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Smithsonian Institution

*Report of the Secretary and the Financial Report
of the Executive Committee of
the Board of Regents*



1964



Smithsonian Institution

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of the Executive Committee of
the Board of Regents*



For the year ended June 30

1964



Smithsonian
Institution

Report of the Secretary and Financial Report

Smithsonian Publication 4595

For the year ended June 30, 1965



For the year ended June 30

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THE SMITHSONIAN INSTITUTION

June 30, 1964

Presiding Officer ex officio.—LYNDON B. JOHNSON, President of the United States.
Chancellor.—EARL WARREN, Chief Justice of the United States.

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(Vacancy), Vice President of the United States.
EARL WARREN, Chief Justice of the United States.
DEAN RUSK, Secretary of State.
DOUGLAS DILLON, Secretary of the Treasury.
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JOHN A. GRONOUSKI, Postmaster General.
STEWART L. UDALL, Secretary of the Interior.
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(Vacancy), Vice President of the United States.
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J. WILLIAM FULBRIGHT, Member of the Senate.
LEVERETT SALTONSTALL, Member of the Senate.
FRANK T. BOW, Member of the House of Representatives.
MICHAEL J. KIRWAN, Member of the House of Representatives.
GEORGE H. MAHON, Member of the House of Representatives.
JOHN NICHOLAS BROWN, citizen of Rhode Island.
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JEROME C. HUNSAKER, citizen of Massachusetts.

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Assistant Secretary.—JAMES C. BRADLEY.

Acting Assistant Secretary.—T. D. STEWART.

Assistant to the Secretary.—THEODORE W. TAYLOR.

Special assistants to the Secretary:

For Fine Arts, THOMAS M. BEGGS;

For Traveling Exhibition Study, MRS. ANNEMARIE POPE;

For Scientific Matters, PHILIP C. RITTERBUSH.

Consultant to the Secretary for international activities.—WILLIAM WARNER.

Administrative assistant to the Secretary.—MRS. LOUISE M. PEARSON.

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Chief, editorial and publications division.—PAUL H. OEHSE.
Librarian.—RUTH E. BLANCHARD.
Curator, Smithsonian Museum service.—G. CARROLL LINDSAY.
Buildings manager.—ANDREW F. MICHAELS, JR.
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Chief, supply division.—A. W. WILDING.
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UNITED STATES NATIONAL MUSEUM

Director.—F. A. Taylor.
Registrar.—Helena M. Weiss.

MUSEUM OF NATURAL HISTORY

Director.—T. D. Stewart.
Assistant Directors.—R. S. Cowan, I. E. Wallen.
Administrative officer.—Mrs. Mabel A. Byrd.

DEPARTMENT OF ANTHROPOLOGY: W. R. Wedel, chairman; A. J. Andrews, exhibits specialist.

Division of Archeology: Clifford Evans, Jr., R. B. Woodbury, curators; G. W. Van Beek, associate curator.

Division of Ethnology: S. H. Riesenbergs, curator; G. D. Gibson, E. I. Knez, W. H. Crocker, associate curators.

Division of Physical Anthropology: J. L. Angel, curator; Lucile E. Hoyme, associate curator.

DEPARTMENT OF ZOOLOGY: H. H. Hobbs, Jr., chairman; F. A. Chace, Jr., senior scientist; W. M. Perrygo, in charge of taxidermy.

Division of Mammals: D. H. Johnson, curator; H. W. Setzer, C. O. Handley, Jr., associate curators.

Division of Birds: P. S. Humphrey, curator; G. E. Watson, R. I. Zusi, associate curators.

Division of Reptiles and Amphibians: Doris M. Cochran, curator.

Division of Fishes: L. P. Schultz, curator; E. A. Lachner, W. R. Taylor, V. G. Springer, S. H. Weitzman, R. H. Gibbs, Jr., associate curators.

Division of Marine Invertebrates: D. F. Squires, curator; T. E. Bowman, C. E. Cutress, Jr., Marian H. Pettibone, R. B. Manning, D. L. Pawson, associate curators.

Division of Mollusks: H. A. Rehder, curator; J. P. E. Morrison, Joseph Rosewater, associate curators.

DEPARTMENT OF ENTOMOLOGY: J. F. G. Clarke, chairman.

Division of Neuropteroids: O. S. Flint, Jr., associate curator in charge.

Division of Lepidoptera: J. F. G. Clarke, acting curator; D. R. Davis, W. D. Duckworth, W. D. Field, associate curators.

Division of Coleoptera: O. L. Cartwright, curator; P. J. Spangler, associate curator.

Division of Hemiptera: R. C. Froeschner, associate curator in charge.

Division of Myriapoda and Arachnida: R. E. Crabill, Jr., curator.

DEPARTMENT OF BOTANY (NATIONAL HERBARIUM): J. R. Swallen, chairman.

Division of Phanerogams: L. B. Smith, curator; Velva E. Rudd, J. J. Wurdack, W. R. Ernst, D. H. Nicolson, S. G. Shetler, associate curators.

Division of Ferns: C. V. Morton, curator; D. B. Lellinger, associate curator.

Division of Grasses: J. R. Swallen, acting curator; T. R. Soderstrom, associate curator.

DEPARTMENT OF BOTANY—Continued

Division of Cryptogams: M. E. Hale, Jr., curator; P. S. Conger, H. E. Robinson, associate curators.

Division of Plant Anatomy: W. L. Stern, curator; R. H. Eyde, associate curator.

DEPARTMENT OF PALEOBIOLOGY: G. A. Cooper, chairman.

Division of Invertebrate Paleontology: R. S. Boardman, curator; P. M. Kier, Richard Cifelli, E. G. Kauffman, M. A. Buzas, R. H. Benson, associate curators.

Division of Vertebrate Paleontology: C. L. Gazin, curator; D. H. Dunkle, Nicholas Hotton III, C. E. Ray, associate curators.

Division of Paleobotany: F. M. Hueber, curator; W. H. Adey, associate curator.

DEPARTMENT OF MINERAL SCIENCES: G. S. Switzer, chairman.

Division of Mineralogy: G. S. Switzer, acting curator; P. E. Desautels, associate curator.

Division of Meteorites: E. P. Henderson, associate curator in charge; R. S. Clarke, Jr., chemist.

OCEANOGRAPHY PROGRAM: I. E. Wallen, assistant director; H. A. Fehlmann, supervisory museum specialist, Smithsonian Oceanographic Sorting Center.

MUSEUM OF HISTORY AND TECHNOLOGY

Director.—F. A. Taylor.

Assistant Director.—J. C. Ewers.

Administration officers.—W. E. Boyle, Virginia Beets.

