :	
Birds.....	25	Birds.....	10
Reptiles.....	30	Deposited :	
	<u>74</u>	Mammals.....	2
Born and hatched in the National		Birds.....	7
Zoological Park :		Reptiles.....	10
Mammals.....	76		<u>19</u>
Birds.....	83	Total accessions.....	390
	<u>159</u>		
Received in exchange :			
Mammals.....	11		
Birds.....	70		
	<u>81</u>		
Purchased :			
Mammals.....	9		
Birds.....	27		
Reptiles.....	2		
	<u>38</u>		
Transferred from other Govern-			
ment departments :			
Mammals.....	2		
Birds.....	1		
Reptiles.....	6		
	<u>9</u>		

SUMMARY.

Animals on hand July 1, 1918.....	1,247
Accessions during the year.....	390
	<u>1,637</u>
Deduct loss (by exchange, death, and	
return of animals on deposit).....	301
	<u>1,336</u>
Animals on hand June 30, 1919.....	1,336

Class.	Species.	Individuals.
Mammals.....	156	528
Birds.....	190	737
Reptiles.....	23	71
Total.....	369	1,336

VISITORS.

The record for number of visitors during a single fiscal year has again been exceeded. The number of people admitted to the park, as determined by count and estimate, was 1,964,715, a daily average of 5,383. The greatest number in any one month was 355,651, in April, 1919, an average per day of 11,855. On March 23, 1919, there were 70,000 visitors; on Sunday, April 6, 1919, 85,000; and on Easter Monday, April 21, 1919, 55,359 (actual count at gates).

The attendance by months was as follows: In 1918: July, 160,600; August, 116,200; September, 154,600; October, 114,500; November, 91,400; December, 93,424. In 1919: January, 101,625; February, 115,150; March, 242,650; April, 355,651; May, 220,700; June, 198,215.

The record for attendance for the year ending June 30, 1918, which exceeded the previous record year (1916) by 436,117, was beaten by 371,488. Following are the attendance records for the past eight years:

1912.....	542,738	1916.....	1,157,110
1913.....	633,526	1917.....	1,106,800
1914.....	733,277	1918.....	1,593,227
1915.....	794,530	1919.....	1,964,715

The park continues in popularity as a means of instruction to schools and classes, as well as a resort for out-of-doors gatherings for large picnic parties, where the usual woodland surroundings and pleasures may be supplemented by visits to the zoological collections. Ninety-eight such schools and classes visited the park in 1919, with a total of 6,169 individuals. These came not only from the District of Columbia, Maryland, and Virginia, but from the more distant States of Pennsylvania, New Jersey, Massachusetts, and Ohio. The American Society of Mammalogists held an informal meeting with luncheon at the park on April 4, 1919, with 75 members in attendance.

IMPROVEMENTS.

Exterior cages for leopards, jaguars, and hyenas, on the east side of the north wing of the lion house, were nearly completed before the close of the year. The cages are seven in number, 24 feet deep, and 74 feet long over all. The cost, including material and the labor of regular employees, was \$3,410. This long-desired improvement adds greatly to the appearance of the building and to the comfort of the animals.

A perforated radial brick chimney 80 feet in height above the concrete foundation and 42 inches interior diameter at the top was built at the central heating plant to replace the old and worn-out metal stack. The concrete base was constructed by the park workmen and the chimney by contract, at a total cost of \$2,647.

A public toilet 13 by 28 feet 8 inches was constructed near the Connecticut Avenue entrance. Some of the materials for this work were purchased from the 1918 appropriation, and the labor was all by regular employees of the park. The cost of this structure, including labor, was \$1,200.

The smaller elephant house, roofs of the larger elephant house and restaurant building, outdoor lion and tiger cages, outdoor cages on east and west sides of monkey house, and other fences and inclosures were painted, at a total cost of \$1,586. The materials, amounting to \$475, were furnished by the park. The contracts for labor totaled \$1,111.

The creek-side drive from Klinge Ford to the crossroads and the main road from the concrete bridge to the concourse were broken up and rebuilt, the creek-side drive from crossroads to the stone bridge was resurfaced, and roads in other parts of the park were repaired and resurfaced where necessary. The cost of materials for road work was \$1,295, and the labor, including regular park employees and temporary men, amounted to \$1,475.50.

Other minor improvements and repairs completed during the year include a new fence around the nursery and gardens, concrete steps to replace old stone steps leading from wolf dens up to bear yard steps, cement stairway from Cathedral Avenue leading down into

park under the Calvert Street Bridge, repair of walks leading in from Adams Mill gate, repair of bridle paths, drainage for zebra house and yards, paving in zebra yards, a new policeman's box at Klingle gate. The old wooden ties of the fence of the large elephant yard were replaced by an iron fence to match the permanent sections already constructed. A number of large wire receptacles for rubbish and 100 new park benches were provided.

IMPORTANT NEEDS.

Alteration of the western boundary.—By an act approved June 23, 1913, Congress appropriated \$107,200 for the purchase of certain lots and parcels of land between the western boundary of the National Zoological Park and Connecticut Avenue, from Cathedral Avenue to Klingle Road, this land, together with the included highways, to become a part of the park. The appropriation was not a continuing one and lapsed at the end of the following fiscal year, before proceedings for the purchase of the land were completed. Items for the reappropriation of this sum and for the additional amount necessary to meet the figures fixed by the court in proceedings of condemnation were submitted to Congress in the following years, but were not favorably considered. Following a suggestion made by the chairman of the Appropriations Committee at the hearing on the bill for 1919, the item for the purchase of this land was revised in the estimate for 1920 to include only a portion of the property originally appropriated for in 1913. The land asked for in the estimates submitted for 1920 and, failing approval, again included in estimates for 1921, includes 250 feet each side of Jewett Street, fronting on Connecticut Avenue, and all of the land inside the unnamed road between Connecticut Avenue and the park, excepting one lot. This, with all of Jewett Street, and the included portion of the unnamed street, would satisfy all the important needs of the park and give a frontage of over 600 feet on Connecticut Avenue. One of the principal entrances to the park will always be from Connecticut Avenue and the importance of a frontage on that thoroughfare at and bordering the gate can not be overestimated. The necessary land can now be purchased for about \$80,000, and should be acquired before it is too late.

Alteration of the southeastern boundary.—The question of the purchase of a narrow strip of land between the park and Adams Mill Road, from Clydesdale Place to Ontario Road, still in private ownership, is now brought forcibly to our attention because of improvements being made at that point by the District government. As this newly developed section of Adams Mill Road will doubtless become one of the most used highways connecting the park systems, and as the privately owned strip is within a few feet of the Adams Mill Road entrance to the park, the need for public ownership can not be

questioned. The amount required is comparatively small and the purchase of the land should not long be delayed, as the bordering road is soon to be opened, and the ownership of the narrow strip by the Government and its incorporation within the park is of very great interest to the public.

Restaurant.—One of the most urgent needs of the park is a suitable restaurant. The present refreshment stand is entirely inadequate and is in a very bad state of repair. On any of the days of reasonably large attendance the public can be only poorly served and the facilities of the stand are overtaxed. It is believed that a suitable building, on the present site, 50 by 100 feet in size, and of two floors, one opening onto the lower slope to the west, would meet the requirements. Such a building, properly equipped and under first-class management, would be greatly appreciated by the constantly increasing number of visitors to the park.

