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REPORT OF THE SECRETARY OF THE SMITHSONIAN INSTITUTION

FOR THE YEAR ENDING JUNE 30

1917



(Publication 2487)



WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

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OF THE SMITHSONIAN
INSTITUTION

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ANNUAL REPORT
OF THE
COMMISSIONER
OF THE GENERAL LAND OFFICE
FOR THE YEAR ENDING JUNE 30
1914



WASHINGTON
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REPORT
OF THE
SECRETARY OF THE SMITHSONIAN INSTITUTION

CHARLES D. WALCOTT

FOR THE YEAR ENDING JUNE 30, 1917.

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: I have the honor to submit herewith the customary annual report on the operations of the Smithsonian Institution and its branches during the fiscal year ending June 30, 1917, including work placed by Congress under the direction of the Board of Regents in the United States National Museum, the Bureau of American Ethnology, the International Exchanges, the National Zoological Park, the Astrophysical Observatory, and the United States Bureau of the International Catalogue of Scientific Literature.

The general report reviews the affairs of the Institution proper and briefly summarizes the operations of its several branches, while the appendices contain detailed reports by the assistant secretary and others directly in charge of various activities. The reports on operations of the National Museum and the Bureau of American Ethnology will also be published as independent volumes.

THE SMITHSONIAN INSTITUTION.

THE ESTABLISHMENT.

The Smithsonian Institution was created an establishment by act of Congress approved August 10, 1846. Its statutory members are the President of the United States, the Vice President, the Chief Justice, and the heads of the executive departments.

THE BOARD OF REGENTS.

The Board of Regents, which is charged with the administration of the Institution, consists of the Vice President and the Chief Justice of the United States as ex officio members, three Members of the Senate, three Members of the House of Representatives, and six citi-

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

In the personnel of the board the only change was the appointment on January 15, 1917, of Hon. Henry White, of Maryland, to succeed Dr. Andrew D. White, of New York, who because of the infirmities of age felt compelled to resign after serving as Regent for nearly 29 years. The roll of Regents on June 30, 1917, 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; William J. Stone, Member of the Senate; Henry French Hollis, Member of the Senate; Scott Ferris, Member of the House of Representatives; Ernest W. Roberts, former Member of the House of Representatives; James T. Lloyd, former 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, jr., citizen of Washington, D. C.; Charles W. Fairbanks, citizen of Indiana, and Henry White, citizen of Maryland.

The board held its annual meeting on December 14, 1916. The proceedings of that meeting, as also the annual financial report of the executive committee, have been printed, as usual, for the use of the Regents, while such important matters acted upon as are of public interest are reviewed under appropriate heads in the present report of the secretary. A detailed statement of disbursements from Government appropriations, under the direction of the Institution for the maintenance of the National Museum, the National Zoological Park, and other branches, will be submitted to Congress by the secretary in the usual manner, in compliance with the law.

FINANCES.

By the deposit of \$4,000 derived from revenues during the year, the permanent fund of the institution deposited in the Treasury of the United States now amounts to \$1,000,000, the limit authorized by Congress, and is divided as follows:

Smithson fund	\$727, 640. 00
Habel fund	500. 00
Hamilton fund	2, 500. 00
Hodgkins fund	216, 000. 00
Rhees fund	590. 00
Avery fund	14, 000. 00
Addison T. Reid fund	11, 000. 00
Lucy T. and George W. Poore fund	26, 670. 00
George K. Sanford fund	1, 100. 00
Total fund in the Treasury of the United States	1, 000, 000. 00

Other resources.

Registered and guaranteed 4 per cent bonds of the West Shore Railroad Co., part of legacy of Thomas G. Hodgkins (par value) -----	\$42,000.00
Coupon 5 per cent bonds of the Brooklyn Rapid Transit Co., due July 1, 1918 (cost)-----	5,040.63
Coupon 6 per cent bonds of the Argentine Nation, due Dec. 15, 1917 (cost)-----	5,093.75
Total invested funds-----	1,052,134.38

With the exception of \$4,000 deposited in the Treasury, above noted, no other permanent investments were made during the year. These deposits consisted of interest accumulations and rentals only.

The principal revenues of the Institution being collectable July 1 and January 1 each year, a surplus of cash is accumulated at these times. Instead of allowing this surplus to be idle in the Treasury, the plan has been adopted to invest such sums as may be spared in time certificates of deposit issued by strong financial institutions of this city. The rate of interest obtained on these certificates is three per cent per annum and it is believed that approximately \$1,000 can be gained each year by this method.

The income of the Institution during the year, amounting to \$88,649.52, was derived as follows: Interest on the permanent foundation, \$61,490.59; contributions from various sources for specific purposes, \$16,630, and from other miscellaneous sources, \$10,528.93.

Adding the cash balance of \$44,711.02 on July 1, 1916, the total resources for the fiscal year amounted to \$133,360.54.

The disbursements, which are given in detail in the annual report of the executive committee, amounted to \$124,127.98, leaving a balance of \$9,232.56 in cash and on deposit in the Treasury of the United States June 30, 1917.

In addition to the above specific amounts to be disbursed by the Institution 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.

The Institution was charged by Congress with the disbursement of the following appropriations for the year ending June 30, 1917.

International exchanges-----	\$32,000
International exchanges, deficiency act of Apr. 17, 1917-----	3,500
American ethnology-----	42,000
Astrophysical observatory-----	13,000
National Museum:	
Furniture and fixtures-----	25,000
Heating and lighting-----	46,000

National Museum—Continued.

Preservation of collections.....	300,000
Books.....	2,000
Postage.....	500
Building repairs.....	10,000
National Zoological Park.....	100,000
International Catalogue of Scientific Literature.....	7,500
Total.....	581,500

GENERAL CONSIDERATIONS.

Throughout its history the Smithsonian Institution has constantly cooperated with the executive departments and other establishments of the Government in all matters pertaining to scientific activities. Particularly during the period of the present world war has the Institution been of service in connection with many important measures. Every member of its scientific staff, every one of its 500 or more employees has aided the Nation to the utmost in every possible manner. The laboratories and workshops of the Institution and its branches have been utilized to their fullest extent and routine affairs have taken second place whenever important national matters have needed attention. Your Secretary, as president of the National Academy of Sciences, as chairman of the military committee of the National Research Council, and as chairman of the executive committee of the National Advisory Committee for Aeronautics, has had opportunity to keep in close touch with the needs of the Nation and to give such advice as has been in his power, especially in connection with the development of aeronautics.

The Institution was particularly fortunate in having as former Secretary Prof. S. P. Langley, who in 1896 gave to the world a practical demonstration of the feasibility of mechanical flight by a machine heavier than the air propelled by its own power. To him the Nation to-day owes more than can be told, and as an indication of that debt his memory is fittingly preserved in the name "Langley Field," a tract of some 1,800 acres near Hampton, Va., where extensive experiments of the highest importance to the art of aviation are now being carried on. The Government has now been aroused to the supreme worth of airplanes, machines which Prof. Langley 20 years ago foresaw would be of great service in times of war as well as peace. His prophecy has been fulfilled far beyond his hopes or dreams. The large machine with which his personal experiments ceased in 1903 proved its worth and its capability of actual flight during the past year. Change after change in the design of airplanes to adapt them for scouting, for fighting, and other military purposes has followed in rapid succession until now aerial battles are of daily occurrence and nations are looking ahead to their extended use under peace conditions.

As stated in my last report, the organization of the National Advisory Committee for Aeronautics has made unnecessary for the present the permanent establishment by the Smithsonian Institution of the Langley Aerodynamical Laboratory. Every facility continues, however, to be afforded to Federal bureaus to study aviation models and records possessed by the Institution and, in particular, to consult the large Smithsonian Library on Aeronautics, together with a general card index of aeronautical literature.

There has recently been erected adjacent to the Smithsonian building a temporary structure for the use of the United States Signal Service especially for housing aeroplanes of various designs and aviation appliances.

The executive committee of the National Advisory Committee has held monthly meetings during the year, and many problems of deep importance have been discussed.

Upon the recommendation of the committee there was organized by the Council of National Defense the "Aircraft Production Board," "to consider the situation in relation to the quantity production of aircraft in the United States and to cooperate with the officers of the Army and Navy and of other departments interested in the production and delivery to these departments of the needed aircraft in accordance with the requirements of each department."

The committee also recommended to the Government the adoption of a continuing program for the training of aviators and the production of airplanes and the establishment of schools and an adequate organization and personnel of regular officers, both in the Army and Navy for the efficient use of aircraft and direction of the aviators provided for. As a result of the committee's activities the advance in aerial preparedness has been accelerated.

The committee has established a research laboratory at Langley Field, Virginia, for the carrying on of scientific investigations. Among the several subcommittees engaged in the study of aeronautic problems are those on aerial mail service, aero torpedoes, aircraft communicating, airplane mapping, relation of the atmosphere to aeronautics, standardization of specifications for aeronautic materials and aeronautic nomenclature, specifications for aeronautic instruments, radiator design, motive power, and safe design, construction, and navigation of aircraft.

The second annual report of the National Advisory Committee for Aeronautics was published during the year in a volume of 630 octavo pages, including technical reports on "General Specifications Covering Requirements of Aeronautic Instruments," "Nomenclature for Aeronautics," "Mufflers for Aeronautics," "Gasoline Carbureter Design," and "Experimental Researches on the Resistance of Air."

RESEARCHES AND EXPLORATIONS.

The usual activities were continued during the past year in advancing one of the fundamental objects of the Smithsonian Institution, the *increase of knowledge*. In this work various explorations and researches were inaugurated or participated in by the Institution and its branches, covering practically all divisions of astronomical, anthropological, biological, and geological science. The extent of these explorations and researches during the history of the Institution covers a wide range, although a great deal more of most important work could have been accomplished had adequate funds been available. Friends of the Institution have generously aided this work, particularly during the last few years, through the contribution of funds for specific purposes, but much yet remains undone, and opportunities for undertaking important lines of investigation are constantly being lost through lack of means to carry them into execution.

Several proposed expeditions to various parts of the world have been temporarily delayed by the war in Europe.

I will here mention only briefly some of the recent activities of the Institution in these directions, and for details of other researches and explorations may refer to the appendices containing the reports of those directly in charge of the several branches of the Institution and also to the accounts given in the customary pamphlet review of this work published each year in the Smithsonian Miscellaneous Collections.

GEOLOGICAL EXPLORATIONS IN THE CANADIAN ROCKIES.

In continuation of geological work carried on by me for several years past in the Canadian Rocky Mountains, I was engaged during the summer and early fall of 1916 in field investigations on the Continental Divide forming the boundary between Alberta and British Columbia, south of the Canadian Pacific Railway. The very heavy snowfall of the previous winter together with frequent snow and rain squalls during the summer, had made the conditions unusually favorable for taking photographs, the air being exceptionally pure and clear during the field season, conditions, however, very unfavorable for geological investigations. A large number of photographs were secured, including a number of panoramic views made on continuous films eight feet in length.

The sections examined and measured extend from the Mount Assiniboine region southwest of Banff, Alberta, northwest to the Kicking Horse Pass, where the Canadian Pacific Railway has bored a double loop through the mountains on the north and south sides of the pass.

The season's work was undertaken with two principal objects in view: First, to determine, if possible, the base line of demarcation between the Lower and Middle Cambrian; and second, to locate the exact horizon of a Cambrian subfauna (*Albertella*) that had in its entirety been found only in drift boulders in the Kicking Horse Valley east of Wapta Lake.

One of the important incidental results obtained was the discovery at Wonder Pass of a great overthrust fault by which the basal Cambrian rocks forming the mountains on the west side of the pass have been thrust eastward over upon the limestones of the Devonian, shown in the slope on the east side of the pass. The thrust along this fault has carried the rocks forming the main range of the Rockies in this area several miles to the eastward. The fault crosses through Wonder Pass and then curves to the northwest, southeast of Magog Lake, to the great cliff forming the northern extension of the Assiniboine massif. During the million or more years that the agencies of erosion had been wearing away the great mass of rocks above the fault, mountain peaks, canyons, and ridges have been carved and polished by frost, snow, and the grinding force of huge glaciers. The glaciers have now retreated to a point near their origin, high up on the mountains, but they have left behind them basins that are filled with beautiful lakes, such as Magog, Sunburst, and Ross.

The line of demarcation between the Lower and Middle Cambrian was found to be high up in the section on the face of the cliffs at Wonder Pass, and throughout the Assiniboine massif.

While camped on Magog Lake, below Mount Assiniboine, some marvelous reflections of the peak in the waters of the lake were seen in the quiet of the early morning. The changes in the "cloud banners," at the peak occur very rapidly. These views led us to regard the grand pyramid of Mount Assiniboine as the Matterhorn of America.

Northwest of Banff the broad valley of the Bow has been eroded diagonally back through the massive scarf of the overthrust massif and thus exposed to erosion the heart of the great arch that had its crest over the region now occupied by Mount Victoria and other peaks of the Bow Range.

Some photographic views were secured looking south across the Bow Valley into the heart of the Rockies. A view of Pinnacle Peak tells the story of the tremendous power of erosive agencies, where the colossal quartzites and limestones are shattered and eroded into the most fantastic forms.

West of Pinnacle Peak, at the head of Paradise Valley, Mount Hungabee rises in a terraced wall 4,000 feet above the glacier at its foot, while another glimpse of these great cliffs is seen under Mount

Lefroy, where the melting snows cascade down as a beautiful brook over the quartzite ledges.

At last, in the cliffs above Ross Lake the *Albertella* fauna was located in situ, and from the slopes above the lake a panoramic view was taken of Mount Bosworth, above Kicking Horse Pass on the Continental Divide. Although only 9,083 feet in height, Mount Bosworth exposes in its slopes over 12,000 feet in thickness of bedded rocks that constitute one of the best sections of the Cambrian rocks found in the Canadian Rockies.

Considerable collections of Cambrian fossils were obtained by myself and Mrs. Walcott, who accompanied and worked with me throughout the entire trip, before the storms of late September drove us back to Banff and ended the research for the season.

Many of the photographs taken in this wonderful region are reproduced in one of the publications of the Institution.¹

GEOLOGICAL FIELD STUDIES.

Dr. George P. Merrill, head curator of geology in the National Museum, devoted several days of the summer vacation period in 1916 to visiting the gem and feldspar quarries of Auburn, Topsham, and neighboring areas in Maine. While nothing new was secured, he was able to add interesting material to the Museum exhibit illustrating the character and association of the pegmatite dikes, which is now being installed in the Museum.

HUNTING GRAPTOLITES IN THE APPALACHIAN VALLEY.

The great value of the extinct organisms known as graptolites in determining the age of geological formations which contain few and often no other kinds of fossils, has been proved time and again. During the summer of 1916 Dr. R. S. Bassler and Mr. C. E. Resser, both of the division of paleontology, United States National Museum, had occasion to test this particular group of fossils in the course of a study of the Cambrian and Ordovician shale formations of western Maryland. They report that—

Recent excavations along the Western Maryland Railroad, in the great shale belt just west of Williamsport and extending north and south for hundreds of miles, exposed these rocks to such advantage that it was thought possible enough fossils could be found in them to determine their exact geologic age and structure. However, no fossils of any kind were found after much search. It was then decided that the rocks were either barren of organic life or the cleavage produced in the strata by the great forces resulting in their present folded condition destroyed all traces of fossils.

Finally a fold of black shale was observed and at the point where the cleavage and the bedding planes coincided, abundant graptolite remains were

¹ Smithsonian Miscellaneous Collections, vol. 66, No. 17, 1917.

discovered. The species which were collected proved to be of such typical Trenton forms that there could be no doubt of the Middle Ordovician age of this particular shale. Limestones known to be much older outcrop so short a distance to the east of this that a great fault or displacement between the two kinds of rocks is clearly indicated.

With these facts in hand, the fault was traced for a distance of 30 miles north and south, thus again showing that the graptolites proved the key to the geologic structure of the region.

EXPLORATIONS IN THE OHIO VALLEY FOR FOSSIL ALGAE AND CORAL REEFS.

Through the extensive studies of the Secretary for several years past, the collections of the National Museum are rich in limestone-forming pre-Cambrian algae—a low order of water plants that secrete lime or silica. An instructive series of these fossils has been placed on exhibition, but in order to show the geologic occurrence and evolution of this group of plants it was necessary to supplement the pre-Cambrian forms with specimens of more recent age. Accordingly Dr. R. S. Bassler, curator of paleontology, spent some weeks in the Ohio Valley, particularly in the blue grass region of Kentucky, in a search for large exhibition specimens, and in a study of their mode of occurrence. He was successful in procuring a number of showy exhibition specimens as well as numerous study collections.

More difficult, however, was the discovery and quarrying of a fossil coral reef suitable for exhibition in the Museum. Coral reefs are known at several horizons in the Paleozoic rocks of the Ohio Valley but they are seldom so exposed that an instructive section can be quarried out without injury to the specimens. A great reef of corals outcrops in the strata along the banks of Chenoweth Creek at Jeffersontown, near Louisville, Ky., and this was selected to furnish an exhibit for the Museum. A section of the stratified rocks 6 feet by 10 feet was bodily quarried out of the bank, and these strata with their contained corals were later set up in the exhibition hall of paleontology.

The lowest layer of limestone is composed largely of fossil brachiopod shells. Next above is a layer with scattered corals belonging to a long-tubed species (*Columnaria calcina* Nicholson), probably torn by waves from a near-by coral reef. Overlying this is a limestone stratum largely made of the twiglike stems of stony Bryozoa (*Trepostomata*).

The main reef of corals is chiefly composed of the rounded heads of three species of honeycomb corals, some with radial partitions in the tubes (*Columnaria alveolata* Goldfuss), others without such partitions (*Columnaria vacua* Foerste), and still others with spongy walls (*Calapoecia cribriformis* Nicholson). Large stems of fluted or

nodular Hydrozoa (*Beatricea*) are scattered among the honeycomb coral masses.

Horn corals (*Streptelasma rusticum* Billings) are to be seen in both the lower and upper coral beds. The spaces between the limestone layers and also between the heads of coral were filled with clay which contained many other examples of fossil life.

Another coral reef in central Kentucky composed of a single species (*Stromatocerium pustulosum* Safford) was investigated and several massive and complete specimens excavated for exhibition. The smallest of these was several feet in diameter. These conical coral masses are restricted to a single layer of limestone, on which account they serve to identify the bed from place to place. This coral reef occurs in the Trenton limestone and fine outcrops occur around Lexington, Ky., and it has been noted at many localities in central Kentucky and central Tennessee.

EXAMINATION OF ANCIENT HUMAN REMAINS IN FLORIDA.

A good deal of public and scientific interest was aroused by the finding of human remains in Florida under conditions which seemed possibly to indicate extreme age. It was therefore desirable that a critical examination be made of the bones and their environment. Accordingly, on the invitation of Dr. E. H. Sellards, State geologist of Florida, and as his guest, Dr. Hrdlička, of the United States National Museum, spent four days in the latter part of October, 1916, at Vero, Fla., where his time was devoted to the study of the site from which certain human bones described by Dr. Sellards were obtained, and to a preliminary examination of the bones themselves.

Dr. Hrdlička reports as follows:

Laborers were engaged, and with their help there was made a clean exposure about 160 feet in length of the geological deposits in close proximity to the localities where the human bones had been discovered. This afforded a comprehensive and enlightening view of the formations involved.

The two human skeletons had been found in the south bank of a recently excavated drainage canal. They occurred one in fairly close proximity to, and the other within the broad, shallow bed of, a small fresh-water stream, now drained by a lateral cut from the canal. The former lay in dark and somewhat indurated sands, the latter for the most part at the base of the muck deposit of the stream bed, and between this and the next older stratum. A few smaller bones, which probably belonged to the second skeleton, were found at about the same level a short distance from the rest of the remains in an elevation of the lower sandy layer.

The first skeleton lay at a depth of $2\frac{1}{2}$ feet, the second at a depth of 2 to $3\frac{1}{2}$ feet from the surface. The deposits above the first skeleton consisted partly of somewhat indurated and partly of ordinary sands, overlaid by a layer of marl. The marl when freshly exposed was found to be of the consistency of fresh mortar, but on longer exposure hardened to fairly solid rock. Above skeleton No. II there was only muck and irregular sandy patches.

Skeleton No. I is that of a woman, probably adult; skeleton No. II that of an adult man of somewhat advanced years. The bones of the former lay close together, those of the latter were dissociated though lying within a moderate-sized ellipse. Broken pottery, bone and stone implements, and stone chips, were found in the same strata, more particularly in the muck layers, with the human bones.

Besides the two skeletons, single bones of three additional human bodies—one a child, one a young person, and one adult—were discovered in the vicinity.

The human bones were considerably mineralized, and in the same strata in which they occurred are found many bones of long-extinct animals, such as mastodons, tapirs, etc.

Due to the presence of the fossil animal bones in the same strata with the human remains, and to the mineralization of the latter, the opinion was advanced that the human remains were of the same age as the animal bones, which would relegate them to the early part of the Quaternary.

This is not sustained by an anthropological study of the case and of the remains. The human bones show no signs of weathering, gnawing, or trampling, and the two skeletons were represented by so many parts that the only satisfactory explanation of the conditions can be found in the assumption that the remains are those of intentional burials.

The pottery and the bone and stone implements are all identical with similar artifacts of the Florida or southeastern Indians, while the human bones themselves show, without exception, modern features, with numerous characteristics which permit their identification also as Indian.

The conclusions arrived at are that the Vero finds represent another of those cases, which are bound to occur from time to time, where the circumstances seem to point to antiquity of the human bones, but where a thorough, all-sided inquiry shows that the mass of the evidence is decisively against such an assumption.

Following the visit to Vero, Dr. Hrdlička made a trip to Fort Myers, Fla., and to several of the outlying keys, where human remains were reported. The particular object of this trip was to visit a small island off Fort Myers known as the Demorest or Demere Key, on which, according to information obtained from Mr. Sam L. King, of Bristol, Tenn., human bones could be found "imbedded in concretionary materials." Concerning these remains Dr. Hrdlička says:

Demere Key, the surface of which measures about 15 acres, was originally a low and swampy island, like all of the small keys in the vicinity, but a larger part of its surface was in the course of time artificially elevated by the Indians, by means of shells, sand, and soil, for the purpose of habitation and cultivation. Along the middle of this large artificial elevation runs a remarkable platform about 80 feet long, the eastern boundary of which is supported by a still fairly well preserved, well-made wall of conch shells. This structure has been briefly reported by Cushing and by Mr. Clarence B. Moore, but its origin is in doubt. At a short distance northeast of this elevation there is a low, irregular heap which contains numerous Indian burials. On examining the surface of this heap, it was found to consist of shells, detritus, sand, and vegetable matter, and to be everywhere more or less consolidated to the depth of from 6 to 18 inches. The consolidation was such that in many places it was very hard to penetrate the crust with an ordinary mattock. Within this crust, on breaking parts of it off and turning them over, were found numerous human bones, including some

more or less defective skulls. Beneath the crust was white sand, which also contained many bones, with a few Indian ornaments and fragments of pottery. The consolidated crust differed in composition. For the larger part it was coquina, of just about such a composition as beach accumulations along the sea; but in other places the solidified part consisted almost entirely of white sand, while in still others it was a dark concretionary mass enclosing shells, sand, and vegetable matter, besides the bones. The human bones, though evidently more or less changed, were not yet petrified; and the mound as a whole appears to have no claim to antiquity greater than perhaps a few hundred years; but its surface offers a fine example of what favorable conditions can accomplish in no great space of time in the way of consolidation and inclusion into rock of human remains.

BIOLOGICAL WORK IN CUBA AND HAITI.

Mr. John B. Henderson, a Regent of the Institution, and Dr. Paul Bartsch, curator of marine invertebrates, spent the last half of March in the region about the Guantanamo Naval Station in eastern Cuba, collecting a large quantity of very interesting land shells, birds, plants, fossils, and marine invertebrates. The month of April was spent in Haiti, where they thoroughly explored the Cul-de-Sac region, the north coast of the western peninsula, and the coastal range from the Cul-de-Sac north as far as San Marcos. They secured many interesting specimens of land and fresh water mollusks, several new birds, some very interesting cacti and other plants, and a general invertebrate collection from this much neglected island. A large series of interesting photographs was also made, many of which will be used in a report on the expedition which the explorers hope to publish in the near future.

BOTANICAL EXPLORATIONS IN THE HAWAIIAN ISLANDS.

During the summer of 1916, from June to November, Mr. A. S. Hitchcock, custodian of the section of grasses of the division of plants in the National Museum, traveled in the Hawaiian Islands studying and collecting the flora, especially the grasses. Concerning his explorations Mr. Hitchcock says:

The islands are all of volcanic origin and the rock is lava except a very little that is coral formation. Kauai, the geologically oldest island, shows the greatest effect of erosion, the deep canyons rivaling in beauty the Grand Canyon of the Colorado. On the island of Hawaii are the two highest peaks of the group, Mauna Kea, 13,825 feet, and Mauna Loa, 13,675 feet in height. Above 10,000 feet there is scarcely any vegetation upon these peaks, especially upon Mauna Loa, which is made up of comparatively recent lava.

The important agricultural industries are the raising of sugar, live stock, and pineapples. The cultivated trees and shrubs are of great variety and beauty, and are drawn from all tropical and subtropical lands. One of the introduced trees of great economic importance is the algaroba tree, or kiawe, as the Hawaiians call it. It is found in a belt on the lowlands along the shores of all the islands and occupies the soil almost to the exclusion of other plants.

The pods are very nutritious and are eagerly eaten by all kinds of stock. The flowers furnish an excellent quality of honey. The prickly pear cactus has become extensively naturalized in the dryer portions of all the islands. The ranchmen utilize this for feed when other kinds become scarce, the cattle eating the succulent joints in spite of the thorns. Two introduced shrubs now occupy extensive areas and have become great pests. These are guava, whose fruit furnishes the delicious guava jelly, and lantana, with clusters of handsome parti-colored flowers.

The indigenous flora is highly interesting though not abundant in species. Two of the commonest trees are the ohia and the koa. The former, also called ohia lehua and lehua, resembles, in the appearance of the trunk, our white oak, but bears beautiful clusters of scarlet flowers with long-protruding stamens. The koa produces a valuable wood much used in cabinetmaking, now becoming familiar through its use for making ukuleles. Among the peculiar plants of the islands is the silversword, a strikingly beautiful composite with glistening silvery leaves, which grows only on the slopes of cinder cones in the crater of Haleakala and in a few very limited localities on Hawaii. The family Lobeliaceae is represented by about 100 species belonging to 6 genera. The numerous arborescent species are very peculiar and characteristic. Many of them form slender trunks like small palms, crowned with a large cluster of long narrow leaves. The trunks of some species are as much as 30 or 40 feet high, and the large bright colored flowers are sometimes remarkably beautiful.

The indigenous grasses of the Hawaiian Islands are not numerous. Three peculiar species of *Panicum* inhabit the open bogs formed on the tops of many of the high mountains in the wet zone such as Mount Eeka and Mount Kukui in West Maui, some of the peaks of Molokai and Oahu, and Waialeale in Kauai, that upon the latter covering in all several square miles. These bogs are found near the summits of ridges in the regions of heavy rainfall, are devoid of trees and shrubs, and harbor a peculiar vegetation.

CINCHONA BOTANICAL STATION.

Recently the Institution has acquired a three years' lease of the Cinchona Botanical Station at Jamaica, comprising about 10 acres of land, with offices, laboratories, and other buildings, for the furtherance of our knowledge of West Indian botany. Assignment of botanists who desire to prosecute studies there are made on the recommendation of organizations which have cooperated with the Institution in securing the use of this important field for botanical investigations.

BIOLOGICAL WORK IN CHINA.

Mr. Arthur deC. Sowerby has continued his work in northeastern China though conditions have been so unsettled as to make collecting extremely difficult. A shipment of natural history specimens to the Museum from Mr. Sowerby received May 27, included 186 bird skins, 44 mammals, 1 reptile, 16 fishes, and other miscellaneous natural history objects.

EXPLORATIONS IN SANTO DOMINGO.

Dr. W. L. Abbott, whose energies for nearly 30 years past have been devoted to explorations in the Old World, made a short visit to Santo Domingo (the scene of his earliest expedition, in 1883), where he spent a few weeks in late summer and fall, 1916, at the eastern end of the island, chiefly in the vicinity of the Bay of Samana, with trips to several localities in the highlands of the interior, notably at Constanza and El Rio. On this expedition he made a very interesting collection of mammals, birds, reptiles, mollusks, insects, and Indian relics.

In the coast region, Dr. Abbott investigated numerous caves in search of remains of an extinct mammalian fauna. One of the most interesting mammals whose remains were found in these caves is a large rodent, described from a freshly killed specimen in 1836, but not captured since then. Whether it is extinct or not is at present an uncertainty. At San Lorenzo Bay, on the south side of the Bay of Samaná, there are "many precipitous limestone hills," which, Dr. Abbott writes, are "literally honeycombed with caves. The cave (usually inhabited) near the pier of the abandoned railroad is full of shell heaps, and contains many Indian carvings, more or less obliterated by smoke and lime deposits." Here he uncovered two hundred or more archeological objects, including terra-cotta images, fragments of pottery, stone pestles, carved stone plates, and similar material.

After exhausting the caves in the vicinity of Samaná, Dr. Abbott visited the mountains of the interior, where, at El Rio, he made a most surprising discovery in the bird fauna. He writes "I had heard of a very small 'parrot' which lived in flocks in the pines on the pine cones. I suspected a crossbill—said to occur here at Jarabococha, below 2,000 feet, but the pair I shot were at near 5,000 feet." The bird proved to be a veritable crossbill and, what was most extraordinary, a form closely related to the white-winged crossbill, a species restricted in the breeding season to the Boreal zone of North America (from Alaska to the higher Adirondacks), migrating in winter at rare intervals as far south as North Carolina.