DEPARTMENT OF SCIENCE AND TECHNOLOGY: R. P. Multhauf, chairman; Deborah J. Mills, assistant curator.

Division of Physical Sciences: R. P. Multhauf, curator; W. F. Cannon, Uta C. Merzbach, associate curators.

Division of Mechanical and Civil Engineering: S. A. Bedini, curator; E. A. Battison, R. M. Vogel, associate curators.

Division of Transportation: H. I. Chapelle, curator; K. M. Perry, J. H. White, Jr., associate curators.

Division of Electricity: B. S. Finn, associate curator in charge.

Division of Medical Sciences: S. K. Hamarneh, curator.

DEPARTMENT OF ARTS AND MANUFACTURERS: P. W. Bishop, chairman.

Division of Textiles: Mrs. Grace R. Cooper, curator; Rita J. Adrosko, associate curator.

Division of Ceramics and Glass: P. V. Gardner, curator; J. J. Miller II, associate curator.

Division of Graphic Arts: Jacob Kainen, curator; F. O. Griffith, Eugene Ostroff, associate curators.

Division of Manufactures and Heavy Industries: P. W. Bishop, acting curator; L. L. Henkle, industrial specialist.

Division of Agriculture and Forest Products: E. C. Kendall, associate curator in charge.

DEPARTMENT OF CIVIL HISTORY: R. H. Howland, chairman; P. C. Welsh, curator; Mrs. Doris E. Borthwick, Anne Castrodale, assistant curators.

Division of Political History: W. E. Washburn, curator; Mrs. Margaret Brown Klapthor, K. E. Melder, Mrs. Anne W. Murray, associate curators; H. R. Collins, assistant curator.

Division of Cultural History: C. M. Watkins, curator; Mrs. Cynthia A. Hoover, J. N. Pearce, Rodris C. Roth, associate curators.

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Division of Philately and Postal History: C. H. Scheele, associate curator in charge.

Division of Numismatics: Vladimir Clain-Stefanelli, curator; Mrs. Elvira Clain-Stefanelli, associate curator.

DEPARTMENT OF ARMED FORCES HISTORY: M. L. Peterson, chairman.

Division of Military History: E. M. Howell, curator; C. R. Goins, Jr., associate curator.

Division of Naval History: P. K. Lundeborg, curator; M. H. Jackson, associate curator.

OFFICE OF EXHIBITS

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Museum of Natural History Laboratory: A. G. Wright, assistant chief; Julius Tretick, production supervisor.

Museum of History and Technology Laboratory: B. W. Lawless, chief.

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Conservator-in-charge.—C. H. Olin.

Chemist.—Mrs. Jacqueline S. Olin.

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Director.—T. H. Reed.

Associate Director.—J. L. Grimmer.

Administrative Assistant.—Travis E. Fauntleroy.

Zoologist.—Marion McCrane.

Veterinarian.—Clinton W. Gray.

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Acting Director.—Henry B. Collins.

Anthropologists.—H. B. Collins, R. L. Stephenson, W. C. Sturtevant, Robert M. Laughlin.

RIVER BASIN SURVEYS.—R. L. Stephenson, *Acting Director.*

ASTROPHYSICAL OBSERVATORY

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Assistant Directors.—C. W. Tillinghast, Charles Lundquist.

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Geochemists.—A. Long.

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Acting Director.—David W. Scott.

Associate curator.—Rowland Lyon.

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Head curator and historian.—P. E. Garber.

Curators.—L. S. Casey, R. B. Meyer, K. E. Newland.

CANAL ZONE BIOLOGICAL AREA

Director.—M. H. Moynihan.

Biologists.—Robert L. Dressler, Neal G. Smith.

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EDGAR M. BRONFMAN.

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ANTHONY J. CELEBREZZE, Secretary of Health, Education, and Welfare, *ex officio*.

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J. WILLIAM FULBRIGHT.

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FRANCIS KEPPEL, Commissioner, U.S. Office of Education, *ex officio*.

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GEORGE MEANY.

L. QUINCY MUMFORD, Librarian of Congress, *ex officio*.

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ROGER L. STEVENS.

L. CORRIN STRONG.

FRANK THOMPSON.

WALTER N. TOBRINER, President, D.C. Board of Commissioners, *ex officio*.

WILLIAM WALTON, Chairman, Commission of Fine Arts, *ex officio*.

WILLIAM M. WATERS, JR., Chairman, D.C. Recreation Board, *ex officio*.

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Treasurer.—DANIEL W. BELL.

Counsel.—RALPH E. BECKER.

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National Portrait Gallery Commission:

CATHERINE DRINKER BOWEN.

• JULIAN P. BOYD.

JOHN NICHOLAS BROWN, *Chairman.*

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WILMARTH SHELDON LEWIS.

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FREDERICK P. TODD.

JOHN WALKER, Director of the National Gallery of Art, *ex officio.*EARL WARREN, Chief Justice of the United States, *ex officio.*

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JOHN NICHOLAS BROWN, *Chairman.*

MRS. JEAN KINTNER.

DAVID LLOYD KREEGER.

ROBERT S. MCNAMARA, Secretary of Defense, *ex officio.*

PAUL H. NITZE, Secretary of the Navy.

WILLIAM H. PERKINS, JR.

S. DILLON RIPLEY, Secretary of the Smithsonian Institution, *ex officio.*

EARL WARREN, Chief Justice of the United States; Chancellor of the Smithsonian Institution.

HENRY BRADFORD WASHBURN, JR.

EUGENE M. ZUCKERT, Secretary of the Air Force.

Honorary Smithsonian Fellows, Collaborators, Associates, Custodians of Collections, and Honorary Curators

OFFICE OF THE SECRETARY

John E. Graf

UNITED STATES NATIONAL MUSEUM

MUSEUM OF NATURAL HISTORY

Anthropology

J. M. Campbell, Archeology.

C. G. Holland, Archeology.

N. M. Judd, Archeology.

Betty J. Meggers, Archeology.

F. M. Setzler, Anthropology.

W. W. Taylor, Jr., Anthropology.

W. J. Tobin, Physical Anthropology.

Nathalie F. S. Woodbury, Archeology.

Zoology

O. L. Austin, Birds	Laurence Irving, Birds.
W. W. Becklund, Helminthology.	Allen McIntosh, Mollusks.
J. Bruce Bredin, Biology.	J. P. Moore, Marine Invertebrates.
W. L. Brown, Mammals.	Dioscoro S. Rabor, Birds.
Leonard Carmichael, Psychology and Animal Behavior.	W. L. Schmitt, Marine Invertebrates.
Ailsa M. Clark, Marine Invertebrates.	Benjamin Schwartz, Helminthology.
H. G. Deignan, Birds.	Robert Traub, Mammals.
Robert W. Ficken, Birds.	Alexander Wetmore, Birds.
Herbert Friedmann, Birds.	Mrs. Mildred S. Wilson, Copepod Crus- tacea.