Grading banks and filling ravines.—The work of further cutting away the irregular hill in the center of the western part of the park and the filling in of a near-by ravine, commenced three years ago but discontinued for lack of funds, should be completed as soon as practicable. Level spaces for yards and inclosures are very much needed, and the work as left makes an unsightly and unfinished looking place in one of the most conspicuous points in the park, bordering on the main road. Completion of the work will level nearly 70,000 square feet of ground which is now of little use, make available a further 25,000 square feet of ground at the ravine, and eliminate a dangerous curve in the automobile road.

Purchase of animals.—A sufficient sum for the purchase and transportation of animals has never been available and is greatly to be desired, so that the park may take advantage from time to time of opportunities to obtain rare and conspicuous animals not before exhibited.

Aviary building.—The need of a new house for the exhibition of birds continues to become more urgent from year to year. The old building is rapidly becoming unfit for use and the public aisles are entirely too narrow for the crowds of people who now visit the park.

The cost of maintenance during the past year has reached a sum greater than ever before. Owing to the increased cost of almost every item, the amount required for food for animals was \$33,149, and repairs and new improvements are similarly expensive. It is urgent, therefore, if there is to be any expenditure for improvements or for necessary repairs that an increase be made in the general appropriation for the expenses of the park.

Respectfully submitted.

N. HOLLISTER, *Superintendent.*

DR. CHARLES D. WALCOTT,

Secretary Smithsonian Institution,

Washington, D. C.

APPENDIX 5.

REPORT ON THE ASTROPHYSICAL OBSERVATORY.

SIR: The Astrophysical Observatory was conducted under the following passage of the sundry civil act approved July 1, 1918:

Astrophysical Observatory: For maintenance of Astrophysical Observatory, under the direction of the Smithsonian Institution, including assistants, purchase of necessary books and periodicals, apparatus, making necessary observations in high altitudes, repairs and alterations of buildings, and miscellaneous expenses, \$13,000.

The observatory occupies a number of frame structures within an inclosure of about 16,000 square feet south of the Smithsonian administration building at Washington, and also a cement observing station and frame cottage for observers on a plot of 10,000 square feet leased from the Carnegie Solar Observatory, on Mount Wilson, Calif.

The present value of the buildings and equipment is estimated at \$50,000. This estimate contemplates the cost required to replace the outfit for the purpose of the investigations.

WORK OF THE YEAR.

At Washington.—As usual, the computation of the results of solar constant observations made at Mount Wilson, Calif., has gone on steadily at Washington, except as interrupted by the furlough of the computer, Miss Graves, for work in France, as mentioned under the subheading "Personnel." After the services of other computers had been obtained the work went on rapidly and is now nearly up to date.

The preparation of Volume IV of the Annals of the Astrophysical Observatory, including results of measurements from the year 1913, has been occupying the attention of the director to a very great extent since February.

In consideration of the fact that the total eclipse of the sun of May 29, 1919, was visible in La Paz, Bolivia, which is not very far from the Smithsonian solar-constant observing station in Calama, Chile, and in further consideration of the fact that the Argentine Government is using the daily telegraphic reports of the solar observations at Calama for forecasting purposes; and, further, that certain conditions had arisen at Calama which would seem to require the personal investigation of the writer, it appeared necessary to make an expedition to South America to attend to these several

matters. The preparation for the eclipse work occupied some time of the director and of the instrument maker.

Several investigations relating to the war, a brief note of which was mentioned in last year's report, were continued during the fiscal year.

The painstaking and valuable work which Mr. Fowle has been doing on the revision of the Smithsonian physical tables should receive some notice, although this work is being done by him outside of his regular hours of service for the observatory. This book has passed through a number of editions under his editorship and has attained an enviable reputation in this country and abroad for the accuracy and fullness of its contents. The new edition, which is now in press, has received unusual attention on his part, and very valuable cooperation from the various scientific departments of the Government and of outside individuals in colleges and industrial corporations and elsewhere, and will be a great advance over any of the former editions.

In connection with work of the Observatory, we have long wished to determine the solar constant of radiation by a method which does not involve the assumption that the transparency of the atmosphere is constant over the two or three hours required for the determination of it by the usual spectrobolometric method. We hoped that, seeing that the sky is brighter when the transparency is less, an observation by the pyranometer, or some other more suitable instrument, of the brightness of the sky in the neighborhood of the sun, combined with the usual measurements of the pyrheliometer and perhaps of the spectrobolometer, but only at one period of time, might be sufficient to determine the solar constant by a satisfactory empirical process based upon spectrobolometric investigations of former years. In the hope of getting an instrument more satisfactory than the pyranometer for this special work, a new design comprising essentially two disks, one of which is shined upon through a graduated aperture by the sun and the other of which is exposed to the small region of sky desired and both connected by thermoelectric junction so as to enable equality of temperature of the two disks to be adjusted, was devised and partly constructed at Washington. It was sent in a letter to Calama, Chile, and was finished by the director during his visit in Chile and is now in satisfactory operation, although it has not yet supplanted the pyranometer for the purpose in question.

Another problem which requires a new kind of apparatus is the measurement of nocturnal radiation such as the earth sends out to space. This investigation is exceptionally difficult, for it involves a range of wave length from 5 microns to 50 microns. There is no surface either of blackened metal or other substance which is fully

absorbing to the rays throughout this whole extent, and furthermore there is no optical medium known by means of which the properties of the rays beyond about 17 microns, where rock salt ceases to be transparent, may be investigated. For the purpose of determining nocturnal radiation it seems absolutely indispensable that there should be devised an instrument based upon the principle of the perfect radiator or "absolutely black body." This is a very difficult thing because not only does the instrument have to be exposed to the full hemisphere of 180° of solid angle, but also the radiation to be observed is small in amount, little more than the tenth part of the radiation of the sun. Seeing that the "black body," so called, requires to be a hollow chamber, large with respect to the aperture through which the rays enter, the rise of temperature of its walls which must be measured is extremely small. After much consultation, Mr. Aldrich and the director decided upon a design of a new instrument for this purpose. This was constructed in the spring of 1919, and is now in use on Mount Wilson. Whether it will prove to be satisfactory or not remains a question.

In order to investigate the rays beyond the wave length where rock salt becomes opaque a great many measurements have been made by Mr. Aldrich, as mentioned in the last report, to attempt to find some substance transmissible to such rays. The best substance found appeared to be potassium iodide. It usually occurs as crystals no larger than a buckshot. Accordingly, in order to make any satisfactory progress it was necessary to procure larger crystals, preferably large enough to make a prism of five or more centimeters on an edge, but at least so large that such a prism could be built up by cementing parts of it together. Experiments had been made at the General Electric Co. for producing large crystals needed in war operations, and they very kindly undertook to try to grow potassium iodide crystals also. A number of crystals, very satisfactorily clear, have been produced by them as large as 2 centimeters on each edge, and from a sufficient number of these the prism required for going on with this long wave length work may probably be formed.

Mr. Aldrich spent a long time on the development and testing of an apparatus for determining the constant of the fourth power radiation formula ordinarily called σ . This is a very difficult research. The quantity is already certainly known within 5 per cent and many physicists would believe even closer than this. Many researches have been made upon it and in order to do a piece of work worth while it is necessary to show that it is certainly accurate to 1 per cent. After many experiments it was found that this degree of certainty could not be secured with the apparatus which Mr. Aldrich and the director had designed and which Mr. Kramer,

the instrument maker, had constructed, and so the work was given over for a time.

