REPORT OF THE SECRETARY OF THE SMITHSONIAN INSTITUTION

FOR THE YEAR ENDING JUNE 30

1920

(Publication 2586)

WASHINGTON
GOVERNMENT PRINTING OFFICE
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SECRETARY OF THE SMITHSONIAN INSTITUTION,

CHARLES D. WALCOTT,

FOR THE YEAR ENDING JUNE 30, 1920.

To the BOARD OF REGENTS OF THE SMITHSONIAN INSTITUTION.

GENTLEMEN: I have the honor to submit herewith the annual report on the activities and condition of the Smithsonian Institution and its branches during the year ending June 30, 1920. An account of the affairs of the Institution itself, together with a summary of the work of the several branches, are given on the first 26 pages of this report, while the appendixes are devoted to more detailed accounts of the operations during the year 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 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 affairs of the Institution are administered by a Board of Regents whose membership consists of "the Vice President, the Chief Justice, 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." One of the regents, usually the Chief Justice, is elected chancellor by the board, and a suitable person is chosen by them as secretary of the Institution, who is also secretary of the Board of Regents and the executive officer directly in charge of the Institution's activities.

During the year Senator Medill McCormick was appointed a regent to succeed Senator Hollis, whose term as Senator had expired. Representative John A. Elston was appointed to succeed Representative Scott Ferris. Representatives Padgett and Greene were reappointed as regents, and Charles F. Choate, jr., was reelected a citizen regent by the Congress. The roll of regents at the close of the fiscal year 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; Medill McCormick, Member of the Senate; Lemuel P. Padgett, Member of the House of Representatives; Frank L. Greene, Member of the House of Representatives; John A. Elston, 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 11, 1919. The proceedings of that meeting, as well as 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 present 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 accordance with the law.

GENERAL CONSIDERATIONS.

The usual routine operations of the Institution in the "increase and diffusion of knowledge among men" were continued during the year, including a mass of correspondence with individuals and scien-

tific establishments throughout the world. It is becoming increasingly difficult for the Institution with its extremely limited funds, in the face of greatly increased costs in every phase of its activity, to carry on effective work. However, in spite of the fact that the Institution's endowed funds have never been materially increased, it has been possible in some measure to advance knowledge and publish the results of scientific work, as noted in the following report on the year's activities.

It is my sad duty to note here the death during the year of Mr. Charles L. Freer, of Detroit, an irreparable loss to the art interests of the country. As stated in previous reports, Mr. Freer presented his unrivaled collections of American and oriental art to the Smithsonian Institution in 1906, and provided $500,000 (later increased to $1,000,000) for the erection of a suitable building to house the collection. This building is now practically completed and nearly ready for the installation of the collections. That Mr. Freer did not live to see the fulfillment of his splendid art gift to the Nation is greatly to be regretted. An interesting article by Miss Katharine N. Rhoades on the recent additions to the Freer Collections appeared in Art and Archeology, October, 1919.

In addition to allotments for the maintenance of the Smithsonian solar observing station at Calama, Chile, several small grants for original research have been made from the Hodgkins fund of the Institution—one to Dr. L. G. Hoxton, professor of physics at the University of Virginia, for research on the Joule-Thomson effect in various gases; another to Mr. Alexander Wetmore, of the Biological Survey of the United States Department of Agriculture, for carrying on investigations of the body temperatures of birds; and a third to the Austrian Meteorological Association for the purpose of aiding in continuing the publication of the Meteorologische Zeitschrift and for the support of the meteorological observatory on the Sonnblick. Both of these were in danger of being discontinued on account of lack of funds, and their cessation would have been a great loss to meteorology.

Working also under a grant from the Hodgkins fund, Prof. Robert H. Goddard, of Clark College, continued his researches on a multiple-charge rocket for reaching great altitudes mentioned in last year's report. The early results of his experiments were published during the year by the Institution under the title "A Method of Reaching Extreme Altitudes," in which Prof. Goddard showed that it would be perfectly possible by means of his new type of high-efficiency rocket to send recording instruments to the hitherto unknown upper layers of the atmosphere and to provide for their safe return, thus obtaining new data of the greatest interest and scientific value to

meteorology and solar physics. Prof. Goddard also showed that it was theoretically possible to send a mass of 1 pound of flash powder outside the earth's attraction and to the dark surface of the new moon, where, on impact, the flash would be visible through telescopes on the earth. This interesting speculation aroused great popular interest throughout the country, almost to the exclusion of the immediately apparent scientific value of the experiment, namely, the exploring of the unknown upper layers of the earth's atmosphere. Prof. Goddard was working on the further development of his researches at the close of the year.

An important event in the art development of the country will be the creation of the National Gallery of Art as a separate administrative unit under the Smithsonian Institution, to take effect at the first of the coming year, instead of, as at present, a division of the National Museum, which action is made possible through a small appropriation in the sundry civil bill for 1921. Mr. W. H. Holmes, at present head curator of the department of anthropology in the Museum, will be appointed director of the National Gallery.

FINANCES.

The investments of the Institution are as follows:

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

CONSOLIDATED FUND.

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 Apr. 1, 1939	9,430.00
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 Victory loan	4,341.64
United States war-savings stamps, series of 1918	100.00
Brooklyn Rapid Transit Co. 5 per cent notes, due July 1, 1918	3,500.00
Redeemed bonds, excess cost over par	134.38
Total	82,896.02

The sum invested for each specific fund and the manner in which held is described as follows:

Fund.	United States Treasury.	Consolidated fund.	Total.
Smithson fund	$727,640.00	$1,304.00	$728,944.00
Habel fund	500.00		500.00
Hamilton fund	2,500.00	500.00	3,000.00
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	117.00	707.00
Avery fund	14,000.00	16,898.84	30,898.84
Addison T. Reid fund	11,000.00	2,150.00	13,150.00
Lucy T. and George W. Poore fund	26,670.00	4,968.00	31,638.00
George K. Sanford fund	1,100.00	221.00	1,321.00
Chamberlain fund		10,000.00	10,000.00
Bruce Hughes fund		8,355.93	8,355.93
Lucy H. Baird fund		1,106.25	1,106.25
Total	1,000,000.00	82,896.02	1,082,896.02

The $3,500 par value of the 5 per cent gold notes of the Brooklyn Rapid Transit Co. are still held in the hands of receivers, no plan of reorganization of the company having yet been decided upon.

Mr. B. H. Swales, honorary custodian, section of birds' eggs, has contributed an additional $300 to the Institution for the purchase of specimens, making a total contribution of $600 since January, 1919.

Several small lots of unimproved land near Lowell, Mass., have been sold, and $440.07 was realized therefrom and invested for account of the Lucy T. and George W. Poore fund.

Dr. William L. Abbott has contributed $4,000 during the year to the maintenance of a field party, the purpose of which is to procure archeological and natural history specimens in Australia. This sum is in addition to an unexpended balance which Dr. Abbott had previously furnished for similar work in Borneo and Celebes.

The Institution has received for specific activities valuable contributions from Mr. John A. Roebling and the Rockefeller Foundation, the amounts being $11,000 and $2,500, respectively.

Current funds not immediately required for expenditure are, when conditions will permit, deposited on time in local trust companies and draw 3 per cent interest per annum. The interest received in this manner during the year amounted to $1,320.60.

The income during the year, amounting to $171,788.35, was derived as follows: Interest on permanent investments and other sources, $65,651.37; repayments, rentals, publications, etc., $14,525.09; contributions from various sources for specific purposes, $41,171.82; bills receivable, $50,000; proceeds from sale of real estate, $440.07.

Adding the cash available July 1, 1919, $2,122.78, the total resources for the year amounted to $173,911.13.

The disbursements, which are described in the annual report of the executive committee, amounted to $160,606.79, leaving a balance on deposit with the Treasurer of the United States, in cash and in bank, amounting to $13,304.34.

The Institution was charged by Congress with the disbursement of the following appropriations for the year ending June 30, 1920:

International Exchanges	$45,000
American Ethnology	42,000
International Catalogue of Scientific Literature	7,500
Astrophysical Observatory	13,000
National Museum:	
Furniture and fixtures	20,000
Heating and lighting	69,715
Preservation of collections	300,000
Building repairs	10,000
Books	2,000
Postage	500
Heating equipment, Aircraft Building	14,000
National Zoological Park	115,000
Increase of compensation (indefinite)	------
Total	638,715

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.

Every year the Institution sends out or participates in, so far as its limited means will permit, expeditions for the purpose of increasing scientific knowledge in various parts of the world which have been previously but imperfectly known to science. In former years every continent and nearly every country on the globe has been visited by Smithsonian scientific explorers, and the result has been the accumulation of a valuable mass of information on the people, fauna, flora, geology, geography, ethnology, etc., of the various regions visited. Many of the more important results of these expeditions have been published by the Institution, and thereby have the chief objects of the Smithsonian as laid down by its founder, "the increase and diffusion of knowledge among men," been carried out.

While the prevailing universal high costs have considerably reduced the effectiveness of the Institution's funds for research and exploration, nevertheless several expeditions were in the field during the past year, and the activities of some of these are here briefly described.

GEOLOGICAL EXPLORATION IN THE CANADIAN ROCKIES.

Geological field work in the Canadian Rocky Mountains was continued by your secretary during the field season of 1919, with the following objects in view: (1) The discovery of an unmetamorphosed, undisturbed section of the Upper Cambrian formations north of the Canadian Pacific Railway; and (2) the collection of fossils to determine the various formations and to correlate them with the Upper Cambrian formations elsewhere. The region selected for examination was the area about Glacier Lake, which was reached through Bow Pass, down the Mistaya Creek to the Saskatchewan River, and thence up to the headwaters of the Middle Fork.

The geological section measured is of such interest that I will describe it briefly. The rocks exposed in the highest cliffs of Mount Forbes and Mons Peak belong to the great Carboniferous system of rocks of this region. Below this series is a belt 1,000 feet or more in thickness comprising the Devonian rocks, beneath which are the strata of the Sarbach formation of the Ordovician system. Under these again are the five formations of the Upper Cambrian series, and at one place near Mount Murchison is a low ridge formed of strata of Middle Cambrian age.

Special attention was given to the glaciers of which there are many fine examples in the region. Beautiful photographs of some of these were obtained, one showing a complete glacier from its névé to its foot. A preliminary examination of the fossils in the formations studied correlates them with the Upper Cambrian formations of Wisconsin and Minnesota and the Upper Cambrian section in southern Idaho, and to a lesser extent with that of the central belt of Pennsylvania.

PALEONTOLOGICAL FIELD WORK.

Two short field trips were taken during the year by Dr. R. S. Bassler, curator of paleontology, for the purpose of securing certain specimens of fossils and rocks required for the Museum exhibition series. During the previous year some excellent exhibition specimens had been located in southeastern Indiana, but owing to the impossibility of securing help to get them to a freight station, it had been necessary to leave them. This year, conditions being the same, they were carefully wrapped in burlap and padded with a quantity of weeds and laboriously dragged along the rails to the nearest station. The same method was used in transporting to a station the specimens found this year along a creek in the same locality, where heavy spring freshets had uncovered some richly fossiliferous layers of rock. One of these specimens, a slab several feet in length and width, was crowded with impressions of the branching fossil seaweed *Butho-*

trephis, and with excellent examples of the dumb-bell seaweed *Arthraria*. A specimen showing an assemblage of these ancient plant remains had long been needed in the fossil-plant exhibition series in the Museum.

Later in the year, Dr. Bassler proceeded to Dayton, Ohio, to prepare for shipment to Washington the largest entire American trilobite so far discovered. The trilobite was uncovered by the pick of a workman in the excavations for the Huffman conservancy dam, 6 miles east of Dayton. Mr. Arthur E. Morgan, chief engineer of the Miami conservancy district, recognized the scientific value of the fossil animal and presented it to the Institution, where it now forms a most unique and instructive exhibit in the hall of invertebrate paleontology of the National Museum. The specimen is of special value since it has become the type of a new species, *Isotelus brachycephalus*, described by Dr. August F. Foerste, of Dayton, Ohio.

THE COLLINS-GARNER FRENCH CONGO EXPEDITION.

The "Collins-Garner expedition in the interests of the Smithsonian Institution," which had been collecting biological material in the French Congo since the summer of 1918, returned to this country early in 1919, but the collections resulting from the expedition were incorporated into the Museum series of African material during the past fiscal year. Mr. C. R. W. Aschemeier, who represented the Institution, collected and turned over to the Museum some 2,500 mammals, birds, reptiles, fishes, and invertebrates, an invaluable addition to the Museum collections.

THE SMITHSONIAN AFRICAN EXPEDITION.

Last year it was announced that an expedition to Africa had been organized to collect plants and animals needed by the Museum to supplement the magnificent collections made on that continent by Col. Theodore Roosevelt and other explorers. This expedition, under the title of the "Smithsonian African expedition, under the direction of Edmund Heller in conjunction with the Universal Film Manufacturing Co.," sailed on July 16 on the steamship *City of Benares*, arriving in Cape Town August 13. Besides Mr. Heller, the Institution was represented by Mr. H. C. Raven, who has in former years made collections for the Smithsonian in Borneo, Celebes, and other regions.

In the vicinity of Cape Town, Mr. Raven was able to collect only insects and invertebrates, and from there he went to the Addo Bush, where 19 days were spent in collecting small mammals and birds. Going through Durban and Johannesburg, Mr. Raven spent two weeks collecting at Ottoshoop in the Transvaal, after which he pro-

ceeded to Victoria Falls, and from there he and Dr. Shantz, who was representing the United States Department of Agriculture, left for the Kafue River region, where they camped for several weeks.

After spending some weeks along the Congo, they reached Lake Tanganyika, where camp was made for about a month. The next stop of any length was in Uganda, where a few days over a month was spent in collecting in the Bundogo Forest. As the whole forest was in the sleeping-sickness area, it was necessary to get a special permit from the district commissioner to enter it, and the native boys engaged by Mr. Raven had to be examined by a doctor before entering the area and again on leaving it. At the close of the year, Mr. Raven was at Masindi, in Uganda, preparing to return to the United States.

Only one shipment of material had been received by the end of the year, consisting of 239 mammals and birds from southern Africa, which with the remainder of the specimens still to be received from Mr. Raven, will be of great value in working up the African material already in the Museum collections.

AUSTRALIAN EXPEDITION.

Through the continued generosity of Dr. W. L. Abbott, the Institution sent Mr. Charles M. Hoy to Australia for the purpose of collecting vertebrates, especially those which are in danger of extermination. As the Museum at present contains only about 200 specimens of the remarkable Australian mammal fauna, this expedition is of the utmost scientific importance, especially since in the future it will be impossible to secure an adequate representation of the fauna owing to their rapid extermination.

Mr. Hoy began work in Australia about the 1st of June, 1919, and by the close of the past fiscal year one shipment had been received at the Museum, consisting of 240 mammals and 228 birds. The following passages from reports and letters received from Mr. Hoy give an idea of the conditions under which the collecting was carried on:

> Nine weeks were spent in the Wandandian region (19 miles southwest of Norwra, New South Wales), with the result of but 131 mammals and 124 birds collected. Among the mammals 10 genera and 12 species are represented in my collection.
>
> The greatest agent working toward the extermination of the native animals is the fox; next comes the cattle and sheep men who distribute poison by the cartload in the effort to reduce the rabbits. This has also caused or helped to cause the extermination of some of the ground-inhabiting birds. Another great agent is the bush fires which sweep over the country. These are often lit intentionally in order to clear out the undergrowth and thus increase the grass.
>
> The extermination of the native mammals has apparently gone much further than is generally thought. Many species that were plentiful only a few years ago are now almost, if not altogether, extinct. Diseases have also played a

great part in the extermination. The native bear died in thousands from a disease which produced a great bony growth on their heads. A mysterious disease also spread through the ranks of the native cat, *Dasyurus viverrinus;* the domestic cat also played a great part in their extermination. Even adult specimens of *Dasyurus* were often dragged in by the family cat.

It is the killing and burning of the brush by the cattlemen that does the most to kill off the animals, and they are yearly reaching farther and farther away from the railroads. One thing that was very noticeable was the great abundance of the introduced rats. They seem to have driven out or killed off practically all the native rats, and I found them everywhere.

ANTHROPOLOGICAL RESEARCHES IN THE FAR EAST.

Dr. Aleš Hrdlička, curator of physical anthropology, National Museum, made an extended trip to the Far East in the interest of his researches on the origin of the American Indian and the peopling of eastern Asia. While in China he assisted with the organization of anthropological research in connection with the Peking Union Medical College in China.

During this trip, which occupied over five months, Dr. Hrdlička visited Japan, Korea, Manchuria, northern China, and the border of southern Mongolia, examining the local collections as well as the actual populations. The results of the journey have contributed very materially to the solution of the problems for which the trip was made, in addition to which it was possible to arrange for exchanges of material, and especially to organize a nucleus for anthropological investigation in China.

Dr. Hrdlička returned by way of Hawaii, where a two weeks' stop was made for the study of the natives and of Hawaiian problems in general.

While at Peking Dr. Hrdlička consulted prominent foreigners, as well as Chinese scholars, on the advisability of establishing in Peking, or of taking steps toward the establishment there of a "China Museum of Natural History," which, like the United States National Museum, would include the departments of geology, biology, and anthropology, and which would serve as a center for investigators in these lines in China and the Far East. Before his departure the opportunity was given him by representatives of several of the ministries and other officials to make the proposal more formally, with the result that a committee was to be organized for consideration of the project.

BOTANICAL EXPLORATION IN HAITI.

Through the generosity of Dr. W. L. Abbott, for many years a benefactor of the Institution, it was possible to detail Mr. Emery C. Leonard, aid in the Division of Plants, United States National Museum, as botanical collector to accompany Dr. Abbott to Haiti

upon his last visit of exploration in that country, from February to July, 1920. A collection aggregating 10,000 specimens, representing about 2,700 collection numbers, was secured by Mr. Leonard in several characteristic regions. This material will prove of exceptional value and interest from the fact that, little botanical collecting having been done in Haiti, the flora is in consequence very imperfectly known. The field work may be summarized as follows:

After completing their outfit at Port au Prince, the point of arrival, Dr. Abbott and Mr. Leonard proceeded by railroad to St. Marc, thence by native fishing schooner to Gonave Island, lying a short distance off the coast. This island, which is about 30 miles long from east to west and 10 miles broad, is entirely of coral formation, which decomposes to form a very rich reddish soil. Work was carried on principally upon the northern side. A low mountain range forms the backbone of the island, intersected by occasional sharp ravines, in which are found a very few springs. The coast is bordered by an almost unbroken fringe of mangroves, back of which is a belt of bare saline flats. Next in succession is a region of low arid foothills, from which the mountains rise rather abruptly. The hills and slopes are covered with thorny thickets, chiefly of leguminous shrubs and low trees, with cacti interspersed, but the uplands (called La Table) open in large grassy areas, with only scattered trees and shrubs, which afford rich pasture. About three weeks were spent on the north side of the island, working from Anse Galette and Etroite, and somewhat later a week on the south shore, with the small village Pickney as base.

The second part of the exploration covered the region west and south of Lake Saumatre. Access was easily gained by railroad from Port au Prince to Etang, on the west shore of the lake. After a week's collecting in the vicinity of Etang the party traveled by boat to Fond Parisien, on the southeast shore, and, procuring donkeys, proceeded overland to Mission, in the midst of the La Salle Mountains, where an altitude of 2,000 meters was reached. From this elevation down to 900 meters the slopes were sparsely covered with pines, and, where protected from fire, with dense thickets that sheltered a luxuriant growth of ferns. About two weeks were spent in collecting in this region.

The final portion of the field work was carried on in the region of Furcy, which lies a short distance south of Port au Prince. The collections here were made mostly on the wooded ridge east of Furcy on the trail to Grande Touraine. The region is well watered and has a delightful climate, but the country about Furcy itself has been almost entirely cleared of forests.

Of the plants collected perhaps one-third are ferns, the remaining portion consisting of shrubs and herbaceous plants, among which are a considerable number of grasses and cacti. The cacti appear to be of special interest.

BOTANICAL EXPEDITION TO BRITISH GUIANA.

Through the cooperation of the United States Department of Agriculture, the Gray Herbarium of Harvard University, and the New York Botanical Garden, a trip to British Guiana was made by Dr. A. S. Hitchcock, custodian of the section of grasses, National Museum. Dr. Hitchcock reports:

I left New York October 4 and arrived at Georgetown, British Guiana, October 22, visiting on the way down the islands of St. Thomas, St. Croix, St. Kitts, Antigua, Guadeloupe, Dominica, Martinique, St. Lucia, and Barbados. On the

return trip in February the islands of Trinidad and Grenada were visited. Collections of grasses were made on all the islands. In British Guiana a general collection of flowering plants was made, a set going to each of the contributing institutions.

My headquarters were at Georgetown, the capital and only large city of the colony. Here there is a good botanical garden and a herbarium of British Guiana plants, known as the Jenman Herbarium. Prof. J. B. Harrison, the director of science and agriculture, is in charge of the scientific activities of the colony and rendered me very efficient aid.

The greater part of British Guiana is covered with virgin forest. The vast savannas of Venezuela extend into the southern part of the colony. The temperature is high, 75° to 85°, according to the season, and the rainfall at Georgetown is about 90 inches. The settlements are mainly along the coast, and travel in the interior is by boat along the numerous rivers. The country for some distance back of the coast is low and wet. The chief industry is the raising of sugar cane. The health of the colony is fairly good, though there is much malaria.

The botanical results were very satisfactory. About 1,200 numbers of plants were collected. Especial attention was given to the grasses, of which 171 species are now known to grow in the colony.

BOTANICAL EXPLORATION IN GLACIER NATIONAL PARK, MONT.

Mr. Paul C. Standley, assistant curator in the Division of Plants, United States National Museum, spent about 10 weeks, from July to September, 1919, in Glacier National Park, Mont., under the authority of the National Park Service, for the purpose of studying the vegetation of the region. A large series of photographs and about 4,000 specimens, representing over 900 species of plants, were obtained, which will serve as the basis of a popular illustrated account of the plants to be published by the Park Service, and a more complete technical paper on the flora, in process of publication by the National Museum. The zonal distribution of the plants, which is of extreme interest, is discussed briefly by Mr. Standley, as follows:

The Continental Divide, which traverses the park, has a marked influence upon plant distribution. On the east slope, whose drainage is partly into the Missouri River and partly into Hudson Bay, the flora is of the Rocky Mountain type, like that of Wyoming and Colorado; while on the west slope, whose streams drain into the Columbia River, the flora is more obviously related to that of the Pacific coast. The forests about Lake McDonald are very dense and are composed of unusually large trees. Although not nearly so extensive, they are much like those of the humid regions of Oregon and Washington.

In the vegetation there are represented four of the life zones recognized by biologists. The transition zone is indicated on the west slope by small areas of yellow-pine timber, and east of the park are the prairies of the Blackfoot Indian Reservation, which extend also within the park boundaries along the stream valleys. The plants here are chiefly herbs, with a few shrubs, and they belong mostly to species which have a wide distribution over the Great Plains. By far the largest portion of the park is covered with the characteristic vegetation of the Canadian zone, which is the heavily forested area. Above the Canadian zone, around timber line (6,000 to 7,500 feet), lies a narrow belt

belonging to the Hudsonian zone. The trees here are mostly low and stunted, and their branches frequently lie prostrate upon the ground. Above this belt, and occupying the highest exposed slopes, lies the Arctic-Alpine zone, whose vegetation is composed chiefly of small herbaceous plants, with a few dwarfed shrubs, mostly willows. Many of the species of this zone are widely distributed in alpine or arctic regions of North America, and some of them occur also in similar situations in Europe and Asia.

BOTANICAL EXPLORATION IN JAMAICA.

Mr. William R. Maxon, associate curator in the Division of Plants, United States National Museum, accompanied by Mr. E. P. Killip, aid, was detailed to field work in Jamaica in February last for the purpose of making botanical collections in general and of securing fern material for use in connection with a projected volume upon the ferns of Jamaica. Over two months were spent in the island, including a period of three weeks in the Blue Mountain region, with the Cinchona botanical station as base. Other regions covered include Mount Diablo, Montego Bay, Mill Bank, and Seamens Valley, and the southern border of the peculiar "cockpit country" above Ipswich, a wooded area of limestone "sinks." Upward of 10,000 specimens were collected, representing about 1,700 collection numbers. In addition to the series to be retained by the National Museum, nearly uniform sets of the ferns and flowering plants have been distributed to the Gray Herbarium of Harvard University, the New York Botanical Garden, the Field Museum of Natural History, and the University of Illinois, all of which contributed equally to the field expenses of the work. Sets of the woody plants and orchids have been sent also to the Arnold Arboretum of Harvard University, and to Mr. Oakes Ames, respectively, in return for similar assistance. The lower cryptogams of the collection are in process of identification and will be distributed shortly.

EXPLORATIONS IN SANTO DOMINGO.

During the first three months of the fiscal year Dr. W. L. Abbot continued his scientific investigations in Santo Domingo, stopping at Sosua, on the north side of the island, where a search was made for certain birds needed to fill gaps in the series already collected. The Samaná Peninsula was then explored, after which Dr. Abbot visited the islets of Saona and Catalina, off the southeastern corner of Santo Domingo, and concluded his investigations with a few days' work at Lake Enriquillo.

The material collected on this trip and the previous trip ending just before the beginning of the fiscal year was varied in character, embracing the several groups of vertebrates as well as mollusks, insects, and plants, with a plentiful series of archeological objects from

caves in the Samaná district. Of birds alone, 278 study skins, 87 alcoholics and skeletons, and 56 eggs were collected, including birds representing four species not hitherto possessed by the Museum and three or four other species not previously known to occur on the island.

LECTURES.

Hamilton fund lecture.—The Hamilton fund was placed under the administration of the Institution by the Rev. James Hamilton in 1875, the interest to be used for "lectures on scientific or useful subjects." Under the auspices of this fund an interesting lecture was delivered on April 13 in the auditorium of the National Museum by the Rev. Charles E. Jefferson, D. D., on "The old order and the new," in which Dr. Jefferson gave his views as to the causes which led the world into its present unsettled condition and of the solution of the problems presented.

Lectures for the Y. M. C. A.—At the request of Dr. W. C. Little, field secretary of the Young Men's Christian Association, a series of lectures on scientific subjects written in a style to be instructive and entertaining to a general audience was prepared by members of the staffs of the Institution and its branches, for use in the educational extension work of the association. The scheme was to have these lectures delivered in rotation by volunteer lecturers in many different localities in the United States, thereby reaching a large number of people interested in keeping in touch with the advance of science and progress in general. The lectures prepared by members of the Smithsonian staff were as follows:

The Sun, by C. G. Abbot.
Cave Dwellings of the New and Old Worlds, by J. W. Fewkes.
The Primeval Life of North America, by R. S. Bassler.
A Visit to the Races of Man, by Walter Hough.
In the Land of the Great Natural Bridges, by Neil M. Judd.
The Progress in Land Transportation, by Carl W. Mitman.
Antiquities of the Bible, by I. M. Casanowicz.
Strange Facts in Nature, by Austin H. Clark.
Flying Animals, by Austin H. Clark.
Interesting Animals and Birds from East Africa, by Austin H. Clark.
Extinct Monsters of North America, by Charles W. Gilmore.
Mammals of Ancient North America, by James W. Gidley.

CINCHONA BOTANICAL STATION.