Entomology

Doris H. Blake.	F. M. Hull.
M. A. Carriker, Jr.	W. L. Jellison.
C. J. Drake.	C. F. W. Muesebeck.
K. C. Emerson.	T. E. Snyder.

Botany

C. R. Benjamin, Fungi.	Mrs. Kittie F. Parker, Phanerogams.
E. C. Leonard, Phanerogams.	J. A. Stevenson, Fungi.
F. A. McClure, Grasses.	W. N. Watkins, Woods.

Paleobiology

C. W. Cooke, Invertebrate Paleontology.	A. A. Olsson, Invertebrate Paleontology.
J. T. Dutro, Invertebrate Paleontology.	W. P. Woodring, Invertebrate Paleon- tology.
Remington Kellogg, Vertebrate Paleon- tology.	

Mineral Sciences

Gunnar Kullerud, Mineralogy.	W. T. Schaller, Mineralogy.
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MUSEUM OF HISTORY AND TECHNOLOGY

Science and Technology

D. J. Price

Civil History

Mrs. Arthur M. Greenwood, Cultural History.	Mrs. R. Henry Norweb, Numismatics.
E. C. Herber, History.	R. Henry Norweb, Numismatics.
I. N. Hume, Cultural History.	Joan Jockwig Pearson, Cultural His- tory.
F. W. McKay, Numismatics.	

Armed Forces History

W. R. Furlong.
F. C. Lane.

| Byron McCandless.

Exhibits

W. L. Brown, Taxidermy

BUREAU OF AMERICAN ETHNOLOGY

Sister M. Inez Hilger.
Frank H. H. Roberts.

| M. W. Stirling.
| A. J. Waring, Jr.

ASTROPHYSICAL OBSERVATORY

C. G. Abbot

FREER GALLERY OF ART

Oleg Grabar.
Grace Dunham Guest.

| Max Loehr.
| Katherine N. Rhoades.

NATIONAL AIR MUSEUM

Frederick C. Crawford.

| Alfred V. Verville.

NATIONAL ZOOLOGICAL PARK

E. P. Walker

CANAL ZONE BIOLOGICAL AREA

C. C. Soper

Report of the Secretary of the Smithsonian Institution

S. DILLON RIPLEY

For the Year Ended June 30, 1964

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: I have the honor to submit a report showing the activities and condition of the Smithsonian Institution and its branches for the fiscal year ended June 30, 1964.

GENERAL STATEMENT

This past year, on January 31, marked the retirement of my predecessor, Dr. Leonard Carmichael, seventh Secretary of the Smithsonian Institution. In the Annual Report for 1963 there was presented a general review of the activities of the Institution from 1953 to 1963, which gives some impression of the magnitude of the changes and developments instituted under Dr. Carmichael's regime. This splendid administrator, who has done so much for the Smithsonian, deserves the very highest praise. Recognition of his accomplishments has been widely expressed, in honorary degrees conferred upon him and in decorations by foreign governments. The Institution will always be grateful to its seventh Secretary and proud of the record of progress and achievement that he helped to foster. Not the least have been the confidence and esteem which he developed with the Regents of the Institution, who have constantly supported and encouraged the programs of the Institution. The Smithsonian wishes Dr. Carmichael well in his new career as vice president for research of the National Geographic Society.

The Smithsonian and Higher Education

In the few months since the assumption of the post of Secretary by the present incumbent on February 1, 1964, certain proposals have been inaugurated with the support of the Regents. The general problem of the Smithsonian's role in cooperating with universities

and programs of higher learning has been explored. Such a program represents a continuation of the traditional role of the Institution in the educational field, although perhaps historically it received greater emphasis in the early days of the Smithsonian than it has in recent decades. The Smithsonian's first Secretary, Joseph Henry, said many years ago: "The Smithsonian, with its widening responsibilities among the arts as well as the sciences, must continue and expand its leadership in education and scholarship in America." It seems high time that we should develop this role, for there is urgent need for the Smithsonian to render genuine service and leadership.

In the broad areas of biology and anthropology, support for specialized training not otherwise available under existing university programs must and can be given by the Smithsonian. In addition to general programs in specialized fields, specific programs are currently being undertaken with eight universities. Duke University will cooperate with the Smithsonian Institution in training biological oceanographers. Johns Hopkins University will join in a common venture to offer graduate education opportunities in paleontology. Other programs of cooperative education have been developed with the University of Minnesota in algology, the University of Maryland in ornithology, George Washington University in malacology, and the University of Kansas in paleontology. In addition there is the well-known program of the Freer Gallery of Art and the University of Michigan in Oriental art and the Astrophysical Observatory's integrated activities with Harvard. Through such arrangements graduate students may come to the Smithsonian Institution to carry out research projects under the supervision of staff members who may be given recognition in the form of an honorary or part-time appointment to the university faculty. Improved use of museum and other laboratory facilities in this way will help to overcome severe national shortages of natural-science specialists in a number of fields.

As part not only of its service to the cause of higher education in this country but also in order to replicate specialists in careers of research and study associated with museum programs, the Institution must always stand ready to serve as a catalyst, to create opportunities for research for students and staff, and to foster interchange between scholars both here and abroad.

Cooperation with Museums

As a part of this wider usefulness of the Smithsonian to education, we hope that it may be possible to broaden the Smithsonian's traditional cooperation with museums throughout the world. Museums and their related laboratories are just entering a new era, and museum resources are being drawn upon as never before for general education.

Thirty years ago a mere 15 percent of museums in America were connected with education in some form. This marked a drastic decline from a hundred years ago when museums housed the genesis of scientific research in the Western World. Today over 90 percent are involved, ranging from simple school-extension programs to post-graduate fellowships. It is for these reasons that we feel that the Smithsonian, with its superb museum resources, now has a great opportunity to serve the museum world in a role of leadership and cooperation. As a first step in this effort, the Smithsonian Institution has entered into an agreement with the American Association of Museums to promote a joint publications program to facilitate the publication and distribution of works needed in the broad field of museum administration, education, museum services, and the science of museology.

Emphasis on Research

Research on wild populations and undisturbed conditions in nature has taken on an aspect of urgency in recent years because so many opportunities for study have changed or disappeared. But man's need to understand his environment and use it sympathetically will require a broad program of observation and research, especially in the tropics. The Smithsonian Institution will seek to promote interest in these objectives throughout the public and private scientific community. Beginning in April, Philip C. Ritterbush was appointed Special Assistant to the Secretary for Scientific Matters, to explore prospects for cooperation with other Government agencies in this effort and to promote consideration of these objectives in the development of national science policy.