At Mount Wilson.—Mr. Aldrich continued the observations of the solar constant of radiation until the middle of October, 1918, and returned to continue them early in June, 1919. In September of 1918 he made a very interesting observation in cooperation with the Army Balloon School at Arcadia at the foot of Mount Wilson. It consisted in arranging a pyranometer to be hung below the basket of a captive balloon, which could be raised above the level of the great horizontal layer of fog which often covers the San Gabriel and other valleys in the neighborhood of Los Angeles in a sheet many miles in extent. On this occasion the layer of fog extended from 1,000 feet of altitude to 2,500 feet. The balloon was raised to about 200 feet above the layer. An officer of the balloon school exposed the apparatus under the balloon to the radiation from the sheet of fog, while Mr. Aldrich, on the ground, observed the deflections of the galvanometer. The galvanometer was connected to the pyranometer by a pair of wires about a half mile long. Simultaneously observations were made on Mount Wilson with the pyrheliometer to determine the exact character of the day, and on other days of similar character Mr. Aldrich exposed the pyranometer to the radiation of the sun and sky combined. Thus knowing the radiation reflected from the sheet of fog, and knowing the radiation on a similar day coming down from the sun and sky, he was able to determine the reflecting power of a great layer of fog. This observation is very useful for the study of the relations of the temperature of the earth to radiation. The result of the experiments, which were continued for several hours without interruption, was very satisfactory. The final value for the reflecting power of a great horizontal sheet of fog was 78 per cent.

The weather on Mount Wilson, in the autumn of 1918, was uncommonly poor for the solar constant work, as rain fell frequently and a great many clouds came up. Altogether it was the most unfavorable weather which has been experienced in any observing season there since it was occupied for solar constant purposes.

SOUTH AMERICAN EXPEDITION.

Several considerations led to the decision to make a small expedition to South America in the spring of 1919. The Institution had equipped an observatory at Calama, Chile, to measure the solar constant of radiation. The Argentine meteorological service, through its chief forecaster, Mr. Clayton, had been determining the effects of the variation of the sun on the temperature and other weather conditions of the earth, and had been so much impressed by the value of the solar variation observations for forecasting purposes that they

had arranged to receive daily telegraphic reports of the values obtained at Calama, Chile. The director of the observatory at Calama, Mr. Moore, had conceived a feeling that the sky conditions were not as favorable as perhaps might be secured in other parts of South America or elsewhere and feared that it was unwise for the Institution to continue to conduct the operations there. On all of these accounts it seemed necessary for Dr. Abbot to go to South America and deal with these several matters.

In accordance with the sundry civil act, which failed of passage on March 4, 1919, but was approved July 19, 1919, the following authorization was secured:

The unexpended balance of the appropriation "For observation of the total eclipse of the sun of June 8, 1918, and so forth," is reappropriated and made available for observation of the total eclipse of the sun of May 28, 1919, visible in Bolivia.

The two 11-foot focus 3-inch cameras employed by the Smithsonian observers at Wadesboro, N. C., in 1900, and again by Mr. Aldrich in 1918, were equipped with a collapsible tube and other mechanism, so that they could be speedily arranged with equatorial clock-driven motion to photograph an eclipse in South America. Mr. Moore, at Calama, was instructed to arrange to join Dr. Abbot with the pyranometer employed there, so as to observe the degree of darkening of the sky and sun as the eclipse progressed. Arrived at Calama, the apparatus was repacked for use in the field, and Messrs. Moore and Abbot proceeded to La Paz, Bolivia, where, owing to the kindness shown by Mr. Babbage, of the railroad, arrangements were made to observe close to the railroad station at El Alto, situated about 1,500 feet above La Paz, at an altitude of about 14,000 feet above sea level. The day of the eclipse, May 29, proved very favorable. The sky was entirely cloudless in the neighborhood of the sun for several hours. Mr. Moore had observed during the day before and during the night, and continued his observations each minute throughout the totality and the succeeding partial phase up until about two hours after sunrise. Dr. Abbot had set up and adjusted the photographic telescope with Mr. Moore's aid, and except for one defect it operated perfectly. This was that since the eclipse took place so very early in the morning, only 20 minutes after sunrise, the rate of motion of the sun above the horizon was not uniform with that which would occur in the middle of the day, owing to refraction. The apparatus had only been set up the day before, so that there was not time to work out this matter to know exactly how to rate the clock at the moment of eclipse. Preliminary observations of May 28 had indicated that the clockwork ran a little too slow. During the day it was speeded up a little, but on the day of the eclipse it proved to be a trifle too fast, so that the moon appears to be elliptical rather than perfectly round,

as it should have been, except for the slight motion of the moon relative to the sun during the eclipse. However, this defect is not very noticeable, and excellent photographs were obtained with both lenses, but particularly with the one which was exposed 1 minute and 30 seconds rather than the other, which was exposed $2\frac{3}{4}$ minutes.

The phenomenon was uncommonly grand, far more so than appears in the photograph. The sun had risen over a snow-capped mountain, about 20,000 feet high. It rose over half eclipsed, with the crescent horns pointing upward from the horizon equally. In 20 minutes totality occurred, and there shot out over 20 fine sharp coronal rays, greatest elongated along the equatorial zone, but also visible to great distances from the poles. At the lower limb there was a very large flaming red prominence, which at that time rose to perhaps a quarter of the solar radius, and had a very long side extension, after the manner of a hook. The same prominence was observed by spectroscopic methods in the United States, at the great observatories, and was one of the finest prominences ever photographed. It is very interesting and fortunate that the early history of this prominence was enriched by the photograph made at La Paz so very early in the morning.

Taking the whole phenomenon together, the snow-covered mountain, the brilliant sky at that great altitude of 14,000 feet, the very numerous and long coronal streamers, and the enormous crimson prominence casting its glow over all, the spectacle was truly glorious, and by far the most impressive of any of the eclipses which have been seen by the writer. It was reported that the Bolivian natives lighted many fires and supplicated the sun to return, after old Inca traditions.

Visit to Argentina.—Immediately after the eclipse Messrs. Moore and Abbot proceeded to La Quiaca in Argentina for the purpose of having a conference there with the director and forecaster of the Argentine meteorological service. Mr. Clayton, the official forecaster, submitted for their inspection results he had obtained during several years in the comparison of the weather of Argentina with the variations of solar radiation reported by the Smithsonian observers at Mount Wilson, Calif., and Calama, Chile, and the results obtained by using the measurements of Calama for the forecasting of the weather in Argentina.

Mr. Clayton says:

For nearly a year numerical and graphical analyses have been made of the solar variations and of the variations of temperature at 20 selected stations well distributed over Argentina, Chile, and Brazil. These analyses show that each variation in solar radiation has been followed by similar variations of temperature in South America, with a few exceptions that may easily have resulted from errors in the measurements of solar radiation. At Buenos Aires the ratio

of temperature change to solar change at the time of greatest solar activity was found from the averages of several years to be 1.4 C. for each change of 1 per cent in solar radiation. Since the extreme solar values range about 6 per cent on either side of the mean, there might result departures from the normal at Buenos Aires from this cause of about 8.5 C. The extreme departure from the normal observed at Buenos Aires during the last 13 years has been 11.5 C. The results of these researches have led me to believe that the existing abnormal changes which we call weather have their origin chiefly, if not entirely, in the variation of solar radiation.