In my report last year it was stated that negotiations had been begun with the Government of Jamaica to renew the Smithsonian's three-year lease on the Cinchona botanical station which was canceled during the period of the war. This was successfully arranged in January, 1920, and the renewed lease dated from January 1.

The station is maintained by the subscription of a number of institutions in this country for the purpose of enabling accredited investigators to study the rich and interesting flora of the region. From January 1 to the close of the year the following botanists planned to avail themselves of the privileges of the station: Messrs. W. R. Maxon and E. P. Killip, of the United States National Herbarium, for work on the taxonomy of ferns and flowering plants; Mr. Frederick Boughton, of Pittsford, N. Y., for collecting fungi; Dr. J. M. Thompson, of Glasgow, for work on the ferns; and Prof. R. E. Danforth, of Rutgers College, also for work on the ferns.

EXHIBITION OF SOUTH AMERICAN HISTORICAL DOCUMENTS.

From July 28 to August 9, 1919, there was held in the Smithsonian Building an exhibition of South American historical documents brought together by Señor Don Jorge M. Corbacho, a member of the Peruvian Parliament and delegate to the Pan American Congress. The collection containing official documents signed by the Spanish conquistadores, the viceroys at Lima and the revolutionary leaders during the wars for independence, was one of inestimable value and was shown at the Smithsonian for the first time in North America.

RESEARCH IN TROPICAL AMERICA.

In June, 1920, the National Research Council, of which your secretary is a vice chairman, held a conference on the project of incorporating an institute for promoting research in tropical America, including exploration and the establishing of laboratories and research stations, and of effecting cooperation between the institutions interested in tropical research and exploration. The membership of the proposed institute was to consist of representatives (one each) from institutions interested in such research, and these institutions were invited by the Research Council to appoint representatives, but at the close of the year replies had not been received.

PUBLICATIONS.

The Institution and its branches issued during the year 95 volumes and separate pamphlets. Of these various publications there were distributed a total of 143,290 copies, which includes 157 volumes and separates of Smithsonian Contributions to Knowledge, 24,949 volumes and separates of Smithsonian Miscellaneous Collections, 16,720 volumes and separates of Smithsonian Annual Reports, 81,936 volumes and separates of the various series of the National Museum, 16,761 publications of the Bureau of American Ethnology, 1,958 special publications, 19 volumes of the Annals of the Astrophysical

Observatory, 23 reports on the Harriman Alaska expedition, and 564 reports of the American Historical Association.

Through its publications the Institution carries out one of its principal objects, the "diffusion of knowledge." The Smithsonian series, except the annual report, are printed from Smithsonian funds in small editions for distribution principally to libraries and scientific and educational establishments throughout the world. The annual report, containing a general appendix consisting of a number of articles illustrating recent advances in nearly every branch of science, is printed by congressional appropriation in editions of 10,000 copies and is in great demand throughout the country. The Museum and Bureau of Ethnology publications are discussed in detail in the reports of those branches appended to this report.

Of the Smithsonian Miscellaneous Collections, 14 numbers were issued, among which may be mentioned 2 papers by your secretary on his researches in Cambrian geology and paleontology, a paper showing the relations between the variations in solar radiation and in the weather, based on the work of the Smithsonian Astrophysical Observatory on the solar constant of radiation, and a fourth revised edition of the Smithsonian Meteorological Tables, for which there is a continued demand.

Allotments for printing.—The congressional allotments for the printing of the Smithsonian report and the various publications of the branches of the Institution were practically used up at the close of the year. The allotments for the coming year ending June 30, 1921, 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	$10,000.00
(*Provided*, That the unexpended balance of the appropriation of $10,000 made for this purpose in the sundry civil act approved July 1, 1918, is hereby reappropriated and made available during the fiscal year 1921)	5,220.99
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	37,500.00
For the annual reports and bulletins of the Bureau of American Ethnology and for miscellaneous printing and binding for the bureau	21,000.00
For miscellaneous printing and binding:	
International Exchanges	200.00
International Catalogue of Scientific Literature	100.00
National Zoological Park	200.00
Astrophysical Observatory	200.00
For the annual report of the American Historical Association	7,000.00

COMMITTEE ON PRINTING AND PUBLICATION.

The function of the Smithsonian advisory committee on printing and publication is to consider all manuscripts offered for publication by the Institution or its branches. During the year 10 meetings were held and 93 manuscripts were passed upon. The membership of the committee is as follows: Dr. Leonhard Stejneger, head curator of biology, National Museum, chairman; Dr. George P. Merrill, head curator of geology, National Museum; Dr. J. Walter Fewkes, chief, Bureau of American Ethnology; Mr. N. Hollister, superintendent, National Zoological Park; and Mr. W. P. True, editor of the Smithsonian Institution, secretary.

LIBRARY.

The Smithsonian library received during the year 6,995 volumes and pamphlets, distributed as follows: To the Smithsonian deposit in the Library of Congress, 4,019; to the Smithsonian office, Astrophysical Observatory, and National Zoological Park libraries, 428; and to the National Museum library, 2,548.

Continued use of the library's collection of works on aeronautics has been made by students of aeronautics, both of the United States and of foreign countries. Forty titles were added to the collection during the year. In the De Peyster collection, author cards have been made for the Napoleon series and for the works on British, German, and Italian history.

The work of the library has suffered from the fact that the appropriation for binding has not kept pace with the greatly increased cost. This has reduced the number of books bound during the year to 737, as compared with 1,322 in 1919 and 1,706 in 1918.

NATIONAL MUSEUM.

The congressional appropriation for the maintenance of the Museum has remained practically the same for many years, and as a result of the great increase, both in size and importance, of the collections, not only has it been impossible to undertake desirable new lines of work, but also existing work has been greatly hampered by the necessity of observing the strictest economy. The two most serious handicaps to the Museum in extending its usefulness to the people of the country are lack of space for proper exhibition of its valuable collections and an insufficient staff of expert curators. This last has in several cases necessitated grouping wholly unlike divisions under one curator, with the result that the sections in which there is no specialist in charge must remain practically at a standstill.

In June, 1920, a small congressional appropriation made possible the establishment of the National Gallery of Art as an independent bureau under the administration of the Smithsonian Institution, instead of being as previously a part of the Museum, the change to take effect on July 1, 1920. Mr. W. H. Holmes, head curator of the department of anthropology in the Museum, will become director of the National Gallery at the beginning of the year.

The Freer Gallery of Art was brought nearly to completion during the year, and arrangements were made with the Office of Public Buildings and Grounds for the construction of driveways and the improvement of the grounds around the building. The collections have begun to come in from the executors of Mr. Freer's estate and are being stored in the building until the installation can be begun.

During the past year the Museum acquired a total of 216,871 specimens, classified as follows: Anthropology, 15,254; zoology, 101,554; botany, 35,211; geology and mineralogy, 22,400; paleontology, 40,000; division of textiles, 1,716; mineral technology, 627; mechanical technology, 97; and National Gallery of Art, 12. Four hundred and ninety-five lots of material were sent to the Museum for examination and report by members of the staff, and 4,306 duplicate specimens were distributed for educational purposes.

The great mass of material for the Museum's collection of objects relating to the World War filled the space allotted to it in the Arts and Industries Building and overflowed into the Natural History Building and the Aircraft Building. This great collection, made possible through the hearty cooperation of the War and Navy Departments, contains material relating to practically every phase of the war, both on land and sea. The Navy furnished much interesting material relating to submarine warfare and other naval activities during the war, and the War Department assembled and deposited in the Museum exhibits illustrating military operations in every branch of the service, including the Air Service, Ordnance, Chemical Warfare, Quartermaster, Engineer, Medical, and Signal Corps. A full account of this valuable and instructive collection is given in the report of the administrative assistant in charge of the Museum, in an appendix to this report.

Additions to the collections in the division of history include 226 complete uniforms of the types worn in the United States Army from 1776 to 1909; miscellaneous scientific apparatus used by Joseph Henry (1799–1878) during the latter part of his life, the gift of his daughter, Miss Caroline Henry; watches owned by Maj. Gen. George B. McClellan, United States Army; swords and other military relics of Maj. Gen. John R. Brooke, United States Army; and many other objects of historical interest and value.

In anthropology the most noteworthy accessions were some valuable ethnological material collected during the period of military occupancy of the Philippines; collections made by members of the staff of the Bureau of American Ethnology, and transferred to the Museum; and a collection of nearly a hundred objects of Christian and Buddhist religious art in wood, copper, bronze, and silver.

The department of biology showed very gratifying results both in number of specimens and in the scientific importance of the material received. Through the liberality of Mr. B. H. Swales, no less than 163 species of birds new to the Museum's collections were among the year's accessions and, with the continued assistance of Dr. W. L. Abbott, 240 mammals and 228 birds from Australia were received as a first installment of a collection being made there by Mr. Charles M. Hoy. A large number of specimens were received during the year as a result of the Collins-Garner French Congo expedition. The divisions of insects and mollusks received important additions, and the botanical material accessioned during the year included valuable collections from all over the world.

In geology there was a decided increase over the previous year, both in number of specimens and in their scientific value, including many thousands of specimens of minerals and invertebrate fossils received from the United States Geological Survey. The collection of gems was overhauled and reweighed, and a handbook and catalogue of them prepared, which was in press at the close of the year. One hundred sets of 85 specimens each of ores and minerals for distribution to schools were prepared.

The divisions of textiles and mineral technology received important additions, and the division of mechanical technology was entirely rearranged during the year in accordance with a new plan for making the exhibits more instructive to visitors.

The usual large number of meetings and lectures were held in the auditorium of the Natural History Building, including the annual meeting of the National Academy of Sciences. The total number of visitors during the year at the Natural History Building was 422,984 and at the Arts and Industries Building 250,982. The Museum library received during the year 1,932 volumes and 1,581 pamphlets, bringing the total number up to 56,617 volumes and 88,690 pamphlets. The publications of the Museum for the year were 3 volumes and 33 separate papers of the Proceedings; Bulletins 106 (text), 107, 108, and a small edition of 103; volume 21 of Contributions from the National Herbarium, and the annual report for 1919.

BUREAU OF AMERICAN ETHNOLOGY.

The purpose of the Bureau of American Ethnology is to contribute to our knowledge of racial culture and advance our appreciation of racial accomplishment with respect to the American aborigines and the natives of the Hawaiian Islands. Inasmuch as the material from which we may secure this knowledge is rapidly disappearing or being absorbed into modern life, it is urgent that the bureau carry on intensive work among the American Indians to preserve for posterity the unwritten literature, languages, customs, and material culture of these most interesting people. The results of these researches are published by the bureau, and its policy with regard to publications is that they should be of such a nature that they may be studied with profit by all intelligent persons and not so technical as to be of value only to a few specialists.

Among researches along special lines conducted by the staff of the bureau may be mentioned the study of the various fibers and foods used by the Indians with the view of discovering a possible adaptation of some of these aboriginal resources to the use of the white man. A series of researches and publications on the habitations of the Indian has been inaugurated in order that they might be better known and an accurate knowledge of them disseminated. Researches on the music of the Indians have been carried on with gratifying results, the themes having been incorporated in certain cases by modern musicians in their compositions. In cooperation with the National Park Service the bureau is engaged in the excavation and repair for permanent preservation of prehistoric ruins and cliff dwellings of the Indians in the national parks and other Government reservations, such as the Mesa Verde in Colorado. These reclaimed Indian dwellings and other structures have proved to be of the greatest educational value and popular interest. During the past year the bureau excavated and repaired two of these prehistoric structures on the Mesa Verde, known as Square Tower House and Painted House, which have already cast considerable light on the ethnological problems of the region.

Work was continued by members of the staff during the year on various publications in varying degrees of completion from manuscript to final proof, and in addition field work was carried on among the Oneida Indians, the Seneca, the Tanoan and Kiowan, the Fox, the Pawnee, the Papago, the Apache, and other tribes. Also a number of archeological researches were conducted, especially in Texas and in the southwestern United States.

One annual report and 4 bulletins were issued during the year, while 14 publications were in press in various stages of completion. The library of the bureau, to which 820 books were added during the year, now numbers over 23,000 volumes and 14,000 pamphlets.

INTERNATIONAL EXCHANGES.

The number of packages handled during the year by the International Exchange Service was 369,372, weighing 496,378 pounds, an increase of 98,512 packages and 204,460 pounds in weight over the preceding year. This large increase is due to the fact that shipments have been resumed to several countries with which relations were suspended during the war. Nevertheless the number of packages handled exceeded by over 27,000 the total during 1914, the last year before the World War.

Shipments are still suspended to certain countries where internal conditions are unsettled or with whom peace treaties have not yet been ratified by the United States. An exchange of publications has been inaugurated with the Czecho-Slovak Republic, and, as soon as conditions warrant, it is expected to take the same step with the Polish Government. The prompt dispatch of foreign exchanges was considerably hampered at times during the year by freight embargoes and marine strikes. Later, however, the official character of the exchange shipments put them among the classes of freight exempt from the embargoes.

The Exchange Service continues to be of use in securing for establishments in other countries collections of scientific or other documents in this country. As an instance of this service, considerable material bearing on American universities and on the methods of government in American municipalities was collected and forwarded to the counselor in charge of foreign relations of the municipality of Prague, at his request.

For transmission to foreign countries there were received during the year 56 full sets of United States official publications and 37 partial sets, in exchange for which this country receives the official publications of these various countries. Two new depositories to receive the official documents were added during the year, Czecho-Slovakia to exchange full sets and the State of Rio de Janeiro, Brazil, partial sets.

NATIONAL ZOOLOGICAL PARK.

The congressional appropriation for the maintenance of the National Zoological Park was the same for the past fiscal year as for the preceding year, and with the constantly increasing cost of practically all supplies used at the park it was impossible to spend more than a small part of the amount for repairs and improvements. Only the most urgent of the needed improvements were completed, among them a public-comfort station at the Harvard Street entrance; nine new inclosures of iron framework covered with heavy mesh wire for strictly outdoor animals, such as pumas, leopards, lynxes, and

others; and some necessary minor improvements, such as new concrete steps, drainage gutters, and new fences.

Popular interest in the park continues to increase, the total number of visitors during the year being 2,229,605, the largest yearly attendance ever recorded. The educational value of the zoological collection is emphasized by the fact that 98 schools and classes, comprising about 9,000 individuals, visited the park during the year.

The number of animals in the collection at the close of the year was 1,427, representing 419 species. Of this total, 496 were mammals, 847 birds, and 84 reptiles. While this number is 124 under the record year, nevertheless the monetary and scientific value of the collection is much greater than ever before. Specially interesting among the 127 animals presented to the park during the year were a number of accessions from South America, including the rare black-headed ouakari monkey, two snowy egrets, a scarlet ibis, a specimen of the rare matamata turtle, a white-backed trumpeter, the most important addition to the bird department during the year, a Mexican kinkajou, and other rare South American species. The most interesting among the animals born in the park is a hippopotamus, which attracts much attention from visitors.

It is gratifying to be able to report that the sundry civil act for 1921 carries an appropriation of $80,000 for the purchase of a frontage of 625 feet on Connecticut Avenue, which will enable the park to have a dignified approach at this important entrance without the danger of encroachment by private dwellings or other buildings. Among the important needs of the park the superintendent mentions, in an appendix to this report, a suitable public restaurant for the increasing number of visitors, the purchase of a narrow strip of land between the park boundary and Adams Mill Road near the southeastern entrance, outdoor inclosures for lions, tigers, and certain other animals, and increased compensation for certain of the employees, particularly keepers and policemen.

ASTROPHYSICAL OBSERVATORY.

The work of the observatory at Washington consisted largely of preparation of tables of results for publication in Volume IV of the Annals of the Astrophysical Observatory, and of reducing the 1919 observations made at Mount Wilson and comparing them with those obtained by the Smithsonian observers in Chile. The agreement between the two sets of results, after allowing for systematic errors, was excellent, the average deviation of the two stations for 50 values obtained on corresponding days being only 0.013 calories, or 0.65 per cent. A remarkable confirmation of the variation of solar radiation on the earth was given by photo-electric observations on the planet

Saturn by Dr. Guthnick, of the Berlin-Babelsberg Observatory. Variations in brightness of that planet were shown which were found to be in almost exact correlation with variations of the solar radiation on the earth as observed at Calama, Chile. This comparison indicates that the variation of the solar radiation is due to rays from the sun of unequal brightness, which, rotating with the sun, strike the various planets successively in the order of their longitudes, and fall one after the other upon the earth as the sun by rotation brings them into line with us.

A new instrument for measuring nocturnal radiation, devised by Messrs. Abbot and Aldrich and constructed at the observatory instrument shop, was successfully tried during the year. It is provisionally called the "honeycomb pyranometer." The instrument is almost as sensitive as a flat blackened strip and moreover, has the valuable property of being fully absorbing, which a strip has not. It is an instrument of great promise for standard measurements of various kinds of radiation.

Through the generosity of Mr. John A. Roebling, of New Jersey, it was made possible to move the Smithsonian observing station previously located on the plain near Calama, Chile, to a near-by mountain above the interference of dust and smoke. With the remainder of Mr. Roebling's grant, it is proposed to establish a new observing station on the Harqua Hala Mountain in Arizona, one of the most cloudless regions in the world. The establishment of these two stations, so widely separated from one another, will make it possible to obtain nearly every day in the year check observations of the solar constant of radiation, laying a firm foundation of solar observations from which meteorologists will be able to determine whether the variations in the sun are of value, as present results indicate, in forecasting weather conditions. However, with the limited funds at his disposal, Dr. Abbot found it necessary to transfer apparatus from the Mount Wilson station to the new Harqua Hala station, and he urges in his report that Congress appropriate sufficient money to provide for independent observing equipment for both stations and for needed improvements to the Arizona station.

INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

The United States Regional Bureau of the International Catalogue of Scientific Literature is intrusted with the duty of collecting, indexing, and classifying titles of all scientific papers published in the United States to form part of the International Catalogue issued by a central bureau in London.

The enterprise was begun in 1900 and published annually 17 volumes up to 1913. Fifteen volumes for the year 1914 have been printed and much of the material for the fifteenth issue is now in the hands of the central bureau, its publication being delayed by financial difficulties brought about by the war. A conference has been called by the Royal Society in London, September 28 next, to consider the future of the catalogue and to discuss means for meeting this financial deficit.

The aim and purpose of the International Catalogue was to meet the demands of scientific workers for an annual authors' and subject catalogue to the current literature of science. A general revision of the classification schedules which form the key to the subject catalogues is now needed and, in view of the present apparent demand for abstract journals, it is to be hoped that when these improvements are considered arrangements may be made to cooperate with the bodies now preparing and publishing abstracts to scientific literature.

It would seem that the pressing demand for such abstract journals, now evident in the United States, should be recognized internationally. This Institution would, therefore, favor any feasible plan to bring the present influential organization of the International Catalogue of Scientific Literature, already recognized and supported by practically all the countries of the world, into close cooperation with existing abstract journals and to encourage the establishment of abstract journals covering those branches of science not already represented.

OBITUARY.

STEPHEN C. BROWN.

Stephen C. Brown, who for more than 40 years had held the position of registrar of the National Museum, died on July 11, 1919. At a meeting of his associates in the Smithsonian and Museum held the following day, many of Mr. Brown's friends expressed the high esteem and admiration in which he had been held and their sorrow at his loss.

R. LUTHER REED.

R. Luther Reed, an employee of the Institution since 1880, died on April 26, 1920. He was foreman of the Museum carpenter shop until the Zoological Park was established, where he served until brought back to the Institution by Secretary Langley to work on his aerodromes. Mr. Langley has expressed in his publications his appreciation of Mr. Reed's skill and efficient service in that connection.

Respectfully submitted.

CHARLES D. WALCOTT, *Secretary.*

APPENDIX 1.

REPORT ON THE UNITED STATES NATIONAL MUSEUM.

SIR: I have the honor to submit the following report on the operations of the United States National Museum during the fiscal year ending June 30, 1920.

The year witnessed very little change in the organization of the United States National Museum. The congressional appropriations for the maintenance of the Museum remaining practically stationary for many years has not only prevented the Museum from engaging in new lines of work offering exceptional opportunities at this time but has allowed it to carry forward existing work only by the use of the strictest economy. The Museum has been unable to add even a few of the experts needed to assist in the classification of specimens in the recently organized department of arts and industries as well as in the long-established natural history departments, nor has it been able to make any general advancement of salaries though greatly needed. The insufficiency of funds precludes separate staff officers for the various sections or divisions of the work, these various activities having of necessity to be placed under those curators in other lines best qualified to also handle the subjects. Thus, for instance, for administrative purposes only, the division of medicine and the section of wood technology are under the general supervision of Mr. F. L. Lewton, who is the curator of textiles, and Dr. Walter Hough, curator of ethnology, has general oversight of various other collections where there is no paid staff, especially the art textiles, ceramics, musical instruments, and the period costume collections. This arrangement is far from ideal, but it holds collections together until means are available for the needed additional experts. The item for preservation of collections, from which the scientific and clerical staffs, the watch and cleaning force, freight and cartage, and preservatives are paid, was last increased 10 years ago, just as the Museum was taking possession of the Natural History Building. Since then approximately 3,000,000 specimens have been added to the Museum.

After the death of Mr. S. C. Brown the position of registrar of the Museum was abolished and a reorganization of the work made. The records relating to accessions, material for examination and report, and to distribution of specimens were transferred to the office

of correspondence and documents, where the files of the Museum are kept, and the duties of shipping clerk were combined with those of property clerk.

The collections of echinoderms were removed from the division of marine invertebrates, a separate division of echinoderms being established and Mr. Austin H. Clark promoted from assistant curator of marine invertebrates to curator of echinoderms and placed in charge. As he had devoted much time to the onychophores, they were included in the new division. At the close of the year the division of graphic arts was transferred from the department of anthropology to that of arts and industries.

The sundry civil bill for 1921 carries a small appropriation for the National Gallery of Art. For economic reasons the gallery has up to now been administered as an integral part of the Museum, the scientific and administrative staffs of which have cared for the gallery in addition to their own regular Museum duties. This appropriation will permit of the gallery being separated from the Museum on July 1, 1920, and organized as an independent bureau under the Smithsonian Institution, and to it will be transferred the fine art collections of the Museum which have heretofore been administered under the curator of the National Gallery of Art. The gallery will for the present, however, continue to be housed in the Natural History Building of the Museum.

The year has witnessed the bringing together here of large war collections, made possible by the hearty cooperation of the War and Navy Departments. Besides supplying the objects, they transported them without cost to the Museum, set them up in the Museum buildings, and in many instances detailed officers and men to assist in labeling and otherwise preparing them for exhibition.

COLLECTIONS.

The total number of specimens acquired by the Museum during the year was approximately 216,871. Received in 1,480 separate accessions, they were classified and assigned as follows: Department of anthropology, 15,254; zoology, 101,554; botany, 35,211; geology and mineralogy, estimated, 22,400; paleontology, estimated, 40,000; textiles, woods, medicines, foods, and other miscellaneous animal and vegetable products, 1,716; mineral technology, 627; mechanical technology, 97; and National Gallery of Art, 12. Loans and deposits for exhibition added 8,348 more, chiefly in the division of history, war collections.

Material to the extent of 495 lots was received for special examination and report. While this free identification of material sent in from all parts of the country requires considerable time on the part

of specialists, it is not without advantage to the Museum in furnishing occasional desirable specimens and in recording new localities.

The distribution of duplicates for educational purposes, mainly to schools and colleges, aggregated 4,306 specimens.

Material sent out to specialists for study on behalf of the Museum amounted to 13,838 specimens, mainly biological.

War collections.—Through cooperation of the Navy and the War Departments, the stream of material reaching the Museum illustrative of the World War filled the quarters assigned to the division of history in the Arts and Industries Building, overflowing into the Natural History Building and the Aircraft Building.

Prior to July, 1919, very little material had been received illustrating the work of the Navy during the World War, with the exception of some uniforms of the Marine Corps and the insignia of its various branches. At that time it was decided to assign the rotunda of the Natural History Building for this purpose, and Lieut. Commander L. P. Warren was designated on the part of the Navy Department to take charge of this work. A number of exhibits were received during the year, the most important of which are a paravane, which is a device attached to battleships for the purpose of destroying mines; an anti-aircraft gun and a Y depth charge gun for destruction of submarines; a collection of British naval airplane bombs, a large number of relics from the sunken battleship *Maine*, a 1-pound gun, a German torpedo 18 feet long, a Davis gun for airplanes, a naval range finder, and the large 6-inch naval gun which fired America's first shot in the World War. Owing to its great weight this gun was placed on the east driveway, where it makes a most impressive exhibit.

The War Department continued its generous cooperation by contributing material illustrating the military activities of the United States, the Allies, and the enemy countries in the following branches: Air Service, Ordnance, Chemical Warfare, Quartermaster, Engineer, Medical, and Signal Corps. The material was selected especially for the Museum with a view to illustrating graphically the military history of the war for the benefit of the public and for historical and scientific research.

From the Air Service came military airplanes showing types of machines used by the United States, France, and Germany, including a De Haviland-4, tractor biplane of type originally developed by England and later adopted by the United States for observation and day bombing purposes; a Le Pere tractor biplane of type developed by the United States Air Service during the war for fighting purposes; a Martin bomber, twin tractor biplane of type developed by United States Air Service for bombardment purposes; a Spad, XVI,

tractor biplane of type developed and used by French for reconnaissance purposes; another Spad, XIII, tractor biplane of type developed and used by France. This airplane, which was part of the Twenty-second Aero Squadron, Air Service, American Expeditionary Forces, has seven victories to its credit, and is of the same type as those with which the famous French flyers Fonch and Guynemer and the American flyer Rickenbacker made a great part of their records; a Fokker, D–VII, tractor biplane developed and used by the German air service for pursuit purposes. This plane was captured at Verdun by Capt. H. McLanahan and Lieuts. E. Curtis and S. Sewall, of the First Pursuit Group, Ninety-fifth Aero Squadron, United States Army, Capt. J. Mitchell commanding.

The Ordnance Department and the Quartermaster Corps supplied ordnance equipment of the type used by the various armies for offensive and defensive purposes, small arms of type used by the United States during the war, rifles, pistols, and swords illustrating the types of weapons used during the World War by the various armies, including the rifles used by the armies of Austria, Belgium, England, France, Japan, Italy, Germany, Russia, Roumania, and Serbia. Of more than passing interest were specimens of silk cartridge cloth used by the United States Army for powder bags for loading the large guns and samples of the same material adapted for civilian use.

Of enemy material the Ordnance Department transmitted a large and interesting collection of German and Austrian equipment captured by the American Expeditionary Forces. This included field, machine, anti-aircraft, and anti-tank guns; field kitchen; various other vehicles, and miscellaneous commissary, infantry, artillery, cavalry, and signal equipment, some made of paper.

From the Chemical Warfare Service came offensive and defensive equipment used in the chemical warfare by both the armies of the allied and enemy countries, including shells, bombs, projectiles, smoke producers, masks, special clothing, and alarm; in each case also nearly complete series showing the development of such objects from their earliest form to the most recent.

The Corps of Engineers contributed a collection illustrating the important part played in modern warfare by that branch of the Army, including examples of tools and small equipment and of the large instruments peculiar to the work of the corps which so greatly aided in winning the war. Particularly interesting are a parabolic listening device; sound and flash ranging sets for locating the position of enemy batteries; examples of the high-intensity electric-arc and the open-type searchlights; models showing the use of camouflage material in trench warfare with dummy silhouettes of soldiers to draw machine-gun fire; representation of standard type trench and

shelter-cave chamber; models of bridges, pontoon boats, and wagons, and a camouflaged-gun position.