A related objective is to strengthen the position, within science as a whole, of those fields of biology which have the entire organism as their object: ecology, genetics, systematics, botany, zoology, oceanography, microbiology, and paleontology, as well as the sciences of man which have so long been central concerns of the Smithsonian. Two related approaches to this subject have been begun. With hopes of contributing to the efficiency of research and investigation, studies are underway to promote the application of data processing, technician employment and training, improved cataloging methods, and more rapid means of indexing and retrieving information in the biological sciences. In order to overcome shortages of competent investigators, studies have begun to indicate appropriate means of expanding educational opportunity in neglected areas of the natural sciences.

International Activities

During the period under review, the Institution made a determined effort to carry its international activities beyond traditional overseas field expeditions and research, which primarily benefit the Smithsonian, to cooperation with other Government agencies and private institutions in the development of exchange of persons and international exhibits programs, to the benefit of others.

Beginning in March, William W. Warner was engaged as a Consultant to the Secretary for International Activities to explore appropriate areas of international cooperation. The first of these has been in the field of archeology with the Department of State. The Department's Bureau of Educational and Cultural Affairs has expressed a strong interest in having the Smithsonian exercise a leading role in the administration of overseas archeological research or excavation projects in connection with those nations in which excess foreign currencies are available through agricultural surplus sales under Public Law 480. The Bureau has also welcomed the Institution's offer to help with the selection and programing of foreign scholarship candidates in fields of Smithsonian interest.

The Institution has also assisted the Department's Office of Soviet and Eastern European Exchanges in planning exchange of museum professionals and exhibits, in accordance with the new U.S.-U.S.S.R. Exchange Agreement, which for the first time includes specific mention of museums. The Secretary of the Smithsonian serves as chairman of the American Association of Museums' Soviet Exchange Committee, an advisory group that has helped the Department in the choice of museum professionals and possible exhibits going to and coming from Russia.

In addition, the Smithsonian has offered its storage facilities and staff assistance to the Department's "Art for Embassies," a project aimed at providing United States Embassies with representative American works of art. The first paintings lent under this project were turned over to the Smithsonian for safekeeping in June.

Among international organizations, the Smithsonian has supported the concept of American participation in the UNESCO campaign for the preservation of the monuments of Nubia in the upper Nile Valley. The Secretary has assisted the State Department in its request for a foreign currency appropriation to provide for American participation by explaining the significance of the monuments themselves and the interests of American universities and museums in the Nubian campaign in particular, and in the wider problems of classical archeology in the Near East in general.

During May the Organization of American States' Department of Scientific Affairs agreed to announce and fund, through its estab-

lished fellowship program, opportunities for Latin American students to serve as aides in research projects conducted at the Canal Zone Biological Area. Discussions have also been held on a jointly financed Organization of American States-Smithsonian program to provide postdoctoral research grants for Latin American scholars in environmental and descriptive biology tenable at both Barro Colorado in the Canal Zone and the Museum of Natural History.

• The Institution has also discovered considerable interest among major American private foundations for cooperative programs in relatively neglected areas of basic science in the developing countries. The development of these and similar activities in future years can help fulfill the Institution's basic responsibility for the advancement of science and the humanities among all peoples.

THE ESTABLISHMENT

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

THE BOARD OF REGENTS

The Institution suffered a great loss this year in the death of Representative Clarence Cannon on May 12, 1964, the day before the spring meeting of the Board. Mr. Cannon had served as a Regent for nearly 30 years, longer than any other member of the Board. His wise counsel and unselfish devotion to the affairs of the Smithsonian will be sadly missed. On May 19 Representative George H. Mahon of Texas was appointed by the Speaker of the House of Representatives to fill this vacancy.

The roll of Regents at the close of the fiscal year was as follows: Chief Justice of the United States Earl Warren, Chancellor; members from the Senate: Clinton P. Anderson, J. William Fulbright, Leverett Saltonstall; members from the House of Representatives: Frank T. Bow, Michael J. Kirwan, George H. Mahon; citizen members: John Nicholas Brown, William A. M. Burden, Robert V. Fleming, Crawford H. Greenewalt, Caryl P. Haskins, Jerome C. Hunsaker.

On January 23, 1964, the annual meeting of the Board was held in the Regents' Room preceded by a private ceremony of installation of

the new Secretary. Dr. Leonard Carmichael, Secretary, presented his published annual report on the activities of the Institution. The Chairman of the Executive and Permanent Committees of the Board, Dr. Robert V. Fleming, gave the financial report for the fiscal year ended June 30, 1963.

On the evening preceding the annual meeting a formal dinner was held in the Hall of Graphic Arts of the Museum of History and Technology to celebrate the dedication of this new museum. The members of the Board and their wives as well as others directly concerned with the planning and construction of the new building were guests.

The spring meeting of the Board of Regents was held on May 13 in the Museum of History and Technology. The Chairman of the Executive Committee presented a financial report.

FINANCES

A statement of finances, dealing particularly with Smithsonian private funds, will be found in the report of the Executive Committee of the Board of Regents, page 274.

Funds appropriated to the Institution for its regular operations for the fiscal year ended June 30, 1964, totaled \$13,191,000 and were obligated as follows:

Astrophysical Observatory.....	\$994, 845
Bureau of American Ethnology.....	124, 228
Canal Zone Biological Area.....	138, 890
International Exchange Service.....	110, 000
National Air Museum.....	300, 075
National Armed Forces Museum Advisory Board.....	29, 115
National Collection of Fine Arts.....	143, 252
National Portrait Gallery.....	16, 678
United States National Museum.....	5, 587, 001
Office of the Secretary.....	257, 596
Buildings Management Department.....	3, 968, 759
Administrative Services.....	1, 464, 006
Unobligated.....	56, 555
	<hr/>
	\$13, 191, 000

Besides this direct appropriation, the Institution received funds by transfer from other Government agencies as follows: from the District of Columbia for the National Zoological Park, \$1,597,356; from the National Park Service, Department of the Interior, for the River Basin Surveys, \$254,500.

VISITORS

Visitors to the six Smithsonian buildings on the Mall again this year surpassed all records, with a total of 10,813,195, which was 503,359 more than for the preceding year. June 1964, with 1,592,540, was

the month of largest attendance; April 1964 second, with 1,555,295; and July 1963 third, with 1,407,858. The largest attendance recorded for a single day was 104,285 on March 28, 1964. Table 1 gives a summary of the attendance records for the six buildings. The National Zoological Park had an estimated 3,900,000 visitors during the year. When this figure is added to the attendance in the Institution's buildings on the Mall, and to the 1,236,155 recorded at the National Gallery of Art, the total Smithsonian attendance for fiscal 1964 aggregated 15,949,350.