Naturally, these results, which are supported by an enormous amount of careful and conscientious computation on the part of the forecasting division of the Argentine meteorological service, are of extreme interest. They point to the great desirability of equipping in different cloudless regions of the world several observatories designed for the measurement of the solar constant of radiation. The chief of the Argentine weather service, Mr. Wiggin, desires very much to take over the South American station of the Smithsonian Institution, to be maintained by the Argentine meteorological service. Tentative arrangements were entered into between Dr. Abbot and Mr. Wiggin for this purpose, which, however, require the further approval of the Argentine Government to become effective. If suitable arrangements for the transfer can be made, it is hoped to employ the funds thereby set loose for the establishment by the Smithsonian Institution of a solar station in Egypt.

From Argentina, Messrs. Moore and Abbot returned immediately to Calama.

Measurements of the Solar Constant of Radiation at Calama, Chile.—When Dr. Abbot reached Calama he found that Messrs. Moore and Abbot had prepared data giving the pyrheliometry, the transparency of the atmosphere for nearly 40 wave lengths, the function ρ/ρ_{sc} , and pyranometer values representing the intensity of the radiation of the sky in a zone 15° wide surrounding the sun. All these values were tabulated with solar constant values for 60 days of observation and for each day at periods when the air masses were 2 and 3, respectively.

We have felt very keenly the desirability of devising some method of determining the solar constant of radiation which would be independent of changes in the transparency of the atmosphere during the period of observation. It had been hoped that this might be done in some simple way by the aid of the pyranometer, that instrument which we devised several years ago for the purpose of measuring the brightness of the sky. It is well known that when the sky becomes more hazy the direct beam of the sun is reduced in intensity, but the scattered light of the sky at the same time is increased. Accordingly, it would seem that a pyranometer measurement of the brightness of a limited area of the sky near the sun would furnish

an index of the state of the transparency of the atmosphere at the moment of observation, and this combined with the usual observations of the solar intensity at the earth's surface by the pyrhelimeter, and combined further with the determination of the quantity of the aqueous vapor between the observer and sun (which is indicated by the state of the great infra-red absorption bands, ρ and φ) might give the means of estimating the solar radiation outside the atmosphere from observations made at a single instant of time.

With the various data mentioned above as a basis, the writer endeavored to find some method of determining the solar constant of radiation without the necessity of treating the several wave lengths of radiation separately, but after almost a week spent in working over the data, trying to combine them along these lines, the effort had to be abandoned. Mr. Moore had, however, suggested that if we knew the coefficient of atmospheric transmission for all of the individual wave lengths on a given day and had observed with the spectrobolometer and pyrhelimeter at air mass 2 or at air mass 3, we could determine the solar constant from these data at once. All simple means having failed to give a satisfactory method, Mr. Moore's suggestion was acted upon, and it was found possible, by noting the value of the function ρ/ρ_{sc} and the intensity of the sky light in the neighborhood of the sun, to determine at once the transmission coefficients for all wave lengths. This we do by means of plots in which the data for the 60 days mentioned are employed. These data were used in the following manner:

Taking the value obtained at air mass 2 by the pyranometer for the limited area of sky around the sun, dividing it by the value of ρ/ρ_{sc} at the corresponding time, we obtain a function which we may call "F." Plotting values of "F" as abscissæ against values of the transmission coefficients for each measured wave length as ordinates, we obtain about 40 plots. These for the infra-red region of the spectrum are nearly straight lines but they become more and more convex toward the axes of coordinates for the rays of shorter wave lengths. In the 60 days which were available for the investigations the function "F" ranged through values running from 100 to 900 of a certain scale, while the function "a"—that is, the transmission coefficient—ranged only through a very few per cent and for a large portion of the spectrum, including the infra-red region, hardly through more than 1 or 2 per cent. Accordingly great error is allowable in the function "F" without greatly affecting the accuracy of the inference as to the value of the function "a." In short, by means of the function "F" we are able to determine the function "a" for all wave lengths with highly satisfactory accuracy from observations at a single point of time, so that changes of the atmospheric transparency during the period of observation are avoided.

This new method will hereafter be employed by the Smithsonian observers at Calama in combination with the old, not only for air mass 2, but for air mass 3, and they will check one against the other frequently for a considerable period of time until we are abundantly satisfied of the accuracy of the new method of observation. Hitherto the new method has enabled us to save at Calama a number of days of observation which, owing to the obvious changes in transparency of the atmosphere, due to formation or disappearance of clouds, would otherwise have been lost.

So far as we have as yet been able to compare the results by the old and the new methods, they are on the average closely identical. For instance, on July 1 three values of the solar constant were computed: (1) By the old process; (2) from observation at air mass 2; (3) from observations at air mass 3. The results obtained were as follows: 1.948, 1.940, 1.955, all agreeing within less than 1 per cent, and the mean of the results by the new process agreeing identically with the result by the old.

The new process requires but two or three hours of work, where the old required about 15, so that if it continues to appear as satisfactory as now a very great gain in labor will result from it. Not only is this so, but a still greater gain we think will come in accuracy, for we have now eliminated the fruitful source of error, depending on the variability of the atmospheric transparency during the observations.

The new method of determining the solar constant of radiation is not applicable to other stations than Calama without a new series of contemporaneous solar constant determinations by the old method and pyranometer observations at air mass 2 and air mass 3 to use with them. We have not at present available the necessary pyranometer observations at Mount Wilson, but we shall undertake to obtain them at the earliest practicable moment, and hereafter it is probable that the new method of determination will be employed there as well as in South America.

On the whole, the expedition to South America was unexpectedly fruitful. First, satisfactory observations were made of the eclipse, including both photographic observations of the eclipse phenomenon and pyranometer observations of the brightness of the sky during its progress. Second, a very interesting conference was held with the chief and chief forecaster of the Argentine meteorological service, in which they explained their investigations of the application of solar radiation measurements to weather forecasts and indicated their high sense of the value of solar radiation work for weather forecasting. Third, investigations at Calama based upon the observations there indicated a new empirical method of determining the solar constant of radiation, which appears to be equally as accurate

as the old and to have the great advantages: (1) That it avoids the assumption of uniformity of atmospheric transparency during the several hours formerly required for observing, and (2) that it diminishes the time required for computing the result from about 15 hours to about 3 hours.

PERSONNEL.

Miss Florence A. Graves, computer, was placed on furlough beginning September 5, 1918, in order that she might take up work in connection with the Red Cross operations in France.

Miss Gladys L. Thurlby reported as assistant computer on December 2, 1918, and Miss Inez A. Ensign reported as computer on February 1, 1919.

SUMMARY.

At Washington, outside of the usual reductions of observations and various pieces of experimental investigation, some connected with the war, others with the study of radiation, but for which, for one reason or another, no definite result can at present be reported, progress has been made with the preparation of a new optical medium, potassium iodide, for the investigation of the rays beyond where rock salt is transmissible, and a new instrument based upon the principle of the perfect radiator or "absolutely black body" has been prepared and is undergoing test for the purpose of measuring nocturnal radiation such as the earth sends out to space.