The series of birds totaled about 250 specimens, of 50 or more species, over 30 of which are peculiar to the island. The indigenous species of this island have long constituted the Museum's chief desiderata among the birds of the West Indies, hence Dr. Abbott's collection has proved of great interest, aside from the special discoveries mentioned above.

EXPEDITION TO CELEBES.

Through the generosity of Dr. W. L. Abbott, associate in zoology in the Museum, Mr. H. C. Raven has continued to make natural

history and ethnological collections in Celebes. In April the Museum received a shipment of ethnological objects from Mr. Raven, including native fish traps, baskets, cloth, rope, hats, dishes, blowguns used for hunting birds, and a curious native musical instrument.

COLLINS-GARNER CONGO EXPEDITION.

Early in 1917 an expedition with the title of the Collins-Garner Congo expedition in the interests of the Smithsonian Institution, left for the French Congo and neighboring parts of west Africa. Mr. C. R. W. Aschemeier, of the department of biology, National Museum, is representing the Smithsonian Institution and the Museum as natural history collector. All of the natural history specimens collected by the expedition will come to the National Museum. The other members of the expedition are Mr. Alfred M. Collins, of Philadelphia, chief; Prof. Richard L. Garner, of New York, who is making special studies concerning apes and monkeys, manager; and Prof. Charles W. Furlong, of Boston, scientist, artist, and explorer.

RESEARCH CORPORATION.

In my annual reports for several years past I have called attention to the Research Corporation organized in 1912 under the laws of New York State, and having as its officers and directors a group of men particularly interested in the development of the industrial arts. The present Secretary of the Smithsonian Institution is one of the directors and a member of the executive committee. The certificate of incorporation declares it to be the purposes of the corporation to—

Provide means for the advancement and extension of technical and scientific investigation, research, and experimentation by contributing the net earnings of the corporation over and above such sum or sums as may be reserved or retained and held as an endowment fund or working capital, and also such other moneys and property belonging to the corporation as the board of directors shall from time to time deem proper, to the Smithsonian Institution, and such other scientific and educational institutions and societies as the board of directors may from time to time select, in order to enable such institutions and societies to conduct such investigation, research, and experimentation.

The principal income of the corporation is at present derived from royalties for the use of the Cottrell process for the electrical precipitation of suspended particles. Dr. F. G. Cottrell, the inventor of this process, offered his patents to the Smithsonian Institution, but since it was not practicable for the Institution to administer them commercially, the Research Corporation was organized for that purpose. The process is now in successful use by a score of smelting and refining companies and other industrial plants and the financial condition of the corporation is very gratifying.

The corporation seeks to do for industrial arts what some other institutions are now doing for the sciences generally, for medicine, and for the improvement of social conditions. There has now been established an annual fellowship "open to general competition for the purpose of encouraging and assisting scientists in the prosecution of their investigations. To the successful competitor, the corporation offers an honorarium of twenty-five hundred dollars and the assistance of the corporation in securing the most favorable opportunity for prosecuting the particular object of study."

The Cottrell process in operation has been described in publications of the Smithsonian Institution. The precipitation processes and their applications have been briefly described as follows:

Electrical precipitation consists of the removal of suspended particles from gases by the aid of electrical discharges. The precipitation process operates by passing the gases carrying the suspended, finely divided particles between two systems of electrodes, one of which is made to carry a negative electrical charge while the other carries a positive charge. In ordinary practice the negative electrodes are small in size, such as iron wires or chains, and the positive electrodes are large, such as iron plates or pipes. The gases are divided into several channels and passed through the space between the wires and the plates or pipes, in the latter case each pipe having a wire placed along its longitudinal axis. The electrodes are charged by being connected with a source of high voltage electricity, consisting ordinarily of a high voltage transformer for increasing the electric potential up to the working voltage which varies with the size and character of the installation from 20,000 to 100,000 volts; a rectifier for changing alternating current into direct current, and a switchboard provided with the necessary standard control equipment. The suspended particles while passing between the electrodes become electrically charged and are then driven to the plates or the inner surface of the pipes by the forces of the electric field. A common example of the application of the process is the precipitation of minute particles containing copper, silver, gold, lead, zinc, and other valuable metals ordinarily carried away from smelting and refining furnaces which may by this process be recovered from such gases without interfering with the operation of the plant. The recovered dust or fume, in such cases, is often valuable and constitutes a large financial saving. In many other industrial operations where noxious gases, fumes, or dusts are given off, the process has been successfully applied, some of the materials precipitated being sulphuric, nitric, and hydrochloric acids; arsenic, bleaching powder, lead, zinc, and other poisonous materials.

NATIONAL RESEARCH COUNCIL.

As stated in my last report, the National Research Council was organized by the National Academy of Sciences, the President of the United States appointing the representatives of the Government and authorizing the appointment of other members by the president of the academy. There was thus brought together about 50 members representing various branches of science, and they were subdivided in several subcommittees. Joint committees were also formed in

cooperation with national scientific societies. The Research Council has since become a part of the Council of National Defense and operates in coordination with that body. In the membership of the Research Council are several of the scientific staff of the United States National Museum, your Secretary being vice chairman of the council and chairman of the military committee.

With the preparations for actual participation by the United States in the world war, the council became an important factor in the scientific work of the Government. On February 29, 1917, the Council of National Defense adopted the following resolution:

Resolved, That the Council of National Defense, recognizing that the National Research Council, at the request of the President of the United States, has organized the scientific forces of the country in the interest of national defense and national welfare, requests that the National Research Council cooperate with it in matters pertaining to scientific research for national defense; and to this end the Council of National Defense suggests that the National Research Council appoint a committee of not more than three, at least one of whom shall be located in Washington, for the purpose of maintaining active relations with the director of the Council of National Defense.

Since that time the National Research Council has served as the department of science and research of the Council of National Defense and in such capacity has been charged with the organization of scientific investigations bearing on the national defense and on industries affected by the war.

Shortly after this action Dr. George E. Hale, chairman of the council, initially undertook the organization of research activities in direct cooperation with the United States Government and its various departments. Office accommodations were provided for chemistry, engineering, medicine and hygiene, and physics committees of the council, and arrangements were made to provide such accommodations also for the agriculture and psychology committees. Dr. Robert A. Millikan, chairman of the physics committee, was appointed vice chairman of the council and consented to give his entire time, upon leave of absence from the University of Chicago, to work in Washington as the executive officer of the council. Offices in New York were retained with the secretary, Dr. Cary T. Hutchinson, in charge.

Particular mention may perhaps be made of the appointment of a foreign service committee of the council and of its important mission and work as a direct aid in acquainting investigators in this country with the scientific problems which have been confronted both in military and industrial pursuits in England and France.

Two other committees of the council have been especially organized as the result of the cooperation brought about with the Council of National Defense; one a committee on navigation and nautical

instruments, appointed upon the request of the General Munitions Board and the other a committee on relations with State research councils, appointed to consider and report upon desirable means of cooperation between the Council and State research committees.

OFFICERS OF THE COUNCIL.

George E. Hale, chairman; Charles D. Walcott, first vice chairman; Gano Dunn, second vice chairman; R. A. Millikan, third vice chairman and executive officer; Cary T. Hutchinson, secretary.

EXECUTIVE COMMITTEE.

J. J. Carty, Chairman.

Marston T. Bogert.	Van H. Manning.	S. W. Stratton.
Russell H. Chittenden.	R. A. Millikan.	Victor C. Vaughan.
Edwin G. Conklin.	Arthur A. Noyes.	Charles D. Walcott.
Gano Dunn.	Raymond Pearl.	William H. Welch.
George E. Hale.	Michael I. Pupin.	

The following members and new committees have been added to the council since my last report:

LIST OF NEW MEMBERS.

Carl L. Alsberg.	John R. Freeman.
Joseph S. Ames.	Hollis Godfrey.
Admiral William S. Benson.	Rear Admiral Robert S. Griffin.
Walter B. Cannon.	Herbert C. Hoover.
John M. Clarke.	Franklin H. Martin.
Howard E. Coffin.	John C. Merriman.
William M. Davis.	Eliakim H. Moore.
Arthur L. Day.	Frederick H. Newell.
Henry H. Donaldson.	George O. Smith.
William F. Durant.	Lewis B. Stillwell.
Rear Admiral Ralph Earle.	Robert W. Wood.

LIST OF COMMITTEES.

Military committee.	Astronomy committee.
Agriculture committee.	Committee on census of research.
Committee on Anthropology.	Engineering committee.
Botany committee.	Foreign service committee.
Chemistry committee.	Geography committee.
Food committee.	Geology and paleontology committee.
Committee on gases used in warfare.	Mathematics committee.
Committee on Industrial Research.	Committee on navigation and nautical instruments.
Committee on Medicine and Hygiene.	Physics committee.
Committee on Optical Glass.	Psychology committee.
Physiology committee.	Committee on research in educational institutions.
Committee on Relations with State Research Councils.	Zoology committee.
Aeronautics committee.	
Anatomy committee.	

Since the close of the year the Signal Corps, desiring to avail itself of the assistance of the National Research Council, appointed Dr. R. A. Millikan, third vice chairman and executive officer, and Dr. Charles E. Mendenhall majors in the United States Army.

PUBLICATIONS.

The Institution proper issues three series of publications: Smithsonian Contributions to Knowledge, Smithsonian Miscellaneous Collections, and Smithsonian Annual Reports. The publications of the various branches of the Institution issued under its direction include the Annual Reports, Proceedings, and Bulletins of the United States National Museum, including the Contributions from the National Herbarium; Annual Reports and Bulletins of the Bureau of American Ethnology; and the Annals of the Astrophysical Observatory. All of the publications of these branches and the Annual Report of the Institution are printed by means of Congressional allotments.

Smithsonian Contributions to Knowledge.—Of this series, which contains in quarto form the results of studies constituting important contributions to knowledge, one memoir was published, entitled "A Contribution to the Comparative Histology of the Femur," by Dr. J. S. Foote, of Creighton Medical College, embodying the results of the author's work for a number of years on this subject.

Smithsonian Miscellaneous Collections.—Of this series, 19 papers forming parts of five volumes were issued, including three papers by your secretary containing the results of his field work in Cambrian geology. The annual Smithsonian exploration pamphlet appears in this series, which describes briefly the work in the field of the Smithsonian scientists and scientific expeditions, illustrated by photographs taken by the explorers in every quarter of the globe. The necessity for a second reprinting of the sixth revised edition of the Smithsonian Physical Tables indicates the continued usefulness of this work. In this series also appeared the important paper by H. Helm Clayton on the effect of variations in solar radiation on the earth's atmosphere, the possibilities of which for use in forecasting temperature are discussed elsewhere in this report.

Smithsonian report.—As stated in the report on the publications, Appendix 8, although the final proof of the 1916 report was returned to the printer in April, the books were not received before the close of the year because of the great rush of war printing at the Government Printing Office.

Special publications.—Among the special publications may be mentioned an illustrated folder describing the Smithsonian and its branches, for the use of visitors and correspondents.

National Museum publications.—The Museum issued during the year 1 volume of the proceedings, 73 papers forming parts of this and other volumes, and 6 bulletins.

Bureau of Ethnology publications.—The Bureau of American Ethnology published 1 annual report, 2 bulletins, and a list of publications of the bureau.

Reports of historical and patriotic societies.—In accordance with a provision in the charters of the American Historical Association and the National Society of the Daughters of the American Revolution, the annual reports of those organizations were submitted to your secretary, and communicated by him to Congress.

Allotments for printing.—The allotments for the printing of the Smithsonian report and the various publications of the branches of the Institution were practically used up, a small balance remaining in one or two cases owing to the impossibility of getting certain publications off the press before the close of the year.

The allotments for the year ending June 30, 1918, are as follows:

For the Smithsonian Institution: For printing and binding the annual reports of the Board of Regents, with general appendices, the editions of which shall not exceed 10,000 copies.....	\$10,000.
For the annual reports of the National Museum, with general appendices, and for printing labels and blanks, and for the bulletins and proceedings of the National Museum, the editions of which shall not exceed 4,000 copies, and binding, in half morocco or material not more expensive, scientific books, and pamphlets presented to or acquired by the National Museum library.....	37,500.
For the annual reports and bulletins of the Bureau of American Ethnology and for miscellaneous printing and binding for the bureau....	21,000
For miscellaneous printing and binding:	
International Exchanges	200.
International Catalogue of Scientific Literature.....	100
National Zoological Park.....	200
Astrophysical Observatory.....	200
For the annual report of the American Historical Association.....	7,000.
Total	76,200.

Committee on printing and publication.—The Smithsonian advisory committee on printing and publication considers all manuscripts offered for publication by the Institution or its branches. During the past year 16 meetings were held, at which 101 manuscripts were considered and acted upon. The membership of the committee was as follows: Dr. Leonhard Stejneger, head curator of biology, National Museum, chairman; Dr. C. G. Abbot, director of the Astrophysical Observatory; Mr. Ned Hollister, superintendent of the National Zoological Park; Mr. A. Howard Clark, editor of the Institution, secretary of the committee; Mr. F. W. Hodge, ethnologist in charge of the Bureau of American Ethnology; and Dr. George P. Merrill, head curator of geology, National Museum.

LIBRARY.

The main purpose of the library of the Smithsonian Institution has been to assemble a collection of periodicals and publications of a scientific nature as well as the journals and other publications of the scientific institutions and learned societies of the world, the whole to be a library of reference for research in the broadest sense. In carrying out this policy an accumulation of over half a million titles has been made, the main part of which is housed in the Library of Congress with the designation of the Smithsonian Deposit of the Library of Congress. In addition to this main part of the Smithsonian library there are maintained a number of smaller libraries at the various branches of the Institution, the National Museum library, the Bureau of American Ethnology library, the Astrophysical Observatory library, and the National Zoological Park library. In the various offices of the Institution and the Museum sectional libraries of technical works in all branches of science are maintained for the use of the scientific staff. There are 35 of these sectional technical libraries.

The accessions to the libraries of the Institution and its branches during the year aggregated more than 9,000 volumes, parts of volumes, and pamphlets. Among important gifts during the year was a first consignment of 561 volumes and 293 pamphlets, part of the botanical library of Dr. John Donnell Smith, of Baltimore; the whole of which, amounting to 1,500 volumes, he has offered to the Institution.

In the Museum library, 1,572 volumes and 3,556 pamphlets were accessioned during the year, among them the scientific library of Dr. Edgar A. Mearns, associate in zoology, who died last fall. This collection is rich in works on mammals, birds, and plants. Through the continued generosity of Dr. William H. Dall, honorary curator of mollusks, the sectional library of the division of mollusks, has been enriched by the addition of 307 titles during the year.

RECEPTION IN HONOR OF FRENCH SCIENTISTS.

On the evening of June 14, under the auspices of the National Academy of Sciences, a reception was held in the Smithsonian building for the members of the French Scientific Mission to the United States. Prof. Charles Fabry told of what France is doing in the war; Commander Bridge spoke of Great Britain's work in submarine warfare; and Sir Ernest Rutherford sketched the situation as England sees it. President Walcott, of the National Academy of Sciences, and Mrs. Walcott were assisted by Lieut. Maurice Paternot, Prof. Charles Fabry, and Prof. Henri Abraham in receiving the guests.

NATIONAL MUSEUM.

One of the most important features to be recorded in the operations of the National Museum during the year was the actual beginning of the building for the Charles L. Freer Art Collections. Excavation was started on October 2, 1916, and by June 30, 1917, the foundations and concrete walls inclosing the subbasement had been completed. The structure, covering 228 by 185 feet, will be of Milford granite and in exterior and interior design best adapted to its purpose. Assistant Secretary Rathbun in the appendix to the present report gives some interesting details regarding this addition to the Smithsonian group of buildings. The construction of this art building is made possible through the most generous gift of \$1,000,000 by Mr. Freer for the housing and study of the magnificent collection he has presented to the Nation. His gift of the building and collection is the most valued donation which any individual has ever made to the Government.

The accessions to the National Museum collections during the year aggregated about 200,000 specimens pertaining to anthropology, zoology, botany, geology and mineralogy, paleontology, textiles and woods, mineral technology, and objects of art. In his report Assistant Secretary Rathbun enumerates the sources and importance of these accessions, so that it is not necessary here to do more than to mention some of the principal items. Interesting collections of anthropological objects were received from the island of Celebes, gathered at the expense of Dr. W. L. Abbott, who for many years has most generously contributed toward the growth of the Museum in ethnological and biological material from various parts of the world. Dr. Abbott personally visited the West Indies during the year and met with gratifying success in adding to our knowledge of the early history of man and of the fauna of that region. A large collection of stone implements belonging to the ancient town builders of Mexico was received through Capts. Wright and Cooper of Gen. Pershing's expedition, and extensive archeological collections from the Southwestern States were gathered by Dr. Fewkes and others connected with the Bureau of American Ethnology. Hundreds of objects of great value in the study of physical anthropology came to the museum as the result of explorations by Dr. Hrdlička and others in Peru.

To the division of American history memorials were added pertaining to eminent military and naval men and other prominent Americans and objects commemorative of historic events, besides costumes, furniture, and other articles illustrative of colonial and later periods.

Although the Museum is without funds for carrying on extended biological explorations, yet through the generosity of friends it has been greatly enriched by the results of field work in various parts of the world, particularly the work of Dr. W. L. Abbott so often mentioned heretofore. A large and fine collection of reptiles and batrachians came as a bequest by the late Julius Hurter, sr., of St. Louis.

To the botanical collections were added about 25,000 specimens and the remnant of the botanical library saved from the flood which so nearly destroyed the Vanderbilt Herbarium at Biltmore, N. C., in July, 1916. These objects were presented by Mrs. Vanderbilt. Prof. O. F. Cook gave to the Museum about 15,000 specimens of cryptogams gathered in the United States and Liberia.

In geological material, likewise, and in the department of textiles, mineral technology, and other divisions of the Museum, there were important additions described by the assistant secretary.

The attendance of visitors to the Natural History building aggregated about 400,000 and the Arts and Industries building about 250,000.

In calling attention to the present needs of the Museum, I may mention the fact that on account of the great growth of the collections during the last few years there is already presented a lack of exhibition and storage facilities in some of the departments, particularly in connection with the applied arts, the fine arts, and American history. It is exceedingly gratifying that the accessions should increase in such great proportions from year to year, but it is likewise important that there be a corresponding increase in the number of the scientific staff and other employees necessary for the proper care and study of this mass of material made up in great measure through gifts by the people of the Nation.

BUREAU OF AMERICAN ETHNOLOGY.

The Bureau of American Ethnology, which conducts ethnological researches among the American Indians and the natives of Hawaii, is under the direction of Mr. F. W. Hodge, whose report is given in Appendix 2.

Among the important researches of the year was the excavation and study of Hawikuh, a large reservation on the Zuñi Reservation in western New Mexico. This work was carried on by Mr. Hodge in cooperation with the Museum of the American Indian, Heye Foundation, of New York City. The purpose of the excavation of Hawikuh was to study a Zuñi pueblo, known to have been inhabited from prehistoric times well into the historic period, to determine as far as possible the character and arts of the Zuni people

in early times, as well as the effect of Spanish contact during the sixteenth and seventeenth centuries. The results of this important study, which were highly successful, will be published in the near future.

In the Mesa Verde National Park Dr. J. Walter Fewkes excavated and repaired a large rectangular ruin, 100 by 113 feet, to which he gave the name of Far View House, by reason of its commanding situation on the mesa. The most important result of the study of this structure is the revelation of a new type of Mesa Verde building, the form and character of which throws light on the close relation of pueblos and cliff dwellings. Dr. Fewkes believes that this structure is the only example of a pure type of pueblo ever completely excavated, the term "pure type" meaning a terraced community building constructed of shaped stones and having circular kivas, or ceremonial rooms, united with surrounding rectangular rooms. This type of pueblo may be considered a stage in architectural development between the older type of structure and the mixed or modern form which shows a retrogression in the art of masonry.

Mr. J. N. B. Hewitt, while conducting studies in Canada relative to the Iroquois League, was selected as an official delegate from the council of the Six Nations to attend a condolence and installation ceremony at Muncietown, in which he took a leading part, requiring the intoning of an address of comforting in the Onondaga language and also in acting the part of the Seneca chiefs in such a council.

Among the special researches carried on during the year may be mentioned the completion of the manuscript on the ethnology of the Kwakiutl Indians by Dr. Franz Boas, honorary philologist. Work is nearly completed on the results of the field work on the Salishan language, carried on through the generosity of Mr. Homer E. Sargent, of Chicago, by Mr. James Teit. The study of Indian music has been continued by Miss Frances Densmore, sufficient data now being on hand to complete a work on the music of the Ute Indians, among whom Miss Densmore has now spent two field seasons.

The bureau has published during the year one annual report, two bulletins, and a list of publications of the bureau. In press or in preparation at the close of the year were four reports and eight bulletins. The library of the bureau accessioned 435 new books and 388 pamphlets.

INTERNATIONAL EXCHANGES.

The International Exchange Service, for the exchange of governmental and scientific publications with other countries, though very much hampered in its operations by war conditions, has nevertheless handled during the year a total of 268,625 packages, weighing 290,193

pounds. On account of the very high ocean freight rates Congress allowed a small additional appropriation to meet the expense of foreign shipments.

Suspension of shipments is still found to be necessary in the case of about 10 countries. It is gratifying to note that since the beginning of the war only three shipments sent out by the Institution have been lost through hostile action, two of these being on vessels sunk by hostile warships. Wherever possible duplicate copies of the publications in lost consignments are procured and another shipment made.

It has been the custom of the Government of India to refer requests from establishments in this country for Indian official documents to the Exchange Service for indorsement, and this year a request for similar services by the director of the Government press at Cairo, Egypt, has been granted.

NATIONAL ZOOLOGICAL PARK.

The National Zoological Park is each year becoming more and more recognized as a means of natural history education and as a place of recreation and amusement for the public, and the collection of animals is now one of the most varied and interesting of its kind in the country.

In October, 1916, Dr. Frank Baker, superintendent of the park for 26 years, resigned to take effect November 1, and was succeeded by Mr. Ned Hollister, assistant curator of the division of mammals in the National Museum.

The total number of animals in the park at the close of the fiscal year was 1,223, including 484 mammals, 683 birds, and 56 reptiles. Among important additions may be mentioned five adult Rocky Mountain sheep received from the Canadian Government; four Bedford deer, or Manchurian stags, from the Duke of Bedford; and some desirable Australian marsupials presented by Mr. Victor J. Evans, of Washington, D. C.

Visitors to the park during the year numbered 1,106,800, a daily average of 3,032. One hundred and fifty-three schools and classes examined the collection for educational purposes.

Among recent improvements the superintendent notes that the hospital and laboratory on which work has been in progress for the past two years, now lacks only the laboratory equipment for the use of pathologists, and the outside yards for the animals to be confined in the hospital limits. The lake for North American water fowl has been enlarged and reconstructed to show as many as possible of these birds in their natural surroundings. At present no less than 136 American water birds of 24 species are to be seen in the lake.

Every effort is being made to make the park a sanctuary for native wild birds. Over 100 nesting boxes have been put in place and during the cold weather food is provided, resulting in a notable increase in the bird population of the park.

As noted in last year's report, the appropriation made by Congress in 1913 for the acquisition of a frontage for the park on Connecticut Avenue, lapsed owing to delays caused by legal complications, and it is regretted that Congress has not made a new appropriation for this purpose. As the principal entrance to the park will probably be on Connecticut Avenue for all time, it is exceedingly important that the land in question be acquired before it is too late.

Among the imperative needs of the park, the superintendent mentions some provision for the parking of the increasing number of automobiles that visit the Zoo, outdoor dens for carnivorous animals, additional ponds for waterfowl, a bird house, and a reptile house. The most urgent need, however, is a substantial increase in the general appropriation. Owing to the steady advance in the cost of supplies and the increasing expense occasioned by the larger number of visitors, the point has now been reached where the entire appropriation, which has remained the same for the past seven years, does not cover actual maintenance expenses.

For some years past the National Zoological Park, in common with other similar institutions in the United States, has felt the effect of conditions that operated to hinder more and more the importation of wild animals from abroad and to reduce the supply.

At the suggestion of Dr. W. T. Hornaday, director of the New York Zoological Park, a conference was held at the Philadelphia Zoological Garden to consider the question of sending a joint expedition, on behalf of the New York, Philadelphia, and National Zoological Parks, to South Africa for animals. It was decided to send a man out to look the ground over, see what could be done in the way of arranging for a supply of animals for the future, and bring back anything desirable that could be secured at the time. Mr. J. Alden Loring, who had been successful in bringing animals from Europe for the New York Zoological Park, and had also had experience in Africa as a member of the Smithsonian expedition to East Africa, was selected to make the trip.

Mr. Loring sailed from New York July 22, 1916, taking with him hay and grain enough to feed as many antelopes and other herbivora as he was likely to obtain, for one of the conditions necessary to secure their entry into the United States was that no forage from Africa should be brought with the animals. He arrived at Port Elizabeth, South Africa, August 31, and, returning, sailed from Durban November 22.

The opportunities for securing animals to bring back were found to be in some respects less favorable than had been anticipated, but fortunately the zoological garden at Pretoria was fairly well stocked, and the director was kind enough to deplete the collection somewhat for the benefit of his distant colleagues. Most of the animals which Mr. Loring brought back were obtained there, an interesting collection of mammals and birds being secured. The mammals obtained include a gemsbuck, a blessbuck, a white-tailed gnu, a nilgai, four springbucks, a pair of duikers, a pair of meerkats, and a few monkeys and rodents. Among the birds are two secretary vultures, a bateleur eagle, a hornbill, francolins of several species, a few touracous and hawks, and a number of smaller birds. The collection has been divided between the three institutions concerned, according to their choice, and in proportion to the share of the expenses that was borne by each. Altogether there were secured 28 mammals, representing 13 species; 60 birds, of 25 species; and 55 snakes and tortoises, of 8 species.

While in South Africa, Mr. Loring visited and made notes on the zoological gardens at Cape Town, Durban, Bloemfontein, Johannesburg, and Pretoria.

ASTROPHYSICAL OBSERVATORY.

Measurements of solar radiation were continued as usual on Mount Wilson. As stated in connection with the Hodgkins fund, an allotment has been made to undertake similar work in South America. Much attention was devoted by Director Abbot to the preparation of the equipment of this expedition. Valuable new instruments were devised and constructed under his direction. Owing to war conditions the expedition was located temporarily at Hump Mountain, N. C., in May, 1917, and shelters prepared and apparatus set up and adjusted under the care of Messrs. Abbot and Aldrich. The research on the absorption of terrestrial radiation by vapors of the atmosphere, upon which Mr. Fowle has been engaged for several years, has been completed, and the results, which are of great importance to meteorology, have been made ready for publication by the Institution. A paper of uncommon interest, by H. Helm Clayton, based upon observations by the Astrophysical Observatory, has been published in the Smithsonian Miscellaneous Collections. The author shows that the short-interval solar variations, discovered in Mount Wilson work, affect terrestrial temperatures and pressures the world over in a well-marked and predictable manner. It is greatly to be hoped that daily solar-radiation observations at all times of the year may be obtained for use in such meteorological researches. It was for this purpose that the South

American expedition was planned, and it will be unfortunate, indeed, if war conditions should long delay the carrying out of this work.

POSSIBILITY OF FORECASTING FROM SOLAR OBSERVATIONS.

As Dr. Clayton has shown that variations of the sun are followed a day or two later by correlated variations of temperature, it is of interest to inquire if the fluctuations of temperature thus caused are large enough to be worth predicting. From Clayton's curves it seems to be shown that in 1913 and 1914 changes of solar radiation of 1 per cent produced changes of maximum temperatures as follows:

Pilar, Argentina.	+5.2° C.
Manila, Philippine Islands.	+1.5° C.
Winnipeg, Canada.	-6.3° C.

It may be supposed that the mean temperatures changed half as much, or +2.6°, +0.75°, and -3.15° corresponding to 1 per cent rise of solar radiation. Changes of 3 per cent or even 5 per cent in solar radiation within 10 days are not very uncommon. For instance, note the following values of "solar constant" observed on Mount Wilson in 1911:

Date, Sept.	3	4	5	6	7	8	9	10	11
Value-----	1.888	1.906	1.917	1.960	1.938	1.993	1.948	1.908	1.892

The observed range was 5.5 per cent in 8 days.

Obviously, the subject presents possibilities that when sufficient observing stations are equipped in various cloudless regions to yield accurate "solar constant" values every day, it may be possible to forecast for one or two days in advance a very considerable part of the now outstanding temperature fluctuations. At present the two stations of the Smithsonian Institution in California and North Carolina are the only ones making the required solar observations, and not in half of the days in the year, especially in midwinter and midsummer, can observations be made on account of cloudiness. A bequest of \$500,000 would enable the Institution to equip and maintain indefinitely the required observing stations.

INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

As the greater part of the countries supporting regional bureaus of the International Catalogue of Scientific Literature are now actually engaged in hostilities, a great deal of difficulty has been encountered in preparing and financing the Catalogue. The number of scientific papers being published has greatly decreased and it has been found practically impossible to obtain the necessary scientific and clerical assistance for the preparation of the Catalogue. However, the Central Bureau at London has succeeded in issuing four

volumes, the twelfth annual issue of geology, and the thirteenth annual issue of chemistry, anatomy, and botany. This brings the total number of volumes published since the inception of the Catalogue in 1901, up to 216 volumes containing about three million references to current scientific periodicals. The organization as a whole is holding together very well under extremely adverse conditions, and when peace is declared it will be necessary only to resume, rather than reorganize the work.