SMITHSON BICENTENNIAL

The year 1965 marks the two-hundredth anniversary of the birth of James Smithson, founder of the Smithsonian Institution, and plans are in progress to observe this event in a manner that will draw international attention to Smithson and the work of the establishment he founded. A committee of Smithsonian staff members has been named, under the chairmanship of John C. Ewers, to plan the celebration and make recommendations to the Secretary concerning it. Scheduled for the fall of 1965, it is the intention to plan a program that will attract scholars and representatives of scholarly institutions and governments, from all parts of the world.

JOSEPH HENRY PAPERS

In collaboration with the National Publications Commission, the National Academy of Sciences, and the American Philosophical Society, a project has been initiated to collect, edit, and publish the Papers of Joseph Henry, first Secretary of the Smithsonian Institution. For at least a decade, scholars devoted to general American history as well as to the history of science in America have felt that such a documentary work would provide not only the story of this outstanding scientist but also much of the history of the organization of science in the United States, its relations with government, and its links with science and scientists in Europe. The significance of Henry was underlined in 1954 when the National Historical Publications Commission named him as one of the nonpolitical Americans whose papers are most worthy of publication.

Because of the enormity of the task and the high costs involved, it is impossible to say at this time how rapidly this project will move forward. Formation of a permanent committee to organize and direct the project is planned.

TABLE 1.—Visitors to certain Smithsonian buildings during the year ended June 30, 1964

Month and year	Smithsonian Building	Arts and Industries Building	Air and Space Building	Freer Gallery of Art	Natural History Building	Museum of History and Technology	Total
<i>1963</i>							
July.....	228,648	518,666	319,413	22,329	318,802	-----	1,407,858
August.....	212,356	431,120	350,707	19,409	316,372	-----	1,330,264
September.....	67,003	139,903	101,234	12,483	131,354	-----	451,977
October.....	55,765	141,625	91,332	10,500	123,116	-----	422,338
November.....	49,513	101,205	85,122	9,062	134,430	-----	379,332
December.....	38,720	76,533	56,726	7,107	93,325	-----	272,411
<i>1964</i>							
January.....	31,741	61,239	48,553	6,952	80,872	132,759	362,116
February.....	39,212	74,072	59,949	8,572	116,400	397,751	695,956
March.....	100,597	168,160	131,962	13,404	225,691	397,662	1,037,476
April.....	150,659	277,863	204,217	20,851	314,030	587,675	1,555,295
May.....	145,228	213,560	188,100	15,913	302,547	440,284	1,305,632
June.....	191,619	252,997	216,871	22,043	355,367	553,643	1,592,540
Total.....	1,311,061	2,457,243	1,854,186	168,625	2,512,306	2,509,774	10,813,195

OPENING OF MUSEUM OF HISTORY AND TECHNOLOGY

On the evening of January 22, 1964, with a large and distinguished audience in attendance, dedication ceremonies were held for the formal opening of the new Museum of History and Technology. The program included music by the United States Marine Band, introductory remarks by Dr. Leonard Carmichael, Secretary of the Smithsonian Institution, who presided as master of ceremonies, and addresses by the Chancellor of the Smithsonian, the Honorable Earl Warren, Chief Justice of the United States; by the Honorable Clinton P. Anderson, United States Senator from New Mexico, Regent of the Smithsonian, and chairman of the Joint Congressional Committee on Construction of a Building for a Museum of History and Technology for the Smithsonian Institution; and by the President of the United States, Lyndon B. Johnson. The texts of these addresses were later printed in a brochure (Smithsonian Publication 4531) distributed by the Institution.

The history of the development and construction of this splendid new museum of the Smithsonian on Washington's Mall has been told in previous reports. Suffice it here to say that in many ways it has exceeded expectations in its acceptance and use by the public. From the day of opening until June 30, a period of 22 weeks, a total of more than 2,500,000 visitors entered its doors. At the time of opening about one-fifth of the total exhibition area of the building—50 halls—were ready for viewing.

LANGLEY MEDAL PRESENTATION

The Langley Medal of the Smithsonian Institution was awarded on May 5 to Astronaut Alan B. Shepard, Jr., in recognition of his "courageous and pioneering contributions to scientific research as the first American to fly in space and the first to control the attitude of a spacecraft while in flight and during a condition of weightlessness." Presentation, which coincided with the third anniversary of Shepard's historic flight, was made by Chief Justice Earl Warren, Chancellor of the Smithsonian, at a brief ceremony at the Institution. In attendance were members of the Smithsonian Board of Regents, including Senator Clinton P. Anderson, who made a brief address; officials of the National Aeronautics and Space Administration; Smithsonian officials; and members of Commander Shepard's family. This was the eleventh time the Smithsonian Institution had awarded the Langley Medal in the 56 years since its establishment in 1908.

LECTURES

Elmer A. Sperry, Jr., eminent inventor, delivered the fifth Lester D. Gardner lecture, "Early Airplane Instruments," in the auditorium of the Freer Gallery of Art on the evening of September 27.

Dr. James A. Van Allen, professor of physics, University of Iowa, gave the 29th Annual James Arthur Lecture on the Sun on the evening of December 12, 1963, in the auditorium of the Natural History Building. His subject was "Some General Aspects of the Earth's Radiation Belts."

Ben Norris, painter and professor of art, University of Hawaii, delivered an illustrated lecture, "Images from Hawaii—From Captain Cook to Contemporary Crossroads," on January 20, 1964, in the auditorium of the Natural History Building. This lecture was sponsored by the Hawaii State Society of Washington, D.C.

George Bass, special assistant for underwater archeology, University of Pennsylvania University Museum, lectured on "Diving 3,000 Years into the Past" in the auditorium of the Natural History Building on the evening of January 24, 1964. This illustrated lecture was sponsored jointly by the Smithsonian Institution and the Archaeological Institute of America.

The Honorable Desmond Guinness, president of the Irish Georgian Society, gave an illustrated lecture on "18th Century Georgian Architecture in Ireland" in the auditorium of the Natural History Building on the evening of February 8, 1964.

The first Edwin A. Link Lecture, "Training by Simulation," was delivered by Astronaut Alan B. Shepard, Jr., in the auditorium of the Natural History Building on the evening of February 19, 1964. This series of lectures, made possible by a grant from the Link Foundation, is administered by the Smithsonian Institution in cooperation with the U.S. Office of Education.