At Mount Wilson the measurements of the solar constant of radiation have been continued, and a very neat and excellent piece of work has been done by Mr. Aldrich, in cooperation with the Army Balloon School at Arcadia, on the measurement of the reflection of sun and sky radiation from great sheets of clouds, which lead to the result that a fully clouded earth would reflect to space 78 per cent of the radiation of the sun falling upon it.

In South America, a successful expedition by Dr. Abbot observed the total eclipse of the sun on May 29 at La Paz, Bolivia. Good photographs of the phenomenon and also pyranometric observations by Mr. A. F. Moore of the brightness of the sky were obtained during the progress of the eclipse. A conference which is likely to prove of great future value was held by Dr. Abbot with the chief and chief forecaster of the Argentine meteorological service with reference to the employment of solar radiation measurements for weather forecasting. At Calama, Chile, Dr. Abbot, in cooperation with the Smithsonian observers there, Messrs. Moore and Abbot, devised a new method of reducing solar radiation observations so as to determine the solar constant of radiation with at least equal precision to that obtained by the older method, and the advantages (1) that the

new method is independent of the variability of atmospheric transparency, and (2), that it requires only about one-fifth as much time as the old.

Respectfully submitted.

C. G. ABBOT,

Director, Astrophysical Observatory.

Dr. C. D. WALCOTT,

Secretary, Smithsonian Institution.

APPENDIX 6.

REPORT ON THE LIBRARY.

SIR: I have the honor to submit the following report on the activities of the library of the Smithsonian Institution during the fiscal year ended June 30, 1919:

The receipts of publications during the year numbered 24,670 packages. Of these, 23,517 were received by mail and 1,153 through the international exchanges. Five hundred and sixty-one volumes were completed and 11,443 periodicals were entered.

SMITHSONIAN LIBRARY.

Main library.—Publications for the Smithsonian Main Library, after entry on the records, are forwarded to the Library of Congress for the Smithsonian deposit. The accession numbers for the year extended from 529,925 to 532,002. The accessions included 1,883 volumes, 242 parts of volumes, 348 pamphlets, and 87 charts.

The cataloguing covered 2,490 volumes and 85 charts; 1,621 volumes were recatalogued; 4,909 cards were typewritten, and 895 printed cards from the Library of Congress for publications deposited by the institution were filed in the catalogue; 5,721 public documents were presented to the Library of Congress in accordance with the established practice.

The securing of publications in exchange for Smithsonian publications was carried on under war conditions with results that fully warranted the effort, and the completion of sets in the Smithsonian deposit of the Library of Congress has been continued, with the following results:

Number of want cards received from Library of Congress:

From Smithsonian Division.....	86
From Periodical Division.....	129
From Order Division.....	14
	<hr/>
	229

Number of publications secured for Library of Congress:

	Volume.	Parts.
For Smithsonian Division.....	94	381
For Periodical Division.....	6	145
For Order Division.....	32	1
	<hr/>	<hr/>
	132	527

Number of sets completed, 61.

Office reference library.—The accessions for the office library, which includes the Astrophysical Observatory and the National Zoological

Park, amounted to 639 publications, distributed as follows: Office library, 358 volumes and 20 pamphlets; Astrophysical Observatory, 89 volumes, 11 parts, 18 pamphlets; National Zoological Park, 140 volumes and 3 pamphlets. There was a circulation of 146 volumes.

Aeronautical collection.—Continued interest has been manifested in the institution's collection of aeronautical publications, which has been of special value to aeronautical-research workers in the Army, the Navy, and scientific institutions. Seventy-eight titles have been added during the year. The Bibliography of Aeronautics, completed last year, is being printed by the National Advisory Committee for Aeronautics, and will be ready for distribution shortly.

Reading room.—No new titles of particular interest have been added to the reading room during the year. In the interest of wartime economy on the part of the publishers, several popular magazines were not received in exchange. The number of magazines loaned during the year was 3,140.

Employees' library.—The number of loans in the employees' library was 332. The collection has been recatalogued, classified, and rearranged on the shelves. The volumes in the stacks are being rearranged, so that the magazines in greatest demand will be rendered more accessible.

Art room.—The collection in the art room, including the pieces of statuary as well as the books, have been carefully gone over during the year, and those that could not be considered as relating to the fine arts were sent elsewhere in order to make room for material which should be placed here. The large cases were remodeled in order to take care of the large portfolios of prints, especially those of the Marsh collection, and other books which should be under cover. The whole contents of this room is rearranged, catalogued, classified, and put in thorough order.

De Peyster collection.—Author cards for 1,722 titles of books in the De Peyster collection have been made, and the volumes on French history, numbering 869 titles, have been arranged on the shelves and rendered accessible.

NATIONAL MUSEUM LIBRARY.

The loans made by the Museum library during the year were 13,913, an increase over last year of 2,676. There were catalogued 1,048 volumes, 3,229 pamphlets; 62 volumes and 115 pamphlets were recatalogued; 1,322 volumes were sent to the Government bindery and 710 returned.

The most important acquisition was a set of catalogues of the J. Pierpont Morgan art collection, presented by J. Pierpont Morgan, jr. The set numbers 29 volumes, many of them privately printed in

numbered editions. Acknowledgment is due the University of Michigan for the gift of the 12 volumes published of the Humanistic Series.

The accessions were further increased by transfers from the Hygienic Laboratory, and contributions from Mr. B. H. Swales, the estate of Dr. Richard Rathbun, Dr. C. D. Walcott, Mr. William Schaus, Dr. O. P. Hay, Dr. C. W. Richmond, Dr. W. H. Dall, Dr. Mary J. Rathbun, Mr. A. H. Clark, Mr. W. R. Maxon, and others.

There were accessioned during the year 2,172 volumes, 2,585 pamphlets, 29 parts of volumes. The number of books in the library now is 141,794, consisting of 54,685 volumes and 87,109 pamphlets and unbound papers.

Technological series.—Additions to the technological library number 346 volumes, 4,096 parts of volumes, and 750 pamphlets. Current periodicals entered and shelved number 56 volumes and 3,091 parts of volumes. The back file of periodicals in the stacks have been examined and recorded from earliest issued to date. Entry was made for 4,249 volumes and 6,172 parts of volumes not entered before in the periodical record. The record of all periodicals is now complete and will be kept up to date for reference and consultation; 885 cards were added to the catalogue, 362 being for new material and the remainder of class 500.

In the scientific depository catalogue 10,230 cards were received, arranged, and filed. Of these 3,032 were main author cards, subject headings and titles being added for 7,198 additional cards in accordance with the plan of a dictionary catalogue.

The books and periodicals loaned during the year number 121 volumes, 21 pamphlets, and 104 periodicals or parts of volumes, making a total circulation of 245.

Sectional library, Division of Plants.—The revision of the books, serials, and periodicals in the Division of Plants has been satisfactorily completed. A card catalogue has been made of all of the books in the sectional library, numbering 896 titles, or 1,308 volumes. A periodical card record has been made for the recording of all volumes and parts of volumes now in the section, and current numbers are to be entered as received. The total number of publications thus recorded is 781 volumes and 153 parts of volumes. All completed volumes of unbound periodicals, numbering 38, have been collated and sent to the bindery.

In the course of revision, 104 volumes were transferred from the main library to the sectional library, inasmuch as they proved to be of special value to the division, and 64 volumes of lesser direct bearing on the division's work were transferred to the stacks of the main library; 510 volumes of the recent Biltmore acquisition were rebound or repaired and placed on the shelves either in the sectional library or in the main library stack rooms.