It is becoming more and more difficult to draw the line between pure science and applied science, and the present limitation of the Catalogue to pure science should be broadened to include at least some of the applied sciences which are advancing with such great strides. Although this would increase the size and cost of the Catalogue, yet its enhanced value would by increasing the demand for it and consequently its sale, offset any additional cost.

Respectfully submitted.

CHARLES D. WALCOTT, *Secretary.*

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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 for the fiscal year ending June 30, 1917:

INTRODUCTORY.

In the last report it was stated that Mr. Charles L. Freer had made arrangements for the immediate erection of the building to house the valuable collections of American and Oriental art which he has presented to the Nation through the Smithsonian Institution, and also that the preliminary plans had been approved, the site selected and the necessary funds, amounting to \$1,000,000, transmitted by him to the Institution. It is exceedingly gratifying to announce that the detailed plans having been sufficiently advanced by that time the work of excavating was begun on October 2, 1916, and by the close of the fiscal year the foundations, including the concrete walls inclosing the subbasement, had been completed.

This addition to the Smithsonian group of buildings, with a frontage of 228 feet, a depth of 185 feet, and a height of 46 feet, and containing an open central court about 65 feet square, will present an exterior of pink granite from quarries at Milford, Mass., a stone which has been employed with good effect for several prominent structures in Washington. Above the ground level it will consist only of a basement and main story, the former lighted by windows, the latter almost wholly by skylights, leaving the upper part of the walls essentially unpierced except for the entrances, of which that on the north front comprises three large arched openings. The location, at the corner of Twelfth and B Streets S. W., between the buildings of the Smithsonian Institution and the Department of Agriculture, seems to assure favorable surroundings for the future, as there is slight probability of intrusion by any high or otherwise objectionable constructions in that vicinity.

Not only beautiful and effective in general design, but showing in interior plan a thorough adaptation to the requirements of the collections both as to space and to lighting, with such facilities as will make it practically an independent unit of the Smithsonian group, the character of the construction work so far as it has been

carried leaves nothing to be desired in respect either to enduring quality or to interpretation of the architect's conception.

The subbasement will contain the appliances connected with the heating, lighting, and ventilation of the building, but steam and electric current will be supplied from the central plant of the Museum. In the basement, which will be a well-lighted story, will be located large studios and rooms for the storage of such parts of the collections as are not on exhibition, a capacious lecture hall, an office for the curator, and work and comfort rooms, furnishing, in fact, all necessary conveniences for administration, for serious study, and for popular instruction.

The main story will be entirely devoted to exhibition purposes and be divided into 19 rooms, each designed for a particular subject or class of objects, reached by wide corridors. The Whistler collection will occupy five of these rooms, in one of which the decorations of the famous Peacock Room will be installed. The central court, to contain a fountain, will be a special feature of this story, large, arched openings lighting the adjoining corridors and loggias. The entire available floor space of the main and basement stories will aggregate some 55,000 square feet, about equally divided between the two floors.

It will be recalled that this building is designed to accommodate only the Freer collections and to provide for the study and appreciation of their varied contents which supply a vast amount of material for research work by specialists. As an integral part of this specific gift of art, the most important and valued donation which any individual has ever made, freely and unconditionally, to the Nation, it can not be otherwise employed. Its completion, an event anticipated for the fiscal year 1918-19, while insuring an incalculable gain for the Museum and the public, will not, therefore, satisfy any of the needs, set forth in the last report, in respect to additional space for the national collections of both the applied and the fine arts, as also of American history. The valuable materials in these departments, which have long since been seriously overcrowded, can at present be neither properly utilized nor appropriately brought to the attention of the public. In one branch especially, that of the industrial arts, it is unfortunate that such a condition should now exist, particularly as it is coupled with lack of means for securing an adequate staff of practical experts, as the collections are closely associated with many of the vital problems now confronting the country. With its limited facilities, however, an effort is being made to demonstrate the value of Museum work in time of crisis, and contributions made since the close of the year but in time to mention the fact of their publication here, have been recognized as of great national importance by those high in authority.

COLLECTIONS.

The additions to the collections, received in 1,450 accessions, aggregated approximately 195,845 specimens and articles, classified by subjects as follows: Anthropology, 10,775; zoology, 71,761; botany, 79,155; geology and mineralogy, 9,800; paleontology, 23,190; textiles and woods, 933; mineral technology, 213; and National Gallery of Art, 18. Many loans were also accepted for exhibition, chiefly in the Gallery of Art and the division of American history; and 906 lots of material, consisting mainly of rocks, ores, minerals, and zoological specimens were received from various parts of the country for examination and report.

Anthropology.—A varied collection from the island of Celebes, made by Mr. H. C. Raven and presented by Dr. W. L. Abbott, and a large number of objects exhibiting every phase of the textile art as practiced among the Indians of British Guiana, assembled by Dr. Walter Roth, constituted the most important accessions in ethnology. Pertaining to aborigines of the North American Continent were rare Papago Indian baskets, baskets of interesting weaves and designs, carved and painted house posts, etc., from the Quileute Indians of Washington; articles of ivory, horn, wood, bark, and stone from Eskimo and British Columbian tribes; and many objects pertaining to the Pueblo Indians of Arizona and New Mexico. Other acquisitions were from Mexico, Central America, Abyssinia, Japan, China, and the Philippines.

Especially noteworthy was a large collection of antiquities made by Capts. John W. Wright and Alexander T. Cooper, United States Army, while with Gen. Pershing's expedition in the State of Chihuahua, Mexico, comprising nearly every variety of artifact of stone belonging to the ancient mound builders of that region.

Explorations under the Smithsonian Institution resulted in extensive archeological collections from the Mesa Verde National Park, Colo., and from old Zuni ruins near Gallup, N. Mex., made by Dr. J. Walter Fewkes; from ancient pit villages in New Mexico and ruins at Awatobi, Ariz., made by Dr. Walter Hough; from sites of prehistoric adobe dwellings in western Utah, made by Mr. Neil M. Judd; and from a cave in the southern wall of Cibollita Valley, N. Mex., made by Mr. F. W. Hodge. Dr. W. L. Abbott presented much valuable archeological material obtained during his investigations in Santo Domingo, and among the smaller accessions were many rare specimens from North and Central America.

Hadji Ephraim and Mr. Mordecai Benguiat made important additions to the rich collection of antique Jewish objects lent by them during previous years. Included in a valuable gift from the estate of the late John Chandler Bancroft Davis were necklaces,

scarabs, figurines, and Ptolemaic coins from Egypt, a sculptured brick from the Colosseum at Rome, and marble and terra-cotta vases. From Miss Isobel H. Lenman were received as a loan a collection of ancient glassware, comprising bottles, flasks, bowls, cups, tear bottles, bracelets, beads, and other articles, displaying the marvelous iridescence characteristic of the ancient glassware of Syria and Phoenicia.

The principal accession in physical anthropology consisted of material obtained in Peru by Dr. Aleš Hrdlička in 1915 in connection with the assembling of exhibits for the Panama-California Exposition. It includes hundreds of objects of great value, among which are many specimens representing rare and in some instances unique anatomical features. Besides an excellent series of brains of gorillas and chimpanzees from the Cameroons and casts of the Sivapithecus remains from India, aboriginal skulls and other bones were received from the vicinity of Vero and Fort Myers, Fla., representing the supposedly very ancient man of that region, from ancient mounds in Utah and the Mesa Verde ruins in Colorado, from Tennessee and Illinois, and from Colombia and Hawaii.

Among the many acquisitions in the division of mechanical technology were rare watch movements; early pieces of apparatus relating to the invention and history of the telegraph, the telephone, the telautograph, the phonograph, and the graphophone; a Howe sewing machine, which sewed the first seam done by machinery; and numerous interesting firearms, some of early make.

To his previous munificent donation, illustrating the history and development of the pianoforte and including dulcimers, spinets, clavichords, harpsichords, and organs, Mr. Hugo Worch added 28 pieces, increasing the extent of this remarkable collection to 117 instruments.

An instructive addition to the exhibition series in graphic arts was a life-size figure of a Japanese wood-cut printer at work, the outfit, complete in every detail, having been a gift from the Imperial Government of Japan. A much earlier stage in the development of graphic methods is illustrated by an original Mexican painting, executed on a sheet of palmetto fiber smoothly surfaced with white clay. Among other interesting acquisitions were one of the earliest forms of the machine for casting linotype slugs; materials of the various kinds employed in miniature painting, with examples of miniature work on ivory, parchment, and porcelain; and a series of specimens illustrating processes in making line-cut and halftone engraving.

American history.—The most notable memorial accession consisted of a large number of relics of Admiral David G. Farragut, United States Navy, including a jeweled sword presented by the Union

League Club of New York and a portrait of Farragut by William Swain, which were received as a donation from the estate of the late Loyall Farragut, only son of the Admiral. Other officers of the Navy represented by contributions were Commodore Stephen Decatur, Commodore John Rodgers, and Rear Admiral C. M. Chester. Among the furniture secured for the collection were pieces which had belonged to Presidents Washington and Jefferson, President and Mrs. Madison, and Charles Cotesworth Pinckney, American minister to France in 1796-1798. To the large series of medals awarded Commander Matthew Fontaine Maury in recognition of his services to science, and placed in the Museum by several of his descendants, was added the ribbon of the Grand Cross of the Order of Our Lady of Guadalupe, presented by Emperor Maximilian of Mexico in 1866, a gift from Mrs. Mary Maury Werth.

For the gift of the wedding dress of Harriet Lane Johnston, niece of President Buchanan, for several years shown in the section of historical costumes, the Museum was indebted to Miss May S. Kennedy. Other hostesses of the White House represented by costumes more or less complete, lent during the year for incorporation in the central feature of the hall, were Mrs. Martha Jefferson Randolph, daughter of President Jefferson; Mrs. Martha Johnson Patterson, daughter of President Johnson; and Mrs. Theodore Roosevelt. Among interesting relics were a silk dressing gown of Lafayette, an eiderdown quilt used by Jefferson, a beaded bag of Mrs. James Monroe, and a handkerchief that had belonged to Queen Anne.

A large number of decorations, medals, and badges of the United States and foreign countries, which had been assembled by the late Lieut. Thomas Kelly Boggs and were presented by Mrs. Boggs, formed a very gratifying addition to the numismatic collection. The greater part of these tokens are foreign war decorations of very timely interest, and 23 countries are represented. The philatelic collection was augmented to the extent of 3,398 specimens, mainly received through the Post Office Department, and including 1,893 examples of new issues of stamps from countries in the Universal Postal Union.

Biology.—Through the generosity of friends the department of biology was greatly enriched by the results of field work in different parts of the world, adding new genera and species and many forms not previously represented in the Museum. Mr. H. C. Raven, under a further grant of funds by Dr. W. L. Abbott, continued his collecting on the island of Celebes, sending to Washington about 900 mammal skins, besides over 1,000 specimens each of birds and mollusks. Dr. Abbott personally spent some time in Haiti, where he obtained many birds, including species whose occurrence on that island was unexpected, reptiles, and mollusks, and also a large quantity of bones

of mammals from prehistoric kitchenmiddens. The study of similar deposits on this and other islands of the Antilles was an interesting feature of the year's activities, a large collection of bones gathered by Mr. Theodoor de Booy in Cuba, Santo Domingo, and the Virgin Islands, and presented by Mr. George G. Heye, having yielded new genera of rodents, birds, and reptiles, which have apparently become extinct within comparatively recent times.

As the proceeds of an expedition to Cuba and Haiti by Mr. John B. Henderson, accompanied by Dr. Paul Bartsch, the Museum received from Mr. Henderson numerous birds, reptiles, and fishes, and over 15,000 land and marine invertebrates, mostly mollusks. Mr. F. J. Dyer, American consul at Ceiba, Honduras, contributed a large number of insects and mollusks from that country; and Mr. Arthur de C. Sowerby transmitted mammals, birds, crustaceans, and mollusks from northern China and Manchuria.

The Bureau of Fisheries deposited, as usual, valuable collections of fishes and marine invertebrates, besides many interesting specimens of mammals, birds, and reptiles. Among the fishes were 72 types, cotypes, and paratypes, 40 of which were of species obtained on the Philippine cruise of the steamer *Albatross* in 1907-1911. The marine invertebrates, numbering several thousand specimens, included recently described type collections of annelids and parasitic copepods. Transfers, chiefly of mollusks and crustaceans, aggregating over 400 specimens, were made by the Biological Survey and Bureaus of Entomology and Plant Industry of the Department of Agriculture.

Exceptionally noteworthy was a bequest to the Museum by the late Julius Hurter, sr., of St. Louis. An enthusiastic collector, he had gathered one of the largest and finest private collections of reptiles and batrachians in existence. Its principal scientific value lies in its splendid series of Missouri forms which served as the basis for Mr. Hurter's "Herpetology of Missouri," published in 1911. Not solely confined to that region, however, it contains valuable material from various parts of the world, and most of the important subdivisions of the group are represented.

From the Santa Marta Mountains in Colombia were received 149 specimens of birds, which added 6 species new to the Museum, and from Panama, 213 specimens of reptiles and batrachians, the latter collected by the Smithsonian biological survey of the Canal Zone. Mr. James Zetek transmitted 769 specimens of mollusks and other marine invertebrates from Panama, and Prof. G. S. Dodds, of the University of Missouri, presented a large number of Entomostraca, representing 55 species, collected in 124 lakes and ponds in Colorado and forming the basis of a paper which he had published.

The Bureau of Entomology was the principal contributor of insects, transferring about 3,000 specimens of various orders. The material from American Consul Dyer in Honduras has already been mentioned. The other more important accessions comprised Lepidoptera from Peru, Mexico, and Alaska; Hymenoptera from western Argentina, and a collection of miscellaneous insects from Mount Kinabalu, British North Borneo.

The additions to the botanical collections exceeded 79,000 specimens, including about 25,000 specimens from the Vanderbilt Herbarium at Biltmore, N. C., comprising all that were saved from the disastrous flood of July 15, 16, 1916. This valuable herbarium, which was established and maintained for many years by the late George W. Vanderbilt, contained at the time of the flood upward of 100,000 specimens, and was especially noteworthy for its representation of the plants of the southeastern United States. This accession, which was accompanied by the remnant of the botanical library attached to the herbarium, was a gift from Mrs. Vanderbilt.

Another notable accession consisted of about 15,000 specimens of cryptogams, mainly mosses, hepatics, fungi, and myxomycetes, from the northeastern United States and Liberia, presented by Prof. O. F. Cook. The Department of Agriculture deposited over 5,800 specimens, resulting principally from field work of the Bureau of Plant Industry and including many tropical American palms and Alaskan and Hawaiian plants. Through exchanges, important collections were obtained from the New York Botanical Garden, the Gray Herbarium of Harvard University, the Missouri Botanical Garden, the British Museum, and the Bureau of Science at Manila. A gift of about 1,000 Venezuelan plants was received from the Carnegie Institution of Washington, and about 5,000 specimens were collected in New Mexico for the Museum by Mr. Paul C. Standley, assistant curator.

Geology.—The Charles U. Shepard collection of meteorites, the bequest of which was announced in the last report, was formally transferred to the Museum during the year, and constitutes one of the most important accessions ever acquired by the department of geology. It comprises 238 falls and finds. Additional specimens of meteorites to the number of 26 were obtained by gift and exchange, and there were many acquisitions of valuable ores and rocks from various localities.

The more prominent accessions of minerals, as also of petrological material, were from the Geological Survey. Among the former, were a fine large series illustrating the occurrence of turquoise, a number of amethyst crystals, many semiprecious stones, and a large number of minerals and rocks collected in connection with studies of the gem deposits of southern California. Among the latter were

extensive collections of rocks and ores representing geological researches in several districts in the western United States.

From other sources were obtained many rare as well as some instructive series of minerals and a number of showy specimens especially desired for exhibition. Among these were type specimens of stevensite and creedite, material illustrating the genesis of the zeolites and their association with glauberite cavities, a remarkable specimen of glendonite from Australia, an exceptionally large crystal of iron pyrite and a fine specimen of crystallized anglesite.

The principal acquisitions in invertebrate paleontology were a collection of Silurian fossils, transferred by the Geological Survey, which had formed the basis of papers illustrating the geology and paleontology of Maine, the types of nine species of Paleozoic crinoids, a series of rare and recently described insects from the Tertiary rocks of Colorado, several hundred species of European invertebrates, and about 2,000 specimens of Lower Ordovician fossils from the zinc mines of Arkansas.

A collection of Permian vertebrates from Baylor County, Tex., contains the greater part of a skeleton of the large finbacked reptile *Dimetrodon*, complete enough to mount for exhibition, besides remains in less perfect condition of the same form and of *Cardiocephalus*, *Lyosorophus*, *Diplocaulus*, *Seymouria*, and *Labidosaurus*, and many bones of small reptiles and batrachians. The skull and lower jaw of a fossil horse, the type of a recently described species, from the Pleistocene gravels of the Yukon Territory, and part of the skull of a fossil muskox from the Pleistocene of Miami County, Ind., were also obtained.

About 400 specimens of small mammalian remains of rare forms from cave deposits in the mountains of western Cuba were collected for the Museum by Mr. William Palmer, and a large part of the skeleton of an extinct and probably undescribed species of bird was received from the Geological Survey. Goucher College, of Baltimore, deposited a collection of reptiles and cetacean remains from the Arundel formation of Maryland, bringing together in the National Museum practically all of the known vertebrate material from that formation in Maryland.

Secretary Walcott and party spent the summer and early fall on the Continental Divide between Alberta and British Columbia, south of the Canadian Pacific Railway, and besides extensive geological observations collected about 1,000 pounds of Cambrian material containing fossils, which were shipped to Washington.

Textiles.—The accessions in the division of textiles comprised many excellent examples of the present-day productions of American textile industries. The largest group of specimens received consisted of the most important types of cotton threads, arranged to show the

various ways in which they are wound and put up for family and factory use. They were accompanied by several beautiful examples of tatting, crochet, embroidery, and cut work, in white and colors, suggesting artistic and practical uses for many of the threads in the series, and supplemented an extensive series of models and machine parts illustrating the manufacture of cotton thread previously received from the same contributor.

The hearty cooperation of many American manufacturers has continued to keep the collections supplied with new types and designs of dress goods as soon as these novelties appear on the market. The exhibits illustrating the principal methods used in decorating fabrics were enriched by numerous examples of tied and dyed work and many samples of skein-dyed plaid silks for comparison with piece-dyed and printed fabrics.

Fresh samples of the standard types of ribbons commonly used and many beautiful specimens of novelty and fancy ribbons, showing Aztec, Indian, Chinese, and Byzantine designs, augmented the ribbon section. The adaptability of mohair, by reason of its luster and resiliency, to the manufacture of plushes, velvets, and fur fabrics was shown in an instructive series of specimens comprising upholstery goods, cloakings, trimmings, and automobile rugs. Examples of household industry in the textile arts of a former period were received in the form of hand-woven coverlets and quilts, while valuable specimens of foreign hand-worked textiles from China, Spain, and Germany were added to the collection through friends of the Museum.

Additions were obtained for the collection of implements illustrating the preparation and use of flax and other fibers in former times, including an old wooden rope machine which had seen many years' service in twisting bed cords and wash lines. The utilization of pine needles in the manufacture of coiled baskets and of split-palm stems for large pack baskets was shown in other accessions.

Wood technology.—Although circumstances greatly retarded the progress of work in wood technology, some interesting exhibits were secured. A model measuring 12 by 15 feet and contributed by the Forest Service is designed to show the various important uses of the national forests and their administration. A comprehensive cork exhibit covers every phase of the industry from the raw bark to the many articles made from this substance, and certain modern methods of preserving wood are represented by a model and samples of the materials employed. Examples of 15 species of Argentine woods and 49 specimens of woods from Surinam were added to the commercial series of timbers, and the series illustrating wood finishing and tanning materials were also increased.

Mineral technology.—Most important among the additions in mineral technology was an impressive model of the Bingham Canyon copper property in Utah, measuring 16 by 19 feet, accurately sculptured and colored, representing what is probably the most significant mining achievement of the present generation. It was a gift from the Utah Copper Co. The manufacture of white lead is shown in another excellent model presented by the National Lead Co., of New York, while among the models made in the Museum are five visualizing the mode of occurrence, the recovery, and the preparation, respectively, of tin, sulphur, asphalt, lime, and oil. A specimen exhibit illustrative of design and execution in cut glassware, specially prepared for the Museum, was contributed by T. G. Hawkes & Co., of Corning, N. Y., and another series of specimens exemplifying the properties and uses of asphalt came from the Barber Asphalt Paving Co.

Exhibits more or less representative or at least covering some phase of 18 mineral resource types are now available to the public in the halls of the division. Of these, abrasives, asbestos, asphalt, coal and coal products, copper, graphite, lime, mica, petroleum, plaster, Portland cement, and sulphur have been treated with sufficient fullness to warrant the publication of descriptive accounts of them and of their significance.

NATIONAL GALLERY OF ART.

The progress of work in the erection of the building for the Freer collections has already been mentioned. Next in importance in this connection are the terms of the will of Henry W. Ranger, N. A., one of the best-known of contemporary American painters, who died on November 7, 1916, leaving his residuary estate, estimated at over \$200,000, to the National Academy of Design to be held as a permanent fund of which the income is to be used for purchasing paintings by American artists, the paintings so obtained to be given to art or other institutions in America which maintain a gallery open to the public, upon the express condition that the National Gallery of Art shall have the option and right to take, reclaim, and own any picture for its collection provided such option and right is exercised at any time during the five-year period beginning 10 years after the artist's death and ending 15 years after his death.

This generous provision by Mr. Ranger, which has been most gratifying to all lovers of art in this country and may be expected to have a stimulating influence upon the work of American artists, will result in a much wider circulation than hitherto of good American paintings and insure the gradual assembling for perpetual exhibition at Washington of some of the best that our painters can

produce. The system of selection will, in its working, be not unlike that which has been followed by the French Government in Paris, and it is to be hoped that the fund for so worthy a purpose may in time be greatly increased through corresponding action by other public benefactors. The National Gallery contains five of Mr. Ranger's paintings, all of which were presented by Mr. William T. Evans.

Among the permanent acquisitions by the Gallery during the year were the following oil paintings: "June," by John W. Alexander; "On the Lagoon, Venice," by R. Swain Gifford; "Portrait of Benjamin West," by himself; "Portrait of J. J. Shannon, R. A.," by Orlando Rouland; "The Song of the Sea," by William F. Halsall; "Portrait of Ellwood Hendrick," by Augustus Vincent Tack; "Evening," by William J. Kaula; "Landscape," by Chauncey F. Ryder; "A Breton Sunday," by Eugene Vail; "The Happy Mother," by Max Bohm; "Portrait of Maj. Gen. Julius Stahel, U. S. Volunteers," by J. Mortimer Lichtenauer; and "Portrait of Joseph Henry," first Secretary of the Smithsonian Institution, by Henry Ulke. Among the sculptures were a bronze "Statue of Robert Emmet," by Jerome Connor; a bronze figure, "The Fire Dance," by Louis Potter; and a marble statue "The Dying Tecumseh," by Chevalier Ferdinand Pettrich.

An oil portrait of Dr. Charles D. Walcott, recently painted by Ossip Perelma, was deposited by the Smithsonian Institution, as were also large oil portraits of Washington, Jackson, Henry Clay, and W. W. Corcoran, by the Supreme Court of the District of Columbia.

Through the kindness of Mr. Ralph Cross Johnson, many fine examples from his splendid private collection of paintings were continued on exhibition throughout the year, while the collection of Mr. W. A. Slater remained in the Gallery until in December. Seventeen paintings from 11 friends of the Gallery were also added to the general loan collection.

The Gallery held four special loan exhibitions during the year. The most notable of these, given under the auspices of the National Park Service of the Department of the Interior during January and February, and designed to bring to the attention of American tourists some of the marvelous natural attractions of their own country, consisted of 45 oil paintings illustrating scenes mainly in the National Parks and Monuments of the United States, among the 27 artists represented being Albert Bierstadt and Thomas Moran. Assembled in connection with the meeting of the National Parks Conference held in the Museum auditorium from January 2 to 6, this interesting exhibition was opened with a special view on the evening of the second and the majority of the paintings remained on

display until March. It was supplemented by series of photographs, studies in oil, and other pictorial matter shown in several rooms.

The other special exhibitions were as follows: Twenty oil paintings and 1 bronze group, by Edwin Willard Deming, illustrating the old-time Indian, his war, hunting, and religious life and mythology; a collection of 27 oil portraits and other paintings by Orlando Rouland, which was opened on the evening of April 2, and was especially noteworthy for the number of prominent men represented; and a collection of 48 paintings, mostly portraits, by the Russian painter, Ossip Perelma, which began on April 28.

Mention should also be made of the ceremonies attending the presentation to the Gallery by the Emmet Statue Committee of the bronze full-length figure of Robert Emmet by Jerome Connor, which took place in the rotunda of the new building on the afternoon of June 28. A distinguished audience, including the President of the United States and other high officials of the Government, was in attendance and several addresses were made.

MEETINGS AND CONGRESSES.

The accommodations afforded by the auditorium and committee rooms in the natural history building were utilized on many occasions. Three courses of lectures, extending from November to April, were given under the auspices of the Washington Society of the Fine Arts, while three other local societies, the Anthropological Society of Washington, the District of Columbia Dental Society, and the Society of Federal Photographers, also made this building their regular meeting place.

The National Academy of Sciences had its annual meeting in April, and lectures were delivered under the auspices of the Washington Academy of Sciences, the War College, the Audubon Society of the District of Columbia, the Bureau of Commercial Economics, the Washington Center of the Drama League of America, the Shakespeare Society of Washington, and George Washington University.

Several bureaus of the Department of Agriculture made use of the auditorium or committee rooms for conferences and hearings, and meetings were held by four societies representing special fields of agricultural subjects. The exhibition halls in the natural history building were opened one evening for the benefit of the Ohio Corn Boys and Domestic Science Girls, then visiting Washington. Other meetings of a governmental character were as follows: By the National Association of Postmasters, holding its nineteenth annual convention; by the Bureau of Foreign and Domestic Commerce of the Department of Commerce; by the National Parks Conference, under

the auspices of the National Park Service of the Department of the Interior, accompanied by an exhibition of paintings; by the National Research Council; and by the Bureau of Commercial Economics, which gave an exhibition of lantern slides and motion pictures relative to the prevention of contagious diseases, for the benefit of the Council of National Defense. Mr. Eugene E. Thompson addressed the employees of the Institution and its branches on the subject of the first Liberty Loan, and two rehearsals of the Inter-Departmental Chorus in preparation for Flag Day exercises were held in the auditorium.

Receptions were given, on the invitation of the Regents and Secretary of the Institution, on the occasion of a special view of paintings by Mr. Orlando Rouland, and to the Daughters of the American Revolution at the time of their annual congress and the delegates to the eighth annual convention of the American Federation of Arts. The exhibition halls in the natural history building were opened on the evening of June 6 in honor of the visiting Confederate Veterans, Sons of Confederate Veterans, and Daughters of the Confederacy, the receiving party consisting of Secretary and Mrs. Walcott, Miss Mary Lee, and members of the local reception committee.

MISCELLANEOUS.

Over 6,000 duplicate specimens, included in 16 regular sets of mollusks, 19 regular sets of fossils, and a number of special sets, were distributed to schools and colleges. Exchanges for securing additions to the collections involved the use of about 19,500 duplicates, while above 14,000 specimens, chiefly biological and geological, were lent to specialists for study.

The attendance of visitors at the natural history building aggregated 343,183 persons for week days and 63,842 persons for Sundays, being a daily average of 1,096 for the former and 1,227 for the latter. At the arts and industries building and the Smithsonian building, which are open only on week days, the totals were, respectively, 161,700 and 86,336, and the daily averages, 516 and 275.

By the terms of three wills admitted to probate during the year the Museum will be materially benefited, and in another case the testator's desires have already been carried out. Attention has been called to two of these bequests in other connections. That of Henry Ward Ranger is destined to have an important bearing on the future welfare of the National Gallery of Art, while the collection of reptiles left by Julius Hurter, sr., is especially noteworthy and valuable. To the late Miss Sarah J. Farmer, of Eliot, Me., the Museum is indebted for the bequest of the models and apparatus left by her father, Moses G. Farmer, a prominent pioneer in the development of the electrical industries, many of whose inventions have for some

time been represented in the Museum. Through the wishes of the late Rev. Bruce Hughes, of Lebanon, Pa., the Smithsonian Institution becomes the recipient of a small sum, the residue of his estate, to found the Hughes Alcove, which will be established in some form in the Museum and be added to perpetually from the interest on principal.

The publications of the year consisted of one volume of Proceedings, two volumes of Contributions from the United States National Herbarium, and four Bulletins, besides 76 separate papers, all of which were from the Proceedings, except two from the Contributions and two catalogues of special loan exhibitions in the National Gallery of Art. The total number of copies of publications distributed was about 64,000.

The library obtained, by purchase, gift, and exchange, 1,572 volumes, 65 parts of volumes, and 3,556 pamphlets. The more important donations were from Capt. John Donnell Smith, the estate of the late Dr. E. A. Mearns, United States Army, and Dr. William H. Dall.

Respectfully submitted.

RICHARD RATHBUN,
Assistant Secretary in Charge,
United States National Museum.

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

NOVEMBER 10, 1917.

APPENDIX 2.

REPORT ON THE BUREAU OF AMERICAN ETHNOLOGY.