Miss Sylvia Kenney, associate professor of music at Bryn Mawr College and visiting associate professor of music at Yale University, gave a lecture on the subject "Paintings, Chronicles, and Stylistic Criteria as Guides for the Performance of 15th Century Music" in the auditorium of the Natural History Building on the evening of May 22, 1964.

Several lectures sponsored by the Freer Gallery of Art and the National Gallery of Art are listed in the reports of these bureaus.

THE KENNEDY CENTER

In January the National Cultural Center, a bureau of the Smithsonian Institution, by act of Congress was renamed the John F. Kennedy Center for the Performing Arts as a memorial to our late President. By this same act, appropriation of \$15.5 million was authorized

from Federal funds to match contributions from the public. Under the chairmanship of Roger L. Stevens, the Center made notable progress during the year toward its objectives. Many substantial gifts were received. Questions relating to the size and site of the Center have been resolved, and plans call for construction of the substructure to begin in the summer of 1965. It is estimated that about 2½ years will be required to complete the building. The Secretary of the Smithsonian Institution serves ex officio as a member of the board of trustees of the Center. Also serving on the board are Senator Leverett Saltonstall and Senator J. William Fullbright, both Regents of the Institution. A detailed report on the John F. Kennedy Center for the year, together with a financial statement, is presented beginning on page 247.

NATIONAL ARMED FORCES MUSEUM ADVISORY BOARD

During the year the National Armed Forces Museum Advisory Board gained a staff to provide assistance in the execution of its missions as assigned by Public Law 87-186. The staff head, designated Coordinator of Studies, is Col. John H. Magruder, III, U.S. Marine Corps. Colonel Magruder, Director, Marine Corps Museums, was detailed by the Secretary of the Navy to work part-time with the Board. He reported for duty October 2, 1963. Other staff members are James S. Hutchins, Assistant Coordinator of Studies (reported December 2, 1963); Col. Robert M. Calland, U.S. Marine Corps, Retired, Museum Specialist (reported June 1, 1964); and Mrs. Miriam H. Schuman, Administrative Assistant (reported September 23, 1963).

The Board, at its third meeting, January 20, 1964, unanimously endorsed Fort Washington, Md., now administered by the National Park Service, as the most feasible and appropriate site for the proposed National Armed Forces Museum. The Board also recommended to the Smithsonian Board of Regents that necessary arrangements be made with the National Park Service and the Congress to provide for the transfer of that site to the Smithsonian Institution.

Accordingly, representatives of the Smithsonian Institution opened negotiations with the National Park Service looking to acquisition of Fort Washington. On March 16, 1964, the Secretary met with T. Sutton Jett, Director of the National Capital Region, National Park Service, and discussed with him the Board's interest in obtaining the Fort Washington site. On May 14, 1964, the subject again was discussed at a meeting between the Secretary and George B. Hartzog, Director of the National Park Service. Further negotiations with the Park Service are in progress.

During the year the staff of the National Armed Forces Museum Advisory Board opened negotiations with various agencies of the Armed Forces and the General Services Administration in regard to

the retention and eventual transfer to the Smithsonian Institution of military and naval objects appropriate for the collections of the National Armed Forces Museum. In addition, the staff undertook its own thorough search for such objects at military and naval installations throughout the continental United States. The staff, in cooperation with the Smithsonian Library, also initiated steps to acquire from Armed Forces historical agencies and elsewhere significant publications in the fields of military and naval history, to serve as a nucleus of the study center library of the proposed museum. All governmental agencies are cooperating fully with the work of the Board. Once a site for the museum has been fixed, there will be no dearth of materiel around which to establish a museum exhibit plan.

SCIENCE INFORMATION EXCHANGE

The Science Information Exchange (S.I.E.) receives, organizes, and disseminates information about scientific research in progress. Its mission is to assist the planning and management of research activities supported by Government and non-Government agencies and institutions by promoting the exchange of information that concerns subject matter, distribution, level of effort, and other data pertaining to current research in the prepublication stage. It helps program directors and administrators to avoid unwarranted duplication and to determine the most advantageous distribution of research funds. It serves the entire scientific community by informing individual investigators about who is currently working on problems in their special fields.

The Exchange is concerned only with research actually in progress in order to cover the 1- to 3-year information gap between the time a research project is proposed or started and the time the results become generally available in published form. Thus, the Exchange complements, rather than duplicates, the services of technical libraries and established documentation centers.

Information is received by the Exchange from all available sources, specifying who supports a research task, who does it, where it is being done, and a 200-word technical summary of what is being done. These basic data are cast into a one-page record, the Notice of Research Project (N.R.P.) that serves as the major input and output of the Exchange. These records are analyzed, indexed, processed, and stored in computer and manual files in such a way that a wide variety of questions about any of these items or any combination of items can be quickly retrieved or compiled.

The acquisition of task records and the input workloads have continued to climb rapidly, from about 56,000 in fiscal year 1962 to 75,000 in 1963 and over 100,000 in 1964. The output services rendered to United States Government agencies and for the entire scientific

community have also increased rapidly, from about 27,000 reports of all kinds in 1963 to about 34,000 this fiscal year. Over three-quarters of a million research task records (N.R.P.'s) were requested and dispatched during the year.

With the rapidly increasing demands, the total staff, including about 40 scientists, grew to 155, but in recent months it has dropped slightly, reflecting in part the economies resulting from improved organization and systems control.

To handle this rapidly increasing volume of records more efficiently and economically, the reorganization and expansion of the Exchange were completed during the past year. An entirely new assembly line system now is capable of receiving and processing well over 100,000 records per year. The system is easily controlled and is amenable to expansion or contraction as workloads may dictate. Each unit process, each organizational unit, and each of the different kinds of services rendered can be identified and the unit costs can be determined by a new accounting system developed and put into operation in recent months.

For almost 15 years, the Exchange was supported by a number of Federal agencies whose far-sighted research directors and administrators were aware of the fact that the management of multimillion-dollar research programs might well be facilitated by the prompt exchange of information about on-going programs. As this enterprise grew rapidly in recent years, support and management problems became more complex and difficult for individual agencies, and so, in 1964, the National Science Foundation undertook the responsibility for funding and overall management with continued operational responsibility under the aegis of the Smithsonian Institution.

It is axiomatic that maximum use should be made of the large number of research records acquired, processed, and stored by the Exchange. To this end, S.I.E. has endeavored to make these services known and available to all eligible users. During the past year, five articles were published in professional journals by staff members describing S.I.E. and its services. Twenty-three articles and news notes about S.I.E. were published by others. Over 25,000 descriptive brochures were requested and distributed. About 685 visitors, including a number from overseas, called at the Exchange to find out how these stores of information could be adapted to their own scientific information and research management problems. S.I.E. staff presented 26 talks, papers, and briefings to professional scientific societies, groups, and organization units. All these activities indicate a growing interest in S.I.E. throughout the scientific community, and there is good reason to believe that these activities are the most effective ways of increasing the use of S.I.E. and thereby contributing to effective management of research projects and programs.