The entire collections have been gathered together and shelved in alphabetical order in the old regents' room, with the exception of a small number of books kept in adjoining offices, where they are especially needed. A card catalogue case has been ordered and will be placed in the library room, to contain not only the catalogue of the sectional library of the Division of Plants but also a duplicate card catalogue which has been prepared of all books and periodicals of the main Museum library on the subject of botany. By collecting these and shelving them in the first floor stacks in the west end of the Smithsonian Building, next to the John Donnell Smith collection, all the available works on botanical subjects have been brought together and rendered readily accessible.

Sectional libraries.—Following is a complete list of sectional libraries:

Administration.	History.	Parasites.
Administrative assist- ant's office.	Insects.	Photography.
Anthropology	Invertebrate paleon- tology.	Physical anthropology.
Biology.	Mammals.	Prehistoric archeology.
Birds.	Marine invertebrates.	Property clerk.
Botany.	Materia medica.	Registrar's office.
Comparative anatomy.	Mechanical technology.	Reptiles and batrachians.
Editor's office.	Mesozoic fossils.	Superintendent's office.
Ethnology.	Mineral technology.	Taxidermy.
Fishes.	Minerals.	Textiles.
Food	Mollusks.	Vertebrate paleontology.
Geology.	Oriental archeology.	War library.
Graphic arts.	Paleobotany.	Wood technology.

BUREAU OF AMERICAN ETHNOLOGY LIBRARY.

A report of the operations of the library of the Bureau of American Ethnology will be found in the report of that bureau. This library is administered under the direct care of the ethnologist in charge.

ASTROPHYSICAL OBSERVATORY LIBRARY.

The collection of reference works relating to astrophysics has been in constant use. Eighty-nine volumes, 11 parts of volumes, and 18 pamphlets were accessioned during the year.

NATIONAL ZOOLOGICAL PARK LIBRARY.

The library of the National Zoological Park made an increase during the year of 140 volumes and 3 pamphlets. This library is not extensive, but is simply a working library.

SUMMARY OF ACCESSIONS.

The accessions during the year, with the exception of the library of the Bureau of American Ethnology, may be summarized as follows:

To the Smithsonian deposit in the Library of Congress, including parts to complete sets	2,077
To the Smithsonian office, Astrophysical Observatory, and National Zoological Park	639
To the United States National Museum	4,786
	7,502

Respectfully submitted:

PAUL BROCKETT,
Assistant Librarian.

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

APPENDIX 7.

REPORT ON THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

SIR: I have the honor to submit the following report on the operations of the United States Bureau of the International Catalogue of Scientific Literature for the fiscal year ending June 30, 1919.

Notwithstanding the fact that the war in Europe practically ceased when the armistice of November 11, 1918, was declared, international affairs are still in such a chaotic state that no reorganization of the International Catalogue has yet been possible. All of the regional bureaus are in practically the same condition as they were in 1918, and are having difficulty in obtaining suitable aid to carry on their work. These conditions also greatly hamper the work of the Central Bureau in London, which, in addition, is faced with the pressing need of greater financial assistance.

The receipts of the London Central Bureau, whose sole support is derived from sales of the catalogue to the various subscribers throughout the world, have been greatly curtailed and unless subscriptions increase or the bureaus of Germany, Austria, Hungary, Poland, Belgium, and Russia, who are in arrears to the extent of almost \$9,000 per annum, again contribute their support it will be necessary to obtain assistance from some other source to finance the enterprise after the publication of the fourteenth annual issue.

Since the publication of the last annual report of this bureau eight volumes of the catalogue have been published, which completes the work through the thirteenth annual issue, with the exception of one volume, that of physiology. Twelve of the 17 volumes of the fourteenth annual issue have been published.

This bureau has continued to collect and classify the publications of the United States, and has now on hand a great quantity of material for the future volumes of the catalogue; indeed, in spite of war conditions, some of the sciences, notably zoology, have been indexed far in advance of the published volumes.

It has been evident ever since the beginning of the war that there would have to be a general reorganization of the catalogue when international affairs become sufficiently settled to enable the various countries taking part in the enterprise to decide how much aid they can individually render in order that the ever-increasing literature of science may be made available for general reference, and then

through their representatives and delegates agree with the other nations on a plan to continue this great international index to science. Methods and means were very thoroughly considered before beginning the publication of the catalogue in 1901, and the methods then decided on and the classification schedules then published were probably at that time the best means of attaining the end sought; but the condition of the world and the methods and aims of scientific workers have now so changed that it is apparent that the organization and methods of the International Catalogue need revision. The Royal Society of London, which has been the principal sponsor of the catalogue since the beginning, has recently announced that after the completion of the fourteenth annual issue it will be necessary for some new financial agreement to be made in order to continue the work, and has requested the scientific academies throughout the world to offer suggestions as how best to accomplish the end in view.

It may be well to here consider the need and aim of an international organization to catalogue scientific literature.

Many of the greatest minds of the day are engaged in researches and investigations the results of which are finally published in some form. It is obvious that means should exist to enable other workers in the same or similar fields as well as the general reader to refer to these publications.

Revolutionizing advances in many of the arts, industries, and trades are often made by means of scientific research, and what to-day appears to be an abstract investigation in pure science to-morrow becomes a stepping-stone to some epoch-making invention which either entirely changes an old or establishes a new trade or industry. This was true even before the present war, but since then cases of such revolutionary discoveries have multiplied to such an extent that it is hardly necessary to cite examples. All of the sciences have their special journals, many of which publish very complete indexes and even abstracts likely to be of interest to the specialists in various sciences, but there is no publication similar to the International Catalogue of Scientific Literature, whose aim is to index and classify all of the literature of the pure sciences of the world. It has been one of the aims of the catalogue since the beginning to cooperate with the editors and publishers of other similar indexes in order to obviate duplication of labor. Cooperation of this kind has been accomplished in several cases, notably that of the Zoological Record, which from 1906 to 1914 was published through the cooperation of the International Catalogue and the Zoological Society of London, with the result that the combined volume was universally acknowledged to be far superior to any index of the kind ever published or, indeed,

attempted. At the convention held in London in 1910 a committee was appointed and authorized to form similar combinations with the publishers of other indexes and yearbooks, but, unfortunately, for various reasons it has not yet been possible to form such combinations to the extent authorized by the convention.

Very respectfully, yours,

LEONARD C. GUNNELL,
Assistant in Charge.

Dr. CHARLES D. WALCOTT,
Secretary Smithsonian Institution.

APPENDIX 8.

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, 1919:

The Institution proper published during the year 10 papers in the series of Miscellaneous Collections, pamphlet copies of 2 Annual Report separates, and 1 special publication. The Bureau of American Ethnology published 5 bulletins, 1 Annual Report, and 1 advance extract from the volume. The United States National Museum issued 2 annual reports, 2 volumes of the proceedings, 48 separate papers forming parts of these and other volumes, 6 bulletins, and 20 separate parts of other bulletins.