SIR: Pursuant to your request dated July 3, I have the honor to submit the following report of the operations of the Bureau of American Ethnology during the fiscal year ending June 30, 1917, conducted in accordance with the act of Congress approved July 1, 1916, making provisions for the sundry civil expenses of the Government, and with a plan of operations submitted by the ethnologist-in-charge and approved by the Secretary of the Smithsonian Institution. The act referred to contains the following item:

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

In addition to conducting the administrative affairs of the bureau, Mr. F. W. Hodge, ethnologist-in-charge, assisted by Miss Florence M. Poast, continued the preparation of the annotated bibliography of the Pueblo Indians as opportunity offered, adding about 1,000 cards to the 3,800 previously prepared.

SYSTEMATIC RESEARCHES.

In April Mr. Hodge proceeded to New Mexico for the purpose of making final arrangements with the Zuñi Indians for the excavation of the ruins of the large pueblo of Hawikuh, situated on their reservation in the western-central part of the State. This having been accomplished, Mr. Hodge returned to Washington and in the latter part of May again proceeded to Zuñi and established camp at Hawikuh, where excavations were immediately commenced under the joint auspices of the Bureau of American Ethnology and the Museum of the American Indian, Heye Foundation, of New York City, the latter institution bearing most of the expense of the expedition, and assigning Mr. Alanson Skinner and Mr. E. F. Coffin to aid in the work. Authority for conducting the excavations was courteously granted by the Secretary of the Interior.

The excavation of Hawikuh has as its chief object the study of a Zuñi pueblo known to have been inhabited from prehistoric times well into the historic period, for the purpose of determining, so far as possible, the character and arts of the Zuñi people in early times, as well as the effect of Spanish contact during the sixteenth and seventeenth centuries. Hawikuh was one of the famed "Seven Cities of Cibola" of early Spanish narrative, and its history from the time of its discovery in 1539 until its abandonment in 1670 is quite well known. Consequently the information that the ruins may be expected to yield will in all probability shed considerable light on a phase of the culture of a branch of the Pueblo Indians at an important period in their life.

It is not necessary in this brief report to present the results of the Hawikuh excavations, which were successful beyond anticipation in both a subjective and an objective way. It is expected that a summary report on the work, which was still in progress at the close of the fiscal year, will be presented for publication in the near future.

The beginning of the fiscal year found Dr. J. Walter Fewkes, ethnologist, engaged in an archeological reconnoissance in the vicinity of Gallup, N. Mex. Early in July he proceeded to Mancos, Colo., examining ancient ruins en route and commencing intensive archeological work in the Mesa Verde National Park, where he remained until the close of September. These excavations, conducted with the coöperation of the Department of the Interior, were in continuation of the work initiated several years ago, of uncovering and repairing the remains of the more important prehistoric ruins in that great area, thus making them available for study and adding to the park's many attractions.

The scene of Dr. Fewkes's activities during this season was one of a cluster of 16 ruins known as the Mummy Lake group, situated above Soda Canyon. None of the walls of this large ruin projected above the surface of the mound of fallen building stones and other débris covered with sagebrush, but on excavation tee remains were shown to be those of a rectangular pueblo, 100 by 113 feet, with three stories at the north and an annexed court inclosed by a low wall on the south. By reason of its commanding situation, Dr. Fewkes has named this former pueblo Far View House. After clearing the ruin of the great quantity of débris accumulated during centuries, the tops of the walls of the four kivas uncovered were protected with a capping of concrete, and so far as means would permit the walls of other chambers were similarly treated. As a report on Dr. Fewkes's work at Far View House will appear shortly,¹ it is not necessary to present the details here; but it may be mentioned that the most important result

¹ "A Mesa Verde Pueblo and its People," Smithsonian Report for 1916, pp. 461-488, pl. 1-15, figs. 1-7, Washington, 1917.

of the study of this site is the fact that a new type of Mesa Verde structure has been revealed, the form and character of which shed light on the close relation of pueblos and cliff dwellings. Indeed, Dr. Fewkes reports that Far View House is the only known example of a pure type of pueblo ever completely excavated, the term "pure type" signifying a terraced community building constructed of shaped stones and having circular kivas united with surrounding rectangular rooms. Other significant features are the vaulted roofs of the kivas, the supporting beams of which rest on pilasters, and the presence of a ventilator and a deflector in each kiva, as in the case of certain cliff dwellings. As this pure type of pueblo is entirely prehistoric, it may be regarded as representing a stage in architectural development between the older stage of pueblo structures and the mixed type or more modern form in which the arrangement of the rooms and the art of the mason exhibits a retrogression.

On finishing his work at Far View House, Dr. Fewkes visited Utah primarily for the purpose of determining the geographic distribution of ruins in the northern limits of Pueblo culture. This reconnoissance extended to the Uintah Reservation, where hitherto unknown ruins in Hill Canyon, near Ouray, were examined and where a number of stone towers similar to those along San Juan River were found. These ruins, to which Dr. Fewkes's attention was called by Mr. Kneale, agent for the Uncompahgre Ute, are especially striking owing to their unusual situation on eroded rocks of mushroom shape. These towers mark the northernmost limit of Pueblo culture in eastern Utah, and some of them are especially instructive by reason of their relation to prehistoric towers much farther south. An illustrated report on these remains, by Dr. Fewkes, has already appeared.¹

Mr. James Mooney, ethnologist, was engaged in field work among the Eastern Cherokee of western North Carolina at the opening of the fiscal year, and on his return to Washington, August 10, resumed the translation and annotation of the Sacred Formulas of the Cherokee, as well as the identification of the plants, etc., used by the tribe in its medicine and other rites. Mr. Mooney reports this work to be well advanced, but its complicated nature, coupled with the author's ill health during the year, has made progress somewhat slow. Mr. Mooney also spent considerable time in supplying information on technical subjects for official correspondence.

Dr. John R. Swanton, ethnologist, was occupied chiefly with two lines of investigation—the one historical, the other philological. In July and August he made a thorough examination of the Woodbury Lowery and Brooks collections of manuscripts in the Library of Con-

¹ "Archeological Investigations in New Mexico, Colorado, and Utah," Smithsonian Misc. Coll., vol. 68, no. 1, pp. 1-38, May, 1917.

gress bearing on the early Spanish history of Florida, finding many important items for incorporation in his "History of the Southeastern Tribes." In September Dr. Swanton visited the Newberry Library in Chicago, where other valuable early documents were found in the Edward E. Ayer collection, which subsequently were copied for the bureau's use by the courtesy of the librarian. These latter manuscripts include a report on the Indians of Louisiana by Bienville, a Louisiana memoir with an extended description of the Choctaw, and a memoir by the French captain Berenger, containing, besides historical and ethnological information, vocabularies of the extinct Karankawa and Akokisa tribes. A Spanish census of the Indians of Florida after the period of the English invasions should also be mentioned. For some months after his return Dr. Swanton was engaged in adding to his monograph the historical notes thus obtained, and in copying and translating the more important parts of the manuscripts mentioned, including all of the Berenger memoir.

Although Dr. Swanton's History of the Southeastern Tribes had been completed a year ago, so far as the information was then available, the manuscript discoveries described have enabled him to augment and to improve it substantially, and more recently he has obtained some supplementary notes from the Louisiana Historical Society. The preparation of the maps to accompany the monograph, chiefly from early sources, did not progress as satisfactorily as was hoped, owing largely to pressure of other illustration work, but they are now practically finished.

Dr. Swanton's second paper, also referred to in last year's report, remains as then practically complete so far as the available material is concerned, but it awaits further data respecting the social organization of the Chickasaw and the Choctaw. A third paper, on the religious beliefs and medical practices of the Creeks and their congeners, has been brought to the same stage as the last, namely, with all the available material incorporated and arranged, and the foot-notes added.

With a view of furnishing the basis of a general study of the social organization of the tribes north of Mexico, Dr. Swanton spent a few weeks collecting material bearing on Indian economic life, but this has been laid aside temporarily on account of the greater urgency of a closer comparative study of the Indian languages of the southeastern part of the United States, particularly as indications of relationship between some of them have already been noted. As a basis for this work Dr. Swanton has recorded a comparative vocabulary of Creek, Choctaw, Alabama, Hitchiti, Natchez, Tunica, Chitimacha, Atakapa, Tonkawa, Comecrudo, Cotoname, Coahuilteco, and Karankawa. Of these languages about 500 words were chosen, but as the lexical material from several of the tribes is scanty, the comparison

can never be complete. It was the intention to follow the compilation of this table with a closer comparison of Chitimacha and Atakapa, which show many resemblances, but in the course of the work so many more similarities between Chitimacha and Tunica presented themselves that these were selected instead. In partial furtherance of this research Dr. Swanton proceeded to Louisiana in May, where he remained almost until the close of the fiscal year, visiting, studying, and photographing the mixed Indian population along the gulf coast in La Fourche and Terra Bonne Parishes, the Chitimacha at Charenton, and the Koasati northeast of Kinder. From the Koasati about 150 pages of native text with interlinear translation were recorded, and 134 pages previously procured from an Alabama Indian in Texas were corrected.

Mr. J. N. B. Hewitt, ethnologist, at the beginning of March went to Canada for the purpose of continuing his Iroquois studies. Establishing headquarters at Brantford, Ontario, he at once undertook the work of revising the extended texts relating to the Iroquois League, recorded during former field trips. Shortly thereafter this work was interrupted when Mr. Hewitt was selected as an official delegate from the Council of the Six Nations to attend a condolence and installation ceremony at Muncietown, in which he took a leading part, requiring the intoning of an address of comforting in the Onondaga language and also in acting the part of the Seneca chiefs in such a council. This official recognition gave Mr. Hewitt the rare opportunity of observing how such a ceremony is conducted from an esoteric point of view.

On returning to Brantford, March 16, Mr. Hewitt resumed work on the texts pertaining to the league, which necessitated the reading of the words and the immediate context several times to determine their final form. Moreover, it was desirable to read the texts over with every informant separately in order to obtain a full expression of the informant's knowledge or criticism of the work of another. In this manner it was possible to study about 70 per cent of the texts, and this led, naturally, to the collection of other corrective or amplifying texts and notes. These aggregate 502 pages, comprising 42 topics, recorded from rituals received by Shaman Joshua Buck and Chief Abram Charles. In addition, Mr. Hewitt recorded in English translation three traditions, comprising 45 pages, purporting to relate events and to express ideas alleged to have led to the founding of the League of the Iroquois, showing naively the birth of the idea of human brotherhood and fellowhood in contradistinction to mere local tribalism.

Mr. Hewitt also made important discoveries regarding Iroquois social organization, namely, that certain so-called clans do not exist outside of the names used to designate them. For instance, the

"Ball" clan is in reality the Hawk clan; the "Hand" clan of the Cayuga is the Gray Wolf clan, and the "Potato" clan of that tribe is in fact a Duck clan or possibly a Wolf clan. This confusion has been due to popular acceptance of a sobriquet for the real name, hence the doubt in the last instance between the Duck and the Wolf, which it is probable will ultimately be removed. Mr. Hewitt was fortunate also in obtaining a set of wooden masks of the various wind gods, and also two masks of food gods—eight in all. He also procured the gourd rattle used by the late Chief John Buck, a medicine flute, and what was probably the last cradle-board with a beaded belt on the reservation.

On returning from the field early in July, Mr. Hewitt undertook at once the editing and copying of the texts of some of his material relating to the Iroquois League. Among these are the following, chiefly in the Onondaga language: (1) The eulogy of the grandsires and founders, one of the essential chants in the condolence ritual, in the version used by the "father side" of the league; (2) the laws governing federal chiefs in intertribal relations; (3) the laws relating to murder committed by a federal chief; (4) the charge made to a newly installed federal chief; (5) the important tradition of the Bear-foot episode; (6) the address made at the lodge of a deceased federal chief three days after his burial; and (7) the laws relating to the nomination and election of a candidate for a federal chiefship. Mr. Hewitt also commenced the translation of the extended "father-side" tradition of the founding of the League by the Deganawida and his associates, read the available proofs of Seneca Fiction, Legends, and Myths for the Thirty-second Annual Report, and supplied numerous technical data for use in responses to inquiries by correspondents.

Mr. Francis La Flesche, ethnologist, when not engaged in field work was occupied in assembling his notes on the Osage Indians, the greater portion of which consists of phonographic records taken from men versed in the tribal rituals, which evidently were composed for the preservation and transmission of the religious concepts of the tribe. Three forms are used in their construction, namely, recitation, song, and dramatic action. The spoken parts, called "wígie," are intoned by the masters of ceremony and by male members of the various gentes of the tribe who have memorized them. These wígie tell of the genesis of the tribe; they recount the stories of the adoption of life symbols and explain their significance, and narrate the finding and selection of the materials used in making the ceremonial paraphernalia. The songs used by the master of ceremonies, with the aid of a few chosen assistants, make the emotional appeal to the various symbols employed in the ritual. Ceremonial acts, processions, and dances accompany some of the songs and wígie.

The theme of these composite rites is the desire of the people for a long, peaceful life and a never-ending line of descendants, and the wígie, songs, and dramatic acts constitute a supplication to the unseen power for aid toward the realization of this desire. The never-ending life so devoutly sought for the tribe seemed to the people to be exemplified in the unfailing recurrence of night and day, in the constancy of the movements of the heavenly bodies, in the manifestation of a like desire among the living forms upon the earth, and thus to point to an ever-present unseen animating power to which the people must appeal for the granting of their prayers. In this appeal for never-ending life the Osage naturally personified, and to a degree deified, those objects to which, as he thought, the unseen power had granted this form of life. Among these he included the vast space within which the heavenly bodies mysteriously moved and into which all living forms are born and exercise their functions. Thus all aspects of nature are made to play a part in the great drama of life as presented in these rituals.

Early in the year Mr. La Flesche finished transcribing the wígie, as well as his notes on two complete versions and a portion of a third version of the Child-naming rituals, comprising 107 typewritten pages. On completing this task he undertook the translation of the Osage personal names in current use and of arranging them by gentes. The Osage generally cling tenaciously to the ancient custom of ceremonially naming their children in the belief that the ceremonies aid the young in attaining old age. In this work Mr. La Flesche was able to determine that many members of the Osage tribe enrolled as full bloods are in reality of mixed blood. The tabulation of these names by sex and gentes, with their translations, together with a transcription of some characteristic tales, occupies 201 typewritten pages.

During the last four months of the fiscal year Mr. La Flesche was engaged in assembling his notes on the Fasting ritual of the Tsízhu Washtage gens. Most of the songs are quite different from those belonging to the Fasting rituals of the Hónga, while some of the wígie are the same, these being used in common with slight modifications among the different gentes. These Fasting rituals cover 139 completed pages, including the music.

A wígie was obtained by Mr. La Flesche from an old woman during his visit to the Osage in January, 1917. This wígie, which consists of 8 pages, fills a hiatus in the rush-mat ceremony previously recorded.

At the opening of the fiscal year Dr. Truman Michelson, ethnologist, was engaged in continuing his studies among the Sauk and Fox Indians of Iowa, the main work accomplished being the phonetic restoration of a long text, written in the current syllabary, on

the origin of the white buffalo dance, intended for publication as a bulletin of the bureau. Considerable information pertaining to a number of sacred bundles of the Fox Indians was obtained, as well as various data of a sociological nature. Nearly 300 personal names were recorded, together with the names of the gentes to which their owners belonged; in this manner about nine-tenths of the population of the Fox Indians has been catalogued.

About the middle of August Dr. Michelson proceeded to Oklahoma where, with the cooperation of the Illinois Centennial Commission, he conducted researches among the Peoria. The ethnology of this tribe, properly speaking, has practically vanished, but their language and folklore still persist, though knowledge thereof is confined to only a few individuals. Contrary to ordinary belief, the Peoria language, phonetically, is extremely complicated. From notes left by the late Dr. A. S. Gatschet, it had been inferred that the Peoria belongs fundamentally with the Chippewa or Ojibwa group of central Algonquian languages, and this was fully confirmed. It is quite clear, however, that there has been another and more recent association with the Sauk, Fox, and Kickapoo group, and Peoria folklore and mythology also point to this double association. The system of consanguinity is clearly that of the Sauk, Fox, and Kickapoo group, rather than that of the Ojibwa. Dr. Michelson recorded, mostly in English, an almost exhaustive collection of Peoria folktales and myths.

After devoting about a month's time to the Peoria, Dr. Michelson returned to Iowa and renewed his work among the Sauk and Fox by making a phonetic restoration of a number of texts on minor sacred packs pertaining to the White Buffalo dance, as well as by recording about 200 pages of the extremely long myth of the Fox culture hero. Most of the ceremonies in connection with the presentation of a new drum of the so-called religious dance of the Potawatomi of Wisconsin were witnessed, as also were parts of a number of clan feasts.

On returning to Washington in November Dr. Michelson commenced the revision of the English translation of the texts relating to the White Buffalo dance, and devoted attention also to paragraphing and punctuating the Indian originals for the purpose of making them correspond with the English equivalents. By the close of the year the English translations were typewritten and put in almost final shape, while little work remained to complete the editing of the native texts.

Mr. J. P. Harrington, ethnologist, spent the entire year in continuation of his intensive study of the Chumashan tribes of California, obtaining a large body of important information which at present is in various stages of elaboration and which will comprise about 1,200

typewritten pages. From the beginning of the fiscal year until September 15 Mr. Harrington devoted his attention to the Purismeño dialect, the existing vocabularies being corrected by the informant, and many new words and grammatical forms added. The next three weeks were spent on the Obispeño with satisfactory results, inasmuch as the material obtained in former years was more than doubled. The sole informant's feeble health made the recording of this material unusually difficult, but it will prove to be of great local as well as of general interest. The remainder of the fiscal year was devoted to Ventureño and Ineseño. While not so nearly lost as Obispeño, it is too late to obtain complete information on these dialects, but in the process of their study many important points have been determined. It is largely from their study that the picture of former Chumashan life must be reconstructed.

The study of the material culture of the Chumashan tribes has not been neglected, and in this work archeological material has been of assistance. Among the important points determined are details concerning the making of the ancient deerskin dress of the women, which consisted of a large back flap and a smaller apron.

From the beginning of the fiscal year to the middle of January, 1917, Dr. Leo J. Frachtenberg, special ethnologist, was engaged in field work in the State of Washington, where he devoted special attention to the Quileute Indians and to collecting additional linguistic and mythological material. The ethnologic investigations covered the subjects of history and distribution, manufacture, houses and households, clothing and ornaments, subsistence, travel and transportation, warfare, games, and pastimes, social organization and festivals, social customs, religion, medicines, charms and current beliefs, and art, and the recorded results consist of 577 manuscript pages. In addition, Dr. Frachtenberg recorded 156 native songs, including words and translations; he also obtained several hundred native drawings illustrating the material culture of the Quileute, and photographed a like number of ethnologic specimens. Furthermore, he materially added to his linguistic and ethnologic studies of this people, commenced during the preceding year, by collecting several thousand additional grammatical forms and phrases, and by recording 22 new native traditions with interlinear translations, and three stories in English. These texts, in the form of field notes, comprise 176 pages. While engaged in this field work Dr. Frachtenberg was instrumental in inducing Mrs. Martha Washburn of Neah Bay, Mr. and Mrs. Theo. R. Rixon of Clallam Bay, and Mrs. Fannie Taylor of Mora, to give to the National Museum a part of their collections of Makah and Quileute specimens, including two old totem poles,

approximately 100 baskets, and more than 30 other ethnologic specimens. In addition to the Quileute studies mentioned, Dr. Frachtenberg collected 88 pages of Makah (Nootka) linguistic data, 57 pages of Quinault (Salish), and 18 pages of Clallam (Lkungen). While in Portland, Oreg., he obtained through the courtesy of the municipal authorities a fine collection of photographs representing several hundred archeological objects owned by the city.

Dr. Frachtenberg returned to Washington early in February. Subsequently, after conference with Dr. Franz Boas, honorary philologist of the bureau, it was arranged that Dr. Frachtenberg prepare for the *Handbook of American Indian Languages* comparative sketches of the Kalapuya, Molala, Klamath, and Quileute, and possibly one of the Salish languages. He also engaged in the final preparation of his paper *Alsea Texts and Myths*, which is now in process of printing as *Bulletin 67*. He next proceeded to prepare for publication the results of his earlier investigations of the language, ethnology, and mythology of the Kalapuya Indians, which will consist of two papers: *A Grammatical Sketch of the Kalapuya Languages and Kalapuya Myths and Texts*. The Kalapuya grammatical material consists of extended field notes gathered in 1913 and 1914, and of grammatical notes on the Atfalati collected by Dr. Gatschet in 1877. Dr. Gatschet's material, comprising 421 pages of field notes, is of inestimable value; indeed it is to the efforts of this untiring scholar that we owe the preservation of this most important dialect of the Kalapuya language, since he obtained his material, which includes also some valuable ethnologic data, from the last full-blood Atfalati. Dr. Frachtenberg's own material comprises several thousand grammatical forms, phrases, and vocables, and 32 native texts with interlinear translation—630 pages in all. The preparation of these linguistic data, as well as the work on the Kalapuya myths and texts, is well under way. Six of the texts, comprising 36 pages, have been prepared for publication; five of these are provided with interlinear translation and with voluminous notes in which attention is directed to the occurrence of similar myths among other tribes. During his studies of the Kalapuya languages Dr. Frachtenberg discovered that there is sufficient reason to believe that the Kalapuya, Takelman, and Chinookan languages are genetically related, the determination being based not only on lexical but also on structural and morphological material. This discovery tends to establish a connecting link between some of the languages of California and most of the languages spoken in Oregon.

During the last two weeks of the fiscal year Dr. Frachtenberg was temporarily detailed for special work in the Bureau of Investigation of the Department of Justice.

SPECIAL RESEARCHES.

Dr. Franz Boas, honorary philologist, completed the preparation of his manuscript on the ethnology of the Kwakiutl Indians, about 2,700 pages of which was submitted to the bureau and assigned as the accompanying paper of the Thirty-fifth Annual Report, the composition of which was commenced before the close of the fiscal year. At the same time progress was made on the preparatory work for the second part of the memoir. Under Dr. Boas's direction Miss Mildred Downs listed the incidents of the Kwakiutl mythology preparatory to a discussion of the subject, and necessary additional information for this purpose was obtained from Mr. George Hunt, of Fort Rupert, Vancouver Island. Mr. Hunt submitted in all 460 pages of manuscript in response to questions, and sent botanical specimens that have been identified through the kindness of Dr. N. L. Britton, director of the New York Botanical Garden.

The manuscript for Bulletin 59, Kutenai Tales, has been completed. All the texts having been set up during the preceding year, the abstracts and comparative notes, referring to the pages of the bulletin, were written out (32 pages of printed matter), and a vocabulary (140 pages of manuscript) based on the text was prepared.

For the second part of the Handbook of American Indian Languages Dr. Frachtenberg submitted his sketch of the Alsea grammar, which will be prepared for publication as soon as a sufficient number of texts are available. Considerable progress has been made in the preparation of the Kutenai grammar. Owing to the impossibility of communicating with Mr. Bogoras in Russia, no progress has been made in proof reading the Chukchee grammar, which has been in type for more than three years, but which can not be completed without submitting the proofs to the author. During the year, however, Dr. Boas revised the Eskimo texts by Mr. Bogoras, for which a brief ethnological introduction has been written by Dr. Ernest Hawkes.

The results of the extended field work of Mr. James Teit, made possible through the generosity of Mr. Homer E. Sargent of Chicago, are nearing completion. At the present time two manuscripts are well advanced. One of these, consisting of about 1,000 pages, prepared jointly by Dr. Boas and Dr. H. K. Haeberlin, was submitted in May, accompanied with a number of maps showing the distribution of Salishan dialects at various periods. It consists of a discussion of the characteristics of the various dialectic groups, comparative vocabularies on which the deductions are based, and a few simple texts. The material on which these studies are founded was collected from field expeditions by Dr. Boas between 1886 and 1900, and by additional material gathered by Mr. Teit between the latter date and the present year.

Dr. Haeberlin has also undertaken to discuss the Salishan basketry, for which purpose he has made detailed studies of various collections in the United States and Canada. In connection with this and other necessary researches on the Salishan tribes, Dr. Haeberlin visited British Columbia and Washington in 1915, and again in June, 1917, for the purpose of obtaining additional material. These expeditions were also made possible by the generosity of Mr. Sargent.

In his investigations Dr. Boas has had the valued help of Miss H. A. Andrews and Miss Mildred Downs.

In behalf of the bureau, Mr. W. H. Holmes, of the National Museum, visited New York, Boston, and Cambridge, for the purpose of studying archeological material in the museums of those cities in connection with the completion of Bulletin 60, Handbook of American Antiquities, part 1 of which is in type. The proof reading of this publication was well in hand at the close of the fiscal year, and progress was made by Mr. Holmes in the preparation of part 2.

The study of Indian music, undertaken by Miss Frances Densmore several years ago under the auspices of the bureau, was successfully continued through the year. The proof reading of Bulletin 61, Teton Sioux Music, was brought to completion. A second season of field work was devoted to the Ute Indians, sufficient data being obtained to complete a work on the music of that tribe. Of this material 73 new songs were transcribed and analyzed, 23 songs previously recorded were likewise analyzed, and 5 songs also previously submitted with analyses were further studied. Five group analyses, together with about 30 pages of manuscript description, were prepared. All except about 15 Ute records are now ready for publication; these cover a considerable variety of songs, analyses of which show important differences from songs of other tribes, one peculiarity being an added importance of rhythm.

For purposes of comparison, Miss Densmore undertook on her own account a study of primitive Slovak music, 10 songs of which were analyzed by the method employed in connection with Indian songs, and these were found to contain interesting points of difference.

Through the courtesy of Dr. Dayton C. Miller, of the Case School of Applied Science in Cleveland, Miss Densmore procured graphic evidence of peculiarities of drum and voice combination noted by ear in Indian music. Dr. Miller made two photographs, about 30 feet in length, each representing about 15 seconds' duration of sound. It is the intention to utilize part of these as illustrations in the forthcoming bulletin on Ute music, the songs photographed being Ute dance songs with strong rhythmic peculiarities.

Early in June Miss Densmore proceeded to the White Earth Reservation, Minnesota, for the purpose of conducting a study of the

material culture of the Chippewa Indians, and at the close of the year good progress was reported.

Mr. D. I. Bushnell, jr., continued the preparation of the manuscript for the Handbook of Aboriginal Remains East of the Mississippi, about 50,000 words being added to the material previously furnished, not including a portion that was rewritten as a result of a discovery of new and valuable information pertaining to certain localities. Introductions to the archeology of various States remain to be written, but it is believed that both the manuscript and the illustrations for the entire bulletin will be completed before the close of the fiscal year 1918.

Under the joint auspices of the bureau and the National Museum Dr. A. Hrdlička visited in October, 1916, a site at Vero, Fla., at which were found certain human remains reputed to be of great antiquity. As a summary account of Dr. Hrdlička's observations has already appeared in Smithsonian Miscellaneous Collections (vol. 66, no. 17, pp. 24-29, 1917) and an extended report will be published in Bulletin 66 of the bureau, now in press, it need only be mentioned that a thorough inquiry has resulted decisively against the assumption of great antiquity of the remains. The pottery and the bone and stone objects found in association with the human burials are identical with similar artifacts of the Florida and other southeastern Indians, while the bones themselves without exception exhibit modern features, with numerous characteristics that permit their identification as purely Indian.

Owing to the fact that Dr. A. L. Kroeber, of the University of California, found it expedient to elaborate certain portions of his handbook of the Indians of California, it was not practicable to submit the entire manuscript before the close of the fiscal year, but at this writing there is every prospect that the work will be ready for publication within a short time.

MANUSCRIPTS.

The following manuscripts, exclusive of those submitted for publication, were received by the bureau:

Photostat copy of a San Blas vocabulary, recorded by Ensign J. M. Creighton, United States Navy, transmitted to the Smithsonian Institution by the Secretary of the Navy.

Philippine songs presented by Mr. E. H. Hammond, of Albuquerque, N. Mex. Photograph of a picture writing on elk skin by Washakie, the Shoshoni chief, with a key thereto.

Reports on prehistoric ruins in Arizona, with numerous photographs, prepared by the late S. J. Holsinger, of the General Land Office, and deposited in the bureau by the United States Forest Service.

Abnaki hymns from John Tahamont, of Pierreville, Quebec, presented by George G. Heye, Esq.

PUBLICATIONS.

The editing of the publications of the bureau was continued through the year by Mr. J. G. Gurley, assisted as occasion required by Mrs. Frances S. Nichols. The status of the publications is presented in the following summary:

PUBLICATIONS ISSUED.

Thirty-first Annual Report. Accompanying paper: Tsimshian Mythology (Boas).

Coos, An Illustrative Sketch, separate (Frachtenberg), Bulletin 40, part 2 (Boas).

Bulletin 55, Ethnobotany of the Tewa Indians (Robbins, Harrington, Freire-Marreco).

List of Publications of the Bureau.

PUBLICATIONS IN PRESS OR IN PREPARATION.

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

Thirty-third Annual Report. Accompanying papers: (1) Uses of Plants by the Indians of the Nebraska 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).

Thirty-fourth Annual Report. Accompanying paper: An Introductory Study of the Arts, Crafts, and Customs of the Guiana Indians (Roth).

Thirty-fifth Annual Report. Accompanying paper: Ethnology of the Kwakiutl Indians (Hunt, edited by Boas).

Bulletin 59, Kutenai Tales (Boas).

Bulletin 60, Handbook of Aboriginal American Antiquities. Part 1. Introductory: The Lithic Industries (Holmes).

Bulletin 61, Teton Sioux Music (Densmore).