By the end of this year all Federal agencies with significant research programs were participating in some degree in the S.I.E. program. About 90-95 percent of all Government research in life sciences and social sciences is being registered. In general, the physical sciences collection has grown slowly, but some fields now are approaching fairly comprehensive proportions. An estimated 15,000 to 20,000 records dealing mostly with applied research in physical sciences are still to be registered. Interest among non-Government agencies, universities, foundations, national fund-raising agencies, industry, State and city research agencies, has been growing substantially even though S.I.E. has concentrated its efforts in the past on Federal agency participation. Closer cooperation with non-Government agencies may be anticipated as the Federal collections approach comprehensive proportions.

To determine if S.I.E. does, in fact, fulfill its mission and effectively achieve its objectives, a questionnaire was sent to 600 scientists who have used the Exchange services. From their response, it was evident that over 95 percent received information concerning new research they did not know about, even in their own specialty fields. The majority used the information to keep up with latest developments and to avoid duplication in formulating new projects and research proposals. Over 70 percent affirmed good scientific quality, comprehensive coverage, and no irrelevant material. Over 60 percent indicated their interest and endorsement by volunteering comments and suggestions. Although the purpose of the questionnaire was primarily as guidance for S.I.E., this practical field test of an actual operating system and its products seems to offer objective and concrete evidence that this kind of information service on current research is needed and is acceptable to the research scientists for whom it was designed.

SMITHSONIAN MUSEUM SERVICE

The Smithsonian Museum Service, through appropriate educational media, interprets to museum visitors and to the general public the objects, specimens, and exhibits in the several Smithsonian museums and develops interpretative and educational programs relating to the work of the Institution in the fields of science, history, and art. The Museum Service also cooperates with the volunteers of the Junior League of Washington, D.C., who conduct the Junior League Guided Tour Program at the Smithsonian. A more complete report of this activity, directed by G. Carroll Lindsay, curator, with the assistance of Mrs. Nella Lloyd, visitor services assistant, is carried in the report on the U.S. National Museum (pp. 65-66).

In addition, the Museum Service acts to coordinate special events and ceremonial activities involving the Smithsonian museums and outside organizations.

The Museum Service provided assistance to professional groups and individuals visiting the museums of the Institution or planning to do so. Assistance in the form of lectures, answers to inquiries, and special tours of museum areas was rendered to college and university groups and individuals from the United States and abroad. Mr. Lindsay served as consultant on museum organization and practices to representatives from other museums on several occasions.

• The Audioguide, or radio lecture system, in the Museum of Natural History continued in operation and was used by 39,504 persons. The complete text of the 37 Audioguide lectures was published during the year under the title *The Exhibits Speak*. In the Museum of History and Technology tape-recorded lectures describing the exhibits were made available to visitors to the First Ladies Hall. This system, using self-contained, battery-powered tape playback machines, is known as Acoustiguide.

Assistant curator Mrs. Sophy Burnham wrote, produced, and directed a 27-minute, 16-millimeter, color motion picture, *The Leaf Thieves*. The film shows research activities, field work, and exhibition preparation carried on by the Museum of Natural History, and included footage exposed in British Guiana during the 1962 Smithsonian Botany-Exhibits Expedition to that area. It is designed to acquaint students with the opportunities for scientific or technical careers in natural history museums.

The film *The Smithsonian's Whale*, describing the construction of the 92-foot model of a blue whale on exhibit in the Museum of Natural History, was distributed from 10 points across the United States and was shown on television stations in Washington and New York. Prints of this film also were borrowed directly from the Museum Service. This film was selected from films produced by Government agencies for showing at the Venice Film Festival in Venice, Italy.

The staff docent in zoology, Mrs. Linda Gordon, and the staff docent in anthropology, Mrs. Marjorie Halpin, continued to handle non-technical correspondence from the public on their respective subjects; they provided tours for groups visiting the museum; lectured before classes visiting the museum; and prepared information leaflets on exhibition halls, bibliographies, and similar educational materials.

Special "touch" tours for several groups of blind persons were arranged during the year. Specimens and objects from the reference collections as well as selected portions of the public exhibits were included in the programs arranged for the blind.

The Urban Service Corps program, under the general direction of Mrs. William Wirtz, held seven sessions at the Smithsonian. Emphasis was placed on the work of the Museum of Natural History, and the programs, designed to stimulate student participation, included lectures and tours of its exhibit areas and technical laboratories. At the

conclusion of one of the regularly scheduled Urban Service Corps programs, a special session was devoted to the Museum of History and Technology (at that time not yet open to the public). Scientific and administrative staff members of the Institution also participated in these programs.

Miss Mary Ann Friend continued her work as audiovisual librarian, cataloging slides and arranging for the loan of slides, films, and photographs related to Smithsonian exhibits and research activities. Facilities of this library were extensively used by Smithsonian staff members and by borrowers outside the Institution.

During the year the responsibility for operating the museum sales shops was transferred to the Museum Service, and Mrs. Emily Pettinos, formerly with the University Museum, University of Pennsylvania, joined the staff as manager of the sales operations. The shops serve as an adjunct to the educational program of the Institution, making available to the visitors printed materials relating to the work of the Institution and reproductions of materials in the museum collections. Three shops are operated in the Museum of History and Technology and one each in the Museum of Natural History and the Arts and Industries Building.

Arrangements were made by the Museum Service for various Smithsonian public functions and special events, including the opening of new exhibit halls, temporary exhibitions, film showings, lectures, visitations by heads of state and other distinguished visitors, and the opening of the Museum of History and Technology. More complete information about these activities will be found under appropriate headings elsewhere in this report. Current mailing lists for announcements of these events were maintained.

The *Smithsonian Calendar of Events*, a listing of special events held at the Institution, was prepared and distributed monthly. An illustrated directory to museums in the Washington metropolitan area was prepared by the Museum Service and published by the Institution, under the title *Brief Guide to the Museums in the Washington Area*.

The Museum Service continued to assist radio and television producers wishing to feature Smithsonian exhibits and scientific work in local or network programs. In this regard the Museum Service acts as liaison between the broadcaster's representatives and the various operating units of the Institution.

William C. Grayson, formerly with the National Broadcasting Co., joined the staff as consultant to assist in the preparation of plans for more effective Smithsonian participation in various aspects of television and radio activity, including the use of the television studio in the Museum of History and Technology.