The total number of copies of publications distributed by the Institution and its branches was 161,288, which includes 404 volumes and separate memoirs of Smithsonian Contributions to Knowledge, 15,603 volumes and separate pamphlets of Smithsonian Miscellaneous Collections, 13,885 volumes and separate pamphlets of Smithsonian Annual Reports, 118,332 volumes and separates of National Museum publications, 11,483 publications of the Bureau of American Ethnology, 1,444 special publications, 10 volumes of the Annals of the Astrophysical Observatory, 69 reports of the Harri-man Alaska Expedition, and 58 reports of the American Historical Association.

SMITHSONIAN MISCELLANEOUS COLLECTIONS.

Of the Miscellaneous Collections, volume 67, 1 paper was published; volume 68, 1 paper, title page, and table of contents; volume 69, 7 papers; volume 70, 1 paper; in all, 11 issues, as follows:

VOLUME 67.

No. 4. Cambrian Geology and Paleontology. IV, No. 4. Appendages of Trilobites. By Charles D. Walcott. December, 1918. 216 pp. (Publ. 2523.)

VOLUME 68.

Title page and table of contents. (Publ. 2526.) December 20, 1918.

No. 12. Explorations and Field-Work of the Smithsonian Institution in 1917. 134 pp. (Publ. 2492.) July 24, 1918.

VOLUME 69.

No. 2. The Mosses Collected by the Smithsonian African Expedition, 1909-10. By H. N. Dixon. October 8, 1918. 30 pp. (Publ. 2494.)

No. 4. Early Mesozoic Physiography of the Southern Rocky Mountains. By Willis T. Lee. July, 1918. 50 pp. (Publ. 2497.)

No. 8. Uganda Mosses Collected by R. Dümmer and others. By H. N. Dixon. Oct. 21, 1918. 11 pp. (Publ. 2522.)

No. 9. The Smithsonian Eclipse Expedition of June 8, 1918. By L. B. Aldrich. March 5, 1919. 22 pp. (Publ. 2527.)

No. 10. The Reflecting Power of Clouds. By L. B. Aldrich. February 10, 1919. 9 pp. (Publ. 2530.)

No. 11. The Races of Russia. By Aleš Hrdlička. March, 1919. 21 pp. (Publ. 2532.)

No. 12. Begoniaceae Centrali-Americanae et Ecuadorenses. By Casimir de Candolle. April 9, 1919. 10 pp. (Publ. 2533.)

VOLUME 70.

No. 1. A Lower Cambrian Edrioasterid (*Stromatocystites walcotti*). By Charles Schuchert. May 8, 1919. 9 pp. (Publ. 2534.)

SMITHSONIAN ANNUAL REPORTS.

Report for 1917.

The general appendix of the report for 1917, which was still in press at the end of the year, contains the following papers:

Projectiles Containing Explosives, by Commandant A. R.

Gold and Silver Deposits in North and South America, by Waldemar Lindgren.

The Composition and Structure of Meteorites Compared with that of Terrestrial Rocks, by George P. Merrill.

Corals and the Formation of Coral Reefs, by Thomas Wayland Vaughan.

The Correlation of the Quaternary Deposits of the British Isles with those of the Continent of Europe, by Charles E. P. Brooks.

Floral Aspects of the Hawaiian Islands, by A. S. Hitchcock.

Natural History of Paradise Key and the near-by Everglades of Florida, by W. E. Safford.

Notes on the Early History of the Pecan in America, by Rodney H. True.

The Social, Educational, and Scientific Value of Botanic Gardens, by John Merle Coulter.

Bird Rookeries of the Tortugas, by Paul Bartsch.

An Economic Consideration of Orthoptera directly Affecting Man, by A. N. Caudell.

An Outline of the Relations of Animals to their Inland Environments, by Charles C. Adams.

The National Zoological Park: A Popular Account of its Collections, by N. Hollister.

Ojibway Habitations and other Structures, by David I. Bushnell, jr.

The Sea as a Conservator of Wastes and a Reservoir of Food, by H. F. Moore.

National Work at the British Museum—Museums and Advancement of Learning, by F. A. Bather.

Leonhard Fuchs, physician and botanist, by Felix Neumann.

In memoriam: Edgar Alexander Mearns, by Charles W. Richmond. --

William Bullock Clark.

REPORT FOR 1918.

The report of the executive committee and proceedings of the Board of Regents of the Institution and report of the secretary, both

forming part of the annual report of the Board of Regents to Congress, were issued in pamphlet form in December, 1918.

Report of the executive committee and proceedings of the Board of Regents of the Smithsonian Institution for the year ending June 30, 1918. 13 pp. (Publ. 2529.)

Report of the Secretary of the Smithsonian Institution for the year ending June 30, 1918. 101 pp. (Publ. 2487.)

The general appendix of the report for 1918, which was in press at the close of the year, contains the following papers:

1. The Discovery of Helium, and what came of it, by C. G. Abbot.
2. An Account of the Rise of Navigation, by R. H. Curtiss.
3. The Tornados of the United States, by Prof. Robert DeC. Ward.
4. Wind Power, by Janes Carlill.
5. A Tribute. Samuel Pierpont Langley: Pioneer in Practical Aviation, by Henry Leffmann.
6. Modern Physics, by R. A. Millikan.
7. The Experiments of Dr. P. W. Bridgman on the Properties of Matter When Under High Pressure. Introductory note, by C. G. Abbot.
8. The problem of Radioactive Lead, by Theodore W. Richards.
9. Sphagnum Moss; war substitute for cotton in absorbent surgical dressings, by Prof. George E. Nichols.
10. History of Military Medicine and its Contributions to Science, by Col. W. P. Chamberlain.
11. Some Problems of International Readjustment of Mineral Supplies as Indicated in Recent Foreign Literature, by Eleanora F. Bliss.
12. Reptile Reconstructions in the United States National Museum, by Charles W. Gilmore.
13. A Pleistocene Cave Deposit of Western Maryland, by J. W. Gidley.
14. Paleobotany: A Sketch of the Origin and Evolution of Floras, by Edward W. Berry.
15. The Direct Action of Environment and Evolution, by Prince Kropotkin.
16. The Law of Irreversible Evolution, by Branislav Petronievics.
17. The Fundamental Factor of Insect Evolution, by S. S. Chetverikov.
18. The Psychic Life of Insects, by E. L. Bouvier.
19. Sexual Selection and Bird Song, by Chauncey J. Hawkins.
20. Marine Camoufleurs and their Camouflage: The present and prospective significance of facts regarding coloration of tropical fishes, by W. H. Longley.
21. Foot-Plow Agriculture in Peru, by O. F. Cook.
22. Sun Worship of the Hopi Indians, by J. Walter Fewkes.
23. The League of the Iroquois and its Constitution: A constitutional league of peace in the Stone Age of America, by J. N. B. Hewitt.
24. The Problem of Degeneracy, by H. F. Tredgold.
25. History in Tools, by W. M. Flinders Petrie.
26. The Background of Totemism, by E. Washburn Hopkins.
27. A Great Naturalist: Sir Joseph Hooker, by Sir E. Ray Lankester.

SPECIAL PUBLICATIONS.

The following publication was issued in octavo form:

Classified list of Smithsonian publications available for distribution October 15, 1918. 1918. 31 pp. (Publ. 2524.)

PUBLICATIONS OF THE UNITED STATES NATIONAL MUSEUM.

The publications of the National Museum are: (a) The annual report to Congress; (b) The Proceedings of the United States National Museum; and (c) The Bulletin of the United States National Museum, which includes the Contributions from the United States National Herbarium. The editorship of these publications is vested in Dr. Marcus Benjamin.