Bulletin 63, Analytical and Critical Bibliography of the Tribes of Tierra del Fuego and Adjacent Territory (Cooper).

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

Bulletin 65, Archeological Explorations in Northeastern Arizona (Kidder and Guernsey).

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

Bulletin 67, Alesa Texts and Myths (Frachtenberg).

The distribution of publications has been continued under the immediate charge of Miss Helen Munroe and at times by Mr. E. L. Springer, of the Smithsonian Institution, assisted during the first part of the year by Miss Lana V. Schelski, and latterly by Miss Ora A. Sowersby, stenographer and typewriter. Notwithstanding conditions incident to the war and the consequent necessity of withhold-

ing the transmission of various foreign shipments, publications were distributed as follows:

	Copies.
Annual reports and separates.....	5,954
Bulletins and separates.....	5,804
Contributions to North American Ethnology and separates.....	28
Introductions.....	7
Miscellaneous publications.....	191
Total.....	11,984

ILLUSTRATIONS.

Mr. DeLancey Gill, with the assistance of Mr. Albert E. Sweeney, continued the preparation of the illustrations required for the publications of the bureau and devoted the usual attention to photographing visiting Indians. The results of this work may be summarized as follows:

Photographic prints for distribution and office use.....	578
Negatives of ethnologic and archeologic subjects.....	173
Negative films developed from field exposures.....	214
Photostat prints from books and manuscripts.....	950
Drawings made.....	54
Mounts used.....	62
Portrait negatives of visiting Indians (Creek 9, Arapaho 4, Cheyenne 16)	29
Negatives retouched.....	75
Illustration proofs examined at Government Printing Office.....	9,000
Illustrations submitted for reproduction and engraver's proofs edited....	781

LIBRARY.

The reference library of the bureau continued in the immediate care of Miss Ella Leary, librarian, assisted by Mr. Charles B. Newman. During the year 435 books were accessioned, of which 97 were purchased, 286 acquired by gift or exchange, and 52 by the entry of newly bound volumes of periodicals previously received. In addition the bureau acquired 388 pamphlets. The aggregate number of books in the library at the close of the year was 21,750; of pamphlets, about 13,848. In addition there are many volumes of unbound periodicals. Several new periodicals were added to the exchange list and about 50 defective series were either wholly or partly completed. As might be expected, the publication of various European periodicals devoted to anthropology has either been suspended or has ceased entirely. Largely with the assistance of Mrs. Frances S. Nichols many of the older books and pamphlets were newly catalogued by both subject and author, and thus made more readily available. Of 133 volumes sent to the bindery about half were returned before the close of the year. Books borrowed from the Library of Congress numbered about 400.

COLLECTIONS.

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

Six ethnologic objects from British Guiana, presented by Dr. Walter E. Roth, of Marlborough, Pomeroun River, British Guiana. (60049.)

A small collection of archeological objects of earthenware, jadeite, etc., from the Kiché district of Totonicopan, Guatemala. (61097.)

A collection of archeological objects, including human bones, gathered by Mr. Neil M. Judd in Utah. (60194.)

Seven specimens found by Mr. Joseph Dame in Millard County, Utah, and purchased from him through Mr. Neil M. Judd. (60105.)

A collection of archeological objects and skeletal material gathered by Dr. Walter Hough at the Luna pit village in western New Mexico. (60196.)

Ten baskets of the Guiana Indians of South America, presented to the bureau by Dr. Walter E. Roth, of Marlborough, Pomeroun River, British Guiana. (60452.)

Seventeen prehistoric pottery vessels, one piece of matting, and a few small objects collected by F. W. Hodge in a cist in a cave in a southern wall of Cibolita Valley, Valencia County, N. Mex. (60453.)

Twenty-five archeological specimens gathered by Dr. J. Walter Fewkes from ancient ruins near Gallup, N. Mex. (60502.)

A small black-ware vase from Santa Clara pueblo, New Mexico, presented by Robert H. Chapman, of Washington, D. C. (60826.)

Twelve stone artifacts from Reeves Mill, near Pitman, Gloucester County, N. J., presented by Mrs. M. B. C. Shuman. (60836.)

Archeological material collected by Dr. J. Walter Fewkes from excavations conducted at Mummy Lake Ruins, Mesa Verde National Park, Colo. (60880.)

Archeological material collected by Dr. J. Walter Fewkes from excavations conducted at Oak Tree House, Mesa Verde National Park, Colo. (60901.)

An Assiniboin headdress from Alberta, Canada, presented by Mr. Robert H. Chapman, Washington, D. C. (61007.)

Skulls, skeletons, and parts of skeletons, an Indian ornament embedded in stone, and pottery fragments, collected in the vicinity of Vero and Fort Myers, Fla., by Dr. A. Hrdlička. (61291.)

Seven baskets made by the Koasati Indians of Louisiana, collected by Dr. John R. Swanton. (61315.)

PROPERTY.

Furniture was purchased to the amount of \$196.25; the cost of typewriting machines was \$206, and of a camera \$10.50, making a total of \$412.75 expended for furniture and apparatus. On the whole the furniture of the bureau is in good condition, but there are a few unserviceable pieces that should be replaced, while need of a few filing cases for current notes and manuscripts is felt.

MISCELLANEOUS.

Quarters.—One of the rooms on the third floor of the north tower of the Smithsonian building, occupied by the bureau, was painted, and the electric-lighting of three rooms improved.

Personnel.—The only change in the personnel of the bureau was the appointment of Miss Ora A. Sowersby, stenographer and typewriter, on February 14, 1917, to succeed Miss Lana V. Schelski, transferred. A temporary laborer was employed from time to time when required.

Clerical.—The correspondence and other clerical work of the office, including the copying of manuscripts, has been conducted with the aid of Miss Florence M. Poast, clerk to the ethnologist-in-charge; Miss May S. Clark, and Mrs. Frances S. Nichols. Miss Sowersby was assigned to the division of publications of the Smithsonian Institution for duty in connection with correspondence arising from the distribution of the bureau's publications.

Respectfully submitted.

F. W. HODGE,
Ethnologist-in-Charge.

Dr. CHARLES D. WALCOTT,
Secretary of the 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, 1917.

The regular congressional appropriation for the support of the Service during the year, including the allotment for printing and binding, was \$32,200, but in order to enable the Institution to meet the very high ocean freight rates on foreign shipments Congress granted an additional appropriation of \$3,500. The repayments from departmental and other establishments aggregated \$3,687.58, making the total available resources for carrying on the system of exchanges \$39,387.58.

During the year 1917 the total number of packages handled was 268,625, which weighed 290,193 pounds.

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

	Packages.		Weight (pounds).	
	Sent.	Received.	Sent.	Received.
United States parliamentary documents sent abroad	137,863		55,376	
Publications received in return for parliamentary documents.....		3,416		7,646
United States departmental documents sent abroad	60,948		116,519	
Publications received in return for departmental documents.....		6,333		6,304
Miscellaneous scientific and literary publications sent abroad..	37,111		68,334	
Miscellaneous scientific and literary publications received from abroad for distribution in the United States.....		22,954		36,012
Total.....	235,922	32,703	240,229	49,962
Grand total.....	268,625		290,191	

As referred to in previous reports, many returns for publications sent abroad reach their destinations in this country direct by mail and not through the Exchange Service.

Shipments are still suspended to Austria, Belgium, Bulgaria, Germany, Hungary, Montenegro, Roumania, Russia, Serbia, and Turkey. Shipments both to and from Germany, which were arranged by the

Institution through the State Department, as referred to in the last report, were discontinued at the outbreak of hostilities between the United States and Germany. The further efforts of the Russian Commission of International Exchanges to resume shipments were not successful, and the commission stated that it would be necessary to withhold consignments until the end of the war.

In accordance with the proclamation of the British Government prohibiting the importation into the United Kingdom of books in bulk, it was necessary to suspend shipments to that country for a time. However, the London agents of the Institution, Messrs. William Wesley & Son, succeeded in procuring from the Royal Commission on Paper a special license to import consignments of international exchanges into England. Owing to the lack of requisite ocean transportation facilities, it was also necessary to suspend shipments for a time to Norway, Sweden, Denmark, and Holland.

The director of the Government Press at Cairo advises the Institution that four boxes of Egyptian exchanges en route to this country were lost at sea, and suggests that shipments be withheld until the end of the war. This suggestion will be followed. On account of the abnormal conditions in the Mediterranean, shipments to Greece will also be suspended.

Since the beginning of the war the Institution has suffered the loss of only three shipments from hostile action. One small shipment—consisting of 24 governmental documents—was lost in transit to India during the first year of the war. Through the sinking of a vessel by a warship during the past year 18 packages in transit to India were also lost. Twenty-one boxes for the French Bureau of Exchanges were lost when the steamship *Juno* was torpedoed in February last. Nineteen of these contained miscellaneous governmental and scientific publications for distribution to various addresses throughout France and the other two the regular series of United States official documents for deposit in the National Library at Paris and the office of the prefect of the Seine.

In the early part of the present fiscal year the Italian Exchange office in Rome reported that one of the boxes of the consignment sent to that office in July, 1915, had not been delivered. Steps taken to have the box traced were unsuccessful.

Wherever possible the Institution has, as formerly in the case of lost consignments, procured duplicate copies of the publications contained in the above-mentioned boxes.

The Government publications office at Bulaq—which acts as the Egyptian Exchange agency—has kindly taken charge until the close of the war of a box addressed to the Jewish Agricultural Experiment Station, Haifa, Palestine, which was detained at Alexandria.

I am pleased to state that the four boxes held at Bahia, Brazil, to which reference was made in the 1915 report, have been released and forwarded to the Government printing works at Pretoria.

Reference has previously been made to the custom of the Government of India to refer requests from establishments in this country for Indian official documents to the Exchange Service for indorsement. The director of the Government Press at Cairo has requested that the Institution take similar action on applications for Egyptian official publications. This request has been granted.

Of the 1,217 boxes used in forwarding exchanges to foreign agencies for distribution during 1917, 170 contained full sets of United States official documents for authorized depositories, and 1,047 were filled with departmental and other publications for depositories of partial sets and for miscellaneous correspondents. The number of boxes sent to each foreign country and the dates of transmission are shown in the following table:

Consignments of exchanges for foreign countries.

Country.	Number of boxes.	Date of transmission.
Argentina.....	43	July 23, Sept. 13, Nov. 15, 1916; Jan. 13, Mar. 20, June 8, 1917.
Barbados.....	1	May 28, 1917.
Bolivia.....	2	Aug. 29, 1916; Mar. 31, 1917.
Brazil.....	25	July 25, Sept. 14, Nov. 15, 1916; Jan. 15, Mar. 28, June 9, 1917.
British Colonies.....	8	July 19, Aug. 3, 23, Sept. 11, Oct. 9, Nov. 1, 24, Dec. 20, 1916; Feb. 7, Apr. 14, 1917.
British Guiana.....	2	Sept. 21, 1916; Feb. 16, 1917.
Canada.....	16	Sept. 25, Dec. 18, 1916; Feb. 17, May 17, 1917.
Chile.....	19	July 26, Sept. 16, Nov. 16, 1916; Jan. 16, Mar. 29, June 11, 1917.
China.....	26	Sept. 5, Oct. 25, Nov. 28, 1916; Feb. 8, Mar. 8, May 23, 1917.
Colombia.....	33	July 16, Oct. 7, Nov. 12, Dec. 13, 1916; May 19, 1917.
Costa Rica.....	12	Aug. 12, Oct. 25, 1916; Jan. 17, Mar. 30, Apr. 6, June 13, 1917.
Cuba.....	4	Sept. 25, Dec. 18, 1916; Feb. 17, May 17, 1917.
Denmark.....	20	Aug. 9, Sept. 29, 1916; Jan. 6, Mar. 12, May 21, 1917.
Ecuador.....	4	Aug. 3, 1916; Apr. 10, 1917.
Egypt.....	8	Aug. 11, 1916; May 16, 1917.
France.....	123	July 10, Aug. 18, Oct. 12, Nov. 14, 1916; Jan. 10, Mar. 21, May 9, 1917.
Germany.....	48	Dec. 16, 1916.
Great Britain and Ireland.....	250	July 20, Aug. 3, 23, Sept. 11, Oct. 9, Nov. 1, 24, Dec. 20, 1916; Feb. 7, Apr. 11, 18, June 6, 1917.
Greece.....	7	Aug. 14, Nov. 9, 1916.
Guatemala.....	2	Aug. 30, 1916; Apr. 6, 1917.
Haiti.....	4	Sept. 25, Dec. 18, 1916; Feb. 17, May 17, 1917.
Honduras.....	2	Aug. 30, 1916; Apr. 4, 1917.
India.....	30	July 19, Aug. 3, 23, Sept. 11, Oct. 9, Nov. 1, 24, Dec. 20, 1916; Feb. 7, Apr. 14, 1917.
Italy.....	90	July 6, Aug. 4, Sept. 22, Nov. 10, Dec. 23, 1916; Jan. 20, Apr. 20, June 4, 1917.
Jamaica.....	5	Aug. 29, 1916; Feb. 9, May 24, 1917.
Japan.....	50	July 7, Aug. 16, Nov. 28, 1916; Jan. 19, Mar. 2, May 13, 1917.

Consignments of exchanges for foreign countries—Continued.

Country.	Number of boxes.	Date of transmission.
Korea.....	1	Aug. 30, 1916.
Liberia.....	2	Aug. 29, 1916; May 28, 1917.
Lourenço Marquez.....	1	May 29, 1917.
Mexico.....	4	Sept. 25, Dec. 18, 1916; Feb. 17, May 17, 1917.
Netherlands.....	30	July 7, Aug. 5, Sept. 25, Nov. 8, 1916; Jan. 5, 1917.
New South Wales.....	43	July 20, Aug. 26, Sept. 25, Oct. 16, Dec. 5, 1916; Jan. 13, Feb. 15, Apr. 16, June 19, 1917.
New Zealand.....	17	July 20, Aug. 26, Oct. 20, Dec. 12, 1916; Feb. 13, Apr. 17, June 21, 1917.
Nicaragua.....	2	Aug. 30, 1916; Apr. 10, 1917.
Norway.....	13	Aug. 9, Sept. 26, Nov. 11, 1916; Jan. 6, Mar. 14, 1917.
Paraguay.....	1	Aug. 30, 1916.
Peru.....	12	July 26, Sept. 16, Nov. 16, 1916; Mar. 29, June 12, 1917.
Portugal.....	15	Aug. 10, Sept. 28, Nov. 20, 1916; Mar. 15, May 22, 1917.
Queensland.....	11	July 20, Aug. 26, Oct. 20, Dec. 12, 1916; Feb. 15, Apr. 17, June 21, 1917.
Salvador.....	4	Aug. 3, 1916; Apr. 7, 1917.
Siam.....	3	Aug. 30, 1916; Feb. 16, 1917.
South Australia.....	18	July 20, Aug. 26, Oct. 18, Dec. 18, 1916; Feb. 12, Apr. 17, June 20, 1917.
Spain.....	22	Aug. 11, Sept. 30, Nov. 17, 1916; Jan. 11, May 14, 1917.
Sweden.....	43	Aug. 9, Sept. 27, Nov. 11, 1916; Jan. 18, May 1, 1917.
Switzerland.....	52	Sept. 25, Aug. 9, Nov. 11, 1916; Jan. 10, May 9, 1917.
Tasmania.....	10	July 19, Aug. 3, 23, Sept. 11, Oct. 9, Nov. 1, 24, Dec. 20, 1916; Jan. 10, Mar. 21, May 9, 1917.
Trinidad.....	2	Aug. 29, 1916; May 25, 1917.
Union of South Africa.....	17	July 6, Sept. 20, Nov. 13, 1916; Jan. 19, 1917.
Uruguay.....	15	July 27, Sept. 16, Nov. 17, 1916; Jan. 17, Mar. 29, June 13, 1917.
Venezuela.....	10	Aug. 12, Oct. 26, 1916; Jan. 17, Mar. 29, June 13, 1917.
Victoria.....	22	July 20, Aug. 26, Oct. 17, Dec. 9, 1916.
Western Australia.....	12	July 19, Aug. 3, 23, Sept. 11, Oct. 9, Nov. 1, 24, Dec. 20; Feb. 7, Apr. 14, 1917.
Windward and Leeward Islands.	1	May 28, 1917.

FOREIGN DEPOSITORIES OF UNITED STATES GOVERNMENTAL DOCUMENTS.

Ninety-one sets of United States governmental documents were received for distribution to foreign depositories in accordance with treaty stipulations and under the authority of the congressional resolutions of March 2, 1867, and March 2, 1901. A communication was received during the year from the assistant secretary to the Government of India, department of education, stating that the United States governmental documents sent to his department are turned over to the Imperial Library at Calcutta, and requesting that future consignments be addressed directly to that library.

A list of the foreign depositories is given below. Consignments for those countries to which shipments are suspended on account of

the war are being held at the Institution for transmission to the various depositories at the close of hostilities.

DEPOSITORIES OF FULL SETS.

- ARGENTINA: Ministerio de Relaciones Exteriores, Buenos Aires.
 AUSTRALIA: Library of the Commonwealth Parliament, Melbourne.
 AUSTRIA: K. K. Statistische Zentral-Kommission, Vienna.
 BADEN: Universitäts-Bibliothek, Freiburg. (Depository of the Grand Duchy of Baden.)
 BAVARIA: Königliche Hof- und Staats-Bibliothek, Munich.
 BELGIUM: Bibliothéque Royale, Brussels.
 BRAZIL: Bibliotheca Nacional, Rio de Janeiro.
 BUENOS AIRES: Biblioteca de la Universidad Nacional de La Plata. (Depository of the Province of Buenos Aires.)
 CANADA: Library of Parliament, Ottawa.
 CHILE: Biblioteca del Congreso Nacional, Santiago.
 CHINA: American-Chinese Publication Exchange Department, Shanghai Bureau of Foreign Affairs, Shanghai.
 COLOMBIA: Biblioteca Nacional, Bogotá.
 COSTA RICA: Oficina de Depósito y Canje Internacional de Publicaciones, San José.
 CUBA: Secretaria de Estado (Asuntos Generales y Canje Internacional), Habana.
 DENMARK: Kongelige Bibliotheket, Copenhagen.
 ENGLAND: British Museum, London.
 FRANCE: Bibliothéque Nationale, Paris.
 GERMANY: Deutsche Reichstags-Bibliothek, Berlin.
 GLASGOW: City Librarian, Mitchell Library, Glasgow.
 GREECE: Bibliothéque 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: Library of the States General, The Hague.
 NEW SOUTH WALES: Public Library of New South Wales, Sydney.
 NEW ZEALAND: General Assembly Library, Wellington.
 NORWAY: Stortingets Bibliothek, Christiania.
 ONTARIO: Legislative Library, Toronto.
 PARIS: Préfecture de la Seine.
 PERU: Biblioteca Nacional, Lima.
 PORTUGAL: Bibliotheca Nacional, Lisbon.
 PRUSSIA: Königliche Bibliothek, Berlin.
 QUEBEC: Library of the Legislature of the Province of Quebec, Quebec.
 QUEENSLAND: Parliamentary Library, Brisbane.
 RUSSIA: Imperial Public Library, Petrograd.
 SAXONY: Königliche Oeffentliche Bibliothek, Dresden.
 SERBIA: Section Administrative du Ministère des Affaires Étrangères, Belgrade.

- SOUTH AUSTRALIA: Parliamentary Library, Adelaide.
 SPAIN: Servicio del Cambio Internacional de Publicaciones, Cuerpo Facultativo de Archiveros, Bibliotecarios y Arqueólogos, Madrid.
 SWEDEN: Kungliga Biblioteket, Stockholm.
 SWITZERLAND: Bibliothéque Fédérale, 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, Melbourne.
 WESTERN AUSTRALIA: Public Library of Western Australia, Perth.
 WÜRTTEMBERG: Königliche Landesbibliothek, Stuttgart.

DEPOSITORIES OF PARTIAL SETS.

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

INTERPARLIAMENTARY EXCHANGE OF OFFICIAL JOURNALS.

Following is a complete list of the governments to which copies of the daily issue of the Congressional Record are now sent. The records for those countries to which it is not possible to forward consignments at present are being held at the Institution:

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

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AUSTRIA: K. K. Statistische Zentral-Kommission, Vienna.¹

AZORES, *via* Portugal.

BELGIUM: Service Belge des Échanges Internationaux, Rue des Longs-Chariots 46, Brussels.¹

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.¹

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, Cairo.¹

¹ Shipments suspended on account of the war.

- FRANCE: Service Français des Échanges Internationaux, 110 Rue de Grenelle, Paris.
- GERMANY: Amerika-Institut, Berlin, N. W. 7.¹
- GREAT BRITAIN AND IRELAND: Messrs. William Wesley & Son, 28 Essex Street, Strand, London.
- GREECE: Bibliothèqne Nationale, Athens.¹
- GREENLAND, *via* Denmark.
- GADELOUPE, *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, Municipal Office of Statistics, Váci-utca 80, Budapest.¹
- ICELAND, *via* Denmark.
- INDIA: India Store Department, India Office, London.
- ITALY: Ufficio degli Scambi Internazionali, Biblioteca Nazionale Vittorio Emanuele, Rome.
- JAMAICA: Institute of Jamaica, Kingston.
- JAPAN: 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, Cetinje.¹
- MOZAMBIQUE, *via* Portugal.
- NETHERLANDS: Bureau Scientifique Central Néerlandais, Bibliothèqne de l'Université, Leyden.
- NEW GUINEA, *via* Netherlands.
- NEW SOUTH WALES: Public Library of New South Wales, Sydney.
- NEW ZEALAND: Dominion Museum, Wellington.
- NICARAGUA: Ministerio de Relaciones Exteriores, Managua.
- NORWAY: Kongelige Norske Frederiks Universitet Bibliotheket, Christiania.
- PANAMA: Secretaria de Relaciones Exteriores, Panama.
- PARAGUAY: Servicio de Canje Internacional de Publicaciones, Sección Consular y de Comercio, Ministerio de Relaciones Exteriores, Asuncion.
- PERSIA: Board of Foreign Missions of the Presbyterian Church, New York City.
- PERU: Oficina de Reparto, Depósito y Canje Internacional de Publicaciones, Ministerio de Fomento, Lima.
- PORTUGAL: Serviço de Permutações Internacionais, Inspeção Geral das Bibliothecas e Archivos Publicos, Lisbon.
- QUEENSLAND: Bureau of Exchanges of International Publications, Chief Secretary's Office, Brisbane.
- ROUMANIA: Academia Romana, Bucharest.¹
- RUSSIA: Commission Russe des Échanges Internationaux, Bibliothèqne Impériale Publique, Petrograd.¹
- SALVADOR: Ministerio de Relaciones Exteriores, San Salvador.
- SERBIA: Section Administrative du Ministère des Affaires Étrangères, Belgrade.¹

¹ Shipments suspended on account of the war.

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.¹

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.

Respectfully submitted.

C. W. SHOEMAKER,

Chief Clerk, International Exchange Service.

Dr. CHARLES D. WALCOTT,

Secretary of the Smithsonian Institution.

AUGUST 15, 1917.

¹ Shipments suspended on account of the war.

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, 1917:

There was allowed by Congress in the sundry civil bill the sum of \$100,000 for all expenses, except printing and binding, for which \$200 additional was granted.

The continued increase from year to year in the cost of nearly all supplies used at the park has so greatly enlarged the bills for maintenance expenses that very little could be done this year in the way of permanent improvements on buildings and grounds. The collections have, nevertheless, been kept in excellent condition and at nearly the normal numbers, though much-needed repairs and alterations, for the comfort and safety of the public, or to improve housing conditions of animals, could not be made. The number of specimens is slightly below that for a number of years, but the actual value and scientific importance of the collection is probably as great as at any time in the history of the park.

In October, 1916, Dr. Frank Baker, for 26 years the superintendent, tendered his resignation to take effect November 1. To quote from an editorial in the Washington Times of October 6, entitled "The Loss of Dr. Baker":

The resignation of Dr. Frank Baker as superintendent of the National Zoological Park marks the close of 26 years of valuable service in that capacity.

A reading of the reports of the Smithsonian Institution shows how much the Zoo here has developed under Dr. Baker, until it now possesses one of the most varied and interesting collections of animals of any such institution in the country.

The average citizen does not bother much about zoos except as a form of Sunday afternoon entertainment for children. But the educational value of the parks is becoming more generally recognized. School children of Washington are now sent to the Zoo to observe the animals, and they can learn and assimilate much more there in a few visits than they could accumulate in weeks of studying geographies.

As a professor of anatomy for 33 years at Georgetown University, as president of the National Association of Anatomists, and as an active member of half a dozen other scientific bodies, Dr. Baker has also attained note outside

his work at the Zoo. His capacity for work is suggested in the calm announcement that he, at the age of 75 years, must retire from the Zoo, not to seek leisure, but because of the pressure of other duties. Dr. Baker is one of a notable group of scientists to be found in Washington whose reputation is world-wide.

ACCESSIONS.

Gifts.—Animals to the number of 99 were presented by friends of the park, or placed on indefinite deposit. These include many of the more common species of the native fauna as well as some especially desirable animals rarely obtained.

One of the most notable gifts was that of five adult Rocky Mountain sheep received from the Canadian Government, through Mr. J. B. Harkin, commissioner of Dominion parks. These animals were captured in the Rocky Mountains Park near Banff, Alberta, and reached Washington March 7 in perfect condition. The shipment included one 5-year-old ram, a younger ram, and three ewes. A ewe lamb was born on May 27. Two paddocks were opened together to give the sheep sufficient range, and the exhibit is one of the most important now shown by the park. The animals are doing well to date and although the wild sheep is one of the species most difficult to keep in eastern zoological gardens it is hoped that the animals comprising this accession may be kept on show for a considerable time. The Duke of Bedford made a further gift of four Bedford deer, or Manchurian stags, from his collection at Woburn Abbey, England. The Bedford deer (*Cervus xanthopygus*) is one of a large group of Old World deer related to the American elk or wapiti, and has not heretofore been exhibited. The animals received have been given a commodious yard bordering the creek on the eastern side of the park, near the yaks, and are doing splendidly in their new home. A thrifty fawn was born June 14. Mr. Victor J. Evans, of Washington, D. C., showed continued interest in the exhibit by depositing some desirable Australian marsupials, including two wombats and a nail-tailed wallaby, both new to the collection.

The complete list of the donors and gifts is as follows:

- Adams Express Co., Washington, D. C., mink.
- Mr. and Mrs. Carl E. Akeley, New York City, vervet monkey and a bonnet monkey.
- Mrs. Ida Bangs, Washington, D. C., yellow-naped parrot.
- Mr. J. C. Beard, Brightwood, D. C., two barred owls.
- The Duke of Bedford, Woburn Abbey, England, four Bedford deer.
- Mr. C. E. Brewster and Dr. F. Kent, Eagle Pass, Tex., Inca dove, a hybrid quail, and eight chestnut-bellied scaled quails.
- Mrs. C. S. Briggs, Washington, D. C., alligator.
- Mrs. F. S. Brown, Washington, D. C., sparrowhawk.
- Postmaster General Burleson, Washington, D. C., alligator.
- Mrs. E. Caminetti, Washington, D. C., yellow rail.

Canadian Government, through Hon. J. B. Harkin, five Rocky Mountain sheep.

Prof. W. E. Castle, Bussey Institution, Harvard University, four Peruvian wild guinea-pigs.

Mrs. Chatham, Washington, D. C., yellow-headed parrot.

Mr. D. Crovo, Washington, D. C., boa constrictor and a murine opossum.

Mr. John O. Darlington, Washington, D. C., two alligators.

Dr. Ned Dearborn, Laurel, Md., common ferret.

Mr. R. E. Dunham, Allegan, Mich., alligator.

Dr. W. O. Emery, Washington, D. C., Cooper's hawk.

Mr. Victor J. Evans, Washington, D. C., nail-tailed wallaby and two wombats.

Mr. E. G. Fletcher, Washington, D. C., alligator.

Mr. J. M. Frank, jr., Washington, D. C., alligator.

Mrs. W. S. Groh, Burke, Va., alligator.

Mr. M. E. Heeter, Washington, D. C., alligator.

Mr. John Heywood, Gardner, Mass., ten mallards.

Mr. J. J. Hoffman, Washington, D. C., alligator.

Mrs. Katherine Hunter, Washington, D. C., yellow-headed parrot.

Mrs. J. W. Jenks, Washington, D. C., blue jay.

Dr. Guy W. Latimer, Hyattsville, Md., ring-necked pheasant.

Mr. Willis Lillycrop, Washington, D. C., white-throated capuchin.

Mr. T. P. Lovering, Washington, D. C., two chicken snakes, a black snake, a southern brown snake, and a brown water snake.

Miss Eleanor Marshall, Washington, D. C., alligator.

Mr. D. W. May, Mayaguez, P. R., Mona Island iguana.

Misses Margaret and Lily Meldahl, Washington, W. Va., curassow and a red-yellow-and-blue macaw.

Mr. J. C. Meyer, Washington, D. C., fox sparrow.

Mr. Irvin Miller, second officer, steamship *Northland*, Norfolk, Va., green heron.

Mr. James Mooney, jr., Washington, D. C., alligator.

Miss Niles, Washington, D. C., alligator.

Mr. William H. Ottemiller, York, Pa., alligator.

Mrs. M. A. Pitt, Washington, D. C., three grass parakeets.

Mr. T. J. Poole, Washington, D. C., two screech owls.

Mrs. J. L. Primm, Washington, D. C., three Virginia opossums.

Mr. Louis Rueger, Richmond, Va., Mexican puma.

Mr. W. E. Safford, Washington, D. C., gopher turtle.