Other contributions, through the Quartermaster Corps, added uniforms and insignia fully representing the uniform and individual personal equipment worn by officers and enlisted men of the following countries and the colonial possessions of each: Belgium, France, Great Britain, Italy, Japan, Austria, Germany, and Turkey. This series forms a marvelously complete collection, and will be a priceless source of information for historical purposes.

The Medical Department completed the extensive series begun last year of objects illustrating the work of that branch of the United States Army, and it was duly installed this year under the supervision of Mr. F. L. Lewton. The field equipment included first-aid kit and emergency belt worn by all enlisted men in the Medical Corps, field operating table, instruments, dressings, and other supplies, complete portable and the emergency dental outfit for carrying in hand, field kitchen, disinfector, sterilizing outfits, litters, ambulances, etc. The base hospital material for exhibition was grouped as follows: The X-ray laboratory, showing all important fixed and movable types of X-ray equipment; the hospital ward of three beds, with various equipment; general operating room of a military hospital; anæsthesia room; eye, ear, and throat clinic; fracture room; dental clinic; sterilizing room; bacteriological laboratory; serological laboratory; pathological laboratory; and chemical laboratory.

The pictorial material of the war collections was increased by a series of nearly 500 drawings and paintings by the official artists of the American Expeditionary Forces, which were installed in rooms 45, 46, and 47 of the Natural History Building. To the numismatic section of the war collections was added a collection of representative war decorations and medals of Great Britain, France, Italy, Germany, Austria, and Turkey, and a series of bronze and silver commemorative medals issued by Belgium, France, Great Britain, Greece, Holland, Italy, Montenegro, Roumania, Russia, and Serbia in commemoration of notable events during the war.

The National Society of the Colonial Dames assisted also in building up the war collections by lending a very interesting and striking series of uniforms of the types worn by American women members of war organizations.

The space assigned to the war collections was increased early in the year by two large ranges on the ground floor of the Natural History Building. In one was installed the collection of foreign uniforms, insignia, and decorations worn by the armies of the Allies and the enemy countries and the captured German military equip-

ment, for which the Museum was indebted to the Quartermaster General of the United States Army, Maj. Gen. H. L. Rogers. In the second range were placed the collections of chemical warfare and ordnance material. The west and central portion of the foyer of this building was given over to the Corps of Engineers for its exhibit; a portion of the foyer and three rooms on the east to the exhibit of the Medical Department; and the walls of three rooms on the west of the foyer to the pictorial material. In the Arts and Industries Building were placed on display captured German ordnance material, small arms of the Allies and enemy countries, American ordnance equipment, and the collection of uniforms worn by the women's organizations. Out of doors, on the west side of this building, were placed the German field guns, and the airplane exhibit is being assembled in the Aircraft Building.

The War Department rendered great assistance in putting this material on display, without which the Museum could have made little progress, the small force of the division of history being entirely inadequate to the huge task. Special credit is due to Capt. J. J. Hittinger, of the Quartermaster Corps, who continued on detail to the Museum throughout the year, giving general supervision to the assembling and installation of material; to Maj. John McLaren in connection with the ordnance section; to Capts. E. W. Jepson and J. E. Costello and Sergt. Burns A. Stubbs under Lieut. T. N. Ellman as to material from the Corps of Engineers; and to Capt. A. P. Mooradian, who planned and supervised the wiring and setting up of the equipment of the X-ray laboratory in the exhibit of the Medical Department, all of which is operative.

History.—In other lines than the war collections the Museum acquired much material of value and interest. In American history the additions included a large collection of uniforms of the types worn by the armies of 23 foreign countries prior to the World War; 226 complete uniforms of the types worn in the United States Army from 1776 to 1909; material relating to the career of Cyrus W. Field and the laying of the first Atlantic telegraph cables; miscellaneous scientific apparatus used by Joseph Henry (1799–1878) during the latter part of his life, the gift of his daughter, Miss Caroline Henry; watches owned by Maj. Gen. George B. McClellan, United States Army; swords and other military relics of Maj. Gen. John R. Brooke, United States Army; mementoes of Susan B. Anthony and objects illustrating the history of the women's suffrage movement in the United States from 1848 to 1919; and, for the series of costumes of mistresses of the White House, a black velvet dress worn by Mrs. Woodrow Wilson, and a lace flounce completing the inaugural dress of Mrs. James A. Garfield. The philatelic material was increased by

5,872 specimens, of which 4,345 were transferred from the United States Post Office Department, and of these 2,475 are examples of new issues reaching that department from the International Bureau of the Universal Postal Union.

Anthropology.—The small number of accessions received in the division of ethnology shows markedly the rapid decline of Indian material and a corresponding though less rapid disappearance of material from races less modified by contact with the white man. The receipts included western Indian baskets donated by Miss Ella F. Hubby; valuable material collected during the period of military occupation of the Philippines received as gifts from Mrs. Thomas F. Dwyer and Miss Kline, Gen. Joseph C. Breckenridge and the late Lieut. Col. Duncan Elliott, United States Army; and pottery and objects in silver, pewter, and brass bequeathed to the Museum by Miss Elizabeth S. Stevens.

The division of American archeology reports its yearly increase due largely to contributions from the Bureau of American Ethnology, including collections made in Arizona, Utah, and Colorado by Dr. Walter Hough; in Texas by Dr. J. W. Fewkes and Prof. J. E. Pearce; in Missouri by Mr. Gerard Fowke; and in Utah by the curator, Mr. Neil M. Judd. The bureau also transferred a collection of archeological specimens obtained by it as a gift from the Otto T. Mallery expedition.

The collections in Old World archeology benefited, too, by the bequest of Miss Elizabeth S. Stevens, receiving nearly a hundred objects of Christian and Buddhist religious art in wood, copper, bronze, and silver. Other additions included ancient coins from Capt. Clarence L. Wiener; casts of engraved antique gems from Dr. William H. Dall; and casts of oriental seals made in the Museum from originals owned by Mrs. Talcott Williams. The collection of Bibles was supplemented by the two copies of the New Testament in English from which Thomas Jefferson cut the English version of his The Life and Morals of Jesus of Nazareth, the so-called Jefferson Bible, donated by Miss Bertha Cohen and her nieces.

In physical anthropology the most important accessions were skeletal material, as follows: From New Mexico, gift of the Museum of the American Indian, Heye Foundation; from Nevada, donated by Hon. William Kent; from Tennessee and Kentucky, partly gift and partly a loan from Mr. W. E. Myer; and from Missouri, collected by Mr. Gerard Fowke; and from Arizona, collected by Dr. Walter Hough, transferred to the Museum from the Bureau of American Ethnology. A Neolithic skull was received in exchange from the University of Liege, Belgium, and a plaster bust representing a form of early man by purchase. The trip of the curator, Dr. Aleš

Hrdlička, to the Far East added to the collections some 2,000 portraits of peoples of that locality.

Mr. Hugo Worch contributed 3 pianos and a harpsichord to the series he is building up here representing the history of the pianoforte, and from Mrs. J. Ryan Devereux came a noteworthy collection of 81 musical instruments of various types.

The additions in graphic arts included a collection of several hundred specimens of wood engravings, mezzotints, aquatints, etc., donated by Mr. Earle W. Huckel; miniature mosaics from Mr. Stockton W. Jones, showing a method of making pictures not heretofore represented in the division; sephiograph reproductions from the Crane Lithograph Co.; and American-made vellum from Mr. George A. Hathaway. The section of photography was enriched by photographic apparatus used by Edward Muybridge in his study of motion in animals, presented by the Commercial Museum of Philadelphia.

In the ceramic gallery loans were credited from Miss E. B. Lowe of old English porcelain, and from Miss Eliza Ruhamah Scidmore of Japanese porcelain and bronze.

Biology.—The additions to the biological collections aggregated approximately 136,765 specimens. Not only was the year numerically a very prosperous one, but the reports of the curators show a gratifying increase in the scientific importance of the material received. This is particularly true of the division of birds, in which no less than 163 species new to the collection were among the accessions. This splendid result was to a great extent due to the liberality of Mr. B. H. Swales, of Washington, D. C., who placed a fund at the disposition of the Museum for this particular purpose. No less important was the material received through the continued generosity of Dr. W. L. Abbott. Impressed by the importance of securing for the Museum an adequate representation of the fast disappearing higher vertebrate fauna of Australia, he granted the means to send Mr. Charles M. Hoy to that Continent for the purpose of collecting especially mammals and birds. No less than 240 specimens of the former and 228 of the latter from a region hitherto very poorly represented in the national collection are contained in this first installment. Dr. Abbott's personal explorations in Haiti have also yielded very important additions. A third expedition was of particular interest as supplementing our African collections, which were hitherto confined chiefly to the eastern side of the Continent, viz, the Collins-Garner expedition to the French Congo. More than 2,350 mammals, birds, reptiles, fishes, and invertebrates were thus added, among them 2 gorillas, 2 chimpanzees, 2 buffalos, etc. The first installment from another African expedition, carried out by the Institution in conjunction with the Universal Film Co., contained 239 mammals and birds from southern

Africa, still further contributing to the excellency of our series from the dark continent.

Among the large collections of insects acquired, the following are especially noteworthy: Mr. B. Preston Clark presented 5,500 lepidoptera of the Hawaiian Islands and South America. Similarly Dr. William Barnes donated 2,000 moths, including 60 types, and 150 butterflies. From Dr. W. M. Mann, through the Bureau of Entomology, the Museum received 6,000 insects of various orders, collected by him in Honduras, and similarly from Dr. E. A. Schwarz a collection made in Florida of 5,770 miscellaneous insects. Besides 6,930 specimens transferred by the Department of Agriculture, numerous accessions were received from Costa Rica, Australia, South Africa, Mexico, etc.

The mollusk collection was the recipient of two particularly valuable and important gifts, namely, the collection of Hawaiian marine shells donated by Mr. D. Thaanum and a part of the William F. Clapp collection of New England land and fresh-water mollusks, about 10,000 specimens purchased and presented by Mr. John B. Henderson. The former, consisting of about 5,000 specimens collected by Mr. Thaanum and Mr. J. B. Langford, has long been known as the best existing collection of authentically located marine Hawaiian shells. As in previous years, the Bureau of Fisheries forms one of the chief sources of our material of marine invertebrates, including specimens collected during the cruises of the *Albatross* and the *Bache* reported on by Mr. Sasaki, Dr. A. L. Treadwell, and Dr. H. B. Bigelow. Numerous other accessions from collectors and collaborators were remarkable for the great number of types of new species added during the year.

The botanical collections accessioned include highly valuable material from all over the world. Besides important North American collections, there are represented plants from Mexico and Central America, Colombia, British Guiana, Brazil, Argentina, Europe, Africa, China, Sumatra, etc. The Department of Agriculture transferred 8,190 specimens, mostly the result of field work of the Bureau of Plant Industry. The Forestry Commission of the Mexican State of Sinaloa transmitted 887 specimens from little known parts of that State. A large number of plants were obtained in exchange, the largest lot consisting of 2,398 specimens received from the New York Botanical Garden, mostly plants collected in Colombia by Rusby and Pennell. Likewise in exchange there were acquired from the Botanical Museum of the University at Copenhagen 923 specimens of Mexican and Central American plants, chiefly material collected a long time ago by Liebmann and Oersted, and therefore of unusual historical interest and value.

Geology.—The additions to the collections in the department of geology during the year were 180 lots against 135 for the year previous, with a decided increase in the number of specimens and their scientific value. Of these accessions, 111 were gifts, 32 transfers, 25 exchanges, 2 were collections by members of the force, 1 received as a deposit, and but 9 acquired by purchase. Among those of greatest importance were gifts comprising ores of the rare metals, particularly tungsten and molybdenum, secured chiefly through Mr. Frank L. Hess, of the United States Geological Survey, an honorary custodian in the Museum. The donors included Mr. C. W. Purington, Vladivostok, Siberia; Mr. J. G. Hibbs, Denver, Colo.; the Homestake Mining Co., Lead, S. Dak.; the R. & S. Molybdenum Co., Questa, N. Mex.; and the Molybdenum Mines Co., Denver. Other important additions were made by Dr. J. Morgan Clements, of New York, traveling in China in the interest of the Federal Trade Commission, and Mr. M. L. Patterson, manager of the Thabawleik Mines, Mergui, Burma.

An excellent series of crystallized native copper and silver minerals from the Lake Superior region was acquired by purchase and gift, and a large slab of native copper, simulating in outline the continent of South America, was received from the Bolivian delegates to the Second Pan American Financial Conference.

The meteorite collection was enriched by examples of the following stones: Colby, Wis., 3,642 grams; Bjurbole, Finland, 2,500 grams; Washington County, Kans., 2,003 grams; Kesen, Japan, 1,397 grams; and Appley Bridge, 598 grams. In addition there was acquired 3,320 grams of an iron from Yenberrie, Australia.

Valuable collections in the form of minerals and invertebrate fossils, comprising many thousands of specimens, were received from the United States Geological Survey, as was also a large series of igneous rocks from the Yellowstone National Park, described by Dr. J. P. Iddings in volume 32 of its monographs.

Large collections from the West Indies, particularly from the Dominican Republic, have been added to the series of invertebrate fossils, which have been further augmented by some 10,000 specimens from the Upper Cambrian of Wisconsin.

To the exhibition series have been added a large and unique specimen of trilobite, the largest American form in existence, which was found during excavations in connection with the conservancy dam at Dayton, Ohio; a mounted skeleton of the large, extinct mammal, *Brontotherium hatcheri;* the sea-living lizard, *Tylosaurus proriger;* and a diminutive camel *Stenomylus hitchcocki.* The study collections in vertebrate paleontology were augmented by a considerable number of type specimens, deposited by the Maryland Geological Survey, which, though fragmentary, are of primary interest. Of

equal importance are gifts of Pleistocene bones and teeth from a cave near Bulverde, Tex., donated by Dr. O. P. Hay, and similar material from Cavetown, Md., gift of Phillips Academy, Andover, Mass.

The gem collection has been thoroughly overhauled, reweighed, and recatalogued, and a handbook and catalogue of the same prepared, the manuscript of which is now in the hands of the Government Printer.

The work of preparing 100 sets of 85 specimens each of ores and minerals for distribution to schools, mentioned in the report of last year, has been completed and the sets are now ready as occasion shall demand.

Textiles.—The collections under the supervision of the curator of textiles, which, besides textiles, embrace medicine, food, wood technology, and miscellaneous animal and vegetable products, were increased by many gifts and by transfer from other Government bureaus amounting to about 2,000 objects. The most important of these are as follows: The division of textiles received for exhibition from the Department of Ordnance, War Department, specimens of the silk cartridge cloth which was so essential in the preparation of separate loading ammunition for all the large guns taking part in the World War; also examples of this same fabric showing the results of the experiments made to demonstrate the value for civilian uses of the 11,000,000 yards sold as surplus material. There were added by gift many specimens of knitted fabrics contributed by American manufacturers, and made from artificial silk, wool, and mohair.

Medicine.—The collections in the division of medicine were enlarged by a series of pharmaceutical preparations illustrating the various forms in which medicinal substances are prepared for administration, a series of essential oils, and an addition to the materia medica collections of a large number of inorganic chemicals. The exhibits planned to illustrate the basic principles of different schools of medicine were increased by many gifts, and the one devoted to homeopathy completed. The section of pharmacy received many documents and publications bearing on the history of the United States Pharmacopoeia and the complete series of written and printed records of the last revision of this important work, amounting to many thousands of pages.

Wood technology.—The exhibition collections of the section of wood technology were much improved by a transfer from the Forest Service of 25 colored transparencies and 48 colored bromide enlargements specially prepared for the National Museum, representing typical forest scenes, methods of lumbering, and forest industries,

and by the gift of exhibit material illustrating the use of wood waste and wood pulp.

Animal and vegetable products.—Many specimens of edible and inedible oils developed as a branch of the meat-packing industry, and samples of the official tea standards used from 1915 to 1920 to control the quality of the foreign teas imported by the United States were added to the collections of animal and vegetable products.

Mineral technology.—In the division of mineral technology the principal addition was a working model of a salt works, donated by the Worcester Salt Co., being a replica of that company's operations near Warsaw, N. Y. A system of circulating water is caused to mine the native salt, bring it in solution to the surface, and finally to surrender it, the whole taking place before the visitor's eyes. The National Lead Co. contributed 26 large transparencies and about 600 exhibition samples needed in completing the comprehensive exhibit illustrating the lead industry undertaken several years ago and which now lacks only competent technical direction in installation. The work of the division was largely at a standstill by the transfer elsewhere in the Museum at the beginning of the year of one of the members of its scientific staff and the resignation soon afterwards of the remaining two members. Mr. Gilbert, after severing active relations, continued under appointment on an honorary basis to give advisory supervision over these collections, all of which had been developed under his direction. It is hoped another year will find this division manned and again to the front, as it was so signally during the period of the war.

Mechanical technology.—Probably the most important addition to the collections of the division of mechanical technology during the year was a 12-cylinder Liberty airplane motor, the gift of the Lincoln Motor Co., various portions of which are cut away to show the interior parts in operative relation. Another accession of note was a replica of the original typographer, invented and patented by William Austin Burt in 1829, donated by his grandson, Mr. Hiram Austin Burt. As representative of the early beginnings of the American typewriter this forms a very important addition to the exhibit, showing the development of the typewriter. The time-keeping collections were enhanced by the gift of two watches from Mr. George W. Spier, honorary custodian of watches. In the section of marine transportation there was added a model of one of the freight ships built at Hog Island Shipyard in 1919, received from the United States Senate Committee on Commerce, through Senator Wesley L. Jones, chairman.

Early in the year plans for the future development of the division of mechanical technology were formulated, the end in view being

a museum of engineering. Accordingly, the collections in care of the division were first rearranged in the halls, the basis of rearrangement being the kind of object rather than the source; thus, one hall now includes all objects relating to land and aerial transportation; another hall, marine transportation; and another hall, metrology and mechanical transmission of intelligence.

NATIONAL GALLERY OF ART.

The National Gallery of Art—the department of fine arts of the Museum—continued in charge of Dr. W. H. Holmes, as curator, the collections occupying mainly the central skylighted hall on the first floor of the north wing of the Natural History Building. The additions while not numerous comprised works and objects of very considerable museum value, not, however, comparable in importance with the accessions of the year before. Of the works of painting and sculpture added, the most noteworthy, perhaps, was a statue in white marble of the Earl of Chatham (William Pitt), by Francis Derwent Wood, R. A., the gift of the Duchess of Marlborough and other American women in Great Britain.

During the year four paintings were purchased from the Henry W. Ranger fund, two of which, Grey Day, by W. Granville-Smith, N. A., and Evening Tide, California, by William Ritschel, N. A., are now on view in the gallery; the others are The Rapids, by W. E. Schofield, N. A., deposited in the Brooklyn Museum, and the Orange Bowl, by Anna Fisher, the assignment of which has not yet been announced. It is gratifying to know that by this bequest the gallery is assured of a number of worthy additions each year.

During the year the Rev. Alfred Duane Pell continued to add to his collection of art objects presented and lent to the Museum and installed in the long room at the north end of the gallery. The installation was not complete at the close of the year.

The preparation of a catalogue of the gallery bringing the record up to date was carried to practical completion. The last issue of the catalogue, prepared by Assistant Secretary Rathbun, is dated 1916, and it is regarded as important that a new edition be printed as soon as practicable.

It is a matter of particular felicitation that in June Congress granted a fund sufficient to permit the organization of the Gallery as a separate unit of the Smithsonian foundation and to provide a modest curatorial staff, thus relieving the Museum of a rapidly growing burden and at the same time affording the long-delayed opportunity of laying the foundation requisite to a reasonable and symmetric development of the Nation's Gallery of Art.

FREER COLLECTIONS.

The death of Mr. Freer this year is a great loss to the art interests of the country. In presenting his collections of American and oriental art to the Smithsonian Institution in 1906, Mr. Freer stipulated that they should remain in his possession during his life, and at that time he provided in his will $500,000 for the erection by the Smithsonian Institution of a suitable building for housing them, near the National Museum. He reserved the right to add to the collections, and in the intervening years he has about tripled the number of objects originally transferred by title to the Institution. Increasing the building fund to $1,000,000 and waiving the original conditions, Mr. Freer in 1915 decided upon the early erection of the structure and the transfer of the collections to Washington. The building, now nearing completion, was accordingly begun in the autumn of 1916. That Mr. Freer was not permitted to see the consummation of his plans for the development of the art interests of the country is greatly deplored. His experience and advice would be invaluable in inaugurating this independent unit of the National Gallery of Art which he so generously provided. The building and collections represent an outlay of some six or seven million dollars and constitute one of the most important and valued donations which any individual has ever made freely and unconditionally to the Nation.

During the year the building for the Freer collections was brought nearly to completion, despite delays now characteristic of the building business. The central court was carefully laid out with walks, gardens, and fountain. Arrangements were made with the officer in charge of public buildings and grounds for laying out the driveways to the building and otherwise improving the grounds immediately surrounding it.

The Peacock room, that celebrated decoration executed by Whistler as a setting for his painting La Princesse, was transferred from the residence of Mr. Freer in Detroit and set up complete in a room specially designed for its reception at the southeastern corner of the building. By the close of the year, the executors of Mr. Freer's estate had commenced to ship to Washington other portions of the Freer collections, which will be stored in the various storage quarters in the building until the structure is entirely completed and the installation of the collections can be undertaken.

THE LOEB BEQUEST.

Prof. Morris Loeb, the eminent chemist, who died on October 8, 1912, left a bequest of $25,000 to the American Chemical Society, to be held as a special fund, the income of which should be used for the establishment or maintenance of a chemical type museum, either in

THE FREER GALLERY OF ART.

connection with the Chemists' Club of New York City, or the National Museum in Washington, or the American Museum of Natural History in New York City, preference to be given in the order named. The chief object of the museum was to be the preservation of all new substances described as the result of chemical research, either by obtaining the same by gift or purchase from the discoverer or by causing the same to be prepared in sufficient quantity according to the discoverer's published directions—all for the purpose of facilitating comparison by subsequent observers.

The Chemists' Club of New York accepted the trust, but being unable to comply with the conditions in the Loeb will, offered to give up their claim, and the Institution indicated its willingness to accept the responsibility, through the National Museum. The fund should hereafter yield an annual income of about $1,155, though the amount for the calendar year 1920 will be slightly less.

By means of this income from the Morris Loeb fund, the Smithsonian Institution proposes to build up in the National Museum "the Loeb collection of chemical types," a permanent reference or study collection of new substances and original material resulting from chemical research. Steps will be taken to secure a competent advisory committee composed of eminent chemists of the country to advise on the policy to be pursued in dealing with investigators desiring the use of portions of type material in the Loeb collection.

The general scheme has the sanction of various governmental chemists, and the Bureau of Chemistry, Department of Agriculture, favoring the establishment of such a collection under the Museum as the proper place for a national collection, offers hearty cooperation, placing at the Museum's disposal in developing this project any of the bureau's resources in the way of personnel, equipment, and supplies.

It is hoped shortly to reorganize the division, or section, of chemical industries, in the department of arts and industries, begun in 1886. Insufficiency of funds prevents this being done at once. In the meantime the Loeb collection, as well as other chemical specimens which the agitation of this subject will doubtless bring to the Museum, will be cared for under the direction of one of the curators in arts and industries.

BUILDINGS AND EQUIPMENT.

The first deficiency act for 1920 included an item of $5,640 for placing the Natural History Building in the same condition as it was when occupied by the Bureau of War Risk Insurance in October, 1917. This permitted the pointing up of the damaged plastered walls and the painting of walls, ceilings, and floors in the area occupied by the bureau from October, 1917, to March, 1919.

Other improvements in this building from the regular Museum appropriation included repairs of settlement cracks in Venetian floors in exhibition halls, the pointing up of cracks and painting the walls and ceiling of these halls, painting walls and ceilings of comfort room and rooms 223 and 224 on third floor, painting floors in west north and west ranges, repointing open seams in the granite courses and ledges on exterior and court walls and the stone steps at south entrance, the painting of exterior surface of metal window frames of first and second stories, and painting gutters. The building in the east court was remodeled for use as a laboratory.

In the Arts and Industries Building the exterior woodwork of the windows was painted; a number of walls in the exhibition halls, offices, and laboratories were repainted, including the café; and an additional dark room was constructed in the photographic laboratory.

An improved system of ventilation was installed in the mascerating room in the south shed.

The deficiency act above referred to also provided the sum of $14,000 to enable the regents of the Smithsonian to heat and fit up for the exhibition of aircraft and accessories the temporary metal structure erected in the Smithsonian Grounds by the War Department, with the understanding that the custody and control of the building be transferred to the regents of the Institution by the Secretary of War. Immediately after the building was turned over to the Institution in November, the old heating equipment was condemned and sold and arrangements made to heat and light the building from the power plant of the National Museum. Steam pipes were run from the Arts and Industries Building, and electric lights were provided for use on dark days and for police purposes at night.

To make the interior of the building suitable for exhibition purposes, a concrete floor was laid in place of the wooden floor, which had deteriorated to an extent that made its use impossible. The entire ceiling and side walls were sheathed, covered with wall board, and painted. Ventilators were installed at either end of the building, a concrete platform constructed at the east end of the building, and a glazed vestibule built at this end to be used as a public entrance. A combination storage, workroom and office was partitioned off in the southeast corner and a new comfort room constructed. The doors on the north side were closed, two doors on the west side remodeled as emergency exits, and the exterior of the building was painted.

The additions to the furniture this year included 30 exhibition cases and bases, 229 storage cases and pieces of laboratory and office furniture, 198 standard unit drawers, 602 insect drawers, and 388 special drawers.

The power plant was closed for two months and eight days, during which time electric current for light and power was purchased from the Potomac Electric Power Co. under special contract made by the Treasury Department.

The changes and repairs to the plant consisted of the installation of the forced oil-feed system for the engines purchased the previous year; the purchase and installation of asbestos covers for the four boiler drums, together with the repairing of the covering on the pipes and smoke breeching in the engine room, and the purchase and installation of a new pump for removing water of condensation from the main exhaust pipe. For the first time since the installation of the plant, in 1909, it became necessary to replace the tubes in two of the boilers and also to have the main bearings of two engines rebabbitted. Though the entire plant has been operated under pressure the deterioration is, in the opinion of the engineer, largely due to the inability of the Museum to secure competent and reliable men as stokers, firemen, and assistant engineers at the very small salaries paid.

MEETINGS AND CONGRESSES.

The annual meeting of the National Academy of Sciences was held again this year in the Museum, on April 26, 27, and 28, the auditorium and committee rooms being used, respectively, for the presentation of the scientific papers and the business sessions. On the first evening the William Ellery Hale lecture in the form of a discussion by Dr. Harlow Shapley, of Mount Wilson Solar Observatory, and Dr. Heber D. Curtis, of Lick Observatory, on the scale of the universe, was followed by a conversazione in the National Gallery of Art and the adjoining halls of the Museum.