During the year the museum published 2 annual reports, 2 volumes of the proceedings, 48 separate papers forming parts of these and other volumes, 6 bulletins, and 20 separate parts of other bulletins.

The issues of the proceedings were as follows: Volumes 52 and 53 complete.

The issues of the bulletins were as follows:

Bulletin 50, Part VIII. The Birds of North and Middle America, by Robert Ridgway.

Bulletin 99. East African Mammals in the United States National Museum; Part I, Insectivora, Chiroptera, and Carnivora; and Part II, Rodentia, Lagomorpha, and Tubutidentata, by N. Hollister.

Bulletin 100. Contributions to the Biology of the Philippine Archipelago and Adjacent Regions. Volume 1, part 4: Report on the Chaetognatha collected by the United States Fisheries Steamer *Albatross* during the Philippine Expedition, 1907-1910, by Ellis L. Michael; part 5, Hydromedusae, Siphonophores, and Ctenophores of the *Albatross* Philippine Expedition, by Henry B. Bigelow. Volume 2, part 1: The Salpidae collected by the United States Fisheries Steamer *Albatross* in Philippine waters during the years 1908 and 1909, by Maynard M. Metcalf; part 2: The Salpidae—a taxonomic study, by Maynard M. Metcalf and Mary M. Bell. Volume 3: Contributions to the Biology of the Philippine Archipelago and Adjacent Regions. Starfishes of the Philippine Seas and Adjacent Waters, by Walter K. Fisher.

Bulletin 102, volume 1. The Energy Resources of the United States—a field for reconstruction, by Chester G. Gilbert and Joseph E. Pogue. Also, The Mineral Industries of the United States. Part 5: Power—its significance and needs, by Chester G. Gilbert and Joseph E. Pogue. Part 6: Petroleum—a Resource Interpretation, by Chester G. Gilbert and Joseph E. Pogue. Part 7: Natural Gas—its production, service, and conservation, by Samuel S. Wyer.

Bulletin 103. Contributions to the Geology and Paleontology of the Canal Zone, Panama, and geographically related areas in Central America and the West Indies, represents the work of a number of specialists, whose papers were issued, in separate form, as follows:

Pages 1-13: On some fossil and recent Lithothamnicae of the Panama Canal Zone, by Marshall A. Howe.

Pages 15-44: The Fossil Higher Plants from the Canal Zone, by Edward W. Berry.

Pages 45-87: The Smaller Fossil Foraminifera of the Panama Canal Zone, by Joseph Augustine Cushman.

Pages 89-102: The Larger Fossil Foraminifera of the Panama Canal Zone, by Joseph Augustine Cushman.

Pages 103-116: Fossil Echini of the Panama Canal Zone and Costa Rica, by Robert Tracy Jackson.

Pages 117-122: Bryozoa of the Canal Zone and related areas, by Ferdinand Canu and Ray S. Bassler.

Pages 123-184: Decapod Crustaceans from the Panama Region, by Mary J. Rathbun.

Pages 185-188: Cirripedia from the Panama Canal Zone, by H. A. Pilsbry.

Pages 525-545: The Sedimentary Formations of the Panama Canal Zone, with special reference to the Stratigraphic relations of the fossiliferous beds, by Donald Francis MacDonald.

Pages 547-612: The Biologic Character and Geologic Correlation of the Sedimentary Formation of Panama in their relation to the geologic history of Central America and the West Indies, by Thomas Wayland Vaughan.

Bulletin 104 (one part). The Foraminifera of the Atlantic Ocean, by Joseph Augustine Cushman, viz: Part 1, "Astrorhizidae," was issued. Of the remaining separates, two formed parts of volume 20, Contributions from the United States National Herbarium, while 19 were from volume 54, and 29 from volume 55 of the Proceedings.

Bulletin 105. Catalogue of the Postage Stamps and Stamped Envelopes of the United States and Possessions, issued prior to January 1, 1919, by Josiah B. Leavy.

PUBLICATIONS OF THE BUREAU OF AMERICAN ETHNOLOGY.

The publications of the bureau are discussed in Appendix 2. The editorial work of the bureau is in charge of Mr. Stanley Searles, editor.

During the year five bulletins, the Thirty-second Annual Report, an advance extract from this report, and a list of publications were issued, as follows:

Bulletin 59. Kutenai Tales. Franz Boas. 1918. 387 pp.

Bulletin 61. Teton Sioux Music. Frances Densmore. 1918. 561 pp., 82 plates.

Bulletin 64. The Maya Indians of Southern Yucatan and Northern British Honduras. Thomas W. F. Gann. 1918. 146 pp., 28 plates.

Bulletin 65. Archeological Explorations in Northeastern Arizona. Alfred Vincent Kidder and Samuel J. Guernsey. 1918. 228 pp., 97 plates.

Bulletin 66. Recent Discoveries Attributed to Early Man in America. Aleš Hrdlička. 1918. 67 pp., 14 plates.

Introduction to Seneca Fiction, Legends, and Myths. Collected by Jeremiah Curtin and J. N. B. Hewitt. Edited by J. N. B. Hewitt. 1919. An advance separate from the Thirty-second Annual Report. 71 pp.

Thirty-second Annual Report—Accompanying paper: Seneca Fiction, Legends, and Myths. (Hewitt and Curtin.) 819 pp.

List of publications of the bureau.

There are at present in press five annual reports, and nine bulletins as follows:

Bulletin 60. Handbook of Aboriginal American Antiquities. Part 1 (Holmes).

Bulletin 67. Alsea Texts and Myths (Frachtenberg).

Bulletin 68. Structural and Lexical Comparison of the Tunica, Chitimacha, and Atakapa Languages (Swanton).

Bulletin 69. Native Villages and Village Sites East of the Mississippi (Bushnell).

Bulletin 70. Prehistoric Villages, Castles, and Towers (Fewkes).

Bulletin 71. Native Cemeteries and Forms of Burial East of the Mississippi (Bushnell).

Bulletin 72. The Owl Sacred Pack of the Fox Indians (Michelson).

Bulletin —. Handbook of the Indians of California (Kroeber).

Bulletin —. Northern Ute Music (Densmore).

REPORT OF THE AMERICAN HISTORICAL ASSOCIATION.

The annual reports of the American Historical Association are transmitted by the association to the secretary of the Smithsonian Institution and are communicated to Congress under the provisions of the act of incorporation of the association.

Volume 1 of the report for 1916 was published during the year, and volume 2 of the same report was in press on June 30.

REPORT OF THE NATIONAL SOCIETY OF THE DAUGHTERS OF THE AMERICAN REVOLUTION.

The manuscript of the twenty-first annual report of the National Society of the Daughters of the American Revolution was transmitted to Congress according to law shortly after the close of the fiscal year.

THE SMITHSONIAN ADVISORY COMMITTEE ON PRINTING AND PUBLICATION.

The editor has continued to serve as secretary of the Smithsonian advisory committee on printing and publication. This committee passes on all manuscripts offered for publication by the Institution or its branches, and considers forms of routine, blanks, and various other matters pertaining to printing and publication. Thirteen meetings were held during the year and 79 manuscripts were acted upon.

Respectfully submitted.

W. P. TRUE, *Editor.*

To Dr. CHARLES D. WALCOTT,

Secretary of the Smithsonian Institution.



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