Mr. E. S. Schmid, Washington, D. C., woodchuck.

Dr. R. W. Shufeldt, Washington, D. C., water snake.

Miss Pearl Smith and Mr. J. C. Lamon, Alcoa, Tenn., two banded rattlesnakes.

Dr. John S. Stearns, Washington, D. C., horned grebe.

Mr. Wilfred Stevens, Wesley Heights, D. C., indigo bunting.

Mr. C. E. Swihart, Fort Barrancas, Fla., horned toad.

Mr. J. E. Taylor, Oxford, Md., common skunk.

Mr. Hall Vermillion, Washington, D. C., sparrow hawk.

Mr. Clark Vernon, Washington, D. C., alligator.

Mr. J. W. Weaver, Nashville, Tenn., common skunk.

Births.—Fifty-two mammals were born, and 41 birds were hatched during the year. The births include 3 bears, 1 hippopotamus, 8 red deer, 1 Bedford deer, 2 elk, 2 mule deer, 2 Virginia deer, 1 fallow deer, 1 axis deer, 2 hog deer, 4 barasingha deer, 3 Japanese deer, 1 black

buck, 1 yak, 3 bison, 1 Rocky Mountain sheep, 1 aoudad, 2 guanacos, 3 llamas, 2 great red kangaroos, 1 wallaroo, 6 coypus, and 1 monkey. The birds hatched include Canada geese, ducks, Java sparrows, and peafowl. The hippopotamus is the first one born in the park, and one of very few ever born in America. It is a thrifty male and has attracted great attention.

Exchanges.—In exchange for surplus animals the park received 12 mammals and 62 birds. A drill, a young male sea lion, a pair of scarlet ibises, and numerous ducks for the North American waterfowl lake were obtained in this manner, as well as other species much needed to fill gaps in the collection.

Purchases.—Owing to lack of sufficient funds for the purchase of animals, many desirable species greatly needed in the collection, and offered from time to time, could not be obtained. A total of 26 mammals, 23 birds, and 22 reptiles were received through purchase, mostly small native species at low cost.

Transfers.—Four elk were received from Yellowstone Park through the Department of the Interior, but only two reached Washington in good condition and were saved. These were shipped East with a carload of elk for the State of Virginia, and were obtained with the idea of introducing new blood in the herd maintained at the park. The Biological Survey, of the Department of Agriculture, transferred to the park certain North American mammals, including a mountain lion from Arizona, a dusky marmot from New Mexico, and some mountain beavers from Washington.

Captured in the park.—One bird and one reptile, captured within the boundaries of the park, were added to the collection.

Deposited.—Hon. R. M. Barnes, of Lacon, Ill., sent to the park as a loan a male of the almost extinct trumpeter swan, one of the finest species of North American waterfowl. The park owned a single female of this rare swan and efforts are now being made to mate these surviving birds and preserve the species from extinction. The two swans are quartered in an ideal place, and although they were apparently placed together too late to breed this season, hopes are entertained that by next spring they will be sufficiently familiar with their surroundings to nest. A number of fur-bearing animals from the Bureau of Biological Survey, Department of Agriculture, and some rhesus monkeys from the Hygienic Laboratory were received on temporary deposit.

REMOVALS.

Surplus birds and mammals to the number of 51 were exchanged to other zoological gardens, and 62 animals on deposit were returned to the Bureau of Biological Survey, Department of Agriculture, and to the Hygienic Laboratory. A number of specimens of native

species were liberated in the Park and dropped from the list of animals in the collection.

The number of animals lost by death is comparatively small, but some important and valuable animals are included in the list. The death of Dunk, the Indian elephant, was the most notable loss. Dunk was the first animal to be placed in the Zoological Park when the present site was occupied. He was presented to the park by Mr. James E. Cooper, proprietor of the Adam Forepaugh Shows, April 30, 1891, and was then about 25 years old. Over 50 years of age at the time of his death, Dunk had reached the average limit for animals of his kind, for contrary to common belief the longevity of the elephant is not great in proportion to the size of the beast. Others of the more serious losses were a large Galapagos tortoise (*Testudo ephippium*), February 21, from enteritis; the harpy eagle (*Thrasaetos harpyia*) April 14, from aspergillosis; and a female Manchurian tiger which was mercifully killed as unfit for exhibition June 29. The Galapagos tortoise, with others of his kind, had been in the collection since October 1, 1898. The record for the harpy eagle is a matter of pride for the keepers in the bird department, for this rare bird of prey had been kept in good health for nearly 18 years. He was received May 19, 1899, as a gift from the governor of the State of Amazonas, Brazil, through Commander C. C. Todd, United States Navy. It is believed that the species has never before been kept in any gardens for a similar period.

Post-mortem examinations were made, as usual, by the pathological division of the Bureau of Animal Industry, United States Department of Agriculture. The following list shows the cause of death of animals in each general group. It is believed that the publication of such lists is to be encouraged, as they are of undoubted value to gardens less fortunately provided for up-to-date pathological investigations.

CAUSES OF DEATH.

MAMMALS.

Primates: Gastritis, 1; enteritis, 3; gastroenteritis, 2; no cause found, 1.
 Carnivora: Enteritis, 3; gastroenteritis, 7; malnutrition, 1; anemia, 1; peritonitis, 1; internal hemorrhage, 1.
 Ungulates: Enteritis, 3; gastroenteritis, 1; pneumonia, 3; congestion of lungs, 1; tuberculosis, 2; uremia, 1; peritonitis, 1; necrosis of jaw, 1; cachexia, 1; malnutrition, 1.
 Rodents: Enteritis, 1; gastroenteritis, 1; tuberculosis, 2; anemia, 1.
 Marsupials: Enteritis, 1; pneumonia, 1; septicemia, 1.

BIRDS.

Passeriformes: Enteritis, 1.
 Coraciiformes: Aspergillosis, 1; no cause found, 2.

- Cuculiformes: Gastroenteritis, 1; internal hemorrhage, 1; cause not found, 10.¹
 Charadriiformes: Enteritis, 2; tuberculosis, 3; pneumonia, 2.
 Gruiformes: Tuberculosis, 2.
 Galliformes: Enteritis, 2; gastroenteritis, 2; quail disease, 22.
 Falconiformes: Enteritis, 1; aspergillosis, 3; no cause found, 1.
 Anseriformes: Enteritis, 2; tuberculosis, 4; pneumonia, 1; aspergillosis, 2; no cause found, 3.
 Ciconiiformes: Enteritis, 5; anemia, 1; internal hemorrhage, 1; fibroma of intestine, 1.
 Colymbiformes: Septicemia, 1.

REPTILES.

- Testudinata: Enteritis, 1.
 Loricata: No cause found, 1.
 Serpentes: Enteritis, 1; intestinal necrosis, 1; no cause found, 1.

Thirty-three of the animals lost by death were transferred to the National Museum for mounting. These included all the rarer specimens or those of special scientific importance.

ANIMALS IN THE COLLECTION JUNE 30, 1917.

MAMMALS.

MARSUPIALIA.		CARNIVORA—continued.	
Murine opossum (<i>Marmosa murina</i>)	1	Cinnamon bear (<i>Ursus americanus cinnamomum</i>)	1
Virginia opossum (<i>Didelphis virginiana</i>)	3	Sloth bear (<i>Melursus ursinus</i>)	1
Tasmanian devil (<i>Sarcophilus harrisi</i>)	2	Polar bear (<i>Thalarctos maritimus</i>)	2
Phalanger (<i>Trichosurus vulpecula</i>)	2	Eskimo dog (<i>Canis familiaris</i>)	6
Dusky phalanger (<i>Trichosurus fuliginosus</i>)	2	Gray wolf (<i>Canis nubilus</i>)	1
Nail-tailed wallaby (<i>Onychogale frenata</i>)	1	Southern wolf (<i>Canis floridanus</i>)	2
Brush-tailed rock kangaroo (<i>Petrogale penicillata</i>)	2	Woodhouse's wolf (<i>Canis frustror</i>)	2
Great gray kangaroo (<i>Macropus giganteus</i>)	5	Coyote (<i>Canis latrans</i>)	7
Red kangaroo (<i>Macropus rufus</i>)	3	Red fox (<i>Vulpes fulva</i>)	1
Walleroo (<i>Macropus robustus</i>)	3	Swift fox (<i>Vulpes velox</i>)	1
Black-tailed wallaby (<i>Macropus ualabatus</i>)	1	Gray fox (<i>Urocyon cinereoargenteus</i>)	1
Parma wallaby (<i>Macropus parma</i>)	1	Cacomistle (<i>Basariscus astutus</i>)	1
Wombat (<i>Phascolomys mitchelli</i>)	2	Raccoon (<i>Procyon lotor</i>)	8
		Gray coatimundi (<i>Nasua narica</i>)	1
		Kinkajou (<i>Potos flavus</i>)	1
		Ferret (<i>Mustela furo</i>)	1
		Mink (<i>Mustela vison</i>)	1
		Tayra (<i>Tayra barbara</i>)	1
		Skunk (<i>Mephitis nigra</i>)	2
		American badger (<i>Taxidea taxus</i>)	2
		European badger (<i>Meles meles</i>)	2
		Florida otter (<i>Lutra canadensis vaga</i>)	5
		African civet (<i>Viverra civetta</i>)	1
		Genet (<i>Genetta genetta</i>)	1
		Spotted hyena (<i>Crocuta crocuta</i>)	1
		African cheetah (<i>Acinonyx jubatus</i>)	2
		Lion (<i>Felis leo</i>)	4
		Somaliand lion (<i>Felis leo somaliensis</i>)	1
		Bengal tiger (<i>Felis tigris</i>)	2
		Manchurian tiger (<i>Felis tigris longipilis</i>)	1
		Leopard (<i>Felis pardus</i>)	2
		East African leopard (<i>Felis pardus suahelica</i>)	1

¹Nine lorikeets, while apparently healthy, died suddenly after convulsions. The pathologists have thus far been unable to find the cause.

CARNIVORA—continued.

Jaguar (<i>Felis onca</i>)-----	1
Mexican puma (<i>Felis azteca</i>)-----	2
Mountain lion (<i>Felis hipolestes</i>)-----	4
Canada lynx (<i>Lynx canadensis</i>)-----	3
Bay lynx (<i>Lynx rufus</i>)-----	6
California lynx (<i>Lynx californicus</i>)----	1

PINNIPEDIA.

California sea lion (<i>Zalophus californianus</i>)-----	2
Steller's sea lion (<i>Eumetopias jubata</i>)--	1
Harbor seal (<i>Phoca vitulina</i>)-----	2

RODENTIA.

Patagonian cavy (<i>Dolichotis patagonica</i>)-----	2
Peruvian guinea pig (<i>Cavia tschudii pallidior</i>)-----	3
Guinea pig (<i>Cavia porcellus</i>)-----	20
Coypu (<i>Myocastor coypus</i>)-----	7
Mexican agouti (<i>Dasyprocta mexicana</i>)--	1
Azara's agouti (<i>Dasyprocta azaræ</i>)-----	2
Crested agouti (<i>Dasyprocta cristata</i>)--	4
Paca (<i>Cuniculus paca</i>)-----	2
Viscacha (<i>Lagostomus maximus</i>)-----	1
Crested porcupine (<i>Hystrix cristata</i>)--	1
Mountain beaver (<i>Aplodontia rufa</i>)-----	2
Woodchuck (<i>Marmota monax</i>)-----	1
Dusky marmot (<i>Marmota flaviventris obscura</i>)-----	1
Prairie dog (<i>Cynomys ludovicianus</i>)--	2
Striped spermophile (<i>Citellus tridecemlineatus</i>)-----	1
Albino squirrel (<i>Sciurus carolinensis</i>)--	1
American beaver (<i>Castor canadensis</i>)--	2

LAGOMORPHA.

Domestic rabbit (<i>Oryctolagus cuniculus</i>)-----	15
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EDENTATA.

Hairy armadillo (<i>Euphractus villosus</i>)--	2
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PRIMATES.

Mongoose lemur (<i>Lemur mongoz</i>)-----	1
Black lemur (<i>Lemur macaco</i>)-----	1
Titi monkey (<i>Saimiri sciureus</i>)-----	2
Gray spider monkey (<i>Ateles geoffroyi</i>)--	1
White-throated capuchin (<i>Cebus capucinus</i>)-----	2
Brown capuchin (<i>Cebus fatuellus</i>)-----	3
Guinea baboon (<i>Papio papio</i>)-----	3
Chacma (<i>Papio porcarius</i>)-----	1
Yellow baboon (<i>Papio cynocephalus</i>)--	1
Hamadryas baboon (<i>Papio hamadryas</i>)--	2
Mandrill (<i>Papio sphinx</i>)-----	1
Drill (<i>Papio leucophæus</i>)-----	1
Moor macaque (<i>Cynopithecus maurus</i>)--	1
Brown macaque (<i>Macaca speciosa</i>)-----	2
Japanese monkey (<i>Macaca fuscata</i>)-----	2
Pig-tailed monkey (<i>Macaca nemestrina</i>)-----	2

PRIMATES—continued.

Rhesus monkey (<i>Macaca rhesus</i>)-----	28
Bonnet monkey (<i>Macaca sinica</i>)-----	2
Javan macaque (<i>Macaca mordax</i>)-----	1
Sooty mangabey (<i>Cercocebus fuliginosus</i>)-----	2
Green guenon (<i>Lasiopyga callitrichus</i>)--	1
Vervet guenon (<i>Lasiopyga pygerythra</i>)-----	2
Mona (<i>Lasiopyga mona</i>)-----	3
Roloway guenon (<i>Lasiopyga roloway</i>)--	1
Patas monkey (<i>Erythrocebus patas</i>)--	3
Chimpanzee (<i>Pan troglodytes</i>)-----	1

Collared peccary (<i>Pecari angulatus</i>)--	1
Wild boar (<i>Sus scrofa</i>)-----	1
Wart hog (<i>Phacochærus æthiopicus</i>)--	2
Hippopotamus (<i>Hippopotamus amphibius</i>)-----	3
Bactrian camel (<i>Camelus bactrianus</i>)--	3
Arabian camel (<i>Camelus dromedarius</i>)-----	3
Guanaco (<i>Lama huanachus</i>)-----	5
Llama (<i>Lama glama</i>)-----	8
Alpaca (<i>Lama pacos</i>)-----	2
Vicuna (<i>Lama vicugna</i>)-----	1
Fallow deer (<i>Dama dama</i>)-----	7
Axis deer (<i>Axis axis</i>)-----	6
Hog deer (<i>Hyelaphus porcinus</i>)-----	7
Sambar (<i>Rusa unicolor</i>)-----	2
Luzon deer (<i>Rusa philippinus</i>)-----	1
Barasingha (<i>Rucervus duvaucelii</i>)-----	13
Japanese deer (<i>Sika nippon</i>)-----	9
Red deer (<i>Cervus elaphus</i>)-----	15
Kashmir deer (<i>Cervus hanglu</i>)-----	5
Bedford deer (<i>Cervus xanthopygus</i>)--	5
American elk (<i>Cervus canadensis</i>)--	9
Virginia deer (<i>Odocoileus virginianus</i>)--	12
Mule deer (<i>Odocoileus hemionus</i>)-----	4
Black-tailed deer (<i>Odocoileus columbianus</i>)-----	3
Blesbok (<i>Damaliscus albifrons</i>)-----	1
White-tailed gnu (<i>Connochættes gnu</i>)--	1
Defassa water-buck (<i>Kobus defassa</i>)--	1
Indian antelope (<i>Antilope cervicapra</i>)--	5
Springbok (<i>Antidorcas marsupialis centralis</i>)-----	1
Sable antelope (<i>Ozanna niger</i>)-----	1
Nilgai (<i>Boselaphus tragocamelus</i>)--	2
Congo harnessed antelope (<i>Tragelaphus gratus</i>)-----	2
East African eland (<i>Taurotragus oryx livingstonii</i>)-----	3
Tahr (<i>Hemitragus jemlahicus</i>)-----	4
Aoudad (<i>Ammotragus lervia</i>)-----	9
Circassian goat (<i>Capra hircus</i>)-----	2
Rocky Mountain sheep (<i>Ovis canadensis</i>)-----	6
Barbados sheep (<i>Ovis aries</i>)-----	8
Zebu (<i>Bos indicus</i>)-----	2
Anoa (<i>Anoa depressicornis</i>)-----	1
Yak (<i>Poëphagus grunniens</i>)-----	4
American bison (<i>Bison bison</i>)-----	18

PERISSODACTYLA.

Brazilian tapir (<i>Tapirus terrestris</i>)	4
Mongolian horse (<i>Equus przewalskii</i>)	1
Grant's zebra (<i>Equus burchelli granti</i>)	1
Grevy's zebra (<i>Equus grevyi</i>)	2
Zebra horse, hybrid (<i>Equus grevyi-caballus</i>)	1

RATITE.

South African ostrich (<i>Struthio australis</i>)	4
Somaliland ostrich (<i>Struthio molybdophanes</i>)	1
Rhea (<i>Rhea americana</i>)	2
Cassowary (<i>Casuarus galeatus</i>)	1
Emu (<i>Dromiceius novæhollandiæ</i>)	2

CICONIIFORMES.

American white pelican (<i>Pelecanus erythrorhynchos</i>)	9
European white pelican (<i>Pelecanus onocrotalus</i>)	2
Roseate pelican (<i>Pelecanus roseus</i>)	2
Australian pelican (<i>Pelecanus conspicillatus</i>)	2
Brown pelican (<i>Pelecanus occidentalis</i>)	3
Florida cormorant (<i>Phalacrocorax australianus</i>)	16
White-necked heron (<i>Ardea cocoi</i>)	1
Great blue heron (<i>Ardea herodias</i>)	1
Snowy egret (<i>Egretta candidissima</i>)	3
Green heron (<i>Butorides virescens</i>)	1
Black-crowned night heron (<i>Nycticorax nycticorax ævius</i>)	14
Boatbill (<i>Cochlearius cochlearius</i>)	2
White stork (<i>Ciconia ciconia</i>)	3
Black stork (<i>Ciconia nigra</i>)	1
Marabou stork (<i>Leptoptilos dubius</i>)	1
Sacred ibis (<i>Threskiornis æthiopicus</i>)	3
White ibis (<i>Guara alba</i>)	11
Scarlet ibis (<i>Guara rubra</i>)	2
Roseate spoonbill (<i>Ajaia ajaja</i>)	2
European flamingo (<i>Phœnicopterus roseus</i>)	1

ANSERIFORMES.

Black-necked screamer (<i>Chauna torquata</i>)	3
Horned screamer (<i>Anhima cornuta</i>)	1
Mallard (<i>Anas platyrhynchos</i>)	10
East Indian black duck (<i>Anas platyrhynchos var.</i>)	14
Black duck (<i>Anas rubripes</i>)	1
European widgeon (<i>Mareca penelope</i>)	1
Baldpate (<i>Mareca americana</i>)	9
Green-winged teal (<i>Nettion carolinense</i>)	11
Blue-winged teal (<i>Querquedula discors</i>)	8
Ruddy sheldrake (<i>Casarca ferruginea</i>)	1

PERISSODACTYLA—continued.

Zebra ass, hybrid (<i>Equus grevyi-asinus</i>)	1
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PROBOSCIDEA.

Abyssinian elephant (<i>Loxodonta africana oryotis</i>)	1
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BIRDS.

ANSERIFORMES—continued.

Pintail (<i>Dafla acuta</i>)	8
Wood duck (<i>Aix sponsa</i>)	9
Mandarin duck (<i>Dendronessa galericulata</i>)	26
Canvas-back (<i>Marila valisineria</i>)	1
Lesser scaup duck (<i>Marila affinis</i>)	6
Rosy-billed pochard (<i>Metopiana peponasaca</i>)	1
Snow goose (<i>Chen hyperboreus</i>)	3
Blue goose (<i>Chen caerulescens</i>)	2
Ross's goose (<i>Chen rossii</i>)	1
White-fronted goose (<i>Anser albifrons</i>)	4
American white-fronted goose (<i>Anser albifrons gambeli</i>)	1
Toulouse goose (<i>Anser cinereus domesticus</i>)	2
Bar-headed goose (<i>Anser indicus</i>)	2
Canada goose (<i>Branta canadensis</i>)	23
Hutchins's goose (<i>Branta canadensis hutchinsii</i>)	4
Cackling goose (<i>Branta canadensis minima</i>)	2
Barnacle goose (<i>Branta leucopsis</i>)	2
Upland goose (<i>Chloëphaga leucoptera</i>)	1
Spur-winged goose (<i>Plectropterus gambensis</i>)	1
Cape Barren goose (<i>Cereopsis novæhollandiæ</i>)	2
Wandering tree duck (<i>Dendrocygna arcuata</i>)	2
White-faced tree duck (<i>Dendrocygna viduata</i>)	3
Black-bellied tree duck (<i>Dendrocygna autumnalis</i>)	1
Mute swan (<i>Cygnus gibbus</i>)	4
Whistling swan (<i>Olor columbianus</i>)	4
Trumpeter swan (<i>Olor buccinator</i>)	2
Black swan (<i>Chenopsis atrata</i>)	3

FALCONIFORMES.

South American condor (<i>Vultur gryphus</i>)	1
California condor (<i>Gymnogyps californianus</i>)	3
Turkey vulture (<i>Cathartes aura</i>)	4
Black vulture (<i>Coragyps urubu</i>)	2
King vulture (<i>Sarcoramphus papa</i>)	2
Secretary bird (<i>Sagittarius serpentarius</i>)	1
Griffon vulture (<i>Gyps fulvus</i>)	2
Cinereous vulture (<i>Aegypius monachus</i>)	2

FALCONIFORMES—continued.

Lammereyger (<i>Gypaëtus barbatus</i>)	1
Caracara (<i>Polyborus cheriway</i>)	3
Yellow-throated caracara (<i>Ibycter</i> <i>ater</i>)	1
Crowned hawk eagle (<i>Spizaëtus coro-</i> <i>natus</i>)	1
Wedge-tailed eagle (<i>Uroaëtus audax</i>)	2
Golden eagle (<i>Aquila chrysaëtus</i>)	2
Bald eagle (<i>Haliaëtus leucocephalus</i>)	15
Alaskan bald eagle (<i>Haliaëtus leuco-</i> <i>cephalus alascanus</i>)	1
Sparrow hawk (<i>Falco sparverius</i>)	3

GALLIFORMES.

Mexican curassow (<i>Crax globicera</i>)	2
Daubenton's curassow (<i>Crax dauben-</i> <i>toni</i>)	3
Wild turkey (<i>Meleagris gallopavo</i>)	5
Peafowl (<i>Pavo cristatus</i>)	35
Peacock pheasant (<i>Polyplectron bical-</i> <i>caratum</i>)	1
Silver pheasant (<i>Euplocamus nycthe-</i> <i>merus</i>)	1
Natal francolin (<i>Francolinus natalen-</i> <i>sis</i>)	1
Crested francolin (<i>Francolinus seph-</i> <i>ana</i>)	1
Curago crested quail (<i>Eupsychortyx</i> <i>cristatus</i>)	2
Bobwhite (<i>Colinus virginianus</i>)	5
Scaled quail (<i>Callipepla squamata</i>)	2
Gambel's quail (<i>Lophortyx gambelii</i>)	1
Valley quail (<i>Lophortyx californica</i> <i>vallicola</i>)	1

GRUIFORMES.

American coot (<i>Fulca americana</i>)	22
Whooping crane (<i>Grus americana</i>)	1
Sandhill crane (<i>Grus mexicana</i>)	3
White-necked crane (<i>Grus leucauchen</i>)	1
Indian white crane (<i>Grus leucogera-</i> <i>nus</i>)	1
Lilford's crane (<i>Grus lilfordi</i>)	3
Australian crane (<i>Grus rubicunda</i>)	1
Demoiselle crane (<i>Anthropoides virgo</i>)	7
Crowned crane (<i>Balearica pavonina</i>)	2
Cariama (<i>Cariama cristata</i>)	1

CHARADRIIFORMES.

Great black-backed gull (<i>Larus mari-</i> <i>nus</i>)	1
Herring gull (<i>Larus argentatus</i>)	1
Laughing gull (<i>Larus atricilla</i>)	2
Australian crested pigeon (<i>Ocyphaps</i> <i>lophotes</i>)	14
Wonga-wonga pigeon (<i>Leucosarcia</i> <i>picata</i>)	10
Speckled pigeon (<i>Columba phæonota</i>)	1
Snow pigeon (<i>Columba leuconota</i>)	2
White-crowned pigeon (<i>Patagianus</i> <i>leucocephala</i>)	1
Band-tailed pigeon (<i>Chloranas fas-</i> <i>ciata</i>)	4

CHARADRIIFORMES—continued.

Red-billed pigeon (<i>Chloranas flaviro-</i> <i>tris</i>)	4
White-winged dove (<i>Melopelia asia-</i> <i>tica</i>)	1
Mourning dove (<i>Zenaidura macroura</i>)	10
Peaceful dove (<i>Geopelia tranquilla</i>)	2
Zebra dove (<i>Geopelia striata</i>)	19
Cape masked dove (<i>Aena capensis</i>)	3
Inca dove (<i>Scardafella inca</i>)	3
Blue-headed quail-dove (<i>Starnænas</i> <i>cynocephala</i>)	2
Collared turtle-dove (<i>Streptopelia</i> <i>risoria</i>)	20

CUCULIFORMES.

White-crested touraco (<i>Turacus cory-</i> <i>thax</i>)	1
Grass parrakeet (<i>Melopsittacus un-</i> <i>dulatus</i>)	3
Black-tailed parrakeet (<i>Polytelis</i> <i>melanura</i>)	1
Banded parrakeet (<i>Palæornis fas-</i> <i>ciata</i>)	1
Lesser vasa parrot (<i>Coracopsis nigra</i>)	1
Gray parrot (<i>Psittacus erithacus</i>)	1
Cuban parrot (<i>Amazona leucocephala</i>)	1
Porto Rican parrot (<i>Amazona vittata</i>)	1
Yellow-winged parrot (<i>Amazona bar-</i> <i>badensis</i>)	2
Festive parrot (<i>Amazona festiva</i>)	1
Yellow-fronted parrot (<i>Amazona och-</i> <i>rocephala</i>)	2
Yellow-naped parrot (<i>Amazona auro-</i> <i>palliata</i>)	2
Yellow-headed parrot (<i>Amazona ora-</i> <i>tria</i>)	4
Quaker parrot (<i>Myiopsitta monachus</i>)	1
Red-and-blue macaw (<i>Ara chlorop-</i> <i>tera</i>)	2
Red-and-yellow-and-blue macaw (<i>Ara</i> <i>macao</i>)	7
Yellow-and-blue macaw (<i>Ara arara-</i> <i>una</i>)	1
Sulphur-crested cockatoo (<i>Cacatoes</i> <i>galerita</i>)	3
Great red-crested cockatoo (<i>Cacatoes</i> <i>moluccensis</i>)	1
White cockatoo (<i>Cacatoes alba</i>)	3
Leadbeater's cockatoo (<i>Cacatoes lead-</i> <i>beateri</i>)	1
Bare-eyed cockatoo (<i>Cacatoes gym-</i> <i>nopsis</i>)	3
Roseate cockatoo (<i>Cacatoes roseica-</i> <i>pilla</i>)	12
Scaly-breasted lorikeet (<i>Psittentetes</i> <i>chlorolepidotus</i>)	1

CORACIFORMES.

Giant kingfisher (<i>Dacelo gigas</i>)	2
Concave-casqued hornbill (<i>Dichoceros</i> <i>bicornis</i>)	1
Barred owl (<i>Strix varia</i>)	5
Screech owl (<i>Otus asio</i>)	1
Great horned owl (<i>Bubo virginianus</i>)	14

PASSERIFORMES.

Yellow tyrant (<i>Pitangus sulphuratus</i>)	1
Japanese robin (<i>Liothrix luteus</i>)	4
Laughing thrush (<i>Garrulax leucolophus</i>)	2
Mockingbird (<i>Mimus polyglottos</i>)	1
Brown thrasher (<i>Toxostoma rufum</i>)	1
Australian gray jumper (<i>Struthidea cinerea</i>)	1
Red-billed magpie (<i>Urocissa occipitalis</i>)	1
American magpie (<i>Pica pica hudsonica</i>)	3
Blue jay (<i>Cyanocitta cristata</i>)	2
American crow (<i>Corvus brachyrhynchos</i>)	1
Australian crow (<i>Corvus coronoides</i>)	1
European raven (<i>Corvus corax</i>)	1
Glossy starling (<i>Lamprotornis caudatus</i>)	1
Malabar starling (<i>Spodiopsar malabaricus</i>)	1
Napoleon weaver (<i>Pyromelana atra</i>)	2

PASSERIFORMES—continued.

Crimson-crowned weaver (<i>Pyromelana flammeiceps</i>)	2
Madagascar weaver (<i>Foudia madagascariensis</i>)	3
Paradise weaver (<i>Steganura paradisea</i>)	5
Cut-throat finch (<i>Amadina fasciata</i>)	1
Black-faced Gouldian finch (<i>Poëphila gouldiæ</i>)	1
Black-headed finch (<i>Munia atricapilla</i>)	4
Three-colored finch (<i>Munia malacca</i>)	1
Nutmeg finch (<i>Munia punctularia</i>)	2
Java sparrow (<i>Munia oryzivora</i>)	13
White Java sparrow (<i>Munia oryzivora</i>)	5
Cowbird (<i>Molothrus ater</i>)	1
Fox sparrow (<i>Passerella iliaca</i>)	1
Nonpareil (<i>Passerina ciris</i>)	1
Saffron finch (<i>Sicalis flaveola</i>)	12
Canary (<i>Serinus canarius</i>)	4
Green singing finch (<i>Serinus icterus</i>)	3
Red-crested cardinal (<i>Paroaria cucullata</i>)	2
Cardinal (<i>Cardinalis cardinalis</i>)	3

REPTILES.