Governmental, scientific, and educational organizations making use of the auditorium and the committee rooms included: The National Women's Trade Union League of America, for the First International Congress of Working Women; the Delaware River Shipbuilders' Council, for a conference of workers in various navy yards and shipyards of the United States in reference to the Government's shipbuilding and shipping program; the American Association of Anatomists, for its annual meeting; the American Association of Ichthyologists, for its annual meeting; Southern Sociological Congress; the American Association of Museums, for its fifteenth annual meeting; the United States Department of Agriculture, for a meeting of fertilizer manufacturers in connection with an investigation of fertilizer prices; the States Relations Service of that department, for various gatherings of its employees, including a seven-day conference of its farm-management demonstrators from all parts of the country and the annual meeting of the Potomac

Garden Club organized under its auspices; the Bureau of Plant Industry, for a phytopathological seminar; and the Federal Horticultural Board, for a public hearing to consider the advisability of quarantining the States of Texas and Louisiana on account of the pink bollworm of cotton; the War Department, for the closing exercises of the Army Medical School session 1919–20; for the fourth Hamilton fund lecture by the Rev. Dr. Charles E. Jefferson on "The old order and the new"; the National Research Council, for a lecture by Dr. John J. Carty on the wireless telephone, illustrated by talking motion pictures; the District of Columbia Minimum Wage Board, to bring together the women employed in hotels, restaurants, apartment houses, and hospitals of Washington, that they might select representatives to serve on the minimum-wage conference for this industry; the public schools of the District, for lantern-slide talks on trees, birds, and gardens by Mrs. Susan Sipe Alburtis before children of the public schools of south Washington; the Southern Society of Washington, for a lyceum on five Wednesday evenings during the winter and spring; the Anthropological Society of Washington, for its gatherings of the 1919–20 season; the Anthropological Society and the Washington Academy of Sciences, for a lecture by Dr. W. H. R. Rivers on ethnology, its aims and needs; the Washington Society of the Archæological Institute of America, for a lecture by Sir Bertram Windle on the megalithic monuments of Great Britain; for a special exhibition of motion pictures of national forests before delegates to the annual convention of the American Pharmaceutical Association; the Audubon Society of the District of Columbia, for its annual meeting, with lectures by Dr. Paul Bartsch on the birds of the District of Columbia, and again for an illustrated lecture by Dr. William L. Finley on wild game; the Wild Flower Preservation Society; the Consumers' League of the District of Columbia, for addresses by Hon. William B. Colver and Mrs. Florence Kelley on the cost of living from the consumer's standpoint; the committee in charge of "Be-kind-to-animals week," for an illustrated lecture by Mr. Ernest Harold Baines on the part played by animals in the war, and again for organizing a "Good-to-animals society"; the U. S. S. Jacob Jones Post No. 2 of the American Legion, to celebrate its first anniversary; the Association of Appointment Clerks; the Smithsonian Auxiliary of the District of Columbia Chapter of the American Red Cross; the Smithsonian Relief Association, for its annual meeting; for awarding the prizes for the Evening Star Army enlistment essays; the Washington Society of Engineers for a discussion of the preliminary report of the engineering council's committee on classification and compensation of Government engineers; and the Washington section of the American Society of Mechanical Engineers.

The work of the Congressional Joint Commission on Reclassification of Salaries created great activity among the civil employees of the Government in Washington, and the Museum afforded a meeting place for the scientific-technical section of the Federal Employees' Union No. 2, to complete the organization of the section, for a symposium on the principles involved in fixing salaries, and for addresses by Prof. Irving Fisher on the purchasing power of salaries and by Drs. McClung and Howe on the work of the National Research Council; for the Smithsonian branch of the Federal Employees' Union No. 2, and for various other groups of civil employees for organizing, preparing data, and otherwise helping toward the classification of the Government forces in Washington, including Federal workers interested in bookkeeping, accounting, and auditing, the clerical force of the Department of Agriculture, the Federal photographers, the marine and stationary operating engineers, the subcommittee on personnel of the reclassification committee, and members of the Museum's scientific staff.

MISCELLANEOUS.

Under the auspices of the Arts Club of Washington, a special exhibition of illustrations of the famous bell towers of the world was held in rooms 46 and 47 of the Natural History Building from October 2 to 31, inclusive. The Arts Club has undertaken to enlist the cooperation of all lovers of freedom in furthering a plan to erect at the Nation's Capital a national peace tower with the largest and finest carillon that the most expert bell founders of the world can provide, as a tribute to the heroic resistance of Belgium, in recollection of our dead and those of our allies, and in enduring commemoration of the great victory won over imperialism.

An exhibition of drawings, photographs, and paintings illustrating the activities of the Air Service of the United States Army at the front and in America was opened to the public from October 4 to October 29, 1919, in the west north range, ground floor, Natural History Building. Capt. Otho Cushing was in charge of the exhibit.

The Museum library was increased by 1,932 bound volumes and 1,581 pamphlets, mainly obtained by gift and exchange, bringing the total in the library up to 56,617 volumes and 88,690 pamphlets and unbound papers. While there were no exceptional pieces contributed, there was a collection of special importance—the personal library of Dr. Charles D. Walcott. His intimate association with the paleontological collections of the Museum makes the Museum sectional libraries of vertebrate and invertebrate paleontology difficult of duplication.

The publications of the Museum for the year consisted of the Annual Report for 1919; volumes 54, 55, and 56 of the Proceedings;

volume 21 of Contributions from the National Herbarium, Bulletins Nos. 106 (text), 107, and 108, a very small edition of Bulletin No. 103, and 42 separate papers. The total distribution of Museum publications aggregated 81,936 copies.

The number of visitors to the Natural History Building aggregated 321,568 for week days and 101,416 for Sundays. At the Arts and Industries Building, which is open only during the week, the total attendance was 250,982. The Smithsonian Building is ordinarily only open to visitors on week days, but an exception was made for a few Sundays in March and April, 1920, when there was on exhibition a series of exquisite water color paintings by Mrs. C. D. Walcott of wild flowers, the attendance being 84,223 on week days and 1,790 on the five Sundays.

The most pressing needs of the Museum are those for additional space for the ever-increasing collections and additional funds for their classification and maintenance. Another year has only made more acute these needs. Preliminary steps are being taken looking to securing the erection of another building to house the great historical collections of the Museum and the collections of the National Gallery of Art. It will nevertheless be some years before relief can be hoped for in this direction, even under the most favorable circumstances. The appropriations for the maintenance of the Museum for 1921 remain practically the same as those for 1920. Never were there so many openings for advancement in industrial as well as scientific lines, but under existing conditions the Museum is helpless. It is not only prevented from developing collections in the various directions now offering exceptional opportunities, but it carries forward existing work only by exercising the strictest economy.

Respectfully submitted.

W. DEC. RAVENEL,
Administrative Assistant to the Secretary,
In charge United States National Museum.

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

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 field researches, office work, and other operations of the Bureau of American Ethnology during the fiscal year ended June 30, 1920, conducted in accordance with the act of Congress approved July 19, 1919. 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 archeologic remains, under the direction of the Smithsonian Institution, including necessary employees and the purchase of necessary books and periodicals, $42,000.

Ethnology is the study of man in groups or races and aims to contribute to our knowledge of racial culture and advance our appreciation of racial accomplishment. The researches of the Bureau of American Ethnology deal with the aborigines of the United States and the Hawaiian Islanders.

The material from which we may secure this knowledge is rapidly disappearing or being absorbed into modern life. The culture of the aboriginal inhabitants has in a great measure vanished, but modern survivals still remain, and it is one object of the bureau to record these survivals while this is possible, thus rescuing what remains as a partial record of the culture of the race. This is essential in order that our knowledge of the North American Indian may neither be distorted by prejudice nor exalted by enthusiastic glorification.

In linguistics the necessity of recording those languages that are in danger of extinction is urgent. Several of these are now spoken only by a few survivors—old men or women—and when they die this knowledge which they possess will disappear forever. Our Indians had a large literature and mythology which on account of their ignorance of letters they did not record. This is rapidly being lost, and it is our duty to secure the information at once before it loses its aboriginal character. The lexical and grammatical structure of the different Indian languages, their phonetic peculiarities, and their relations to each other, also require intensive studies, which have been industriously pursued by the linguists of the bureau.

It is believed that the publications of the Bureau of American Ethnology should be of such a nature that they may be studied with profit by all intelligent persons and not so crowded with technicalities as to repel all readers except a few specialists. While the bureau publications should not be devoted solely to popular articles they fail to advance and diffuse ethnological knowledge if they are so technical that they appeal only to one class of readers. The policy of the bureau is to publish a limited number of technical papers, the popular demand also being given due weight.

Important researches have been conducted by members of the staff on the material culture of the Indians, one aim being to ascertain the various fibers and foods used by them with a view to discover hitherto unused aboriginal resources that might be adopted with profit by the white man.

In order that the character of the habitations of the Indian might be better known and an accurate knowledge of them disseminated, illustrations of aboriginal buildings found in early maps and documentary records are being gathered and a series of publications on this subject has been inaugurated. These, when available, are accompanied by the original descriptions of the buildings and incidentally identifications of the sites of the larger villages so far as possible.

The bureau has continued researches on the music of the Indians with good results, as the past publications on this subject have attracted the attention of musicians who are making practical use of this knowledge in their compositions. There is a great demand for strictly Indian music.

Archeology has been one of the important lines of research by members of the bureau during the past year. Although the methods of research of this science are somewhat different from those of the ethnologist, the goal is the same.

It is urgent to gather all possible data regarding the ethnology of the Indian prior to the advent of the white man, and where written history is silent on this subject, legends, monuments, and other prehistoric remains are the only media to supply the unknown chapters of history. As the national parks, like the Mesa Verde, and national monuments, like the Chaco Canyon, containing the best examples of this evidence, have been reserved for permanent protection, the bureau is engaged in the scientific study of these remains in cooperation with the National Park Service.

The function of the Bureau of American Ethnology is both to advance knowledge of ethnology and archeology by researches and to disseminate information on all subjects concerning Indians. Much of the time of the chief and the members of the staff is occupied in

replying to letters requesting this information. This in many cases requires special knowledge of experts or extended studies in the library. The administration and routine duties of the office have also occupied much of the time of the chief.

The Great War has enlarged our view of the practical value of ethnological studies. As our country has become a world power and has entered into political and commercial relationships with many other races whose ethnology is little known, it is desirable that the ethnological researches of the bureau be enlarged in order that we may better appreciate these foreign peoples. From necessity we have limited our researches to the American Indian and the natives of Hawaii. There is, however, an urgent call for more extended studies of all peoples whose amalgamation will constitute the future American.

In addition to purely official duties, the chief has devoted considerable time to field work and the preparation of reports on archeological researches. In the course of the year two visits were made to the Mesa Verde National Park, Colorado—one in August and September, 1919; the other in June, 1920. These researches, in accordance with the above-mentioned act of Congress for the excavation and repair of archeological remains, were in continuation of the cooperative work of the Smithsonian Institution and the National Park Service of the Department of the Interior, and were made with an allotment from the latter for the excavation and repair of cliff houses and other ruins on the Mesa Verde.

In the summer and autumn of 1919 the chief excavated and repaired Square Tower House, formerly known as Peabody House, one of the most picturesque cliff dwellings of the park. The excavation of small house sites situated among the cedars on top of the mesa near the trail to Square Tower House was carried on simultaneously by Mr. Ralph Linton, under the direction of the chief.

The work at Square Tower House has enlarged our knowledge of the structure of cliff dwellings; that on small house sites contributes to theoretical discussions of their genesis and evolution. The small house sites on top of the mesa were interpreted as prototypes of kivas in the large cliff buildings and are thought to be the ancient stages in their development. The whole history of the evolution of horizontal masonry can be followed by studies of various types of buildings on the Mesa Verde.

The two unique characteristics of Square Tower House are a square tower situated in the middle of the ruin and the well-preserved roofs with beams intact on two of the ceremonial rooms, or kivas. The repair of the tower was timely, as it had been feared for many years that it would fall, since it has long been tottering. As

all friends of our antiquities would regard the destruction of this as a calamity, it was strengthened and put in a condition for permanent preservation.

The roofs of two of the eight kivas in Square Tower House were almost intact and show the best specimens of aboriginal carpentering in the park. Almost all of the original beams are still preserved, and their arrangement shows how the aboriginal builders constructed a vaulted roof. Especial care was exercised in repairing Square Tower House to protect these roofs and preserve the beams in place for examination by archeologists and visitors.

Small house sites are very numerous on top of Mesa Verde among the dense growth of cedars, and two of these situated above Square Tower House were chosen as types of the remainder for excavation. The rooms uncovered on these sites may be called Earth Lodges, and had sunken floors with roofs now fallen in but originally constructed of logs covered with earth. One of these rooms, called Earth Lodge A, was completely excavated, and in order that the style of the most ancient habitation on the park might be seen by visitors it was protected from the elements by a shed. Another form of Earth Lodge, subterranean and probably of later construction, had stone pilasters like a cliff-house kiva for the support of a domed roof, but its walls were made of adobe plastered in the earth. It shows three periods of occupancy: (1) the original excavation, a subterranean room constructed on the lines of the unit type of kiva; (2) its secondary use as a grinding pit, by the introduction of vertical slabs of stone making three grinding mills, the metates of which were in place; and (3) a depression filled in with débris containing human skeletons and other bones. It may thus have served distinct purposes at different times.

The theoretical importance of Earth Lodge A is that it represents not only the archaic type of building on the mesa but also resembles those widely distributed habitations of nonpueblo tribes. It points to the conclusion that when the ancient colonists came to the Mesa Verde they differed only slightly from nomadic tribes and that their descendants developed the craft of stonemasons long after Earth Lodge A was inhabited.

Archeological work was renewed on the Mesa Verde in June, 1920, and the work of excavating was begun on a ruin called Painted House and a neighboring cliff dwelling. The result of this work was of great significance, for it brought to light a large cliff building that showed no evidence of having been formerly inhabited. It was not a cliff dwelling, but built for some other purpose. Its character points to the conclusion that this purpose was a temple for the celebration of fire rites, or possibly the conservation of that fire from year to year. While there was found no evidence that anyone ever

lived in it, an adjacent cliff dwelling afforded every indication that it was inhabited by at least two clans. New Fire House belongs to the same group of ceremonial buildings as Sun Temple, except that it is situated in a cliff and not on top of the mesa.

The features that have led to the identification of this ruin as one devoted to New Fire rites are the large walled fire pit full of ashes in the middle of the court and the resemblances of phallic and other pictures on the walls of the rooms to those still surviving among the Hopi in the New Fire cult.

Mr. James Mooney, ethnologist, remained in the office throughout the year, engaged chiefly in the elaboration of material relating to the Heraldry of the Kiowa and the Peyote Cult of the Southern Plains tribes.

In connection with the preparation of the Denig Assiniboin manuscript for publication, a correspondence was carried on with members of the Denig family and others for the purpose of gathering all available information concerning the history and personality of the author. A valuable complement to the Denig work is the German manuscript journal of the Swiss artist, Friedrich Kurz, who visited the upper Missouri in 1851–52, spending some months with Denig at Fort Union. A copy of the original journal, now in the museum of Bern, was made some years ago by direction of Mr. David I. Bushnell, jr., who sold it to the bureau.

The usual amount of correspondence in answer to requests for varied ethnologic information received attention. Among these may be noted requests from the War Department for Indian designs for regimental flags for two newly organized regiments.

In the latter part of October and throughout November, 1919, Dr. John R. Swanton, ethnologist, was at Anadarko, Okla., where he recorded about 270 pages of text in the Wichita language and 100 in Kichai, besides considerable vocabulary material in both. It should be remarked that the Kichai language is rapidly becoming extinct, being now spoken fluently by not over a dozen persons.

During the summer preceding this expedition he was engaged in the extraction and card-cataloguing of words from his Natchez texts, and after his return he prepared a grammatical sketch of the Natchez language, complete as far as the material on hand will permit, but withheld from publication for a final review with the help of Indian informants. This language is now spoken by only three persons.

He also completed a sketch of the Chitimacha language, the rough draft of which had already been prepared, and began the extraction and recording of words from his texts in the Koasati language.

Part of his time has been occupied in correcting the proofs of his Bulletin 73, on the Early History of the Creek Indians and Their Neighbors.

Several hundred cards have been added to his catalogue of material bearing on the economic basis of American Indian life.

Dr. Swanton completed reading the proofs of Bulletin 68, A Structural and Lexical Comparison of the Tunica, Chitimacha, and Atakapa Languages, and the bulletin was issued in December, 1919.

The sketch of the Chitimacha language mentioned above, along with a similar sketch of Atakapa previously prepared, is ready for publication. Dr. Swanton has a much longer paper on the social organization and social customs of the southeastern Indians which requires a little work for completion, but is withheld until the bulletin, which it naturally follows, is through the press.

Mr. J. N. B. Hewitt, ethnologist, took up the critical analysis and constructive rearrangement of the three differing versions of the Eulogy of the Founders of the League of the Iroquois, obtained by him, respectively, from the late Seneca federal chief, John Arthur Gibson; the late Mr. Joshua Buck, Onondaga shaman, of Onondaga-Tutelo extraction; and chief emeritus Abram Charles, of the Cayuga tribe—all of Ontario, Canada.

This Eulogy of the Founders is a very long chant and one of marked difficulty to render accurately. In his report for last year it was stated that the long-standing disruption of the several tribes composing the league had led to the breaking up of the parts thereof and loss of traditions concerning the principles and structure of the league; hence there are differing versions of most important rituals. In the tribal organization the federal chiefs were organized into several groups with definite political relationships, which differing relationships implied naturally corresponding differences in duties and obligations for the several persons so politically related.

But since the disruption of the political integrity of the tribes of the league and of the league itself by the events of the war of the American Revolution these relationships have become more or less confused in the minds of the people, and hence the great difficulty in determining from the informants of to-day the correct sequence of the names and the exact political relationships subsisting among the several chiefships. This accounts for the difficulties encountered in editing the three variant versions of the eulogy.

In view of works recently published on the genetic relationship of certain linguistic stocks of California and other North American linguistic stocks, and as a result of a conference of the staff of the bureau early in December on late linguistic work in California Mr. Hewitt critically examined the methods and the evidences for relationship relating to the Yuman, the Serian, the Tequistlatecan, Waicuran, the Shahaptian, the Lutuamian, and the Waiilatpuan,

claimed in recent publications by Dr. Radin and Dr. Kroeber. In no instance did he find that these authors had proved their case.

Mr. Hewitt continued the preparation for publication of the second part of Iroquoian Cosmology, Part I having already appeared in the Twenty-first Annual Report of the bureau. He spent considerable time in reading the manuscript dictionary and grammatical sketch of the Chippewa language prepared by Father Chrysostom Verwyst, in order to ascertain its value for publication and to enable him to assist the author in a revision of the work; and prepared much data for use in reply to requests by correspondents, often requiring considerable time and most exacting work.

In June, 1920, Mr. Hewitt visited the Oneida Indians, residing in the vicinity of Seymour and Oneida, Wis.

The purpose of this visit was to ascertain what information, if any, these Indians retained concerning the principles and structure of the League of the Five (later, Six) Nations, or even concerning their own social organization, or the mythic and religious beliefs of their ancestors, which has not already been recorded by him, from other sources. He found that these Indians had forgotten the great principles and the essential details of the organic structure of the league, of which the Oneida before their disruption by the events of the war of the American Revolution were so important a member, due to the adoption of lands in severalty about 1887, and the administration of their public affairs under the laws of the State of Wisconsin.

He discovered that these Oneida spoke a dialect markedly different from that of the Oneida with whom he was already acquainted and succeeded in recording a text relating to hunting wild pigeons (now practically extinct) at the time of "roosting."

From the Wisconsin Oneida Mr. Hewitt went directly to the Tonawanda Reservation to consult with Seneca chiefs, after which he proceeded to the Grand River grant of the Six Nations, near Brantford, Ontario, Canada, and there obtained an interesting text in the Onondaga language, with a free English translation. This text embodies an old Tutelo tradition of the manner in which the assistant to the chief was established, and is reminiscent of the early raids of the warriors of the Five Nations into the southern home of the ancient Tutelo.

Information relating to the internal structure of the tribal organization of the several tribes was carefully revised, especially the place of the several clans with regard to the symbolic council fire, and therefore their membership in either the male or the female side of the tribal organization. Certain sentences placed after every Federal title throughout the Eulogy of the Founders—originally 49 in number—can not be understood without this definite knowledge of internal tribal organization, as there is constant danger of confusing

tribal with Federal relationships. The internal tribal organization differed among the Five Nations and the knowledge of one or two is not sufficient.

With the aid of Mr. Asa R. Hill as Mohawk interpreter and informant, the work of the textual criticism of the Mohawk text of the league material originally collected by Mr. Seth Newhouse, a Mohawk ex-federal chief, was revised. Knowing that Mr. Newhouse is a fine Mohawk speaker, Mr. Hewitt induced him to translate his material back into the language from which he had rendered it into indifferent English. This translation was not desired for publication but to obtain the correct Mohawk terminology or diction for the expression of the ideas embodied in the material.

During the year Mr. Francis La Flesche, ethnologist, devoted most of his time to the task of preparing for publication the manuscript of the first volume of his work on the Osage Tribe. In February the text of the first volume was finished and the manuscript placed in the hands of the Chief of the Bureau of American Ethnology.

The volume contains two elaborate ancient rituals, the first of which is entitled "Ga-hi′-ge O-k′o^{n}, Ritual of the Chiefs"; and the second "Ni′-ki ·No^{n}-k′o^{n}, Hearing of the Sayings of the Ancient Men." These rituals are rendered in three forms: First, in a free English translation; second, the recited parts, also the words of the songs, as given by the Indians themselves in their own language into the dictaphone; third, a translation from the Osage language into English as nearly literal as can be made. Owing to the peculiar modes of expression used in the rituals by the Indians, such as metaphors, figures of speech, tropes, and archaic terms, it is impossible to give an absolutely literal translation. Furthermore, much of the language used in these rituals is in ceremonial style and not that in daily use among the people.

On the completion of the manuscript of the first volume, Mr. La Flesche took up the task of preparing for publication the manuscript of the second volume.

Mr. J. P. Harrington, ethnologist, spent the months of July, August, and September, 1919, on field duty in New Mexico in pursuance of his studies of the ethnology and linguistic relationship of the Southwest Indians. These studies resulted in a large amount of most carefully heard textual, grammatical, and lexical material from the Tano-Kiowan family of languages, the elaboration of more than 750 pages of which was completed for publication before the close of the fiscal year.

Important discoveries in connection with this work are that Zuñian is definitely added to the Tano-Kiowan-Keresan-Shoshonean stock; and that the religious-ceremonial words of Tanoan are largely borrowed from Zuñian and Keresan. This last discovery has proved one

of the most interesting features of the work, for, just as it can be shown that the watermelon and muskmelon, for example, are not native to the Tanoan Indians because designated by Spanish loan-words or by mere descriptive terms, so it can be also demonstrated linguistically that the Tanoans have adopted many features of the Zuñian and Keresan religion. Even such fundamental conceptions as Wenima, the abode of the dead, and Sipapu, the entrance to the other world, have been taken over by the Tanoans, e. g., as Tewa Wayima and Sip'o phe.

At the close of September Mr. Harrington returned to Washington and was engaged during the remainder of the year in the elaboration of his material. Mr. Harrington also performed various office duties during this period.

In August, 1919, Dr. Truman Michelson, ethnologist, renewed his researches among the Fox Indians, which consisted exclusively of working out a grammatical analysis of the Indian text of his manuscript on the White Buffalo Dance, in order to make a vocabulary for the same. He returned to Washington near the middle of September, when he resumed his work on the Indian text, as well as the vocabulary. The manuscript was submitted in March, 1920.

During the winter Dr. Michelson worked on the manuscript of the White Buffalo Dance; he also spent some time on a rough translation of an autobiography of a Fox Indian woman written in the current syllabary. This translation was based on a paraphrase in English written by Horace Poweshiek. In the middle of June he left for Tama, Iowa, to restore the syllabary text phonetically, to further work out a grammatical analysis to enable him to add a suitable vocabulary, to elucidate a number of ethnological points, and to correct the translation in a number of places. By the close of the fiscal year he entirely restored the text phonetically.

In addition, Dr. Michelson has furnished data for official correspondence.

SPECIAL RESEARCHES.

In addition to the work of members of the staff mentioned in their reports above, the bureau has employed others in ethnological and archeological researches.

Mr. Neil M. Judd, curator of American archeology in the United States National Museum, was detailed in June to complete a report on his work for the bureau in previous seasons in southeastern Utah. At the time of writing no report on this work has been received.

Miss Densmore resumed work on the Pawnee songs on September 1, 1919. Transcriptions and analyses of 58 Pawnee songs have been submitted during the year. These comprise songs of the Morning Star ceremony and of the Buffalo dance, the Bear dance, and the

Lance dance. In April, 1920, she visited the Pawnees a second time and was permitted to enter the lodge during the Morning Star ceremony and to see the contents of the "sacred bundle." This bundle is opened once a year. (It is said that only one other white person has been permitted to enter the ceremonial lodge.) This ceremony afforded an opportunity to hear certain interesting rituals which are sung only at this time.

Three manuscripts on Pawnee music have been submitted during the year. In addition to the ceremonial material above mentioned these papers contain songs of war and of a game, as well as miscellaneous songs and those connected with folk tales. The Pawnees were selected as representative of the Caddoan stock, according to the plan of comparing the songs of the various linguistic stocks.

About the middle of February, 1920, Miss Densmore began a study of the Papago Indians as a representative of the Piman stock. For more than a month she lived at San Xavier Mission, a Government station, among the Papago near Tucson, Arizona, and recorded more than 100 songs, 25 of which have been transcribed, analyzed, and submitted. Three subjects were studied—treatment of the sick, customs of war, and ancient stories. As examples of the psychology revealed by musical investigation it may be noted that the Papago state that all sickness has its origin in the anger of a mythical "creator," and that many of the songs used in treating the sick are said to have been received from spirits of the dead.

Miss Densmore considers the chief points of the year's investigation to be the evident contrast of songs of different linguistic stocks and the increasing evidence that rhythm in Indian song is more varied and important than melody. It is interesting to note that the songs recorded by an individual Indian doctor showed similarity in melodic material and formation, but a wide variety in rhythm. The poetry of the words of Papago songs is of an unusually high order.

In April, 1920, Miss Densmore visited the "Mohave" Apaches living at Camp MacDowell near Phoenix, Ariz., with a view to recording songs among them next season, taking the Apache as the representatives of the Athapascan stock.

In July, 1919, Miss Densmore visited the Manitou Rapids Reserve in Canada to obtain data on the customs of the Canadian Chippewas for comparison with the tribe in the States. She found an interesting contrast in bead patterns and collected considerable information on their general culture. August 14 to 30, 1919, she worked on the botanical section of the book on Chippewa Arts and Customs, this section comprising the use of plants as food, medicine, and charms.

Mr. David I. Bushnell, jr., continued the preparation of his manuscript for the Handbook of Aboriginal Remains East of the Rocky Mountains, and in the course of his work has prepared a bulletin entitled "Native Villages and Village Sites East of the Mississippi," which has been published as Bulletin 69. He has also written Bulletion 71, on "Native Cemeteries and Forms of Burial East of the Mississippi," the final proofs of which have been sent to the printer, but the work has not yet been delivered to the bureau. The favorable reception of these bulletins, as indicated by the many applications made at the office for them, is gratifying.

Mr. Bushnell also gathered notes, maps, and photographs to be used in the preparation of two manuscripts for the bureau. One is to have the title, "Villages of the Algonquian, Siouan, and Caddoan Tribes West of the Mississippi"; the second, "Burials of the Algonquian, Siouan, and Caddoan Tribes West of the Mississippi." The former is nearing completion, and both should be finished during the next fiscal year.

The results of the archeological work in Texas under Prof. J. E. Pearce, for which a special allotment was made, are important. Reconnoissance work has been done in the eastern, middle, and western parts of the State. Indian mounds at Athens, in eastern Texas, have yielded pottery akin in form and technique to that of the Mississippi, suggesting cultural connections which have as yet not been completely traced. In western Texas the group of pictographs at Paint Rock has been given especial attention. They are little known, as they are at present seldom visited by tourists. This series of rock pictures is important enough to be protected by law. The present owner of the ranch upon which they are situated, recognizing their importance, will prevent vandalism.

The work was mainly on the antiquities of central Texas, where intensive work was much to be desired. Prof. Pearce, who has charge of this work, believes that the mounds in this part of the State are kitchen middens and that they were connected with the first men who came into this region. He is also of the opinion that the culture which they represent was much cruder than that of the historical Indians; that they knew nothing of polishing stone or of pottery making; and that for thousands of years they were the only occupants of the open prairies and plains of central and west Texas; and finally, that their life was little modified during the entire period of the formation of the mounds. Prof. Pearce's report is so promising of results that work in Texas will be continued another year.

Although the aboriginal monuments called mounds and stone graves of the Cumberland Valley have been investigated by several well-known archeologists, it appears from the researches of Mr.

W. E. Myer, of Nashville, that much remains to be discovered in this region. Under his guidance the chief visited the aboriginal mounds on the Harpeth River at Oldtown, Castalian Springs, and elsewhere. It was seen that while many of the smaller mounds have been plowed down by cultivation of the land the larger ones still bear mute evidence of the industry of the builders of these structures and the magnitude of the population.

Mr. Myer has transmitted to the bureau a manuscript on the antiquities of the Cumberland Valley, Tenn., the results of a lifelong devotion to the subject.

Mr. Otto Mallery has presented to the bureau a valuable pueblo collection from the Chama region, New Mexico, made by Mr. J. A. Jeancon, who had charge of the work, and has transmitted a report which is now being prepared for publication.

Mr. Gerard Fowke was given a small allotment for an archeological reconnoissance of the Hawaiian Islands. He began work in May and reports important results which it is too early to detail at this time.

MANUSCRIPTS.

The following manuscripts, exclusive of those submitted for publication by members of the staff of the bureau and its collaborators, were purchased:

"Wawehock Texts," by Frank S. Speck.

"History of the Jesuit Mission in Paraguay." The original manuscript, being an English translation by Dr. George Spence, from the original French manuscript of the Abbé Jo. Pedro Gay, Curé de Uruguayana. 2 vols., 4to. Circa 1880. 275 pp.

"A New Guarani Grammar," the original manuscript complete, being a translation into English by Dr. George Spence from the French manuscript of l'Abbé Jo. Pedro Gay, Curé de Uruguayana. 2 vols., 4to.

"Manuel de Conversation en Français, en Portugues, en Español, en Guarany Abañeeme par le Chanoine J. P. Gay, curé de Uruguayana," arranged in four columns.

"Nouvelle Grammaire de la Langue Guarany et Tupy, etc., par le Chanoine J. P. Gay, Curé, etc., 188 p., folio.

"Mappa geographico da republica do Paraguay pelo conego Joao Pedro Gay, pelo engenhiero Falix Alx. Grivot. 1881.

A copy of "Manuel de Conversation en Français, en Portugues, en Anglaise, en Español, en Guarany Abañeeme." Arranged in five columns. No date.

In addition to those purchased Mr. Edward M. Brigham has submitted for publication a valuable manuscript with many plates on "The Antiquities of the Marajo," Brazil; and Mr. W. E. Myer, of

Nashville, Tenn., a manuscript on "The Antiquities of the Cumberland Valley of Tennessee." "A Chippewa Bible History in manuscript in four volumes. 8vo. A. D. 1896–1901," was presented by Fr. Chrysostom Verwyst, O. F. M.

EDITORIAL WORK AND PUBLICATIONS.

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

PUBLICATIONS ISSUED.

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 Laie-i-ka-wai (Beckwith). 677 pp. 95 pls.

Three separates from the Thirty-third Annual Report.

Bulletin 60.—Handbook of Aboriginal American Antiquities (Holmes). 380 pp.

Bulletin 68.—Structural and Lexical Comparison of the Tunica, Chitimacha, and Atakapa Languages (Swanton). 56 pp.

Bulletin 69.—Native Villages and Village Sites East of the Mississippi (Bushnell). 111 pp. 17 pl.

Bulletin 70.—Prehistoric Villages, Castles, and Towers (Fewkes). 79 pp. 33 pl.

PUBLICATIONS IN PRESS OR IN PREPARATION.

Thirty-fourth Annual Report.—Accompanying paper: Prehistoric Island Culture Areas of America (Fewkes).

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

Thirty-sixth Annual Report.—Accompanying paper: The Osage Tribe (La Flesche).

Thirty-seventh Annual Report.—Accompanying paper: The Winnebago Tribe (Radin).

Thirty-eighth Annual Report.—An Introductory Study of the Arts, Crafts, and Customs of the Guiana Indians (Roth).

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

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 73.—Early History of the Creek Indians and their Neighbors (Swanton).

Bulletin 74.—Excavations at Santiago, Ahuitzotla, D. F., Mexico (Tozzer).

Bulletin —.—Archeological Investigations in the Ozark Region of Central Missouri (Fowke).

Bulletin —.—Northern Ute Music (Densmore).

Bulletin —.—Mandan and Hidatsa Music (Densmore).

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

DISTRIBUTION OF PUBLICATIONS.

The distribution of publications has been continued under the immediate charge of Miss Helen Munroe, assisted by Miss Emma B. Powers. Publications were distributed as follows:

Annual reports and separates	3,373
Bulletins and separates	12,886
Contributions to North American ethnology	32
Miscellaneous publications	572
Total	16,863

As compared with the fiscal year 1919, there was an increase of 5,380 publications distributed. Fourteen addresses have been added to the mailing list during the year and 28 dropped, making a net decrease of 14.

ILLUSTRATIONS.

Mr. De Lancey Gill, with the assistance of Mr. Albert E. Sweeney, continued the preparation of the illustrations of the bureau. A summary of this work follows:

Photographic prints for distribution and office use	500
Negatives of ethnologic and archeologic subjects	300
Negative films developed from field exposures	100
Photostat prints made from books and manuscript	250

ILLUSTRATIONS PREPARED AND SUBMITTED FOR PUBLICATION.

Photographs retouched and otherwise	350
Line and color drawings	215
Illustration proof edited	1,400
Lithographic proofs examined at Government Printing Office	5,200

LIBRARY.

The reference library continued in the immediate care of Miss Ella Leary, librarian, assisted by Mr. Charles B. Newman.

During the year 820 books were accessioned, of which 140 were acquired by purchase and 680 by gift and exchange. Volumes made by binding serials are included in these figures. The periodicals currently received number about 800, of which 35 were obtained by purchase, the remainder being received through exchange. The library has also received 260 pamphlets. The catalogue of the bureau now records 23,380 volumes; there are about 14,508 pamphlets and several thousand unbound periodicals.

Successful effort has been made to complete the sets of certain publications of scientific societies and other learned institutions. For the use of the members of the staff there has been prepared and posted copies of a monthly bulletin of the principal accessions of the library;

also information has been furnished and bibliographic notes compiled for the use of correspondents.

During the year the work of cataloguing has been carried on as new accessions were acquired and good progress was made in cataloguing ethnologic and related articles in the earlier serials.

Attention has been given to the preparation of volumes for binding, with the result that 502 books were sent to the bindery. The number of books borrowed from the Library of Congress for the use of the staff of the bureau in prosecuting their researches was about 400.

A pressing problem is the congestion of books on the shelves. For some time the library has been overcrowded and we are now taxed to find room for the current accessions.

The library is constantly referred to by students not connected with the bureau, as well as by various officials of the Government service.

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:

Archeological objects collected in Cottonwood Canyon, Kane County, Utah, by Mr. Neil M. Judd, during the spring of 1919. Accession 63841, 257 specimens.

Archeological objects (748) and skeletal remains (24) collected for the bureau by Mr. Gerard Fowke, from Miller's Cave, Missouri, during the spring of 1919. Accession 64150, 772 specimens.

Archeological collection, including human bones, from Sell's and Bell's Caves, Pulaski County, Missouri, forwarded by Mr. Gerard Fowke. Accession 64198, 83 specimens.

Archeological material from Texas, gathered from the surface by Dr. J. W. Fewkes and Prof. J. E. Pearce, in the autumn of 1919. Accession 64248, 165 specimens.

Sculptured stones of Huastec culture, presented to the bureau by Mr. John M. Muir, of Tampico, Mexico. Accession 64249, 5 specimens.

Three fine hardwood bows and three ceremonial clubs from British Guiana, and a blanket of the Cowichan Indians (Salish), Northwest Coast. Accession 64327, 7 specimens.

Collection of archeological objects (262) and skeletal material (16 specimens), together with ethnologica of the Apache Indians (4 specimens), obtained in Arizona by Dr. Walter Hough during the spring of 1919. Accession 64603, 282 specimens.

Collection of archeological objects (212) and two human skulls, gathered by Dr. J. Walter Fewkes, at Square Tower House and contiguous ruins on the Mesa Verde National Park, Colo., in cooperation

with the National Park Service of the Interior Department in 1919. Accession 64646, 214 specimens.

Archeological objects (446) and skeletal material (5) collected by Mr. J. A. Jeancon in an ancient ruin near Abiquiu, N. Mex., for Mr. Otto T. Mallery during the summer of 1919, and presented to the Bureau by Mr. Mallery. Accession 64885, 451 specimens.

PROPERTY.

Furniture and office equipment was purchased to the amount of $162.73.

MISCELLANEOUS.

Personnel.—The position of Honorary Philologist, held for several years by Dr. Franz Boas, has been abolished.

Clerical.—The correspondence and other clerical work of the office 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, Bureau of American Ethnology.

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, 1920:

The congressional appropriation for the support of the service during the year was $45,000, an increase of $10,000 over the amount of the regular appropriation for 1919. This increase was made necessary in order to meet the cost of transportation at the prevailing high ocean freight rates on shipments of accumulated publications for certain countries. The usual allotment of $200 for printing and binding was allowed by Congress. The repayments from departmental and other establishments aggregated $4,992.96, making the total available resources for carrying on the system of exchanges during the fiscal year 1920 $50,192.96.

During the year 1920 the total number of packages handled was 369,372—an increase over the number for the preceding year of 98,512. These packages weighed a total of 496,378 pounds—a gain of 204,460 pounds. These increases in the number and weight of packages handled are accounted for by the fact that during the year shipments were resumed to several countries with which exchange relations were suspended during the war, concerning which a statement will be made later in this report. It is gratifying to state that the work of the office during the past year exceeded by 27,705 packages the number handled during the fiscal year 1914, just prior to the outbreak of the World War.

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

	Packages.		Weight.	
	Sent.	Received.	Sent.	Received.
			Pounds.	*Pounds.*
United States parliamentary documents sent abroad	165,291	.....	90,725	.....
Publications received in return for parliamentary documents	.....	2,598	.....	11,431
United States departmental documents sent abroad	123,345	.....	206,029	.....
Publications received in return for departmental documents	.....	3,870	.....	9,116
Miscellaneous scientific and literary publications sent abroad	56,484	.....	125,137	.....
Miscellaneous scientific and literary publications received from abroad for distribution in the United States	.....	17,784	.....	53,940
Total	345,120	24,252	421,891	74,487
Grand total	369,372		496,378	

Packages from foreign countries frequently contain more than one publication. The returns from abroad, therefore, are larger than would be supposed from a casual glance at the figures in the table. Even allowing for this, there is still a disparity between the number of publications sent and those received through the International Exchange Service. This apparent one-sidedness, however, is largely offset by the number of publications received by governmental and other establishments in this country directly through the mails from abroad. Several years ago (1907) the Institution brought this subject to the attention of the various bureaus of the Government and offered to make a special effort to secure for them more adequate returns for the publications sent by them through the Exchange Service to foreign correspondents. While several offices took advantage of this offer, and a large number of foreign publications were received for them by the Institution, many of the bureaus stated that the quantity and value of the publications received, either through the International Exchange Service or direct by mail, were considered an equivalent for the documents sent abroad. Quotations from some of the letters are given below:

Coast and Geodetic Survey.—Not all of our publications forwarded to foreign addresses are sent in anticipation of exchanges to be received by this bureau. Many are sent to individuals from whom no return is expected. I take it that in like manner many individuals, citizens of the United States, are favored with publications of interest to them put out by foreign Governments. I think we are now receiving all of the publications of other Governments in which we are interested. Many of these reach us through the mails.

Weather Bureau.—It is believed that the bureau already receives adequate returns from its foreign correspondents, most of whom send their publications by mail direct.

Office of the Chief of Staff.—Many of the exchanges are received by the War Department from our military attachés abroad, all of whom have pouch service through the Department of State, which probably accounts largely, if not entirely, for the lesser number of packages received than sent.

Nautical Almanac Office.—The Ephemeris, being issued every year, makes the volume of our publications larger than that of most observatories, and on that account anything like an equality in the number of packages exchanged can not be expected.

Bureau of Foreign and Domestic Commerce.—The cause of the excess of packages sent by this bureau through your exchange as compared with those received from it is, as you are probably aware, that this department has no adequate appropriation for the payment of postage on packages sent abroad and is therefore obliged to avail itself of the lesser expense of sending them through your Institution, while foreign Governments in most cases pay the postage on exchanges and mail them direct to this bureau.

Surgeon General's Office, War Department.—The volumes of the Index Catalogue, the only publication of this office now sent through the Smithsonian Exchange Service, have been forwarded annually to the libraries of the most important medical and other scientific institutions in foreign countries—including the universities in France and Germany—receiving, in return, the theses

and dissertations of the universities and such publications as the other institutions issue. A very large number of exchanges are also received through our agents in London, Paris, and elsewhere. The aid received from the Smithsonian Institution in forwarding and receiving these exchanges can not be overestimated, but it is believed that we are receiving a full return for the exchanges that are now being sent out.

United States Patent Office.—Your offer to endeavor to increase the foreign exchanges of this office through your Institution is appreciated, but it is reported to me by the librarian that we now receive all the publications which are considered to be of value in the work of this bureau which can be secured in that way.

Comptroller of the Currency.—The packages from this bureau sent through the Smithsonian Institution are annual reports of the comptroller, practically all of which are addressed to individuals or corporations, from whom no returns are expected.

Bureau of Navigation, Department of Commerce.—The bureau receives ample return for its publications sent abroad. Indeed, in cost and in numbers our foreign exchanges exceed considerably our publications sent abroad. I have noticed, however, that it is the practice of our foreign correspondents to send their packages, pamphlets, etc., directly to this bureau through the mails.

In my last report I stated that the service had not been put on a prewar basis so far as the forwarding of consignments abroad was concerned. Shipments are still suspended to Austria, Germany, Montenegro, Roumania, Russia, Serbia, and Turkey. The opinion was expressed in last year's report that it was not advisable to forward consignments to the above until the peace treaties with the enemy countries were finally ratified by the United States and the internal conditions in the other nations became more settled. Trade relations having been resumed with Germany, Austria, and Hungary, the Institution took steps to reopen exchange relations with them, and just before the close of the year shipments to Hungary were resumed. Montenegro and Serbia now form part of the Serb-Croat-Slovene State, and the Institution has taken up with the authorities of that State the question of the interchange of publications. Internal conditions in Roumania having improved, the Roumanian authorities have been asked if they are ready to renew the exchange of publications with the United States. Nothing can, however, be done concerning the reopening of exchange relations with either Russia or Turkey until conditions in those countries reach a more normal basis.

The Bulgarian foreign office, in reply to a letter from the Institution concerning the reestablishment of exchange relations, writes, under date of July 3, that the Bulgarian Government eagerly accepts the proposal of the Institution. Shipments to that country will, therefore, be resumed in the early part of the next fiscal year.

An exchange of publications was inaugurated during the year with the Czecho-Slovak Republic, and the Polish Government will be ap-

proached concerning the exchange of publications as soon as conditions in that country become more settled.

Before the war shipments of international exchanges were made to Finland through the Russian exchange commission at Petrograd. Now, that Finland has become an independent State, consignments are being forwarded directly to that country.

The prompt dispatch of exchange consignments to foreign countries was greatly interfered with during the year owing to railroad freight embargoes and marine strikes. Transportation of boxes to New York was further interrupted owing to the severe winter. During the latter part of the year railroad freight became very much congested, especially in the vicinity of New York, which necessitated the placing of a general embargo on all freight. This required the suspension of the Institution's shipments for over a month. The official character of the work carried on by the Exchange Service was brought to the attention of the railroad authorities with the request that a permit be issued granting the Institution permission to forward its material to New York for transmission abroad. When the railroad began to exempt certain classes of freight from the embargo, the Institution was given authority to send its consignments.

The Institution has, in a few cases, rendered aid to various establishments in procuring publications relating to some particular subject in which especial interest was manifested. I may refer to one instance in this connection: The counselor in charge of foreign relations of the municipality of Prague wrote to the American Legation in that city that he wished to establish better cultural and intellectual relations between the University of Prague and the various American universities, and that with that end in view he was desirous of receiving catalogues giving the courses offered by those universities. The counselor also expressed a desire to receive documents concerning the functioning of the governments of American municipalities and their methods of solving economic, social, and political problems. The matter was brought to the attention of the more important American universities and of the governments of the larger cities in this country, from whom considerable material bearing on the subject was received and forwarded to Prague.

In March, 1920, a letter was received from Dr. S. G. de Vries, director of the Bureau Scientifique Central Néerlandais, Bibliothèque de l'Université, Leyden, stating that on account of the condition of his health he was unable to retain the management of the Dutch Central Scientific Bureau (the Netherlands Exchange Agency), and that Dr. H. H. R. Roelofs Heyermans, director of the Bibliothèque de l'Académie Technique, Delft, had succeeded him in the management of the Dutch bureau. Shipments for the Netherlands are therefore now forwarded to Delft. Dr. de Vries had been head of

the Dutch scientific bureau for 18 years, during which time the interchange of publications between the Netherlands and the United States was conducted in a most efficient manner, and I desire to record here the Institution's appreciation of his services in promoting the interchange of publications between the Netherlands and the United States.

The National Committee of the United States for the Restoration of the University of Louvain in Belgium, which work is being conducted under the direction of Dr. Herbert Putnam, Librarian of Congress, collected and sent to the Institution for transmission to that university up to March, 1920, over 12,000 publications. The forwarding of these publications required 102 boxes, measuring 767 cubic feet and weighing 25,423 pounds. That shipment was the largest single consignment ever forwarded through the Exchange Service to any address at one time. It was greater than the combined bulk of the shipments sent abroad during the entire year 1871. The Institution is still receiving books for the University of Louvain, and these will be forwarded at a subsequent date.

Occasionally complaints are received from foreign correspondents that transportation charges are made on packages sent to them through exchange channels. Such a complaint was recently received from an Egyptian correspondent. The subject was taken up with the Government Publications Office at Cairo—the Egyptian Exchange Agency—which replied that henceforth that office would deliver all packages under Government frank free of expense to the recipients. This action on the part of the Government Publications Office is very gratifying, as one of the principal provisions of the Brussels Exchange Convention of 1886 would be defeated if any transportation charges were exacted from consignees. While not all countries were parties to that convention, most of them adhere to its provisions. I may add in this connection that packages received from abroad for distribution through the Smithsonian Exchange Service are sent to their destinations by mail under Government frank.

During the latter part of the year a letter was received from the Victorian Exchange Agency stating that the 16 boxes (Nos. 852–863, 9739–9740, 9794–9795) sent in its care under date of December 29, 1919, were lost at sea when the steamship *Marne* was wrecked off the coast of Panama. Four of these boxes contained the regular series of United States governmental documents for deposit in the public library of Victoria and in the library of the Commonwealth Parliament. Duplicate copies of these publications were forwarded to take the place of those lost. The contents of two of the boxes were for the Commonwealth War Memorials Library, and the Library of Congress, the sender, has taken steps to duplicate the material. The remaining 10 boxes contained miscellaneous publications for various

addresses in Victoria. On account of the difficulty of determining the contents of the packages contained in these latter boxes, it was deemed best to let the matter rest until requests for the missing publications are received from the addressees.

During the year 2,359 boxes were used in forwarding exchanges to foreign agencies for distribution, being an increase of 1,556 over the number for the preceding 12 months. While this is a very large increase, the total number of boxes represents about the quantity used during a normal year.

Of the total number of boxes forwarded, 342 contained full sets of United States official documents for authorized depositories and 2,017 included departmental and other publications for depositories of partial sets and for miscellaneous correspondents.

The number of boxes sent to each foreign country is given in the following table:

Consignments of exchanges for foreign countries.

Country.	Number of boxes.	Country.	Number of boxes.
Argentina	50	Jamaica	5
Belgium	239	Japan	95
Bolivia	8	Korea	2
Brazil	39	Mexico	6
British colonies	9	Netherlands	64
British Guiana	2	New South Wales	47
Canada	24	New Zealand	48
Chile	27	Nicaragua	5
China	35	Norway	40
Colombia	23	Paraguay	1
Costa Rica	16	Peru	16
Cuba	6	Portugal	26
Denmark	54	Queensland	21
Dutch Guiana	2	Salvador	7
Ecuador	12	Siam	4
Egypt	12	Spain	44
Finland	10	Sweden	87
France	253	Switzerland	57
Great Britain and Ireland	481	Tasmania	11
Greece	24	South Australia	31
Guatemala	6	Trinidad	1
Haiti	8	Union of South Africa	39
Honduras	4	Uruguay	21
Hungary	75	Venezuela	17
India	59	Victoria	66
Italy	110	Western Australia	10

FOREIGN DEPOSITORIES OF UNITED STATES GOVERNMENTAL DOCUMENTS.

In accordance with treaty stipulations and under the authority of the congressional resolutions of March 2, 1867, and March 2, 1901, setting apart a certain number of documents for exchange with for-

eign countries, there are now received for distribution to depositories abroad 56 full sets of United States official publications and 37 partial sets, two depositories having been added during the year, as referred to below.

An arrangement for an exchange of a full set of official documents between the Governments of Czecho-Slovakia and the United States was entered into in the summer of 1919, but the details of transmission were not perfected until near the close of the fiscal year, and the first shipment to that country will be made during the month of July, 1920. It might be added as a matter of record that the consignment will consist of 25 boxes containing governmental documents received at the Institution since January 27, 1919, the Czecho-Slovak Government being requested to send to the United States copies of its own documents covering the same period. It is understood that the publications from this country will be deposited in the Ministère de l'Instruction Publique at Prague.

In August, 1919, the State of Rio de Janeiro was added to the list of those countries receiving partial sets. The documents are deposited in the Bibliotheca da Assemblea Legislativa do Estado do Rio de Janeiro in Nictheroy.

Since Alsace-Lorraine has been restored to France the Bibliothèque Universitaire et Régionale de Strasbourg has been designated as the depository of the partial set sent to that province.

The depository in Finland since that country established its independence has been changed from the Chancery of Governor to the Central Library of the State, Helsingfors.

A complete list of the depositories is given below:

DEPOSITORIES OF FULL SETS.

ARGENTINA: Ministerio de Relaciones Exteriores, Buenos Aires.
AUSTRALIA: Library of the Commonwealth Parliament, Melbourne.
AUSTRIA: Statistische Zentral-Kommission, Vienna.
BADEN: Universitäts-Bibliothek, Freiburg. (Depository of the State of Baden.)
BAVARIA: 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.

CZECHO-SLOVAKIA: Ministère de l'Instruction Publique, Prague.
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 de Staten-Generaal, The Hague.
NEW SOUTH WALES: Public Library of New South Wales, Sydney.
NEW ZEALAND: General Assembly Library, Wellington.
NORWAY: Storthingets 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: Public Library, Petrograd.
SAXONY: 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: Landesbibliothek, Stuttgart.

DEPOSITORIES OF PARTIAL SETS.

ALBERTA: Provincial Library, Edmonton.
ALSACE-LORRAINE: Bibliothèque Universitaire et Régionale de Strasbourg, Strasbourg.
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: Central Library of the State, Helsingfors.
GUATEMALA: Secretary of the Government, Guatemala.
HAMBURG: Senatskommission für die Reichs- und Auswärtigen Angelegenheiten.
HESSE: Landesbibliothek, 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-Amt der Haupt- und Residenz-Stadt.

INTERPARLIAMENTARY EXCHANGE OF OFFICIAL JOURNALS.

In the early part of the fiscal year the immediate exchange of the official journal was entered into with the Government of Czecho-Slovakia. A complete list of the countries now taking part in this immediate exchange is given below:

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

It will be noted from the above that there are at present 37 countries with which this exchange is conducted. To some of the countries two copies of the Congressional Record are sent, one to the Upper and one to the Lower House of Parliament, the total number transmitted being 43.

FOREIGN EXCHANGE AGENCIES.

Since Finland became an independent State the president of the Delegation of the Scientific Societies of Finland, Helsingfors, has offered the services of that delegation as the Finnish exchange agency. This offer has been accepted and consignments intended for that country are now forwarded in care of the delegation.

Dr. Julius Pikler, of Budapest, whose services as Smithsonian agent for Hungary were, owing to the war, discontinued June 30, 1917, until further notice, was reappointed Hungarian exchange agent, to take effect July 1, 1920.

The Bureau Scientifique Central Néerlandais—the Dutch exchange agency—formerly under the Bibliothèque de l'Université, is now under the Bibliothèque de l'Académie Technique at Delft.

A complete list of the foreign exchange agencies or bureaus is given below. 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:* 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 Internacionaes, 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.
FINLAND: Delegation of the Scientific Societies of Finland, Helsingfors.
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.
HUNGARY: Dr. Julius Pikler, Fövárosi Telekértéknyilvántartó Hivatal (City Land Valuation Office), Központi Városház, Budapest IV.
ICELAND, *via* Denmark.
INDIA: Superintendent of Stationery, Bombay.
ITALY: Ufficio degli Scambi 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'Académie technique, Delft.
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 Permutacões Internacionaes, 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 Publique, Petrograd.
SALVADOR: Ministerio de Relaciones Exteriores, San Salvador.
SERBIA: * Section Administrative du Ministère des Affaires Etrangères, 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.

Shortly after the close of the fiscal year, at the request of the Economic Liaison Committee of the State Department, Mr. C. W. Shoemaker, chief clerk, and Mr. F. E. Gass, correspondence clerk, of the service, appeared before that committee to give information concerning the workings of the International Exchange Service.

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, 1920:

The appropriation allowed by Congress in the sundry civil act for the maintenance of the park was the same as for the preceding year, $115,000, with the usual additional allotment of $200 for printing and binding. With the cost of almost all of the supplies necessary for the maintenance of such an establishment increasing constantly, only a comparatively small part of this amount could be used for repairs and improvements of any kind. Such permanent improvements as were effected were made possible by the purchase of much of the necessary material during the preceding year. The grounds, roads and walks, buildings, and inclosures have, however, been kept in good condition by the regular force of employees, although many much needed repairs not actually urgent have been postponed. The number of animals in the collection shows an increase over that of last year; and the attendance reached a new mark of over 2,000,000 visitors.