Gopher tortoise (<i>Gopherus polyphemus</i>)	1	Horned toad (<i>Phrynosoma cornutum</i>)	1
Duncan Island tortoise (<i>Testudo ephippium</i>)	1	Rock python (<i>Python molurus</i>)	3
Albemarle Island tortoise (<i>Testudo vicina</i>)	1	Anaconda (<i>Eunectes murinus</i>)	1
Alligator (<i>Alligator mississippiensis</i>)	30	Boa constrictor (<i>Constrictor constrictor</i>)	3
Mona Island iguana (<i>Cyclura stejnegeri</i>)	1	Water snake (<i>Natrix sipedon</i>)	2
Gila monster (<i>Heloderma suspectum</i>)	7	Black snake (<i>Coluber constrictor</i>)	1
		Coach-whip snake (<i>Coluber flagellum</i>)	1
		Chicken snake (<i>Elaphe obsoleta quadrivittata</i>)	2

STATEMENT OF THE COLLECTION.

ACCESSIONS DURING THE YEAR.

Presented:		Transferred from other Government departments:	
Mammals	28	Mammals	5
Birds	44		5
Reptiles	27	Captured in National Zoological Park:	
	99	Birds	1
Born and hatched in the National Zoological Park:		Reptiles	1
Mammals	52		2
Birds	41	Deposited:	
	93	Mammals	52
Received in exchange:		Birds	1
Mammals	12		53
Birds	62	Total accessions	397
	74		
Purchased:			
Mammals	26		
Birds	23		
Reptiles	22		
	71		



FIG. 1.—THE RECONSTRUCTED BUFFALO HOUSE, NOW USED AS A SHELTER FOR THE MOUNTAIN SHEEP, ELANDS, AND KASHMIR DEER, RECENT GIFTS TO THE PARK FROM CANADA AND ENGLAND.



FIG. 2.—VIEW ON THE NEW NORTH AMERICAN WATERFOWL LAKE IN THE NATIONAL ZOOLOGICAL PARK. TWENTY-FOUR OF OUR NATIVE SPECIES OF WILD DUCKS AND GESE MAY BE SEEN ON THIS LAKE.



FIG. 1.—HIPPOPOTAMUS AND YOUNG (BORN IN NATIONAL ZOOLOGICAL PARK, MAY 23, 1917).

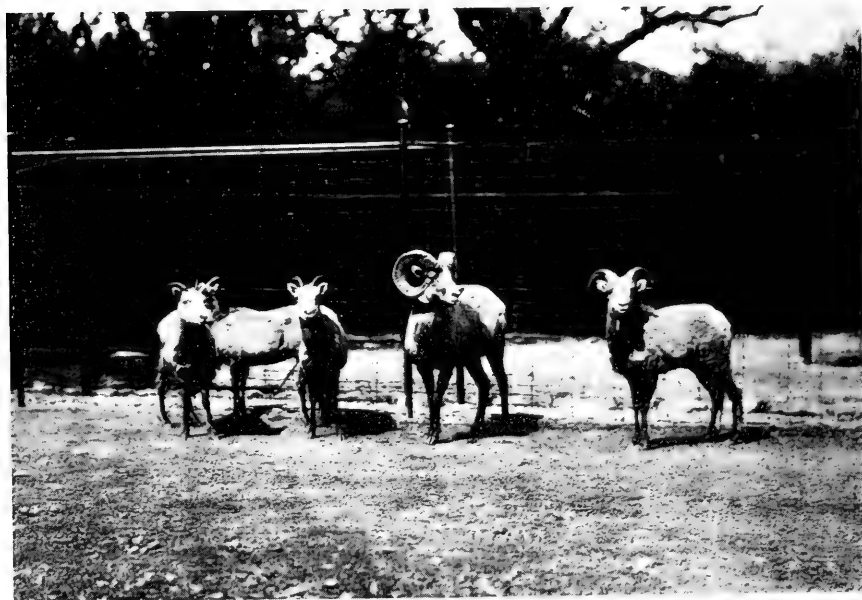


FIG. 2.—ROCKY MOUNTAIN SHEEP RECEIVED AT THE NATIONAL ZOOLOGICAL PARK, MARCH 7, 1917, FROM ROCKY MOUNTAINS PARK, BANFF, ALBERTA, CANADA.

SUMMARY.

Animals on hand July 1, 1916.....	1,383
Accessions during the year.....	397
	<hr/>
	1,780
Deduct loss (by exchange, death, return of animals, and animals liberated).....	557
	<hr/>
On hand June 30, 1917.....	1,223

Class.	Species.	Individuals.
Mammals.....	159	484
Birds.....	182	683
Reptiles.....	14	56
	<hr/>	
Total.....	355	1,223

VISITORS.

The number of visitors to the park during the year, as determined by count and estimate, was 1,106,800, a daily average of 3,032. The greatest number in any one month was 171,400, in April, 1917, an average per day of 5,713. The attendance by months was as follows:

1916: July, 78,800; August, 80,500; September, 122,550; October, 92,200; November, 43,250; December, 44,625.

1917: January, 37,750; February, 55,675; March, 108,400; April, 171,400; May, 110,550; June, 161,100.

Excepting 1916, this was the largest attendance in the history of the park. The number of visitors was only 50,310 less than in 1916, and doubtless would have exceeded that record year but for the unseasonable weather on Easter Monday.

One hundred and fifty-three schools and classes visited the park, with a total of 8,492 individuals. In addition to the local schools and those from near-by States, these included schools from Alabama, Arkansas, Massachusetts, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, and Vermont. A number of officials from other zoological gardens visited the park.

The exceptionally favorable weather made the skating pond an attractive feature during the past winter and for a much longer period than usual. The ice was kept clean of snow throughout the season and the appreciation of the public would seem to warrant the construction of additional lakes to be used for exhibits of waterfowl during the summer and skating in winter.

IMPROVEMENTS.

The hospital and laboratory, which has been mentioned in the reports for the last two years, is still unfinished, but a considerable amount of work was done on the interior cages so that the building now lacks only the necessary outside yards and the laboratory equipment. The hospital cages are designed for the care and special comfort of indisposed or quarantined animals, and accommodations are provided for two mammals of lion-size, three of leopard-size, three large ruminants, and a number of smaller animals. In addition, there is a large, well lighted, central room for laboratory use. The completion of this building will greatly facilitate the work of the pathologists from the Department of Agriculture who visit the park.

The largest water fowl lake, in the southeastern part of the park, was enlarged and reconstructed to provide safe and retired breeding and resting places for the birds. It had formerly been inclosed by a fence of ordinary poultry wire without special protection from predacious animals, and there had been frequent loss from the depredations of rats and the smaller native carnivores. In order to increase sufficiently the land area it was necessary to construct a stone wall along Rock Creek at the rear of the inclosure. By lowering the grade of the hill bordering the lake, sufficient earth was procured to fill up to the level of the wall on the inner side. A rat-proof fence was woven in the machine shop and further provided with guards against cats and raccoons. The level of the water was raised about 12 inches, greatly increasing the size of the lake, and the new fence was constructed on a concrete coping considerably outside the former boundary. Numerous shrubs, small trees, canes, and grasses were planted to supplement the fine growth of larger trees already on the area. Visitors walk along one side of the lake only and as the thick vegetation virtually hides the fence on the opposite side at all points the effect is that of a wilderness breeding lake for ducks and geese. As completed, the inclosure provides almost natural conditions for the waterfowl of numerous species and forms a very attractive exhibit. It has been given over entirely to North American species, and it is hoped that a large representation of the ducks, geese, and other aquatic birds commonly associated with them native to our continent may be kept here. On June 30, no less than 136 North American waterfowl, of 24 species, were to be seen on the lake. The natural surroundings and the fact that only American species are shown here makes this waterfowl lake of special interest to school classes, sportsmen, and bird lovers, and it has become one of the popular features of the park. A cement walk was extended from the bridge near the Harvard Street entrance along the south side of

the road to the cross roads, to connect with the cinder path bordering the lake.

The work of grading and filling around the old buffalo house and the remodeling of the building for other uses, which was commenced last year, has been completed. As reconstructed the building makes an ideal shelter of pleasing design and furnishes house space for the animals occupying the six large paddocks that surround it. The Canadian Rocky Mountain sheep, the elands, and the Kashmir deer are provided for in this group of yards.

An outdoor cage and shelter, summer quarters for the chimpanzee, were built near the north entrance to the lion house. This provides not only for the better health of this interesting trained ape, but makes it possible for larger crowds to gather about at the time his meals are served.

New paddocks were provided for ungulate mammals on the piece of ground recently leveled by grading northwest of the llama yards. Much-needed repairs were made on the wolf dens and to the lion-house roof.

A considerable portion of the pasture land near the office was plowed as an addition to the garden, in an effort to decrease the cost of feed for the animals. For the same reason horseflesh has been substituted for beef as food for the carnivorous animals, with the prospect of saving at least \$6,000 on this item alone during the next fiscal year. A portion of the nursery was fenced and breeding pens for quail and other game birds were installed within the inclosure. It is hoped that most of the quail of various species needed for park purposes may be reared in this place and that important experiments in the breeding of game birds may at the same time be conducted without additional expense.

THE PARK AS A BIRD SANCTUARY.

The entire 169 acres of the National Zoological Park constitutes a carefully preserved sanctuary for native wild birds. Every effort is being made to increase the bird population within this area and to give better protection to the resident species. During the past year over 100 nesting boxes were provided for those species which commonly nest in holes in trees. These were made in the carpenter shop at odd times during the winter months from trunks and limbs of fallen trees with the bark in place. Attached to trees of the same kind or with bark of the same color these nesting boxes are much less conspicuous and unsightly in the park trees than square boxes made from planed boards. Many of the boxes were occupied during the summer by bluebirds, chickadees, nuthatches, wrens, and flickers, and additional nests will be provided from year to year. During the

colder months food is provided for the winter residents in various parts of the park.

Of all the native wild birds within the park perhaps none attract so much attention as the turkey vultures, or "buzzards," which congregate here in great numbers during the fall and winter months. Food, at practically no expense, is provided for the vultures, and they become very tame and confiding. Many visitors from the Northern States, to whom the birds are a novel sight, greatly admire the graceful flight of these interesting creatures. During the summer months the vultures scatter out over the surrounding country to nest, and only a few appear within the boundaries of the park, but the security afforded for winter roosts brings them back in great numbers with the approach of autumn.

Bobwhite quail appear to be increasing in numbers within the park and are now fairly abundant. A considerable number of these birds must help stock the surrounding country from year to year.

Numerous bird classes from the schools and parties of Audubon Society members find the wilder parts of the park ideal grounds for observation of the birds.

ALTERATION OF WESTERN BOUNDARY.

It again appears desirable to recapitulate for future reference the various stages through which the matter of the adjustment of the western boundary, near the Connecticut Avenue entrance, has passed.

The following appropriation was made by the act approved June 23, 1913:

Readjustment of boundaries: For acquiring, by condemnation, all the lots, pieces, or parcels of land, other than the one hereinafter excepted, that lie between the present western boundary of the National Zoological Park and Connecticut Avenue from Cathedral Avenue to Klinge Road, \$107,200, or such portion thereof as may be necessary, said land when acquired, together with the included highways, to be added to and become a part of the National Zoological Park. The proceedings for the condemnation of said land shall be instituted by the Secretary of the Treasury under and in accordance with the terms and provisions of subchapter 1 of chapter 15 of the Code of Law for the District of Columbia.

As the act required that the proceedings be instituted by the Secretary of the Treasury, the attention of that official was called to the matter in a letter from the Secretary of the Smithsonian Institution, dated June 28, 1913. A special survey and plat of the land required was necessary, but this plat was not forwarded to the Department of Justice until November 5, 1913. Other delays ensued; the title of the various owners of the land had to be investigated, and it was not until March 11, 1914, that the district court ordered a jury to be summoned. A hearing was set for April 10, 1914, and a final hearing of the case was heard by the jury on July 2 following. The verdict

of the jury was not filed until December 11, 1914. The hearing of objections to the verdict much delayed a final conclusion, especially as the time of the court was almost wholly occupied by a contest in an important will case. It was not until June 28, 1915, over two years from the passage of the appropriation act, that the court confirmed the verdict as regards the awards for damages for the land to be taken. The benefits assessed against the neighboring property were set aside by this and by a subsequent decision of January 28, 1916. The decree of the court fixed the amount required for the purchase of the land at \$194,438.08. The cost of the proceedings for condemnation was \$2,203.35.

The great delay caused by these legal proceedings occasioned another complication. The appropriation made by the act of June 23, 1913, was not a continuing one, but lapsed at the end of one year. Consequently after June 30, 1915, there was nothing available to defray the purchase of the land.

An item for an additional appropriation and for a reappropriation of the original sum appropriated by the act of June 23, 1913, was submitted to the first and second sessions of the Sixty-fourth Congress, but was not favorably considered.

It is greatly to be regretted that this appropriation failed, as it is exceedingly desirable that the land in question be obtained for park purposes before it is too late. A frontage on Connecticut Avenue at this point is most important, because the principal entrance to the park will probably be here for all time, and it is essential that the control of the land be in the hands of park authorities.

IMPORTANT NEEDS.

Grading and filling.—The work of grading and filling, commenced last year, should be continued. The further cutting away of the irregular hill in the center of the western part of the park and the filling in of a nearby ravine will level nearly 70,000 square feet of ground which is now of little use and make available about 25,000 square feet of ground at the ravine, besides straightening out the automobile road at this point. More inclosures are seriously needed for deer and similar animals, and this grading would provide for a number of these yards on flat ground.

Public-comfort building and restaurant.—The need of a suitable structure for a rest house and refreshment room is strongly felt. This rest house should provide toilet facilities for both women and men. It is probably true that the present restaurant occasions more unfavorable comment from visitors than any other one feature in the park. It is only a rude wooden platform with cover, but with open sides; the kitchen and other facilities are inadequate, and the entire structure is in a bad state of repair.

Roads, bridle paths, and automobile parking.—The question of providing space for the parking of automobiles near the main buildings in the center of the park is becoming serious. The available space is entirely insufficient on nearly every Sunday and on all holidays. In order to provide suitable accommodations for the constantly increasing number of cars it will be necessary to make some change in the roads and lawns at the central point. It will be necessary to make extensive repairs to the roads during the coming year, which will involve a considerable expenditure. The roads need repair now, but under the stringent economy that is compelled during 1918 it will not be possible to make even the repairs already needed, nor to provide proper upkeep of the roads. The greatly increased auto traffic (sometimes 2,500 cars in a day) makes necessary each year greater expenditures to keep the roads in order. Some change should be made in the bridle paths in order that equestrians would not be forced to use the bridge and the main road from the Harvard Street gate to the crossroads. Numerous complaints have been made as to the danger at these points, not only to children, but to the riders themselves. The bridle path could, at some expense, be carried up the west side of the creek from the crossroads, and a ford constructed to connect with the bridle path on the east side of the creek.

Outdoor dens for carnivorous mammals.—Recent experiments have shown that many kinds of animals usually kept in heated houses are much better off in outdoor yards, with warm, but unheated sleeping quarters. Such accommodations should be provided for the Siberian tiger, some of the lions, and other animals now occupying quarters in crowded heated houses. The health of these animals would unquestionably be improved and their lives prolonged under such conditions, and the space they now occupy in heated houses would become available for other animals really needing such accommodations. A series of outdoor, unheated cages and shelters should also be provided to replace the series of unsightly old wooden cages along the hilltop north of the bird house.

Additional ponds for waterfowl.—Additional lakes to be used for waterfowl in summer and for skating in winter could be provided at comparatively small expense both in the open flat near the Harvard Street entrance and near the pelican pond across the road. Exhibits of waterfowl are very popular and instructive, and the skating privilege is much appreciated by the public in winter.

Aviary building.—The park reports have for a number of years urged the appropriation of funds for a new bird house. That such a structure is badly needed is apparent. The building now used for the birds was erected in the cheapest manner possible for temporary use and is now in a bad state of repair. The collection is an im-

portant one, and a suitable bird house would without doubt prove one of the most attractive and instructive features of the park.

Reptile house.—A properly constructed reptile house would, it is certain, prove almost as attractive to the public as a bird house. The comparatively small collection of reptiles now kept in crowded quarters in the lion house is very popular.

The most urgent need of the park is a substantial increase in the general appropriation. When the amount provided was raised to the present figure, seven years ago, it was recognized that there was necessity for a considerable sum above the cost of actual maintenance, in order that improvements could be made and the grounds and buildings be kept in a good state of repair. Owing to the steady advance in the price of supplies and to the additional expense necessitated by the constantly increasing number of visitors, the point has now been reached where the entire appropriation does not cover actual maintenance expenses. It is only by rigid economy, and by the elimination of some things really necessary, that the cost of operation can be kept within the amount.

Respectfully submitted.

N. HOLLISTER,
Superintendent.

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

APPENDIX 5.

REPORT OF THE ASTROPHYSICAL OBSERVATORY.

SIR: I have the honor to present the following report on the operations of the Smithsonian Astrophysical Observatory for the year ending June 30, 1917.

EQUIPMENT.

The equipment of the observatory is as follows:

(a) At Washington there is an inclosure of about 16,000 square feet, containing five small frame buildings used for observing and computing purposes, three movable frame shelters covering several out-of-door pieces of apparatus, and also one small brick building containing a storage battery and electrical distribution apparatus.

(b) At Mount Wilson, Cal., upon a leased plat of ground 100 feet square, in horizontal projection, are located a one-story cement observing structure, designed especially for solar-constant measurements, and also a little frame cottage, 21 feet by 25 feet, for observer's quarters. Upon the observing shelter at Mount Wilson there is a tower 40 feet high above the 12-foot piers which had been prepared in the original construction of the building. This tower is equipped with a tower telescope for use when observing (with the spectrobolometer) the distribution of radiation over the sun's disk.

During the year apparatus for research has been purchased or constructed at the observatory shop. The value of these additions to the instrumental equipment is estimated at \$1,000.

WORK OF THE YEAR.

1. AT WASHINGTON.

Three copies of the pyranometer, our new instrument for measuring sky radiation, have been prepared by the Institution, respectively, for the United States Weather Bureau, the University of Wisconsin, and for the proposed expedition to South America mentioned in my report for 1916. These instruments were finished and standardized by Mr. Aldrich. The tests made led to long investigations and improvements, which greatly increased the sensitiveness of the pyrano-

meter. All three instruments are now in use and, so far as known, with satisfaction.

Two silver-disk pyrheliometers were standardized for the proposed South American expedition.

Considerable work was done on the apparatus mentioned last year, designed to measure the constant of the fourth power radiation formula. Owing to trouble found in maintaining a vacuum in the apparatus no actual determinations were made.

Much attention was devoted to the preparation of the equipment of a solar constant expedition for South America. The purpose of the expedition, as stated last year, is by cooperation with Mount Wilson to secure daily values as far as possible throughout the year for several years, and thus to investigate the influence of solar variation on terrestrial temperature.

Many improved devices were invented and constructed for the expedition. Among them is a new vacuum bolometer of very high sensitiveness and in every way exemplary behavior. This instrument is constructed in such a way as to be sealed off when highly exhausted, like an X-ray tube. Having no cocks or windows it requires no further attention to maintain a vacuum indefinitely. The construction of the sensitive strips follows the indications of mathematical analysis covering the whole theory of the bolometer, so that a maximum sensitiveness is obtained. A similar instrument was prepared

also for Mount Wilson work. The high sensitiveness of the new bolometer is indicated by the statement that when used with the same spectroscope and galvanometer employed in our Algerian expedition of 1912 more than tenfold deflections on the solar spectrum were observed with similar conditions.

Another new instrument is a special machine designed to aid in reducing spectro-bolometry, in solar constant work. Heretofore we have plotted, on large cross-section paper, logarithms of observed radiation against the air-masses traversed by the solar beam. Nearly forty such plots, each of six points, are required to represent a morning's spectro-bolometry. The plotted points fall in approximately straight lines, whose projection to the zero of air mass yields

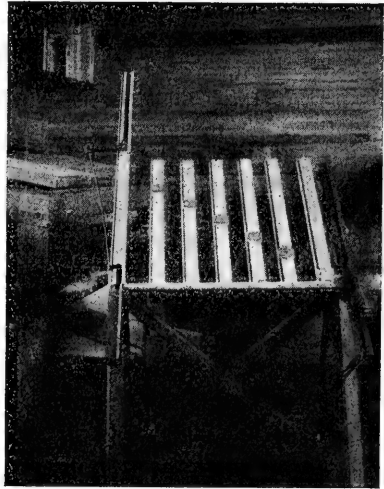


FIG. 1.—Computing machine in use in North Carolina.

logarithms of intensities as they would be observed outside our atmosphere. The inclinations of the representative straight lines give the logarithms of the atmospheric transmission coefficients. What I desire to point out is that the process requires taking out about 300 logarithms, besides plotting and extrapolating.

In the new instrument as shown in the illustration six 16-inch slide rules are arranged to be set at chosen places and at right angles to a horizontal linear scale of air masses. The observations are set up by reading the crossline of the sliders against the central movable slide-rule scales, these latter being set with respect to the fixed scales on the sides so as to apply a small correction for sensitiveness of the bolometric apparatus. A stretched wire is then adjusted to fit the six points as thus plotted. On another slide rule fixed at zero air mass one reading of the crossing point of the wire over the fixed scale gives the intensity as it would be outside the atmosphere, and a second reading on the movable scale gives the atmospheric transmission coefficient. No logarithms or computing are required.

The equipment of the expedition was all boxed ready for shipment to South America when circumstances connected with the war with Germany led to a postponement. Under these circumstances it was deemed best to send the expedition to Hump Mountain in North Carolina, a station at 4,800 feet elevation, where it is now located. This location was chosen with a view to its being at a great distance from Mount Wilson, in a region where Weather Bureau observers reported uncommonly little cloudiness, and easily accessible from the railroad and from Washington.

The expedition with over 3 tons of equipment went forward in May, 1917. It is in charge of Mr. A. F. Moore, who is assisted by Mr. L. H. Abbot. Two small frame buildings were erected for the observing and living quarters. The apparatus was set up and adjusted by Messrs. C. G. Abbot, L. B. Aldrich, and A. F. Moore, and gotten ready for observing about June 15. Unfortunately the most cloudy and rainy summer in the recollection of old residents had been experienced up to August 1. Otherwise, everything is highly favorable to excellent solar-constant work. If war conditions warrant, the Institution still hopes to send the expedition to South America later, where a station is selected at which 300 cloudless forenoons for observing per year are to be expected.

Before leaving this subject I desire to call attention to the remarkable paper by Dr. H. Helm Clayton (Smith. Misc. Collections, vol. 68, No. 3) on the "Effect of Short Period Variations of Solar Radiation on the Earth's Atmosphere." Dr. Clayton shows by the mathematical method of correlations, free from all influence of personal judgment, that variations of solar radiation observed by us at Mount Wilson in 1913 and 1914 were reflected in variations of terrestrial

temperatures all over the world. The correlations were positive in and near the Tropics, negative in temperate zones, and positive near the poles. A lag of from 1 to 5 days occurred, the lag being less for tropical zones. The barometric pressure also appeared to join in the correlations. By an ingenious application of his method Dr. Clayton shows that the short interval fluctuations of solar radiation are not altogether without periodicity, for the changes tend to repeat themselves after 11 and 22 days, respectively. The same tendency is found in the temperature records of Buenos Aires. We are now engaged in testing this conclusion by computations for other years.

Computations of Mount Wilson solar observations went on in the hands of Miss Graves as usual at Washington, and the computing is practically up to date.

Mr. Fowle's research on the effect of water vapor and carbon dioxide of the atmosphere to absorb long-wave rays, such as the earth sends out, is now ready for publication. Many of the best observations were made by him during the past year. Some observations made in February, 1917, at a time when the humidity of the atmosphere was very small, proved of special value. Opportunity was taken of using some of the apparatus prepared for the South American expedition to aid in making bolographic observations on the solar spectrum at very great wave lengths, reaching to 17 microns. By means of the spectro-bolometer prepared for South America it was possible to determine accurately the quantities of water vapor in the path of the solar beam.

Certain conclusions stated in Volume II of the *Annals of the Astrophysical Observatory* may now be corrected to correspond with the new information. We stated:

We can by no means admit that the radiation from the solid and liquid surface of the earth passes unhindered to space. * * * The clouds, whose average presence includes 52 per cent of the time, * * * are even more efficient screens to the radiation of the earth than they are to the radiation of the sun, so during 52 per cent of the time we may regard the radiation of the solid and liquid earth to space as zero. During the remainder of the time water vapor presents almost as effective a screen * * *. From the combined work of Rubens and Aschkinass, Langley, Keeler and Very, and Nichols, we * * * conclude that a tenth part of the average amount of water vapor in the vertical column of atmosphere above sea level is enough to absorb more than half of the radiation of the earth to space, and it is highly probable that, considering the greater air mass attending the oblique passage of many of the rays to space, nine-tenths of the radiation of the solid and liquid surface of the earth is absorbed by the water vapor of the atmosphere even on clear days. On cloudy days none is transmitted, so that the average escape of radiation from the earth's surface to space probably does not exceed 5 per cent.

Some writers have attributed a large share of the absorption of the atmosphere to the carbonic-acid gas which it contains, but * * * in atmospheric conditions the absorption of carbonic acid gas in the spectrum of the earth appears to be confined to two bands extending from wave lengths 3.6 to 5.4 μ .

and from 13.0 to 16.0μ , respectively. In these bands its absorption is nearly total from 4.0 to 4.8μ and from 14.0 to 15.6μ even when carbonic-acid gas is present in much less quantities than the atmosphere contains. * * * In the absence of water vapor the total absorption possible by carbonic-acid gas would be 14 per cent. In all the lower regions of the atmosphere, however, water vapor is present in such quantities as almost completely to extinguish the radiation of the earth's surface in these two special regions. * * * It therefore does not appear possible that the presence or absence, or increase or decrease, of the carbonic-acid contents of the air are likely to appreciably influence the temperature of the earth's surface.

It seems certain, in view of what has been said that the earth's solid and liquid surfaces, and the lower parts of the atmosphere, contribute directly almost nothing to the amount of radiation which the earth as a planet sends to space. The earth's surface and the lower atmosphere, of course, exchange radiation together, and by this process and by convection the heat of these regions ascends toward space. But convection grows less and less as the air becomes rarer, and must at length cease to be an appreciable factor. It is the water vapor and carbonic-acid gas far above the earth's surface, where the absorption of the rays by the water vapor and carbonic-acid gas lying still higher becomes small, that form the true radiating surface of the earth considered as a planet. * * * With the scanty material at hand, and in consideration of the distribution of water vapor in the free air, it seems safe to put the effective position of the radiating surface at fully 4,000 meters above sea level * * * at a probable mean temperature of 263° absolute centigrade or -10° centigrade.

Some writers have misinterpreted these remarks and understood us as supposing that there is a special layer at 4,000 meters elevation above sea level which prevents radiation escaping from below and whose own radiation passes unhindered to space. Our meaning was quite different. Every layer from sea level to the limit of the atmosphere contributes something to the total radiation output of the earth. But, because of the great absorption of superposed water vapor and clouds, the lower solid and liquid and atmospheric layers contribute little, while because of their dryness the higher atmospheric layers contribute little. Roughly estimating the various factors, we concluded that the center of activity of the radiation of the earth as a planet could be set at about 4,000 meters elevation.

How far are these conclusions now to be altered? As to the effect of cloudiness, not at all. As to water vapor Mr. Fowle finds the following results on the percentages of absorption of rays from a perfect radiator at the earth's mean temperature in atmospheric columns containing besides carbon-dioxide sufficient to produce maximum absorption, water vapor which if precipitated would produce certain depths of liquid water:

Ppt. water ^{cm} -----	0.003	0.03	0.3	3.0
Absorption-----	49	57	66	75

In order to apply these data I give figures for the average quantities of terrestrial water vapor which, according to Hann, exist in vertical

columns from sea level to the limit of the atmosphere over different zones of the earth.

Latitude -----	0-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-90°
Ppt. water ^{cm} ---	4.3	3.1	2.2	1.6	1.0	0.6

From these figures it may be seen that the statement, "a tenth part of the average amount of water vapor in the vertical column above sea level is enough to absorb more than half of the radiation of the earth is space," is confirmed. But the conclusion therefrom that "nine-tenths of the radiation of the solid and liquid surface of the earth is absorbed by the water vapor of the atmosphere on clear days" is not confirmed. Mr. Fowle has computed the absorption of the atmosphere in a state of humidity corresponding to 1.0 cm. ppt. water, and finds it 72 per cent. Considering that the ppt. water in a vertical column over most of the earth exceeds 3.0 cm., it now seems probable that the proper figure should be eight-tenths instead of nine-tenths.

As regards the absorption of carbonic-acid gas Mr. Fowle finds that one-fortieth part of the amount of this gas found in a vertical atmospheric column produces the maximum possible effect. This does not lead to any modification of our conclusions as to the effect of atmospheric carbonic acid gas as stated above.

With ordinary humidity, at sea level a layer of air 10 meters long, according to Fowle, will absorb 50 per cent of the radiation of a perfect radiator at terrestrial temperatures. Similarly the layer of air above 11 kilometers, or 6 miles, altitude contains enough water vapor to absorb 50 per cent of such radiation.