ACCESSIONS.

Gifts.—Animals to the number of 127 were presented by friends of the park or were placed on indefinite deposit. It is gratifying that the park is becoming more and more appreciated as the natural depository for pet or captive wild animals no longer desired by their owners. Many important specimens, including parrots and other cage birds, reach the collection as gifts. The owners of such animals feel that their pets will not only enrich the national collections but that they will have the most expert care and kindly treatment.

Most noteworthy among the gifts for the year are four accessions from tropical America, which included several species new to the collection. Mr. W. J. La Varre, jr., of Washington, D. C., during an extended trip up the Amazon River and some of its tributaries collected a number of desirable animals which he presented to the park. Mr. La Varre's collection included a specimen of the rare black-headed ouakari monkey (*Cacajo melanocephalus*), a species

never before represented in the collection. This monkey is a member of the only genus of short-tailed monkeys inhabiting the New World, and is very seldom seen in captivity. The species is, unfortunately, like some others of the more delicate American monkeys, very difficult to keep, and this specimen survived only two months after its arrival in Washington. Other animals in the La Varre collection were a brown capuchin monkey, two titi or squirrel monkeys, an ocelot, two margay cats, two snowy egrets, a scarlet ibis, an orange-winged parrot, two yellow-winged paroquets, and four tui paroquets. Mr. La Varre also brought to Washington with him from Manaos, Brazil, a large specimen of the rare and curious matamata turtle, presented to the National Zoological Park by his friend, Mr. A. T. S. Hore, of Manaos.

A second accession from Brazil was from Mr. Edward B. Kirk, American consular agent at Manaos. This lot included three large American egrets, a white-backed trumpeter, and two brocket deer. The quarantine regulations in force at the time unfortunately prohibited the landing of the deer, and these were returned to Mr. Kirk's place in Brazil. The white-backed trumpeter (*Psophia leucoptera*) is very unusual in collections and is the most important addition to the bird department made during the fiscal year.

Dr. W. M. Mann, of the Bureau of Entomology, during a short stay in Honduras, collected a number of valuable and interesting Central American animals which he brought to the park on his return. Included were a Mexican kinkajou, a mantled howler monkey (*Alouatta palliata*), a paca, a Honduras squirrel, two speckled agoutis, a Central American cooter, and a fine specimen of Rossignon's snapping turtle. Howler monkeys are exceptionally difficult to keep in captivity, and this specimen, a young example, did not long survive; but the remaining animals in Dr. Mann's collection are all in excellent condition.

Among the parrots received as gifts during the year were two species never before shown in the park. These were the lesser white-fronted parrot, presented by Mr. Alex Gregory, and the blue-backed parrotlet, from Mrs. Samuel Spencer, Washington, D. C.

Sixty individual donors contributed to the collection this year. The complete list is as follows:

Mr. John L. Barr, Washington, D. C., red-winged blackbird.
Mr. Bert Brooks, Washington, D. C., two alligators.
Mr. John A. Buckley, Fairfax, Va., woodchuck.
Mr. Granville Christman, Washington, D. C., screech owl.
Mrs. E. L. Conn, Washington, D. C., double yellow-head parrot.
Capt. Robert G. Cook, Washington, D. C., alligator.
Col. J. A. Crane, Washington, D. C., cockateel.
Mr. J. I. Cusick, Washington, D. C., two barn owls.
Mrs. C. E. Dornheim, Washington, D. C., bald eagle.

Mr. John W. Dudley, Washington, D. C., sparrow hawk.
Mr. D. L. Du Pre, Washington, D. C., garter snake.
Mr. W. A. Eaton, Washington, D. C., alligator.
Mrs. A. F. Enquist, Washington, D. C., two canaries.
Mr. Victor J. Evans, Washington, D. C., gray coatimundi.
Mr. Raymond T. Faunce, Washington, D. C., alligator.
Mr. Enos Ferguson, Washington, D. C., six starlings.
Dr. A. K. Fisher, Washington, D. C., chuck-walla.
Mr. H. Fitzinreuter, Washington, D. C., sparrow hawk.
Mr. R. F. Funkhauser, Washington, D. C., alligator.
Mr. Julian Greene, Washington, D. C., alligator.
Mr. Alex Gregory, Washington, D. C., lesser white-fronted parrot.
Miss Harriet Hackett, Baltimore, Md., double yellow-head parrot.
Mrs. Edith S. Hawes, Washington, D. C., alligator.
Mr. F. K. Heindrich, Washington, D. C., two gray foxes.
Mr. A. T. S. Hore, Manaos, Brazil, matamata turtle.
Mr. C. J. Hornberger, Washington, D. C., alligator.
Mr. L. M. Humphrey, Glen Echo, Md., queen snake.
Mr. Perry H. Jacob, Washington, D. C., Cooper's hawk.
Mr. Hiram F. Johnson, Washington, D. C., alligator.
Mr. James S. Kerkendall, Louisville, Ky., ferret.
Mr. Edward B. Kirk, Manaos, Brazil, white-backed trumpeter and three American egrets.
Mr. J. A. Krentzlin, Washington, D. C., black snake.
Mr. W. J. La Varre, jr., Washington, D. C., black-headed ouakari, brown capuchin, ocelot, orange-winged parrot, scarlet ibis, two titi monkeys, two margay cats, two yellow-winged paroquets, two snowy egrets, and four tui paroquets.
Mr. T. P. Lovering, Wilmington, N. C., coach-whip snake.
Mr. George Mackle, Washington, D. C., woodchuck.
Miss Genevieve Magee, Washington, D. C., alligator.
Dr. W. M. Mann, Washington, D. C., Mexican kinkajou, mantled howler monkey, Central American paca, Honduras squirrel, Rossignon's snapping turtle, Central American cooter, and two speckled agoutis.
Mrs. A. D. Marks, Washington, D. C., alligator.
Mr. J. C. Meyer, Washington, D. C., five canaries.
Mrs. Joseph F. Miller, Washington, D. C., soft-shelled turtle.
Mr. W. L. Peak, Washington, D. C., barn owl.
Mrs. Winnie Harward Phillips, Washington, D. C., three chameleons, four horned toads, and five whip-tailed lizards.
Mrs. Sylvanus Billings Pond, Washington, D. C., canary.
Mr. C. D. Reeder, Lorton, Va., barred owl.
Mr. B. H. Roberts, Washington, D. C., woodchuck.
Mr. Henry Roberts, Washington, D. C., woodchuck.
Dr. R. W. Shufeldt, Washington, D. C., spotted turtle and two box tortoises.
Mrs. R. W. Shufeldt, Washington, D. C., painted turtle.
Mrs. Samuel Spencer, Washington, D. C., four blue-backed parrotlets.
Rear Admiral Benjamin Tappan, Altha Hall, Va., cardinal, red-and-blue-and-yellow macaw, and blue-and-yellow macaw.
Mr. B. M. Taylor, Houston, Tex., two ringed turtledoves.
Miss L. F. Thompson, Washington, D. C., alligator.
Mr. Richard E. Tiller, Washington, D. C., wood duck.
Maj. G. O. Totten, jr., Washington, D. C., Yucatan jay, cedar waxwing, blue grosbeak, two Yucatan cardinals, two nonpareils, and three indigo buntings.

Mr. Titus Ulke, Washington, D. C., painted turtle.
Mr. Edward L. Weikert, Dickerson, Md., banded rattlesnake.
Mr. H. J. Wildeman, Titusville, Fla., barn owl.
Mr. Thomas Williams, Washington, D. C., barred owl.
Mr. W. N. Williams, Washington, D. C., chameleon.
Miss H. D. Wise, Washington, D. C., fish crow.

Births.—Fifty mammals were born and 72 birds were hatched in the park during the year. This record includes only such animals as are reared to a reasonable age, no account being made in these published statistics of young that live but a few days. The births include 1 hippopotamus, 1 Indian water buffalo, 1 yak, 3 llamas, 1 guanaco, 1 tahr, 2 Indian antelopes, 2 American elk, 5 European red deer, 1 barasingha deer, 1 hog deer, 4 Japanese deer, 1 fallow deer, 3 Virginia deer, 8 raccoons, 4 prairie dogs, 2 Peruvian wild guinea pigs, 3 great red kangaroos, 1 great gray kangaroo, 1 rufous-bellied wallaby, and 4 rhesus monkeys. No record was kept of the numerous domesticated guinea pigs and rabbits born during the year. The birds hatched were of the following species: Florida cormorant, black-crowned night heron, Canada goose, mallard, black duck, wood duck, redhead, peafowl, and bob-white quail.

The hippopotamus was born on May 31; it is a thrifty male, and is the second young from this same pair of animals. The nesting of the redhead duck is the first record of the breeding of this species in the park.

Exchanges.—In exchange for surplus animals born in the park there were received during the year 7 mammals, 133 birds, and 5 reptiles. The mammals included a zebu and a Burmese stag from the gardens of the Zoological Society of Philadelphia, and 2 black spider monkeys, 1 chacma baboon, 1 Canadian porcupine, and a snow leopard from miscellaneous sources. Of particular interest among the birds are many of the characteristic species of Europe: Wood pigeon, blackbird, robin redbreast, bullfinch, hawfinch, yellowhammer, goldfinch, siskin, greenfinch, bramblefinch, and jackdaw. Neotropical birds received in exchange include the black-necked screamer, upland goose, roseate spoonbill, white ibis, seedeater, yellow-backed cacique, Yucatan jay, blue tanager, red-crowned parrot, and Mexican green macaw. Species new to the collection from Asia are the Baikal teal and the silver-eared hill-tit. One of the most valuable birds received in exchange is a fine example of the single-wattled cassowary which is apparently referable to a little-known species, *Casuarius philipi*, of New Guinea. Five specimens of a large South American lizard, *Tupinambis teguixin*, were also added to the collection.

Purchases.—The lack of sufficient funds for the purchase of animals made it impossible to add to the collection many desirable

species offered for sale from time to time. Four young harbor seals, a Brazilian ocelot, and a collared peccary from Texas were the only mammals bought during the year. A few waterfowl were purchased for the North American lake, including 2 blue geese, 4 Hutchins's geese, 1 canvasback duck, 3 lesser scaups, 2 gadwalls, and 4 male shoveller ducks. A few native birds of prey and a single pine snake were also purchased.

Transfers.—The Biological Survey of the Department of Agriculture contributed to the collection some important animals taken for various purposes by its field agents. The most valuable of these is a lot of 6 little brown cranes (*Grus canadensis*), a species not hitherto exhibited in Washington. Other animals transferred from the Biological Survey were 9 western box-turtles from the Chiracahua Mountains, Ariz.; 2 great horned owls from Long Island, N. Y.; and a collection of small mammals, including species of *Peromyscus*, *Microtus*, and *Perognathus*. In cooperation with the State Livestock Board of Utah, the survey also contributed, through Mr. George E. Holman, 2 young gray wolves from Grand County, Utah.

Captured in the park.—Two Virginia opossums and 30 small birds, captured in the park, were added to the collection. Among the more interesting birds so taken are examples of the European starling and Baltimore oriole.

Deposited.—The most interesting specimens received on deposit during the year are a fine male Brazilian brocket from Mrs. Lindon W. Bates, New York City; and an American marten from Mr. Ernest Thompson Seton, Greenwich, Conn. Eighteen alligators were carried over winter for the Pan American Union.

REMOVALS.

The surplus animals sent away in exchange during the year numbered 54, of which 29 were mammals and 25 birds. The exchange value was $3,017.50, as compared with $3,240.70 worth of animals exchanged in 1919. Most of the surplus animals were born in the park, and the shipments included 6 bison, 3 barasingha deer, 3 red deer, 5 Japanese deer, 1 hog deer, 4 llamas, 2 guanacos, 2 gray wolves, 3 red kangaroos, 4 peafowl, 3 golden pheasants, 10 Canada geese, 1 Mandarin duck, 1 bald eagle, and 6 black-crowned night-herons. A number of animals on deposit were returned to owners.

The death rate during the year, while slightly above that of 1919, was nevertheless very low, and was approximately equal to that of 1918. The specimen of the rare brown hyena (*Hyæna brunnea*) deposited in the park by Mr. E. S. Joseph in September, 1917, died of acute pneumonia on November 14, 1919. The male Philippine deer (*Rusa philippinus*) presented to the park October 17, 1904, by Admiral Robley D. Evans, died of senile cachexia October 22, 1919.

This animal was at least 4 years of age when it arrived at the park and was therefore fully 19 years old at the time of its death. The Grevy's zebra stallion presented by Emperor Menelik of Abyssinia to President Roosevelt, which reached the park November 24, 1904, died, after over 15 years of life in Washington, on December 4, 1919. A pair of Japanese monkeys received August 4, 1904, fully adult at the time, died during the year, the female on December 7, 1919, and the male on January 21, 1920. Autopsies in both cases showed splenic tumor as the immediate cause of death. A California lynx died from pyemia on September 23, 1919, almost 14 years after the date of its arrival, October 19, 1905. A female coyote, received April 26, 1906, was mercifully killed on June 10, 1920, as it was virtually helpless with disabilities of old age. An aged female Florida otter, received July 20, 1907, died on March 20, 1920, almost 13 years after its arrival in the park. Among birds long in the collection, a demoiselle crane, received July 2, 1903, was accidentlly killed October 18, 1920; a crowned crane, received on May 25, 1905, died from enteritis December 26, 1919; and a red-and-blue macaw, received January 26, 1907, died on September 8, 1919.

Other serious losses during the year include a wombat, from pneumonia, August 5, 1919; the waterbuck, killed as unfit for exhibition, on November 5, 1919, after nearly 10 years of life in the antelope house; a hornbill, from enteritis, August 19, 1919; and our last specimen of the blue-headed quail dove, January 16, 1920.

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

CAUSES OF DEATH.

MAMMALS.

Marsupialia: Pneumonia, 1; tuberculosis, 1; pyemia, 1; peritonitis, 1; multiple tumors in lungs, 1.
Carnivora. Pneumonia, 2; gastroenteritis, 6; pyemia, 1; metritis, 1.
Rodentia: Tuberculosis, 1; enteritis, 1; hepatitis and nephritis, 1.
Primates: Pneumonia and gastroenteritis, 1; enteritis, 1; gastroenteritis, 1; colitis, 1; dysentery, 1; tumor of spleen, 2.
Artiodactyla: Tuberculosis, 2; colitis, 1; fermentation colic, 1; senile cachexia, 1.
Perissodactyla: Acute gastro-enteritis, 1.

BIRDS.

Ciconiiformes: Septicemia, 1; impaction of proventriculus, 1; accident, 2.
Anseriformes: Tuberculosis, 4; enteritis, 5; impaction of proventriculus, 1; anemia, 2; septicemia, 4; pericarditis, 1; no cause found, 2.
Falconiformes: Tuberculosis, 1.
Galliformes: Inflammation of rectum and cloaca, 1; anemia, 1; pyemia, 1; necrosis of ceca, 1; sarcoma, 1; accident, 1; no cause found, 2.
Gruiformes: Tuberculosis, 1; enteritis, 1; no cause found, 1.
Charadriiformes: Catarrhal enteritis, 1.
Psittaciformes: Tuberculosis, 1; enteritis, 3; gastritis, 1.
Coraciiformes: Enteritis, 1; no cause found, 1.
Passeriformes: Tuberculosis, 1; catarrhal enteritis, 1; no cause found, 4.

REPTILES.

Serpentes: Enteritis, 1.

Thirty-nine specimens, including 15 mammals, 21 birds, and 3 reptiles, of special scientific importance were transferred after death to the United States National Museum for permanent preservation. Two monkeys, especially desired for study, were sent immediately after death to the Army Medical Museum. Skins of birds to the number of 25 were added to the collection of "dealers' cage birds" kept for reference in the office of the superintendent, National Zoological Park.

ANIMALS IN THE COLLECTION JUNE 30, 1920.

MAMMALS.

MARSUPIALIA.

Virginia opossum (*Didelphis virginiana*)	3
Tasmanian devil (*Sarcophilus harrisii*)	2
Australian opossum (*Trichosurus vulpecula*)	3
Dusky phalanger (*Trichosurus fuliginosus*)	2
Brush-tailed rock wallaby (*Petrogale penicillata*)	3
Black-tailed wallaby (*Macropus billardierii*)	5
Parma wallaby (*Macropus parma*)	1
Black-tailed wallaby (*Macropus bicolor*)	1
Great gray kangaroo (*Macropus giganteus*)	4
Black-faced kangaroo (*Macropus melanops*)	2
Wallaroo (*Macropus robustus*)	1
Red kangaroo (*Macropus rufus*)	8

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 cinnamomum*)	2
Florida bear (*Ursus floridanus*)	2
Glacier bear (*Ursus emmonsii*)	1
Sun bear (*Helarctos malayanus*)	1
Sloth bear (*Melursus ursinus*)	1
Polar bear (*Thalarctos maritimus*)	2
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*)	2

CARNIVORA—continued.

Red fox (*Vulpes fulva*)	5
Gray fox (*Urocyon cinereoargenteus*)	6
Cacomistle (*Bassariscus astutus*)	2
Raccoon (*Procyon lotor*)	15
Gray coatimundi (*Nasua narica*)	2
Kinkajou (*Potos flavus*)	2
Mexican kinkajou (*Potos flavus aztecus*)	1
Marten (*Martes americana*)	1
Ferret (*Mustela furo*)	1
Tayra (*Tayra barbara*)	1
Skunk (*Mephitis nigra*)	1
American badger (*Taxidea taxus*)	2
European badger (*Meles meles*)	1
Florida otter (*Lutra canadensis vaga*)	2
African civet (*Viverra civetta*)	1
Genet (*Genetta genetta*)	1
Spotted hyena (*Crocuta crocuta*)	1
Striped hyena (*Hyæna hyæna*)	2
African cheetah (*Acinonyx jubatus*)	2
Lion (*Felis leo*)	4
Bengal tiger (*Felis tigris*)	1
Manchurian tiger (*Felis tigris longipilis*)	2
Leopard (*Felis pardus*)	1
East African leopard (*Felis pardus suahelica*)	1
Jaguar (*Felis onca*)	1
Brazilian ocelot (*Felis pardalis brasiliensis*)	1
Margay cat (*Felis tigrina*)	1
Snow leopard (*Felis uncia*)	1
Mexican puma (*Felis azteca*)	2
Mountain lion (*Felis hippolestes*)	2
Canada lynx (*Lynx canadensis*)	2
Northern wild cat (*Lynx uinta*)	3
Bay lynx (*Lynx rufus*)	2

PINNIPEDIA.

California sea lion (*Zalophus californianus*)	2
Harbor seal (*Phoca vitulina*)	1

RODENTIA.

Woodchuck (*Marmota monax*)	5
Dusky marmot (*Marmota flaviventris obscura*)	1

RODENTIA—continued.

Prairie dog (*Cynomys ludovicianus*)	8
Honduras squirrel (*Sciurus boothiæ*)	1
Fox squirrel (*Sciurus niger*)	1
Albino squirrel (*Sciurus carolinensis*)	2
Dusky pocket mouse (*Perognathus flavescens perniger*)	3
American beaver (*Castor canadensis*)	1
White-footed mouse (*Peromyscus leucopus noveboracensis*)	2
Montana white-footed mouse (*Peromyscus leucopus aridulus*)	2
Nebraska white-footed mouse (*Peromyscus maniculatus osgoodi*)	2
Canadian Porcupine (*Erethizon dorsatum*)	1
Yellow-haired porcupine (*Erethizon epixanthum*)	1
Coypu (*Myocastor coypus*)	6
Paca (*Cuniculus paca*)	3
Central American paca (*Cuniculus paca virgatus*)	1
Mexican agouti (*Dasyprocta mexicana*)	1
Speckled agouti (*Dasyprocta punctata*)	2
Azara's agouti (*Dasyprocta azaræ*)	2
Crested agouti (*Dasyprocta cristata*)	2
Peruvian guinea pig (*Cavia tschudii pallidior*)	5
Guinea pig (*Cavia porcellus*)	23
Capybara (*Hydrochœrus hydrochœris*)	1

LAGOMORPHA.

Domestic rabbit (*Oryctolagus cuniculus*)	18

PRIMATES.

Black spider monkey (*Ateles ater*)	2
Gray spider monkey (*Ateles geoffroyi*)	2
White-throated capuchin (*Cebus capucinus*)	2
Brown capuchin (*Cebus fatuellus*)	1
Margarita capuchin (*Cebus margaritæ*)	1
Titi monkey (*Saimiri sciureus*)	2
Chacma (*Papio porcarius*)	2
Hamadryas baboon (*Papio hamadryas*)	1
Mandrill (*Papio sphinx*)	1
Drill (*Papio leucophæus*)	1
Moor macaque (*Cynopithecus maurus*)	1
Brown macaque (*Macaca speciosa*)	2
Burmese macaque (*Macaca andamanensis*)	1
Rhesus monkey (*Macaca rhesus*)	32
Bonnet monkey (*Macaca sinica*)	1
Javan macaque (*Macaca mordax*)	1
Philippine macaque (*Macaca syrichta*)	1
Sooty mangabey (*Cercocebus fuliginosus*)	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 (*Phacochœrus æthiopicus*)	2
Collared peccary (*Pecari angulatus*)	1
Hippopotamus (*Hippopotamus amphibius*)	3
Bactrian camel (*Camelus bactrianus*)	2
Arabian camel (*Camelus dromedarius*)	2
Guanaco (*Lama huanachus*)	3
Llama (*Lama glama*)	9
Alpaca (*Lama pacos*)	1
Vicuña (*Lama vicugna*)	1
Fallow deer (*Dama dama*)	4
Axis deer (*Axis axis*)	4
Hog deer (*Hyelaphus porcinus*)	5
Sambar (*Rusa unicolor*)	2
Barasingha (*Rucervus duvaucelii*)	7
Burmese deer (*Rucervus eldii*)	1
Japanese deer (*Sika nippon*)	11
Red deer (*Cervus elaphus*)	20
Kashmir deer (*Cervus hanglu*)	4
Bedford deer (*Cervus xanthopygus*)	6
American elk (*Cervus canadensis*)	8
Virginia deer (*Odocoileus virginianus*)	10
Mule deer (*Odocoileus hemionus*)	2
Black-tailed deer (*Odocoileus columbianus*)	3
Brazilian brocket (*Mazama simplicicornis*)	1
Prong-horned antelope (*Antilocapra americana*)	1
Blesbok (*Damaliscus albifrons*)	1
White-tailed gnu (*Connochætes gnou*)	1
Indian antelope (*Antilope cervicapra*)	8
Nilgai (*Boselaphus tragocamelus*)	2
East African eland (*Taurotragus oryx livingstonii*)	3
Angora goat (*Capra hircus*)	1
Tahr (*Hemitragus jemlahicus*)	3
Aoudad (*Ammotragus lervia*)	1
Rocky Mountain sheep (*Ovis canadensis*)	5
Arizona mountain sheep (*Ovis canadensis gaillardi*)	1
Barbados sheep (*Ovis aries*)	5
Zebu (*Bos indicus*)	2
Yak (*Poëphagus grunniens*)	5
American bison (*Bison bison*)	16
Indian buffalo (*Bubalus bubalis*)	3

PERISSODACTYLA.

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

PROBOSCIDEA.

Abyssinian elephant (*Loxodonta africana oxyotis*)	1
Sumatran elephant (*Elephas sumatranus*)	2

BIRDS.

RATITÆ.

South African ostrich (*Struthio australis*)	4
Somaliland ostrich (*Struthio molybdophanes*)	1
Rhea (*Rhea americana*)	2
Sclater's cassowary (*Casuarius philipi*)	1
Emu (*Dromiceius novæhollandiæ*)	2

CICONIIFORMES.

American white pelican (*Pelecanus erythrorhynchos*)	9
European white pelican (*Pelecanus onocrotalus*)	2
Roseate pelican (*Pelecanus roseus*)	2
Australian pelican (*Pelecanus conspicillatus*)	2
Brown pelican (*Pelecanus occidentalis*)	2
Florida cormorant (*Phalacrocorax auritus floridanus*)	20
Great white heron (*Ardea occidentalis*)	1
Great blue heron (*Ardea herodias*)	1
Goliath heron (*Ardea goliath*)	1
American egret (*Casmerodius egretta*)	3
Snowy egret (*Egretta candidissima*)	3
Black-crowned night heron (*Nyeticorax nycticorax nævius*)	30
Boatbill (*Cochlearius cochlearius*)	2
White stork (*Ciconia ciconia*)	2
Black stork (*Ciconia nigra*)	1
Straw-necked ibis (*Carphibis spinicollis*)	1
Sacred ibis (*Threskiornis æthiopicus*)	3
White ibis (*Guara alba*)	12
Scarlet ibis (*Guara rubra*)	2
Roseate spoonbill (*Ajaia ajaja*)	5
European flamingo (*Phœnicopterus roseus*)	1

ANSERIFORMES.

Mallard (*Anas platyrhynchos*)	19
East Indian black duck (*Anas platyrhynchos var.*)	3
Black duck (*Anas rubripes*)	24
Gadwall (*Chaulelasmus streperus*)	2
European widgeon (*Mareca penelope*)	8
Baldpate (*Mareca americana*)	7
Green-winged teal (*Nettion carolinense*)	7
European teal (*Nettion crecca*)	10
Baikal teal (*Nettion formosum*)	1
Blue-winged teal (*Querquedula discors*)	6
Garganey (*Querquedula querquedula*)	1
Cinnamon teal (*Querquedula cyanoptera*)	1
Ruddy sheldrake (*Casarca ferruginea*)	1
Shoveller (*Spatula clypeata*)	4
Pintail (*Dafila acuta*)	8
Wood duck (*Aix sponsa*)	15
Mandarin duck (*Dendronessa galericulata*)	19
Canvasback (*Marila valisineria*)	2

ANSERIFORMES—continued.

Redhead (*Marila americana*)	8
Ring-necked duck (*Marila collaris*)	1
Lesser scaup duck (*Marila affinis*)	8
Rosy-billed pochard (*Metopiana peposaca*)	1
Snow goose (*Chen hyperboreus*)	2
Greater snow goose (*Chen hyperboreus nivalis*)	2
Blue goose (*Chen cærulescens*)	7
White-fronted goose (*Anser albifrons*)	3
American white-fronted goose (*Anser albifrons gambeli*)	3
Bar-headed goose (*Eulabeia indica*)	1
Canada goose (*Branta canadensis*)	19
Hutchins's goose (*Branta canadensis hutchinsii*)	9
Cackling goose (*Branta canadensis minima*)	2
Brant (*Branta bernicla glaucogastra*)	7
Barnacle goose (*Branta leucopsis*)	3
Spur-winged goose (*Plectropterus gambensis*)	2
Black-bellied tree duck (*Dendrocygna autumnalis*)	6
White-faced tree duck (*Dendrocygna viduata*)	3
Coscoroba swan (*Coscoroba coscoroba*)	1
Mute swan (*Cygnus gibbus*)	4
Whistling swan (*Olor columbianus*)	1
Trumpeter swan (*Olor buccinator*)	1
Black swan (*Chenopis atrata*)	3

FALCONIFORMES.

South American condor (*Vultur gryphus*)	1
California condor (*Gymnogyps californianus*)	3
Turkey vulture (*Cathartes aura*)	4
Black vulture (*Coragyps urubu*)	2
King vulture (*Sarcoramphus papa*)	2
Secretary bird (*Sagittarius serpentarius*)	1
Griffon vulture (*Gyps fulvus*)	1
Cinereous vulture (*Aegypius monachus*)	2
Caracara (*Polyborus cheriway*)	2
Cooper's hawk (*Accipiter cooperi*)	1
Wedge-tailed eagle (*Uroaëtus audax*)	2
Golden eagle (*Aquila chrysaëtos*)	3
Bald eagle (*Haliæetus leucocephalus*)	13
Alaskan bald eagle (*Haliæetus leucocephalus alascanus*)	1
Red-tailed hawk (*Buteo borealis*)	5
Sparrow hawk (*Falco sparverius*)	2

GALLIFORMES.

Razor-billed curassow (*Mitu mitu*)	2
Mexican curassow (*Crax globicera*)	2
Chicken-guinea hybrid (*Gallus* × *Numida*)	1
Wild turkey (*Meleagris gallopavo silvestris*)	1
Peafowl (*Pavo cristatus*)	34

GALLIFORMES—continued.

Peacock pheasant (*Polyplectron bicalcaratum*)	1
Silver pheasant (*Gennæus nycthemerus*)	1
Ring-necked pheasant (*Phasianus torquatus*)	1
Bobwhite (*Colinus virginianus*)	1
Scaled quail (*Callipepla squamata*)	4
Gambel's quail (*Lophortyx gambelii*)	2
Valley quail (*Lophortyx californica vallicola*)	6

GRUIFORMES.

American coot (*Fulica americana*)	3
South Island weka rail (*Ocydromus australis*)	3
Short-winged weka (*Ocydromus brachypterus*)	2
Earl's weka (*Ocydromus earli*)	1
Whooping crane (*Grus americana*)	1
Sandhill crane (*Grus mexicana*)	3
Little brown crane (*Grus canadensis*)	6
White-necked crane (*Grus leucauchen*)	1
Indian white crane (*Grus leucogeranus*)	1
Lilford's crane (*Grus lilfordi*)	2
Australian crane (*Grus rubicunda*)	1
Demoiselle crane (*Anthropoides virgo*)	5
Crowned crane (*Balearica pavonina*)	1
White-backed trumpeter (*Psophia leucoptera*)	1
Cariama (*Cariama cristata*)	1

CHARADRIIFORMES.

Great black-backed gull (*Larus marinus*)	1
Herring gull (*Larus argentatus*)	1
Laughing gull (*Larus atricilla*)	2
Australian crested pigeon (*Ocyphaps lophotes*)	1
Bronze-wing pigeon (*Phaps chalcoptera*)	1
Wonga-wonga pigeon (*Leucosarcia picata*)	8
Wood pigeon (*Columba palumbus*)	7
Mourning dove (*Zenaidura macroura*)	1
Zebra dove (*Geopelia striata*)	9
Bar-shouldered dove (*Geopelia humeralis*)	2
Inca dove (*Scardafella inca*)	3
Ringed turtledove (*Streptopelia risoria*)	14

PSITTACIFORMES.

Kea (*Nestor notabilis*)	5
Roseate cockatoo (*Kakatoe roseicapilla*)	10
Bare-eyed cockatoo (*Kakatoe gymnopis*)	3
Leadbeater's cockatoo (*Kakatoe leadbeateri*)	1
White cockatoo (*Kakatoe alba*)	2
Sulphur-crested cockatoo (*Kakatoe galerita*)	2

PSITTACIFORMES—continued.

Great red-crested cockatoo (*Kakatoe moluccensis*)	1
Mexican green macaw (*Ara mexicana*)	2
Blue-and-yellow macaw (*Ara ararauna*)	2
Red-and-blue-and-yellow macaw (*Ara macao*)	8
Red-and-blue macaw (*Ara chloroptera*)	1
Thick-billed parrot (*Rhynchopsitta pachyrhyncha*)	2
Haitian paroquet (*Aratinga chloroptera*)	1
Yellow-winged paroquet (*Tirica virescens*)	2
Tui paroquet (*Brotogeris stthomae*)	4
Blue-backed parrotlet (*Psittacula vivida*)	1
Yellow-naped parrot (*Amazona auropalliata*)	2
Yellow-cheeked parrot (*Amazona autumnalis*)	1
Orange-winged parrot (*Amazona amazonica*)	1
Red-crowned parrot (*Amazona viridigenalis*)	6
Double yellow-head parrot (*Amazona oratrix*)	10
Yellow-headed parrot (*Amazona ochrocephala*)	1
Yellow-shouldered parrot (*Amazona barbadensis*)	1
Festive parrot (*Amazona festiva*)	1
White-fronted parrot (*Amazona albifrons*)	1
Lesser white-fronted parrot (*Amazona albifrons nana*)	1
Santo Domingo parrot (*Amazona ventralis*)	2
Cuban parrot (*Amazona leucocephala*)	1
Gray parrot (*Psittacus erithacus*)	1
Lesser vasa parrot (*Coracopsis nigra*)	1
Black-tailed paroquet (*Polytelis melanura*)	1
Ring-necked paroquet (*Conurus torquatus*)	5
Grass paroquet (*Melopsittacus undulatus*)	2

CORACIIFORMES.

Giant kingfisher (*Dacelo gigas*)	2
Short-keeled toucan (*Ramphastos piscivorus brevicarinatus*)	1
Barred owl (*Strix varia*)	9
Screech owl (*Otus asio*)	4
Great horned owl (*Bubo virginianus*)	7
Western horned owl (*Bubo virginianus pallescens*)	1
American barn owl (*Tyto perlata pratincola*)	6

PASSERIFORMES.

Silver-eared hill-tit (*Mesia argentauris*)	3
Red-billed hill-tit (*Liothrix luteus*)	10
Black-gorgeted laughing-thrush (*Garrulax pectoralis*)	3

PASSERIFORMES—continued.

White-eared bulbul (*Otocompsa leucotis*)	3
European robin (*Erithacus rubecula*)	1
Hermit thrush (*Hylocichla guttata pallasi*)	1
European blackbird (*Turdus merula*)	3
Robin (*Planesticus migratorius*)	1
Western mockingbird (*Mimus polyglottos leucopterus*)	1
Cedar waxwing (*Bombycilla cedrorum*)	1
European raven (*Corvus corax*)	1
Australian crow (*Corvus coronoides*)	1
Fish crow (*Corvus ossifragus*)	1
Jackdaw (*Corvus monedula*)	6
Yucatan jay (*Cissilopha yucatanica*)	5
Blue jay (*Cyanocitta cristata*)	3
Green jay (*Xanthoura luxuosa*)	1
Australian gray jumper (*Struthidea cinerea*)	1
Starling (*Sturnus vulgaris*)	10
Crimson tanager (*Ramphocelus dimidiatus*)	2
Blue tanager (*Thraupis cana*)	3
Napoleon weaver (*Pyromelana afra*)	1
Madagascar weaver (*Foudia madagascariensis*)	4
Strawberry finch (*Amandava amandava*)	5
Nutmeg finch (*Munia punctulata*)	9
White-headed nun (*Munia maja*)	8
Java finch (*Munia oryzivora*)	8
White Java finch (*Munia oryzivora*)	1
Black-faced Gouldian finch (*Poëphila gouldiæ*)	3
Zebra finch (*Tæniopygia castanotis*)	4
Cut-throat finch (*Amadina fasciata*)	7
Vera Cruz red-wing (*Agelaius phœniceus richmondi*)	2
Baltimore oriole (*Icterus galbula*)	2

PASSERIFORMES—continued.

Purple grackle (*Quiscalus quiscula*)	7
Black-tailed hawfinch (*Eophona melanura*)	1
Bullfinch (*Pyrrhula pyrrhula*)	2
Greenfinch (*Chloris chloris*)	3
Yellowhammer (*Emberiza citrinella*)	5
European goldfinch (*Carduelis carduelis*)	1
Chaffinch (*Fringilla cœlebs*)	1
Bramblefinch (*Fringilla montifringilla*)	6
European siskin (*Spinus spinus*)	3
Mexican goldfinch (*Astragalinus psaltria mexicanus*)	1
House finch (*Carpodacus mexicanus frontalis*)	4
Purple finch (*Carpodacus purpureus*)	3
Canary (*Serinus canarius*)	9
Green singing finch (*Serinus icterus*)	1
Slate-colored junco (*Junco hyemalis*)	3
Tree sparrow (*Spizella monticola*)	1
White-throated sparrow (*Zonotrichia albicollis*)	4
Song sparrow (*Melospiza melodia*)	1
San Diego song sparrow (*Melospiza melodia cooperi*)	5
Fox sparrow (*Passerella iliaca*)	3
Towhee (*Pipilo erythrophthalmus*)	1
California towhee (*Pipilo crissalis*)	5
Saffron finch (*Sicalis flaveola*)	3
Seed-eater (*Sporophila gutturalis*)	2
Nonpareil (*Passerina ciris*)	1
Indigo bunting (*Passerina cyanea*)	3
Blue grosbeak (*Guiraca cærulea*)	1
Red-crested cardinal (*Paroaria cucullata*)	1
Cardinal (*Cardinalis cardinalis*)	2
Yucatan cardinal (*Cardinalis cardinalis yucatanicus*)	1

REPTILES.

Alligator (*Alligator mississipiensis*)	30
Teguexin (*Tupinambis teguixin*)	5
Gila monster (*Heloderma suspectum*)	6
Horned toad (*Phrynosoma cornutum*)	3
Rock python (*Python molurus*)	3
Anaconda (*Eunectes murinus*)	2
Boa constrictor (*Constrictor constrictor*)	4
Blacksnake (*Coluber constrictor*)	1
Chicken snake (*Elaphe quadrivittata*)	1
Water snake (*Natrix sipedon*)	4
Queen snake (*Natrix septemvittata*)	1
Garter snake (*Thamnophis sirtalis*)	2
Moccasin (*Agkistrodon piscivorus*)	1
Ground rattler (*Sistrurus miliarius*)	1
Snapping turtle (*Chelydra serpentina*)	2
Rossignon's snapping turtle (*Chelydra rossignonii*)	1
Spotted turtle (*Clemmys guttata*)	1
Box-tortoise (*Terrapene carolina*)	2
Western box-tortoise (*Terrapene ornata*)	4
Painted turtle (*Chrysemys picta*)	1
Cooter (*Pseudemys scripta*)	1
Florida cooter (*Pseudemys floridana*)	1
Central American cooter (*Pseudemys ornata*)	1
Gopher tortoise (*Gopherus polyphemus*)	2
Duncan Island tortoise (*Testudo ephippium*)	1
Albemarle Island tortoise (*Testudo vicina*)	1
Matamata turtle (*Chelys fimbriata*)	1
Soft-shelled turtle (*Amyda ferox*)	1

STATEMENT OF THE COLLECTION.

ACCESSIONS DURING THE YEAR.

	Mammals.	Birds.	Reptiles.	Total.
Presented	21	65	41	127
Born and hatched in National Zoological Park	50	72	.....	122
Received in exchange	7	133	5	145
Purchased	6	33	1	40
Transferred from other Government departments	11	8	9	28
Captured in National Zoological Park	2	30	.....	32
Deposited	5	1	18	24
Total	102	342	74	518

SUMMARY.

Animals on hand July 1, 1919	1,336
Accessions during the year	518
Total animals handled	1,854
Deduct loss (by exchange, death, and return of animals on deposit)	427
Animals on hand June 30, 1920	1,427

Class.	Species.	Individuals.
Mammals	166	496
Birds	225	847
Reptiles	28	84
Total, June 30, 1920	419	1,427

It will be interesting at this time to submit figures showing the comparative size of the collection at the close of each fiscal year since the foundation of the park. The years and numbers of animals are as follows:

1892	448	1907	1,193
1893	504	1908	1,402
1894	510	1909	1,416
1895	520	1910	1,424
1896	553	1911	1,414
1897	567	1912	1,551
1898	549	1913	1,468
1899	675	1914	1,362
1900	839	1915	1,397
1901	878	1916	1,383
1902	883	1917	1,223
1903	1,000	1918	1,247
1904	1,111	1919	1,336
1905	1,307	1920	1,427
1906	1,272		

The number of animals is now 124 under that of the record year (1912), but is greater than has been maintained since 1913. The

monetary and scientific value of the collection is, however, very much greater than ever before.

VISITORS.

The attendance for the fiscal year, as determined by count and estimate, was 2,229,605, a daily average of 6,108. This is the first time that the official records have gone above two millions. The greatest number of visitors in any one month was 402,403, in April, 1920, an average per day of 13,413. The largest single day's attendance in the history of the park occurred in this month, on Sunday the 11th, when 95,000 people were admitted to the gates. The other three Sundays in April show attendance records of 25,000, 87,000, and 55,000.

The attendance by months was as follows: In 1919: July, 125,700; August, 230,255; September, 268,941; October, 205,398; November, 204,944; December, 74,161. In 1920: January, 55,547; February, 27,099; March, 203,803; April, 402,403; May, 265,604; June, 165,750.

Ninety-six schools and classes visited the park during the year, with a total of 8,959 individuals. As usual, these came largely from the District of Columbia, Maryland, and Virginia; but several were from States as distant as Pennsylvania and Massachusetts.

IMPROVEMENTS.

The most needed improvement completed during the year is the public-comfort station at the Harvard Street entrance. This building is set into the steep hillside just inside the gate, and is so nearly hidden by the natural growth of trees, especially by the low-sweeping branches of some fine beeches, that comparatively little planting was necessary to improve the ground around it.

The row of old wooden cages along the hill just north of the bird house, the first cages used in the park, some of which were originally brought from the Smithsonian grounds when the park was first occupied, were replaced by nine new inclosures for strictly outdoor animals, especially for the medium-sized carnivores not requiring artificial heat. The new cages are made of iron framework, covered with heavy mesh wire, with cement floors, and comfortable, sanitary retiring rooms in the rear. The largest of these new cages, 20 by 20 by 12 feet in size, is now occupied by the Mexican pumas. The other eight, from 10 by 16 by 9 feet to 14 by 16 by 10 feet in size, are used for the snow leopard, lynxes, certain of the Canidæ, and a large chacma baboon. The type of construction adopted for these cages has proved exceedingly satisfactory, and the airy, cleanly quarters are much admired by the visitors.

The quarters occupied by the chimpanzee in summer having proved unsatisfactory since this animal became mature, it was de-

cided to prepare outdoor cages for his use adjoining his winter home in the lion house. The hyena cage next to his indoor quarters was therefore remodeled and connected with his main apartment, and two spacious outdoor yards prepared for his use. He now has two comfortable indoor rooms and two outdoor yards, which makes the problem of his care much more simple, as it is not necessary with the new arrangement for his keepers to work while he is in the same room or outdoor cage.

Among minor improvements completed during the year are wide concrete steps connecting the walk in front of the bears with the walk on the lower level along the sea-lion and beaver pools; new drainage gutters at antelope house; new fence along hilltop below children's playgrounds and sand boxes near the Adams Mill entrance; and repairs to road between Klingle entrance and the upper ford. The reconstruction of the old outdoor chimpanzee cage into quarters suitable for a grizzly bear and the re-covering of the large outdoor cage for the California condors were both well under way, and would have been completed before the close of the fiscal year but for the fact that the cement and wire needed in the work could not, at that time, be obtained in Washington.

Alteration of the western boundary.—This item has been considered in the annual report for many years, and it is therefore especially gratifying now to be able to report actual progress on the purchase of the land necessary to protect the western entrance. The sundry civil act for 1921, approved during the past year, carries an appropriation of $80,000 for the purchase of all the land between the western boundary of the park and the unnamed street connecting Cathedral Avenue with Klingle Road, excepting one small lot at the southern end, together with 300 feet each side of Jewett Street fronting on Connecticut Avenue. All of Jewett Street, which now connects the park with Connecticut Avenue, and the included portion of the unnamed street running parallel with Connecticut Avenue are to become a part of the National Zoological Park, and a 50-foot roadway at each end of the area to be purchased will be taken over by the District of Columbia to connect the unnamed street with Connecticut Avenue. The area appropriated for includes 209,050.5 square feet, and the park will now be bounded at this point by public highways instead of privately owned property. The frontage on Connecticut Avenue, including the former Jewett Street, will be 625 feet—ample for all purposes.

IMPORTANT NEEDS.

Restaurant.—As mentioned in the last annual report one of the most urgent needs of the park is a suitable public restaurant. The present refreshment stand, entirely inadequate and in a bad state of

repair, is unsuited to the present-day crowds of visitors. It is believed that an up-to-date 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 and would pay the Government a fair income in rent. Preliminary plans for such a building have been made by the office of the municipal architect; the present estimated cost of construction is $65,400.

Alteration of the southeastern boundary.—The District government has now opened Adams Mill Road from the southeastern entrance of the National Zoological Park to Harvard Street and a narrow strip of land, between the park and this new roadway, between Clydesdale Place and Ontario Road, still in private ownership, should become Government property. This narrow strip of land is of very little use, except possibly for garages, and its close proximity to the entrance to the park makes its public ownership of great importance. The amount required for its purchase is comparatively small and its acquisition by the park or by the District of Columbia should not long be delayed. The cost should not exceed $4,000.

Outdoor quarters for mammals.—Provision should be made for the exhibition of lions, Siberian tigers, and other mammals now occupying quarters in certain buildings, in outdoor inclosures with warm but unheated shelters. The animals themselves would be greatly improved by such conditions and the space they now occupy in buildings would become available for animals actually requiring heated quarters in winter. It is proposed that, when funds may be obtained for the purpose, large inclosures of this type be constructed on the space between the lion house and the monkey house now utilized as a paddock for ostriches.

The most urgent need of the park at the present time is increased compensation for certain of the employees, particularly the keepers and policemen. While the rate of pay for these and other employees has been slightly increased during the past four years, the increase has in no measure kept pace with the cost of living, and it is becoming more difficult all the time to retain valuable and trained men in the service.

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 19, 1919:

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 investigation.

WORK OF THE YEAR.

At Washington.—Much labor was expended on the preparation of tables of results for publication in Volume IV of the Annals of the Observatory.

Under Mr. Fowle's direction, the Mount Wilson observations of 1919 were reduced and compared with those obtained by Smithsonian observers in Chile. An experiment had been made in using rolled stellite instead of cast stellite to prepare new spectroscope mirrors for the South American work. As these mirrors were not quite finished when Director Abbot went south to observe the eclipse of May 28 (as related in last year's report) he took with him the Mount Wilson spectroscope mirrors, intending that the new ones should replace them on Mount Wilson. Unfortunately, they proved unsuitable owing to a gradual alteration of figure after completion, but were nevertheless used on Mount Wilson by Mr. Aldrich for the experiments of 1919.

The matter is mentioned here because the defective mirrors introduced stray light in the spectrum, which led to a systematic error of 2 per cent (in defect) in the Mount Wilson solar constant values of 1919. Considerable additional labor was required in the reductions on this account. Furthermore, the sky was unusually hazy and

streaky on Mount Wilson in 1919, which also added to the labor and anxiety of determining the best values from the observations.

Agreement of Mount Wilson and Chilean work.—However, the results when finally worked out proved to agree excellently, except for the systematic error above mentioned, with the results obtained in Chile. Both stations showed simultaneous and nearly equal fluctuations of solar radiation through a range of about 5 per cent. After allowing for the aforesaid 2 per cent systematic error of Mount Wilson, the average deviation of the two stations was but 0.013 calorie, or 0.65 per cent from all the values, about 50 in number, obtained on corresponding days. Omitting five values very discordant, when the Mount Wilson sky was very hazy and streaky, the average deviation of the remaining days was about 0.008 calorie, or 0.4 per cent.

Solar variation confirmed by observations of Saturn.—From correspondence with Dr. Guthnick, of the Berlin-Babelsberg Observatory, a most interesting confirmation of the solar variability has appeared. Variations of brightness of the planet Saturn from January to May, 1920, were shown by Dr. Guthnick's photo-electric observations which could not be accounted for after allowance for all known sources of variability. These outstanding variations were found to be in almost exact correlation with fluctuations of the solar radiation as observed at Calama, Chile. One per cent increase in solar radiation was found to accompany 1 per cent increase of Saturn's brightness.

These results, however, were only derived in connection with one of two possible interpretations of the nature of solar variation. The sun might vary in such a manner that its changes would be observed simultaneously in all directions and so would occur on identical days on all the planets. This hypothesis *does not fit* the available observations of the sun and Saturn. On the other hand, the solar radiation may be unequal in different directions. Such inequalities are, in fact, indicated by the ragged raylike structure of the solar corona. On this hypothesis a change of solar radiation would occur as ray after ray strikes the earth in the course of the sun's rotation upon its axis. These same unequally intense rays would reach the planet Saturn either before or after they reached the earth, according to the relative heliocentric longitudes of the earth and Saturn. The sun rotates about 14° a day, so that the angular difference in position of the two planets is to be divided by 14° to indicate the number of days allowance to be made between the dates of corresponding solar and Saturnian measurements.

Proceeding on this second hypothesis, extraordinarily close correspondence between the variations of the sun and Saturn was found. Further work of the kind is to be done at Saturn's next opposition. It will be noted that this second hypothesis of the nature of the solar variation relieves us of the great difficulty of understanding how so immense a body as the sun could vary in radiation so rapidly as our

observations indicate. We have now only to suppose that there are inequalities of radiation in different directions which may be due to the absorption or scattering of the rays in the coronal regions near the sun. These inequalities may persist with little alteration for weeks. We, however, note them as variations of solar radiation as they sweep by us in the course of the sun's rotation on its axis.

The honeycomb pyranometer.—Mr. Aldrich constructed two copies of a new instrument devised by Abbot and Aldrich for measuring "nocturnal radiation." We call it provisionally the "honeycomb pyranometer." In this instrument a long thin ribbon of "therlo" resistance metal about one-half inch wide and one one-thousandth of an inch thick is bent in such a way as to make up into 200 cells of triangular cross section all included in a total cross-sectional area of about 1 inch square. The corners of the cells are electrically insulated with baked shellac so that a current of electricity can be caused to flow from end to end of the ribbon and thus all around each cell. Radiation which enters the front of the cells from any source, if not absorbed there is reflected to and fro within the cells till it reaches their rear ends. There its remnant emerges upon a silvered mirror inclined at a small angle so as to throw back the rays to make a second course to and fro toward the front. Thus by repeated absorptions the rays are at length almost wholly converted into heat. The device is, in short, a "black body." But unlike other "black-body" receivers, its central cells are protected from losses of heat to the sides by reason of the nearly equally warmed cells surrounding them. Thus the instrument is almost as sensitive as a flat blackened strip, but possesses the valuable property of being fully absorbing, which a strip does not. The temperature difference between the central cells and the case of the instrument is indicated by thermoelectric elements. By passing a proper electric current through the "therlo" ribbon the same temperature difference can be produced as by radiation. The known energy of the electric current becomes the desired measure of the energy of radiation, as in Ångstrom's pyrheliometer. Also the constant of the apparatus is calculable from the known dimensions of it. It is possible, too, to observe the solar radiation with this instrument, and so to calibrate it. Measurements of this kind check very closely with the computed values.

Messrs. Aldrich and Abbot made a series of measurements with the honeycomb pyranometer on various sources of radiation, including comparisons with the ordinary pyranometer on incandescent lamps of different kinds, and also observations on large hollow radiators at different constant temperatures. Values of the constant of the fourth power law of radiation differing by only 1 per cent from the best accepted value were readily obtained in this latter work.

On the whole the "honeycomb pyranometer" is an instrument of great promise for standard measurements.

Experiments on the constant "sigma."—In collaboration with Dr. C. E. Mendenhall, a new attempt was begun to devise means to measure the constant of radiation with greater certainty. Apparatus was devised and constructed in the Observatory shop for this purpose. There was not time to try it before the departure of Messrs. Abbot and Aldrich into the field, so that the apparatus was loaned to Dr. Mendenhall for trial at the University of Wisconsin.

Field work at Mount Wilson.—Mr. Aldrich continued observing on Mount Wilson until October, 1919. As said above, the year was unfavorable both by reason of a defect in equipment and by reason of much haze, cirrus cloud, and streakiness of sky. Also on many days a curious wandering of the galvanometer needle occurred. This phenomenon has been noted at Mount Wilson occasionally in former years, but was unusually pronounced in 1919. By anticipation, it may be remarked that it occurred also very markedly in late July and in August, 1920. The march of the galvanometer spot in these wanderings is relatively slow. A centimeter or two back and forth upon the scale in one to two minutes is the usual magnitude. It occurs with the galvanometer unconnected to the bolometer. Reastaticising of the needle system till it turned in the earth's field at the same rate as the supporting quartz fiber failed to cure the trouble. The Mount Wilson expedition was renewed in June, 1920, by Messrs. Abbot and Aldrich.

Proposed station in Arizona.—The prevailing cirrus cloudiness and haziness at Mount Wilson in all recent years, greatly exceeding that which obtained from 1905 to 1910, when the station was new, has been very discouraging. Furthermore, the station is quite unsuitable for "solar-constant" work in winter and spring months owing to cloudiness. It is urgently desirable to observe the solar radiation daily, as far as possible, in the United States, in order to check the results which are being obtained by Smithsonian observers in Chile.

Accordingly it seemed best to set up a station in the most cloudless region of the United States, where the work could go on during the entire year. Chief Marvin, of the Weather Bureau, obligingly caused investigations to be made of various proposed sites in California, Nevada, and Arizona. The one of highest promise appeared to be on the Harqua Hala Mountain (elevation about 5,800 feet) near Wenden, Ariz. Congress was urged to appropriate $25,000 for the establishment of a first-rate "solar-constant" observing station at the best site, but the appropriation failed.

At this juncture Messrs. Abbot and Marvin held a long discussion by correspondence and verbally as to the reality of the supposed solar

variability, and its availability as a forecasting element, in view of the use being made of the Smithsonian solar observations in Chile by the Argentine and Brazilian weather bureaus. The discussion brought out very clearly the urgency of obtaining corroborative observations of the solar radiation daily in the United States.

Fortunately the proposed new station obtained private financial support in the lack of congressional action. Mr. John A. Roebling, of Bernardsville, N. J., at Dr. Abbot's solicitation, made a grant of $11,000 for promoting measurements of solar radiation. Mr. Roebling made the condition that so much of this sum as necessary should be devoted to removing the Smithsonian station from the plain near Calama, Chile, to a mountain site above the reach of dust and smoke. Any balance remaining after this improvement of the Chilean station could be used for the removal of the Mount Wilson equipment to the Harqua Hala Mountain in Arizona, or for such other purpose as Dr. Abbot might prefer for the advance of the study of solar radiation.

At a cost of between $4,000 and $5,000 the Calama station was removed to a mountain about 10 miles south of Calama, where skies of extraordinary purity have been experienced. The removal was completed and first observations made at the mountain shortly after the close of the fiscal year.

Dr. Abbot visited Wenden, Ariz., and the Harqua Hala Mountain in the last week of June, 1920. Contracts were made for the erection on the summit of a stone and adobe building of two stories, a lower, partly underground, for observing, and an upper for quarters of observers. This is to be ready for occupancy by September 15, 1920, when it is proposed to remove the "solar-constant" observing equipment from Mount Wilson to Harqua Hala.

The purpose of these improvements is to enable us to obtain nearly every day in the year first-rate check observations of the "solar constant" of radiation at two stations remote from one another in the two hemispheres. Only thus is it possible to lay a firm foundation of solar observations extending over a considerable interval of time, which will enable meteorologists to determine if the sun's variations are really of value as a weather-forecasting element. In view of the results published by Mr. H. H. Clayton, of the Argentine weather service, there is sufficient evidence that this may be the case to warrant the expense and discomfort attending the continuous occupation of two desert mountain observatories like Harqua Hala and the Chilean station.