In view of what has been said and remembering the presence of clouds, only about one-tenth of the radiation of the solid and liquid surface of the earth escapes directly to space. The atmosphere above 11 kilometers apparently contributes more than half of the radiation of the earth viewed as a planet and prevents half of the radiation of lower layers from escaping. Nearly the entire output of radiation of the earth to space, certainly more than three-fourths, arises from the atmosphere and its clouds as its source. The "effective radiating layer," meaning a layer which if perfectly radiating to space would equal in radiation the actual earth viewed as a planet, may still be thought of as at several kilometers altitude and at a temperature well below freezing.

The subject of atmospheric absorption is so difficult both theoretically and experimentally that much more investigation ought still to be done on it. Mr. Fowle's long experience has well fitted him for making further advances. It is hoped to put at his disposal soon the necessary means to make new researches. These include bolometric apparatus of greatly increased sensitiveness, such

recent studies now enable us to construct. The one obstacle to complete success which now seems insuperable is the lack of any means to form an intense unabsorbed spectrum free from stray light, extending from 15 to 50 microns in wave length.

2. AT MOUNT WILSON.

The expedition of 1916 continued "solar-constant" and other observations at Mount Wilson until late in October. The expedition was renewed late in June, 1917. Improvements in the supply of electricity and water to the station were completed in June, 1917.

In 1916 many observations of the sky by day and by night were made at Mount Wilson with the pyranometer. The plan was followed from August to October of measuring with this instrument the total solar radiation at a fixed zenith distance of the sun, and almost simultaneously the total sky radiation over a fixed small area immediately surrounding the sun. It seems probable that as the brightness of the sky depends on the prevailing humidity and dust, and as the radiation of the sun is diminished by presence of humidity and dust, a method of combination of the two measurements may be found, adapted to give approximately the "solar constant." When computations are further advanced the matter will be tested.

Restandardization of secondary pyrhelimeters in 1916 against our standard water-flow pyrhelimeter indicated no change in their constants.

A vacuum bolometer was employed during a large part of the observing season. The sensitiveness was so much greater that considerable improvement in the work on the investigation of the distribution of radiation over the sun's disk was possible.

Redeterminations were made with great care on the form of distribution of the solar energy curve outside the atmosphere. New mirrors of stellite, a very hard nontarnishing alloy, were substituted for the silvered mirrors of the spectrobolometer. It is hoped that the work of 1916 will indicate conclusively how the sun's variations affect the distribution of energy in the solar spectrum.

SUMMARY.

Preparation of apparatus and equipment for a new "solar-constant" station of the Smithsonian Institution, now located at Hump Mountain, N. C., led to valuable improvements in the bolometer and the pyranometer, and to the invention and construction of a new instrument for avoiding computation in reduction of spectro-bolometric observations.

A long research on the transmission of long-wave rays by atmospheric columns of known humidity and carbon-dioxide contents,

has been completed and prepared for publication by Mr. Fowle. In expeditions to Mount Wilson the observation of the amount and distribution of solar radiation has been continued. In cooperation with the new station above mentioned it is hoped to obtain much more complete records of the variation of the sun, now shown by Clayton to be of great meteorological significance.

Respectfully submitted.

C. G. ABBOT,

Director Astrophysical Observatory.

Dr. CHARLES D. WALCOTT,

Secretary of the Smithsonian Institution.

APPENDIX 6.

REPORT ON THE LIBRARY.

SIR: I have the honor to submit the following report on the activities of the library of the Smithsonian Institution during the fiscal year ending June 30, 1917.

The Smithsonian library was founded with the definite plan that it should contain publications of the scientific institutions and learned societies of the world, together with a collection of periodicals and publications of a scientific nature. The most important function contemplated was that of reference for research in the broadest sense, and in this connection a complete collection of the catalogues of the libraries of the world was also contemplated. This policy has been continued with the result that the vast series of scientific publications in the Smithsonian library, now numbering a half million of titles, has been brought together.

As early as 1865 Secretary Henry realized that it would not be possible to adequately care for the entire collection in the Smithsonian building, even if the entire building were devoted to the purpose; and a special act of Congress authorized the Library of Congress to assume the care of the main library of the Smithsonian Institution, the Institution to retain ownership of the publications and to have the same use of the books as if they were in its own building, and in addition to have the same privileges in the use of the Library of Congress as Members of Congress. While the main collection is in the Library of Congress, there are smaller collections here in the Institution, i. e. the books for office reference, dictionaries, encyclopaedias, etc., the Government branch libraries of the Astrophysical Observatory, Bureau of American Ethnology, and the United States National Museum. All of these are confined to special publications relating to the subjects covered by the bureaus, and supplement rather than duplicate books in other libraries.

The library of the Smithsonian Institution is augmented in two ways, i. e., by gift, and through the exchange of the Institution's publications for those of similar institutions.

JOHN DONNELL SMITH LIBRARY.

In 1905 Dr. John Donnell Smith, of Baltimore, Md., offered to the Smithsonian Institution his botanical library consisting of over 1,500 volumes, to accompany his herbarium to which it is closely related. The proposed gift was the most valuable of its kind that had been offered to the Institution, and it will be of great assistance in the development of botanical research in the Museum. The conditions were that Dr. Smith should retain possession of the books as long as he desired, and that when his library should come to the Institution it should be kept separately and each book should have a book plate indicating that he was the donor. A plate was immediately designed and engraved, and the ex-libris labels were printed and sent to Dr. Smith, who had them placed in each one of the books. In January of the present year the first consignment of these books for the library was received, and they were at once placed in a separate stack in the Smithsonian building and kept together. The number sent amounted to 461 bound volumes, 100 unbound volumes, some incomplete, and 293 pamphlets.

EXCHANGES.

Special efforts have been made to meet the conditions coexistent with the third year of war in the matter of preserving and promoting foreign exchange relations, and the generous response met with has been very gratifying. On the other hand, a number of important publications have been suspended owing to the death or absence of collaborators; and still others will be withheld pending termination of the war, while the uncertainties of transportation have resulted in the loss of a number of valuable publications from abroad. The policy of broadening exchange relations with South and Central America has been inaugurated.

ACCESSIONS.

Additions to the library, consisting mainly of gifts and exchanges, were received in 24,292 packages. Of these 23,307 were received by mail and 985 through the International Exchange Service. Correspondence in connection therewith amounted to about 1,245 letters and 2,126 acknowledgments on the regular printed forms.

The cataloguing, not including publications for the Bureau of American Ethnology and the National Museum, reported elsewhere, covered 3,546 volumes and 47 charts. Of these 698 were new titles added to the author catalogue and 59 new periodicals. In addition to 1,500 printed cards received from the Library of Congress, 1,855 new typewritten cards were prepared. There were 976 volumes recatalogued.

SMITHSONIAN MAIN LIBRARY.

Publications for the Smithsonian main library have been forwarded to the Smithsonian deposit in the Library of Congress as received, after being duly entered on the records. During the fiscal year 2,886 of these were catalogued and accessioned, consisting of 1,736 volumes, 301 parts of volumes, 805 pamphlets, and 44 charts, thereby extending the accession numbers from 525,256 to 527,150. Several thousand publications remained unaccessioned at the close of the year, owing to a position of cataloguer being vacant for over nine months. The existing practice of transferring to the Library of Congress, without stamping or recording, public documents received in exchange for Smithsonian publications, mainly of a statistical character, has been continued, with the result that 2,349 were forwarded in this manner.

During the year the titles of 757 new publications were added to the catalogue. Want cards to the number of 535 for series in the Smithsonian division at the Library of Congress were considered with the result that 154 volumes, 571 parts of volumes, and 51 title-pages were secured, thus completing 44 sets to date. There were received from the periodical division 105 cards, action on which resulted in securing 9 volumes, 79 parts of volumes, and 32 title-pages; and in response to 32 cards from the order division, 28 volumes and 12 parts were obtained.

The number of dissertations and technological publications received showed a marked decrease over previous years. They were contributed by the following:

Kejsersliga Alexanders-Universitet i Finland.

Technische Hochschule, Breslau.

Kongliga Tekniska Högskolan, Stockholm.

University of Würzburg.

University of Breslau.

Königlich Sächsische Technische Hochschule, Dresden.

Office reference library.—The accessions for the office library, which includes the Astrophysical Observatory and the National Zoological Park, amounted to 1,025 publications, distributed as follows: Office library, 899 volumes and pamphlets; Astrophysical Observatory, 55 volumes, 18 parts of volumes, and 39 pamphlets; National Zoological Park, 11 volumes and 3 pamphlets.

Reading room.—The reading room has now about 311 foreign and domestic periodicals, which have been in constant use by the staff and members of the scientific bureaus of the Government. During the year 3,701 publications from the reading and reference rooms were in circulation, of which 3,367 were single numbers of periodicals and 334 were bound volumes.

The aeronautical library.—The aeronautical library is probably one of the most complete series on the subject in the United States, and the policy has been to maintain it as such.

Before Dr. Langley came to the Smithsonian Institution as assistant secretary he had made a collection of what had been published relating to aeronautics. Later, when he became secretary and published his epoch-making works "Experiments in Aerodynamics" and "Internal Work of the Wind," the number of publications was gradually growing, so that when his successful experiments were made with the heavier-than-air models the Institution had the most complete library of aeronautical literature in the United States. With this collection of books as a basis, a bibliography was prepared by me to cover all existing literature up to 1909. Since that time the securing of publications has continued, and every possible effort has been made to have it complete. Dr. Alexander Graham Bell, a regent of the Institution, has also shown an interest in this collection by contributing his entire working library of books and newspaper clippings relating to aeronautics, arranged and mounted, which is a valuable addition in supplementing the series already in the Institution.

There are now on hand 1,009 volumes and 83 titles of periodicals. With the close of the year a second part of the bibliography of aeronautics is in preparation by me for the National Advisory Committee for Aeronautics at the suggestion of the secretary, which will complete the references from 1909 to the end of 1916.

Art room.—No additions have been made to the collection of publications relating to art in the art room, in view of the fact that all of those relating to the fine arts have been placed in the sectional library of administration for use in connection with the National Gallery of Art, and those relating to the reproductive processes for engraving have been placed in the sectional library of the Division of Graphic Arts in the Museum.

Employees' library.—The condition of the employees' library has remained practically the same as last year, with no additions. If money were available, it could be used to great advantage in adding some of the latest literature in fiction and other classes. The library has been in constant use, and 304 volumes were circulated during the year.

John Watts de Peyster collection.—This collection of Napoleona is probably the most unique collection of publications relating to Napoleon in the United States, and was brought together by Gen. John Watts de Peyster to include works relating to Napoleon as a general. It covers the period from the end of the Napoleonic wars to the present great struggle. There are many calls for these publications, and some means must be found to make them available. So far it

has not been possible to do this with the present staff, and a cataloguer with a knowledge of French history should be employed for the special purpose of cataloguing this collection. Every effort is being made now to make the books available, but without an adequate catalogue they can not be used to the fullest extent.

NATIONAL MUSEUM LIBRARY.

The value of the library of the National Museum is largely due to the systematic collecting of works relating to the subjects covered by the collections in the Museum and at the same time supplementing as far as possible series in other libraries of Washington. The books are consulted by persons carrying on research work in almost every branch of the Government service, including those who are doing scientific work along similar lines. The publications for the library come to the Museum by gift, by exchange of publications, and by purchase. Many important gifts have been received from specialists, and those received during the year are given in detail. The exchanges, as is the case with the Smithsonian library, have met with many difficulties raised by war conditions in the matter of securing foreign publications, which have been put partially overcome. The situation in this respect has, on the whole, shown no appreciable amelioration over the preceding year. Special effort, however, has been directed toward maintaining the foreign exchanges at the maximum compatible with existing conditions. In connection with this work 271 letters were written in securing a number of new titles and in filling "wants" in many of the incomplete sets on hand. The appropriation for the purchase of books is very small and has been the same for a number of years, and it is only by judicious spending that the urgent needs of the Museum can be secured.

The library was fortunate enough to secure by purchase the following three rare books, the editions of which are not represented in the United States:

Boddaert, P.: *Elenchus animalium*, I Roterodami, 1784.

Forster, J. R.: *Afrikanischen Vögel*, Halle, 1798.

Vroeg, A.: *Catalogus . . . Vogelien*, etc., s'Gravenhage, 1764, with separately paged "*adumbratiunculae*."

Mearns collection.—One collaborator who had taken a special interest in the library was Dr. Edgar A. Mearns, the announcement of whose death was received with deep regret last fall. Dr. Mearns contributed publications to the library each year as well as a collection of Korans, and after his demise his widow carried out his expressed wish in presenting the remainder of his scientific library to the Museum. This collection is especially rich in works on mammals, birds, and plants.

Dall collection.—The continued interest of Dr. William Healey Dall in the books relating to mollusks, which form the sectional library of the division of mollusks, has resulted in the further addition of 307 titles during the past year.

Other members of the scientific staff who have contributed to the collection in the library are: Dr. C. D. Walcott, Dr. O. P. Hay, Dr. C. W. Richmond, Mr. W. R. Maxon, Mr. W. H. Holmes, Dr. J. C. Crawford.

Accessions.—There are now in the Museum library 132,203 publications, consisting of 49,285 volumes, 82,794 pamphlets and unbound papers, and 124 manuscripts. Of these 1,572 volumes, including 949 completed volumes of periodicals, 3,556 pamphlets, and 65 parts of volumes, were accessioned during the past year.

Cataloguing.—As in the past, new material has been promptly entered and placed on the shelves or assigned to the sectional libraries. The cataloguing covered 623 books, 949 completed volumes of periodicals, and 373 pamphlets; in addition, 10,142 periodicals were entered. There were also 4,522 section cards made out covering publications assigned to sectional libraries.

Loans.—The loans from the general library during the year covered by this report totaled 12,869 publications, in which are included 3,035 books borrowed from the Library of Congress, including the Smithsonian deposit, and 496 books borrowed from other libraries. In addition, 5,580 books were consulted in the reading room of the library.

Binding.—The serious situation with regard to publications remaining unbound is being gradually relieved, but much remains to be done. During the past year 1,377 such publications were prepared for binding and sent to the Government binder. Of these 685 were returned within the year.

Technological series.—Additions to the technological library were composed of 374 volumes, 3,826 parts of volumes, 802 pamphlets, and 5 maps. There were filed 352 cards for books catalogued. A file of approximately 2,500 printed cards covering Smithsonian publications was received and incorporated in the catalogue. In the scientific depository catalogue 1,507 author cards were filed, and to 4,515 additional cards subject headings were added, increasing the catalogue by 6,022 cards.

Books and periodicals loaned during the year numbered 133 volumes and 297 parts of volumes and pamphlets, making a total circulation of 430 publications. About 620 volumes were consulted in the reading room of the library.

Several sets have been rearranged and more logically classified. In addition, a set of duplicates has been gone over, sorted, and ar-

ranged by class number. Of the duplicates received 89 were volumes and 1,328 parts of volumes and pamphlets.

Sectional libraries.—The series of publications in the sectional libraries were dormant until a few years ago, and no effort was made to add to the collection of books in these libraries, the whole matter being held in abeyance until the work on the collections had been resumed. Books on the various subjects covered have, therefore, been sought and the number augmented. During the interval, however, the future need of publications for working up the collections was never lost sight of and there were a number of the serials bound and ready for use. Toward the end of the year two cataloguers were employed in the division of mineral technology to put the books on hand in the very best of order and for the making of a special author and subject catalogue, so that with the close of the year the work has been completed and this sectional library is in excellent condition. It is hoped that during the present year it will be possible to do the same thing for the division of textiles. This will, however, not be possible with the present force, which is too small.

With the death of Mr. Thomas W. Smillie, who was for many years custodian of the section of photography in the division of graphic arts, it was necessary that all books in the section should be checked up. A special cataloguer was employed for the purpose and the books and pamphlets were put in order and catalogued, periodical series arranged on the shelves and lacking numbers indicated in order that the sets could be completed. The work was finished by June 30.

The following is a complete list of the sectional libraries:

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

BUREAU OF AMERICAN ETHNOLOGY LIBRARY.

This library is administered under the direct care of the ethnologist in charge, and a report on its operations will be found in the report of that bureau.

ASTROPHYSICAL OBSERVATORY LIBRARY.

The collection of reference works relating to astrophysics has been in constant use. During the year 55 volumes, 18 parts of volumes, and 39 pamphlets were added to this library.

NATIONAL ZOOLOGICAL PARK LIBRARY.

This collection contains publications relating to the work of the park, and while not large is a strictly working library. During the past year 11 volumes and 3 pamphlets were added to the series.

SUMMARY OF ACCESSIONS.

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

To the Smithsonian deposit in the Library of Congress, including parts to complete sets.....	2, 886
To the Smithsonian office, Astrophysical Observatory, and National Zoological Park.....	1, 025
To the United States National Museum.....	5, 193
Total.....	9, 104

Respectfully submitted.

PAUL BROCKETT,
Assistant Librarian.

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

APPENDIX 7.

REPORT ON THE INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.

SIR: I have the honor to submit the following report on the operations of the United States Bureau of the International Catalogue of Scientific Literature for the fiscal year ending June 30, 1917:

This international enterprise was, at the beginning of the present war, being carried on through the cooperation of the 34 following-named countries: Argentine Republic, Austria, Belgium, Canada, Chili, Cuba, Denmark, Egypt, Finland, France, Germany, Greece, Holland, Hungary, India and Ceylon, Italy, Japan, Mexico, New South Wales, New Zealand, Norway, Poland, Portugal, Queensland, Russia, South Africa, South Australia, Spain, Straits Settlements, Sweden, Switzerland, United States of America, Victoria and Tasmania, and Western Australia. Each of these countries supported a regional bureau whose duty it was to furnish to the central bureau in London classified index citations to all the scientific literature published within their several regions.

As the greater part of these countries are now actually engaged in hostilities it is natural that scientific research and publication would be much affected, and that such an international cooperative enterprise as the International Catalogue would find itself in many difficulties. Not only have the number of scientific papers being published greatly decreased but the difficulty of preparing and publishing a regular index has increased owing to the impossibility of obtaining necessary scientific and clerical assistance to aid in the preparation and publication of the catalogue. The London Central Bureau was, however, able to publish four volumes of the catalogue during the fiscal year, these volumes were the twelfth annual issue of Geology and the thirteenth annual issue of Chemistry, Anatomy, and Botany. All of the eleventh annual issue has now been published together with 15 volumes of the twelfth annual issue, 13 volumes of the thirteenth annual issue, and 1 volume of the fourteenth annual issue, making a total of 216 regular volumes published since the beginning of the enterprise in 1901. In addition to these regular volumes several special volumes of schedules, lists of journals, etc., have been published.

Almost three million references to current scientific publications are contained in these 216 volumes, about 12 per cent of which have been supplied by this bureau.

Owing to the dangers and difficulties of transportation much of the material prepared by this bureau for incorporation in the catalogue during the present year has been held until such time as it can be safely forwarded to London.

It is not to be expected that the publication of the catalogue can be regularly carried on until after the return of peace, but it appears that the organization is holding together better than might be expected under existing conditions and that when peace is declared it will only be necessary to resume, rather than reorganize, the work.

When it is possible for all the regional bureaus to fully resume the preparation of the Catalogue it is to be hoped that every effort will then be made to carry out one of the most important resolutions adopted at the last convention of the International Catalogue, held in London in 1910. This resolution was:

(1) To take all possible steps to prevent reduplication by the publication of several annual and similar catalogues and indexes on the same subject, by making arrangements such as those now in force with the Zoological Society of London.

(2) To obtain further assistance and cooperation in the preparation of the material of the catalogue from the principal scientific societies and academies and the organizations which collect materials for indexing scientific literature.

Scientific bibliographic work is seldom if ever self-supporting, and after the war it will undoubtedly be more than ever necessary to exercise every possible economy in the preparation and publication of scientific indexes and yearbooks, so that the editors and publishers of all such publications will find it greatly to their advantage to cooperate with the International Catalogue to the fullest possible extent and thus prevent the reduplication referred to in the resolution quoted above. This will benefit not only the International Catalogue and the publishers of the other bibliographies, but will greatly lessen the labors of librarians and scientific investigators who have occasion to use such works of reference.

More than ever before the line of demarcation between the researches of pure science and the practical application of such researches is being eliminated, and laboratory experiments of to-day may to-morrow be in actual use in ways vitally affecting the welfare of man. It is becoming more than ever difficult to define what is pure science and what is applied science and the heretofore arbitrary, though at the time necessary, limitation of the scope of the International Catalogue to include papers on pure science only should now be so broadened as to include at least some of the applied sciences, which have in the last few years advanced with such un-

precedented strides. The inclusion of papers dealing with the application of scientific discoveries would undoubtedly greatly increase the size and cost of the catalogue, but on the other hand its value and use would be so increased that the demand and consequent sales of the catalogue would more than offset any additional cost.

Very respectfully, yours,

LEONARD C. GUNNELL,
Assistant in Charge.

Mr. CHARLES D. WALCOTT,
Secretary of the 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, 1917:

The Institution proper published during the year 1 memoir in the series of Contributions to Knowledge, 19 papers in the series of Miscellaneous Collections, and 6 special publications. The Bureau of American Ethnology published 1 annual report, 2 bulletins, and a list of publications of the bureau. The United States National Museum issued 1 volume of the Proceedings, 73 papers forming parts of this and other volumes, and 6 bulletins.

The total number of copies of publications distributed by the Institution and its branches was 158,797, which includes 2,673 volumes and separates of the Smithsonian Contributions to Knowledge, 53,615 volumes and separate pamphlets of Smithsonian Miscellaneous Collections, 21,865 volumes and separate pamphlets of Smithsonian Annual Reports, 64,365 volumes and separates of National Museum publications, 11,984 publications of the Bureau of American Ethnology, 4,182 special publications, 23 volumes of the Annals of the Astrophysical Observatory, 29 reports of the Harriman Alaska Expedition, and 53 reports of the American Historical Association.

SMITHSONIAN CONTRIBUTIONS TO KNOWLEDGE.

QUARTO.

VOLUME 35.

No. 3. A contribution to the comparative histology of the femur. By J. S. Foote. February 6, 1917. ix+242 pp., 38 pls. (Publ. 2382.)

Title-page and table of contents. April 4, 1917. (Publ. 1740.)

SMITHSONIAN MISCELLANEOUS COLLECTIONS.

OCTAVO.

Of the Miscellaneous Collections, volume 63, 1 paper was published; of volume 64, 1 paper; of volume 66, 11 papers; of volume 67, 2 papers; of volume 68, 4 papers; in all, 19 papers, as follows:

VOLUME 63.

No. 6. Smithsonian Physical Tables. Second reprint of sixth revised edition. By F. E. Fowle. January 12, 1917. xxxvi+355 pp. (Publ. 2269.)

VOLUME 64.

- No. 5. Cambrian Geology and Paleontology. III, No. 5. Cambrian trilobites. By Charles D. Walcott. September 29, 1916. Pp. 303-456, pls. 45-67. (Publ. 2420.)

VOLUME 66.

- No. 6. Phonetic transcription of Indian languages. Report of Committee of American Anthropological Association. 15 pp. (Publ. 2415.)
- No. 9. Maxonia, a new genus of tropical American ferns. By Carl Christensen. September 30, 1916. 4 pp. (Publ. 2424.)
- No. 10. Three new murine rodents from Africa. By N. Hollister. October 26, 1916. 3 pp. (Publ. 2426.)
- No. 11. On the use of the pyranometer. By C. G. Abbot and L. B. Aldrich. November 6, 1916. 9 pp. (Publ. 2427.)
- No. 12. Bones of mammals from Indian sites in Cuba and Santo Domingo. December 7, 1916. 10 pp., 1 pl. (Publ. 2429.)
- No. 13. The teeth of a monkey found in Cuba. By Gerrit S. Miller, jr. December 8, 1916. 3 pp., 1 pl. (Publ. 2430.)
- No. 14. Preliminary survey of the remains of the Chippewa settlements on La Pointe Island, Wisconsin. By Philip Ainsworth Means. January 4, 1917. 15 pp., 2 maps. (Publ. 2433.)
- No. 15. Three remarkable new species of birds from Santo Domingo. By J. H. Riley. December 1, 1916. 2 pp. (Publ. 2435.)
- No. 16. The determination of meteor orbits in the solar system. By G. von Niessl. April 23, 1917. 35 pp. (Publ. 2436.)
- No. 17. Explorations and field work of the Smithsonian Institution in 1916. April 26, 1917. 134 pp. (illustrated). (Publ. 2438.)
- No. 18. On the occurrence of *Benthodesmus atlanticus* Goode and Bean on the coast of British Columbia. By C. H. Gilbert. February 21, 1917. 2 pp. (Publ. 2439.)

VOLUME 67.

- No. 1. Cambrian Geology and Paleontology. IV, No. 1. Nomenclature of some Cambrian Cordilleran formations. By Charles D. Walcott. May 9, 1917. pp. 1-8. (Publ. 2444.)
- No. 2. Cambrian Geology and Paleontology. IV, No. 2. The *Albertella* fauna in British Columbia and Montana. By Charles D. Walcott. May 9, 1917. pp. 9-59, pls. 1-7. (Publ. 2445.)

VOLUME 68.

- No. 1. Archeological investigations in New Mexico, Colorado, and Utah. By J. Walter Fewkes. May 15, 1917. 38 pp., 14 pls. (Publ. 2442.)
- No. 2. Recognition among insects. By N. E. McIndoo. April 30, 1917. 78 pp. (Publ. 2443.)
- No. 3. Effect of short period variations of solar radiation on the earth's atmosphere. By H. Helm Clayton. May 21, 1917. 18 pp., 8 charts. (Publ. 2446.)
- No. 4. Preliminary diagnosis of new mammals obtained by the Yale-National Geographic Society Peruvian Expedition. By Oldfield Thomas. April 10, 1917. 3 pp. (Publ. 2447.)

SMITHSONIAN ANNUAL REPORTS.

Owing to the congestion of work at the Government Printing Office on account of the war, the Smithsonian Report for 1916, which was ready for printing in April, was not yet off the press at the close of the fiscal year.

SPECIAL PUBLICATIONS.

The following special publications were issued during the year:

- Publications of the Smithsonian Institution issued between January 1 and June 30, 1916. 3 pp. (Publ. 2422.)
- Publications of the Smithsonian Institution issued between January 1 and September 30, 1916. 3 pp. (Publ. 2425.)
- Publications of the Smithsonian Institution issued between January 1 and December 31, 1916. 3 pp. (Publ. 2537.)
- Publications of the Smithsonian Institution issued between January 1 and March 31, 1917. 1 p. (Publ. 2448.)
- Classified list of Smithsonian publications available for distribution December 15, 1916. vi+32 pp. (Publ. 2434.)
- The Smithsonian Institution (descriptive folder). 17 pp. (Publ. A.Q.)

PUBLICATIONS OF THE UNITED STATES NATIONAL MUSEUM.

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

During the year the Museum published 1 volume of the Proceedings and 73 separate papers forming parts of this and other volumes, and 6 bulletins.

The issues of the Proceedings were as follows: Volume 50; volume 51, papers 2139-2172; volume 52, papers 2173-2193; volume 53, papers 2194-2206, 2208, and 2210-2212.

The Bulletins were as follows:

- Bulletin 71, A monograph of the foraminifera of the North Pacific Ocean, Part VI, Miliolidae, by Joseph A. Cushman.
- Bulletin 93, The sessile barnacles (Cirripedia) contained in the collections of the U. S. National Museum; including a monograph of the American species, by Henry A. Pilsbry.
- Bulletin 96, A synopsis of American early Tertiary Cheilostome Bryozoa, by Ferdinand Canu and Ray S. Bassler.
- Bulletin 98, The birds of the Anamba Islands, by Harry C. Oberholser.
- Volume 16, Contributions from the U. S. National Herbarium, entitled "Systematic investigations in Phanerogams; ferns, and mosses," by various authors.
- Volume 17, Contributions from the U. S. National Herbarium entitled "Systematic investigations in lichens and ferns, grasses, and other Phanerogams," by various authors.

PUBLICATIONS OF THE BUREAU OF AMERICAN ETHNOLOGY.

The publications of the Bureau are discussed in appendix 2 of the Secretary's report. The editorial work of the Bureau has continued in charge of Mr. J. G. Gurley, editor.

During the year, 1 annual report, 2 bulletins, and a list of publications were issued, as follows:

Thirty-first Annual Report of the Bureau of American Ethnology (containing an accompanying paper. "Tsimshian Mythology" (Boas)).

Bulletin 40, part 2 (edited by Boas), "Coos, an illustrative sketch," by Leo J. Frachtenberg.

Bulletin 55, Ethnobotany of the Tewa Indians, by Robbins, Harrington, and Freire-Marreco.

List of publications of the Bureau of American Ethnology.

At the close of the fiscal year there were in press or in preparation 4 annual reports and 7 bulletins.

REPORT OF THE AMERICAN HISTORICAL ASSOCIATION.

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

Volume 1 of the annual report for 1914 was issued during the year, and volume 2 of this report and the report for 1915 were in press at the close of the year.

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

The manuscript of the Nineteenth Annual Report of the National Society of the Daughters of the American Revolution for the year ending October 11, 1916, was communicated to Congress on February 5, 1917.

THE SMITHSONIAN ADVISORY COMMITTEE ON PRINTING AND PUBLICATION.

The editor has continued to serve as secretary of the Smithsonian advisory committee on printing and publication. This committee passes on all manuscripts offered for publication by the Institution or its branches, and considers forms of routine, blanks, and various other matters pertaining to printing and publication. Sixteen meetings were held during the year and 101 manuscripts were acted upon.

Respectfully submitted.

A. HOWARD CLARK, *Editor.*

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



SMITHSONIAN INSTITUTION LIBRARIES



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