Great appreciation is due Mr. John A. Roebling for his generous aid in stepping into the breach at this time when it proved impossible to obtain public support for the urgent need. Only the most primitive equipment has, it is true, been possible on the Harqua Hala Mountain with the means available. Unfortunately, too, it means a

considerable restriction of other interesting investigations under way or proposed, owing to the partial dismantling of the Mount Wilson station. This is greatly to be regretted. It is recommended that Congress be urged to appropriate the money needed to complete the independent equipment of Harqua Hala, so as to permit needed apparatus to return to Mount Wilson. The Harqua Hala station should also be relieved of its limitations of water, of accessibility, and of communication, and the buildings made more commodious. Otherwise it will be only at such personal sacrifice of comfort as few can be found willing to make that its work can go on.

PERSONNEL.

Miss Inez Ensign resigned as computer on September 22, 1919. Miss F. A. Graves returned as computer from leave for overseas work in France on September 4, 1919. Miss Gladys Thurlby, computer, married, on May 8, 1919, Mr. Albion M. Bond, but remained in the service of the Observatory.

SUMMARY.

The year has been marked by the practical completion for publication of Volume IV of the Annals, but no appropriation is yet available for its publication. Close agreement in solar variation was found for 1918 and 1919 between results of Mount Wilson, Calif., and Calama, Chile, 4,000 miles apart. A further remarkable confirmation of the solar variation comes from a comparison of Smithsonian observations in Chile with photo-electric observations of the brightness of Saturn by Dr. Guthnick, of the Berlin-Babelsberg Observatory. This comparison indicates that the nature of the rapid solar variation consists in the rotation with the sun of rays of unequal brightness which strike the different planets successively in the order of their longitudes and fall one after the other upon the earth as the sun by rotation brings them into line with us. A new nocturnal radiation instrument, provisionally called the "honeycomb pyranometer" on account of its cellular structure, and which employs the well-known hollow chamber principle of the "absolutely black" body, but without loss of sensitiveness, has been successfully constructed and tried. By the generosity of Mr. John A. Roebling, of New Jersey, it has been possible to remove the Chile station to a mountain above the dust and smoke of its former plateau location, and also to erect a building on the Harqua Hala Mountain, in Arizona, to which the Mount Wilson solar-constant work will be removed in September, 1920.

Respectfully submitted.

C. G. Abbot, *Director.*

Dr. C. D. Walcott,
Secretary, Smithsonian Institution.

APPENDIX 6.

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, 1920.

At the beginning of the war six volumes of the eleventh issue were still to be published, and only one volume of the twelfth issue had appeared.

In spite of the evident financial difficulty ahead of the Catalogue, the Royal Society decided that publication should be continued through the fourteenth issue, covering the year 1914. The deficit has since been met by generous contributions from the Royal Society, the Carnegie Corporation of New York, and other sources. All of the volumes of the thirteenth and fourteenth issues have now been published excepting those for Geology and Physiology of the fourteenth issue, which are both in advanced stages of preparation. Much of the material for the fifteenth and later issues is now in the hands of the Central Bureau awaiting only authority for its publication.

On account of the general upheaval felt among all international organizations as soon as war began, it became impossible for the International Catalogue to continue its work in the satisfactory manner which up to that time had characterized the enterprise. A brief review of the history and aims of the International organization may be repeated in order that the future aims and plans may be better understood.

When the publication was begun in 1901 it was for the purpose of satisfying a recognized demand for a complete authors' and subject index of all current scientific literature. This demand was to be met by publishing in annual volumes, one for each recognized branch of pure science, a complete authors' and subject index to its current literature. Each branch of science was to be covered by volumes containing complete citations of the author, title and source of every original paper, comprising first an authors' index and second a classified subject index so arranged by means of classification schedules that the literature on any subject in any of the sciences might be readily found. The schedules were issued prior to the publication of the first

volumes of the Catalogue and were prepared in every case by specialists who were careful to take into consideration the needs of scientists as well as of librarians and students. Provision was made to include new subjects and introduce new methods of reference as the demand arose, in recognition of the fact that practically all of the sciences are in a constant state of transition and that a plan satisfactory at one time would probably be inadequate to meet the needs of a later period.

Omitting the greater part of the intervening history of the work, it may be said that in 1910, at a conference held in London to discuss the affairs of the Catalogue, it was recognized that although changes had been made in many of the schedules a general revision was necessary and a committee was appointed to superintend this revision. Authority was given to this committee by a resolution which reads as follows:

> That a committee be appointed to revise the schedules and to make such other alterations as may be necessary in the form of issue of the Catalogue. That it may be an instruction to the committee that, so far as possible, the subject index be confined to abbreviated titles and authors' names and numbers to serve as references to the authors' index.

It will thus be seen that plans were in preparation to greatly increase the usefulness of the Catalogue, but before they were put into effect the war came and all progress was necessarily checked, and although the war is now over, financial conditions still prevent the introduction of new and improved methods. In spite of the fact that the publication of the Catalogue was begun under financial difficulties, as no working capital was available, by 1914, when the war began, the receipts and expenditures practically balanced.

The delay in the publication of the annual volumes is recognized as the most serious defect in the enterprise, but with this remedied, as it would have been, but for the war, and with the schedule revision in effect as provided for in the resolution above quoted, it is undoubtedly true that the International Catalogue would now meet all practical requirements of an annual authors' and subject catalogue to the literature of pure science.

A résumé of the condition of the work at present can not better be given than by quoting a statement made by Prof. Henry E. Armstrong, who as dean of the enterprise and chairman of its executive committee, is of all persons connected with the Catalogue the one best fitted to report on its affairs.

> The progress made in the publication of the International Catalogue since its foundation in 1900 is nothing short of remarkable. Two hundred and forty-two volumes have been published, indexing the scientific literature of the period 1901–1914. An extraordinarily broad, sound foundation has been laid and much helpful experience gained. The difficulties that were expected to arise

have either been nonexistent or were easily overcome. To have established so complete an organization on a thoroughly successful working basis is in itself a feat of no mean order and most creditable to all concerned, not only to the staff of the Central Bureau but also to the various regional bureaus.

The real difficulty by which the work has always been hampered is want of a working capital; this has affected both the Central and the regional bureaus. Had funds been always available, publication would have been far more rapid and the work might have been more fully developed. Almost every criticism that has been leveled at the Catalogue involves its extension, and therefore additional expenditure.

The International Catalogue was established primarily to meet the demands of scientific workers by furnishing an annual authors' and subject catalogue and index to the literature of each of the recognized branches of science; but as it is now evident that a general revision of the methods of production will be necessary, as soon as international affairs become stabilized, it would appear advisable when this revision becomes operative to establish some form of cooperation with the many existing abstract journals and, so far as possible, to encourage and aid the establishment of abstract journals in sciences not already represented. This need for abstract journals is now pressing for recognition, especially in the United States, and the preparation and publication of abstracts is so akin to that of scientific yearbooks that economy of effort in the production of both branches of bibliography evidently demands a very close cooperation. These abstract journals, organized and directed by workers in the several sciences represented, would, when published, form the basis of the annual volumes of an authors' and subject index similar to the present International Catalogue of Scientific Literature, preferably by the reorganization of that international project which already receives official recognition and support from practically all of the countries of the world, acting through some 30 regional bureaus.

By some simply organized method of cooperation between the abstract journals and the Catalogue, both branches would mutually aid one another to a very great extent and would in practice act as one organization. The abstracts and citations published in the abstract journals would form the basis of the Catalogue, thereby greatly simplifying the work of the regional bureaus, which in turn would aid the abstract journals in many ways and relieve them of the necessity of publishing annual indexes, at present quite an expensive and laborious undertaking. The abstract journals and annual indexes would together furnish to scientific investigators, librarians, and others interested in scientific subjects all that they severally require.

Owing to the financial difficulty which has involved the International Catalogue since war began, the Royal Society, which since

the beginning of the undertaking has been the financial sponsor of the Catalogue, has issued invitations to scientific academies and institutions to send delegates to a special conference to open on September 28, 1920, in London to discuss the future of the International Catalogue. As the need for a catalogue of scientific literature is universally acknowledged, and as the present organization of the International Catalogue up to the time of the beginning of the war was meeting this demand in a more satisfactory manner than ever before, and as the present organization has behind it the official support of all of the principal countries of the world, it appears obvious that every effort should be made to continue and improve the work rather than abandon it simply on account of temporary financial troubles and later have to reestablish the organization to cover the same ground. Many projects are now being promoted to publish abstracts, indexes, and catalogues of scientific publications, but the question of finance seems to be a common paramount difficulty, and it will certainly require less money to assure the success of the present organization than it would to organize and finance a new project.

Very respectfully, yours,

LEONARD C. GUNNELL,
Assistant in Charge.

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

APPENDIX 7.

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, 1920:

The receipts of publications compare most favorably with those of preceding years. Packages withheld from the mails during the war have begun to come in, and war regulations limiting exchanges have been largely removed. Although many societies were forced to limit distribution or to suspend publication during the war, it is expected that the receipts will continue to increase when shipments through the international exchanges may again be made between the United States and the Central Powers. The receipts for the year ended were 23,810 packages, 22,495 of which were received by mail and 1,315 through the international exchanges. Eight hundred and eighty volumes were completed and 14,273 entries were made.

The library has suffered, however, from a lack of cataloguers to carry on the work. The question of salaries for cataloguers in the library is a serious one, as those doing similar work elsewhere are receiving at least 33 per cent more. One desk has been vacant for practically the entire year and, as the staff already was very small, this has been a serious handicap.

SMITHSONIAN MAIN LIBRARY.

Publications for the Main Library, after entry on the records, are forwarded to the Library of Congress for deposit in the Smithsonian Division. The accession numbers for the year extended from 532,003 to 534,618, the accessions including 3,634 volumes, 186 parts, 157 pamphlets, and 42 charts.

The cataloguing covered 23,332 volumes and 32 charts; 848 volumes were recatalogued; 2,280 cards were typewritten and 618 cards from the Library of Congress, for publications deposited there by the Institution, were filed in the catalogue; 3,756 public documents were presented to the Library of Congress in accordance with the established practice.

Dissertations were received from the Universities of Toulouse, Paris, Utrecht, Lund, Ghent, Helsingfors, Bonn, Basel, Lausanne, Zurich, and Geneva.

The securing of publications in exchange for the completion of sets has been continued with the following results:

Number of want cards received from Library of Congress:

From Smithsonian Division	176
From Periodical Division	79
From Order Division	30
Total	285

Number of publications secured for Library of Congress:

	Vols.	Parts.
For Smithsonian Division	313	316
For Periodical Division	11	66
For Order Division	13	36
Total	337	418

Number of sets completed, 73.

With exchanges to the Central Powers still suspended, shipments delayed, and many societies suspending publication, the time for securing missing parts has been far from favorable. It is worthy of note, however, that in spite of the unfavorable conditions, a larger proportion of the wants have been secured in exchange than in years previous as may be seen by the following table:

Years.	Want cards received.	Sets completed.	Per cent.
1915–16	387	82	21.0
1917–18	996	186	18.6
1919–20	514	134	26.0

Requests sent out for missing parts, it will be seen, are more effective by 5 per cent than those sent out before the war. It is hoped that, when shipments to the Central Powers through the International Exchange Service are resumed, and overseas shipments can be delivered more promptly, that still better results can be secured.

SMITHSONIAN OFFICE LIBRARY.

The accessions for the office library amounted to 300 volumes and 7 pamphlets, not including the set of publications of the Carnegie Institution of Washington, numbering more than 300 volumes, which has been placed on deposit by Secretary Walcott. In order to provide adequate shelving space for these volumes it was necessary to rearrange the books already in the reference room, and as a result, practically all of the shelving space is now occupied. The circulation of books in the reference room was 218 volumes.

Aeronautical collection.—The aeronautical collection, as in the past, has been consulted by students of aeronautics of foreign countries as well as those of the United States. Additional cases in the hall of the Smithsonian Institution have been set aside for the accommodation of this collection, so that it is now more accessible to the public. Forty new titles were added during the year.

De Peyster collection.—Author cards for the Napoleon series, numbering more than 1,200 volumes, have been made, and the books have been arranged in regular order in the cases in the hall of the Smithsonian Institution. Author cards have been made also for the series in British, German, and Italian history.

Reading room.—The number of magazines loaned during the year from the reading room was 2,907, a decrease of 233, as compared with the preceding year. The service has suffered from the fact that no binding could be done, owing to the exhaustion of the funds available for this purpose.

Employees' library.—The increased use of the employees' library is noteworthy. Six hundred and forty-one volumes were loaned, as compared with 332 last year.

MUSEUM LIBRARY.

There have been no additions to the Museum library of exceptional importance. Valuable material has been contributed, however, by Dr. Charles D. Walcott, Mr. W. R. Maxon, Maj. Gen. John R. Brooke, Dr. A. J. Boving, Dr. F. H. Knowlton, Dr. J. M. Aldrich, Dr. W. H. Holmes, Dr. Mary J. Rathbun, Dr. W. H. Dall, Dr. O. P. Hay, Mr. William Schaus, Dr. C. W. Richmond, Mr. Austin H. Clark, Dr. Walter Hough, Mr. A. N. Caudell, and the Knab estate.

Accessions.—Two thousand five hundred and forty-eight accessions were received during the year, including 1,932 completed volumes and 1,581 pamphlets. The number of books in the library is now 145,307; including 56,617 volumes and 88,690 parts of volumes and pamphlets.

Periodicals.—Thirteen thousand four hundred and thirty-two periodicals were entered during the year; 2,619 section cards for periodicals and 858 section cards for volumes were made. The number of new cards for periodicals was 351.

Cataloguing.—The number of catalogue cards added was 2,748; 744 books and 1,529 pamphlets were catalogued.

Loans.—The number of books loaned out was 9,802. Of these, 2,145 books, including 1,951 from the Library of Congress, were borrowed from other libraries. Fully as many volumes were consulted, but were not taken out.

Binding.—Owing to the increasing cost of binding, the library's funds allotted for that purpose were exhausted in January, 1920.

As will be seen by the figures below, the library's allotment for binding has not kept pace with the increases in cost. As a consequence the number of books sent to the Government bindery has been steadily decreasing. Following are the number sent during the past three fiscal years:

1918	1,706
1919	1,322
1920	737

With a constantly increasing supply of volumes and many publications received during the present and past fiscal years still unbound, the library is greatly handicapped and is unable to render the service that it should.

Technological series.—Additions to the technological library during the year, exclusive of duplicates, number 200 bound volumes, 2,983 pamphlets, and 2,576 periodicals; 2,245 cards have been added to the scientific depository catalogue. A special effort has been made to complete the files of publications, especially United States Government documents. The books and periodicals loaned during the year were 200.

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

Administration.
Administrative assistant's office.
Anthropology.
Biology.
Birds.
Botany.
Comparative anatomy.
Editor's office.
Ethnology.
Invertebrate paleontology.
Mammals.
Marine invertebrates.
Materia medica.
Mechanical technology.
Mesozoic fossils.
Minerals.
Physical anthropology.
Prehistoric archeology.
Property clerk.
Registrar's office.
Reptiles and batrachians.
Superintendent's office.

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 chief of the bureau.

ASTROPHYSICAL OBSERVATORY LIBRARY.

Further additions to the library of the Astrophysical Observatory number 87 volumes, 10 parts of volumes, and 16 pamphlets.

NATIONAL ZOOLOGICAL PARK LIBRARY.

To the National Zoological Park library there were added six volumes and two pamphlets.

SUMMARY OF ACCESSIONS.

The accessions during the year, with the exception of those in 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	4,019
To the Smithsonian office, Astrophysical Observatory, and National Zoological Park libraries	428
To the United States National Museum library	2,548
Total	6,995

Respectfully submitted.

PAUL BROCKETT,
Assistant Librarian.

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, 1920:

The Institution proper published during the year 14 papers in the series of Miscellaneous Collections, 1 annual report and pamphlet copies of 20 articles in the appendix to the report, and 1 special publication. The Bureau of Ethnology published 1 annual report and 3 separate papers from the same report, and 4 bulletins. The United States National Museum issued 1 annual report, 3 volumes of the proceedings, 33 separate papers forming parts of these and other volumes, 5 bulletins, and 9 separate parts of bulletins.

The total number of copies of publications distributed by the Institution and its branches was 143,290, which includes 157 volumes and separates of the Smithsonian Contributions to Knowledge, 24,949 volumes and separates of the Smithsonian Miscellaneous Collections, 16,720 volumes and separates of the Smithsonian annual reports, 81,936 volumes and separates of National Museum publications, 16,761 publications of the Bureau of American Ethnology, 1,958 special publications, 19 volumes of the Annals of the Astrophysical Observatory, 23 reports on the Harriman Alaska Expedition, and 564 reports of the American Historical Association.

SMITHSONIAN MISCELLANEOUS COLLECTIONS.

Of the Miscellaneous Collections, volume 67, 2 papers were issued; volume 69, 2 papers; volume 70, 3 papers; volume 71, 5 papers; volume 72, 2 papers; in all, 14 papers, as follows:

VOLUME 67.

No. 5. Cambrian Geology and Paleontology. IV, No. 5. Middle Cambrian Algae. By Charles D. Walcott. December 26, 1919. Pp. 217–260, pls. 43–59. (Publ. 2542.)

No. 6. Cambrian Geology and Paleontology. IV, No. 6. Middle Cambrian Spongiae. By Charles D. Walcott. April 21, 1920. Pp. 261–364, pls. 60–90. (Publ. 2580.)

VOLUME 69.

No. 1. Smithsonian Meteorological Tables. August 19, 1919. 261 pp. (Publ. 2493.)

No. 5. Mammals of Panama. By Edward A. Goldman. April 22, 1920. 309 pp., 39 pls. (Publ. 2498.)

VOLUME 70.

No. 2. Explorations and field-work of the Smithsonian Institution in 1918. July 15, 1919. 122 pp., 127 figs. (Publ. 2535.)

No. 3. Archeological investigations at Paragonah, Utah. By Neil M. Judd. July 15, 1919. 22 pp., 15 pls. (Publ. 2536.)

No. 4. Temperature variations in the North Atlantic Ocean and in the atmosphere. Introductory studies on the cause of climatological variations. By Björn Helland-Hansen and Fridtjof Nansen. Hodgkins Fund. April 17, 1920. 408 pp., 48 pls. (Publ. 2537.)

VOLUME 71.

No. 2. A method of reaching extreme altitudes. By Robert H. Goddard. December 30, 1919. 69 pp., 10 pls. (Publ. 2540.)

No. 3. Variation in solar radiation and the weather. By H. Helm Clayton (introductory note by C. G. Abbot.) January 15, 1920. 53 pp., 5 pls. (Publ. 2544.)

No. 4. The brightness of the sky. By A. F. Moore and L. H. Abbot. Hodgkins Fund. February 4, 1920. 36 pp. (Publ. 2545.)

No. 5. Observations of the total solar eclipse of May 29, 1919. By C. G. Abbot and A. F. Moore. January 31, 1920. 12 pp., 1 pl. (Publ. 2578.)

No. 6. New species of piper from Panama. By Casimir de Candolle. February 12, 1920. 17 pp. (Publ. 2579.)

VOLUME 72.

No. 1. Explorations and field-work of the Smithsonian Institution in 1919. May 8, 1920. 80 pp., 77 figs. (Publ. 2581.)

No. 2. Two new East African primates. By N. Hollister. January 22, 1920. 2 pp. (Publ. 2582.)

SMITHSONIAN ANNUAL REPORTS.

REPORT FOR 1917.

The complete volume of the Annual Report of the Board of Regents for 1917, together with pamphlet copies of the papers in the general appendix, was received from the Public Printer during the year.

Annual Report of the Board of Regents of the Smithsonian Institution, showing operations, expenditures, and condition of the Institution for the year ending June 30, 1917. xii+674 pp., 241 pls. (Publ. 2502.)

The appendix contained the following papers:

Projectiles containing explosives, by Commandant A. R. 16 pp. (Publ. 2503.)

Gold and silver deposits in North and South America, by Waldemar Lindgren. 27 pp. (Publ. 2504.)

The composition and structure of meteorites compared with that of terrestrial rocks, by George P. Merrill. 14 pp., 9 pls. (Publ. 2505.)

Corals and the formation of coral reefs, by Thomas Wayland Vaughan. 88 pp., 37 pls. (Publ. 2506.)

The correlation of the quaternary deposits of the British Isles with those of the continent of Europe, by Charles E. P. Brooks. 99 pp. (Publ. 2507.)

Natural history of Paradise Key and the near-by everglades of Florida, by W. E. Safford. 58 pp., 64 pls. (Publ. 2508.)

Notes on the early history of the pecan in America, by Rodney H. True. 14 pp. (Publ. 2509.)

Floral aspects of the Hawaiian Islands, by A. S. Hitchcock. 14 pp., 25 pls. (Publ. 2510.)

The social, educational, and scientific value of botanic gardens, by John Merle Coulter. 6 pp. (Publ. 2511.)

Bird rookeries of the Tortugas, by Paul Bartsch. 32 pp., 38 pls. (Publ. 2512.)

Catalepsy in Phasmidae, by P. Schmidt. 5 pp. (Publ. 2513.)

An economic consideration of orthoptera directly affecting man, by A. N. Caudell. 8 pp. (Publ. 2514.)

An outline of the relations of animals to their inland environments, by Charles C. Adams. 28 pp. (Publ. 2515.)

The National Zoological Park—A popular account of its collections, by N. Hollister. 51 pp., 46 pls. (Publ. 2516.)

The sea as a conservator of wastes and a reservoir of food, by H. F. Moore. 14 pp., 8 pls. (Publ. 2517.)

Ojibway habitations and other structures, by David I. Bushnell, jr. 9 pp., 6 pls. (Publ. 2518.)

National work at the British Museum—Museums and advancement of learning, by F. A. Bather. 15 pp. (Publ. 2519.)

Leonhard Fuchs, physician and botanist, 1501–1566, by Felix Neumann. 13 pp., 7 pls. (Publ. 2520.)

In memoriam—Edgar Alexander Mearns, 1856–1916, by Charles W. Richmond. 14 pp., 1 pl. (Publ. 2521.)

William Bullock Clark. 4 pp. (Publ. 2522.)

REPORT FOR 1918.

The general appendix to the report for 1918, which was still 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 tornadoes of the United States, by Robert DeC. Ward.
4. Wind power, by James 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 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.

REPORT FOR 1919.

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 November, 1919.

Report of the executive committee and proceedings of the Board of Regents of the Smithsonian Institution for the year ending June 30, 1919. 18 pp. (Publ. 2548.)

Report of the Secretary of the Smithsonian Institution for the year ending June 30, 1919. 106 pp. (Publ. 2547.)

The general appendix to this report was in preparation but did not go to the printer until shortly after the close of the year.

SPECIAL PUBLICATIONS.

The following special publication was issued:

Publications of the Smithsonian Institution issued between October 16, 1918, and July 16, 1919. August 12, 1919. 1 p. (Publ. 2541.)

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 ending June 30, 1920, the Museum published 1 annual report, 3 volumes of the proceedings, 33 separate papers forming parts of these and other volumes, 5 bulletins, and 9 separate parts of bulletins.

The issues of the proceedings were as follows: Volumes 54, 55, and 56.

The issues of the bulletins were as follows:

Bulletin 103. Contributions to the geology and paleontology of the Canal Zone, Panama, and geographically related areas in Central America and the West Indies. Prepared under the direction of Thomas Wayland Vaughan.

Bulletin 106 (text). North American early Tertiary Bryozoa, by Ferdinand Canu and Ray S. Bassler.

Bulletin 107. Life histories of North American diving birds. Order Pygopodes. By Arthur Cleveland Bent.

Bulletin 108. A revision of the nearctic termites, by Nathan Banks, with notes on biology and geographic distribution, by Thomas E. Snyder.

Contributions from the United States National Herbarium, volume 21. Flora of the District of Columbia and vicinity, by A. S. Hitchcock and Paul C. Standley.

Of the separate papers of bulletins, the following were issued:

Bulletin 100. Contributions to the biology of the Philippine Archipelago and adjacent regions. Volume 1, part 6: The relationships of the genera Calcarina, Tinoporus, and Baculogypsina as indicated by recent Philippine material, by Joseph A. Cushman. Volume 2, part 3: Pyrosoma—A taxonomic study based upon the collections of the United States Bureau of Fisheries and the United States National Museum, by Maynard M. Metcalf and Hoyt S. Hopkins.

Bulletin 103. Contributions to the geology and paleontology of the Canal Zone, Panama, and geologically related areas in Central America and the West Indies. Pages 189–524: Fossil corals from Central America, Cuba, and Porto Rica, with an account of the American Tertiary, Pleistocene, and recent coral reefs, by Thomas Wayland Vaughan.

Of the remaining separates, 4 formed parts of volume 20 and 2 of volume 22, contributions from the United States National Herbarium, while 1 was from volume 55, 16 from volume 56, and 16 from volume 57 of the proceedings.

PUBLICATIONS OF THE BUREAU OF AMERICAN ETHNOLOGY.

The publications of the bureau are described in detail in Appendix 2 of this report. The editorial work of the bureau is under the direction of Mr. Stanley Searles, editor.

During the past year four bulletins, the Thirty-third Annual Report, and three separates from this report were published, as follows:

Bulletin 60. Handbook of Aboriginal American Antiquities. By W. H. Holmes. 380 pp.

Bulletin 68. Structural and Lexical Comparison of the Tunica, Chitimacha, and Atakapa Languages. By John R. Swanton.

Bulletin 69. Native Villages and Village Sites East of the Mississippi. By David I. Bushnell, jr. 111 pp., 17 pls.

Bulletin 70. Prehistoric Villages, Castles, and Towers. By J. Walter Fewkes. 79 pp., 33 pls.

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 Laie-i-ka-wai (Beckwith). 677 pp., 95 pls.

Three separates from the thirty-third Annual Report.

There were in press at the close of the year five annual reports and nine bulletins. The bulletins were as follows:

Bulletin 67. Alsea Texts and Myths (Frachtenberg).

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 73. Early History of the Creek Indians and their Neighbors (Swanton).

Bulletin 74. Excavations at Santiago, Ahuitzotla, D. F. Mexico (Tozzer).

Bulletin —. Northern Ute Music (Densmore).

Bulletin —. Mandan and Hidatsa Music (Densmore).

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

Bulletin —. Archeological Investigations in the Ozark Region of Central Missouri (Fowke).

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 2 of the report for 1916 was published during the year, and the reports for 1917 and 1918 were in press at the end of the year.

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

The manuscript of the Twenty-second Annual Report of the National Society of the Daughters of the American Revolution was transmitted to Congress according to law in June, 1920.

THE SMITHSONIAN ADVISORY COMMITTEE ON PRINTING AND PUBLICATION.

The Smithsonian advisory committee on printing and publication passes upon all manuscripts offered for publication by the Institution or its branches and considers all forms of routine, blanks, and such other matters as pertain to printing and publication. Ten meetings were held during the year and 93 manuscripts were acted upon.

Respectfully submitted.

W. P. True, *Editor.*

Dr. Charles D. Walcott,
Secretary of the Smithsonian Institution.

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