Meredith Johnson, formerly director of Woodlawn Plantation, joined the staff of the Museum Service to assist in the development of

educational and visitor service programs, particularly in regard to the greatly increased demands for such services arising upon the opening of the Museum of History and Technology.

During the year curator G. Carroll Lindsay attended various professional meetings and conferences. He appeared on the programs of the following meetings: The Annual Winterthur Seminar on Museum Operation and Connoisseurship, Winterthur, Del.; the Museum Audio-Visual Applications Group, Rochester, N.Y.; the American Association of Museums Annual Meeting, St. Louis, Mo. He also attended the annual meetings of the Division of Audio-Visual Instruction, National Education Association, Rochester, N.Y.; and the Museum Stores Association, Chicago, Ill.

He also lectured before various groups visiting the Institution, describing for them the history and current work of the Smithsonian, and presented similar talks before meetings of local service clubs and other groups interested in the Institution.

Mr. Lindsay continued his research in the field of early American culture. He also presented lectures to the St. Mary's County, Md., Historical Society and to the National Trust Conference for Historic Museum Associates on the subject of southern colonial architecture; participated in the annual Forum held by the Alexandria (Va.) Association and spoke on early Alexandria architecture; presented a series of four lectures on early American furniture as part of the Junior League of Washington's adult education program; and lectured at the Cheltenham Township (Pa.) Adult School on the subject of early American silver. He appeared four times on television programs to discuss the work of the Smithsonian Institution and twice for the same purpose on radio programs.

The curator and the consultant on TV installations, William C. Grayson, traveled to New York to consult with the program director of Lincoln Center. They also observed the visitor information facilities in Williamsburg, Va.

The assistant curator attended the Calvin Motion Picture Studio Workshop seminar on motion-picture production in Kansas City, Mo.

The audiovisual librarian, Miss Mary Ann Friend, represented the Museum Service at the American Film Festival of the Educational Film Library Association in New York City for the entry of one of our films.

The museum docents have made trips to the American Museum of Natural History to examine the education programs and confer with staff members. In addition, the docent in zoology traveled to Boston to examine the education department at the Science Museum. The docent in zoology attended the International Congress on Zoology which consisted of seminars and a film theater in action.

Report on the United States National Museum

SIR: I have the honor to submit the following report on the condition and operations of the U.S. National Museum for the fiscal year ended June 30, 1964:

COLLECTIONS

During the year, 1,234,752 specimens were added to the national collections and distributed among the 10 departments as follows: Anthropology, 38,484; zoology, 196,427; botany, 30,427; entomology, 241,947; mineral sciences, 9,186; paleobiology, 376,007; science and technology, 1,361; arts and manufactures, 2,697; civil history, 336,393; and Armed Forces history, 1,823. This year's accessions were acquired as gifts from individuals, by staff collecting in the field, or as transfers from Government departments and agencies. The complete report on the Museum, published as a separate document, includes a detailed list of the year's acquisitions, of which the more important are summarized below. Catalog entries in all departments now total 58,755,099.

Anthropology.—Two large and important North American collections were accessioned in the division of archeology. One, received by transfer from the River Basin Surveys, Bureau of American Ethnology, included 18,603 specimens from the Medicine Creek Reservoir, Nebraska, and comprises one of the largest and most complete collections extant on the prehistoric agricultural peoples of the Central Plains in the 9th to 14th centuries. The second lot is from the 1931-32 investigations of the Bureau of American Ethnology at Signal Butte, a key stratified site in western Nebraska with a series of occupational levels spanning the period from 2600 B.C. to about A.D. 1700. Other noteworthy accessions include 6,031 pieces collected by the Bureau of American Ethnology from the Parita and Santa Marta areas in Panama; a group of handaxes from the Fezan and microlithic blades from Tripolitania, Libya, presented by James R. Jones of the U.S. AID mission to Libya; and an exceptionally well-preserved Egyptian cat mummy donated by Edith Goldsmith of Methuen, Mass.

In the division of ethnology, a large portion of the year's acquisitions were obtained, chiefly by purchase, for use in the new Hall of Cultures of Africa and Asia. Noteworthy Asian accessions included:

79 specimens representing Chinese opera, purchased with aid of the Chinese National Government; 116 items relating to agriculture and daily life in Japan, obtained from the Japanese Association of Museums; a Hindu village altar assemblage of 40 specimens, purchased with assistance of the Government of Orissa, Bhubanaswar, and the Crafts Museum, New Delhi; 255 Burmese items purchased from the collector, Brian Peacock, University of Rangoon; 226 specimens mostly from Isfahan and dealing with Iran textile printing, collected and donated by Mrs. Ethel J. W. Bunting; 76 items of Korean furniture, architectural pieces, and objects of everyday use, presented by the Korean Ministry of Public Information; 5 traditional Japanese swords, with scabbards and a leather sword case, presented by Adm. William M. Fichteler; a ceremonial bone apron from Tibet, by exchange from Simon Kriger, Washington, D.C.; and 3 large rubbings of stone relief from the Bayon at Angkor, donated by the Kingdom of Cambodia. To the African collections were added 60 items from the Endo-Marakwet of Kenya, purchased for the Museum by Deric O'Bryan, formerly U.S. Foreign Service Officer in Nairobi; and full-scale copies of six rock paintings from the Tassili Mountains of Algeria, made at the Musée de l'Homme under direction of Henri Lhote.

Among the accessions in the division of physical anthropology are two casts of trephined skulls from Peru, one with five and the other with seven openings; these will be exhibited as examples of the number of trephine openings which have been made in a skull in vivo. Two Kraho Indian face masks from central Brazil were made for the Museum by Harold Schultz. One is to be incorporated in the map of peoples of the world in the new hall of physical anthropology in preparation. Other accessions include skeletal materials from Virginia, Maryland, Latin America, and Alaska.

Zoology.—A currently accelerated program of field activities in the division of mammals added 14,869 specimens to its collections. Field parties working under the direction of Dr. Henry W. Setzer collected more than 5,000 specimens from Africa and southwestern Asia. The tropical areas of the Americas continued to provide large numbers of specimens. Of special note are Dr. C. O. Handley's general collections from Panama and Arthur M. Greenhall's large collection of bats from Trinidad. Important accessions also include a rare marbled cat from Sumatra presented by Kent Crane, a series of baboons obtained by Clifford E. Sanders in Northern Rhodesia, South American marmosets received from the National Institutes of Health Primate Colony at the San Diego Zoo through Robert W. Cooper, and a good series of canids allied to red wolves from the south-central part of the United States received through the Fish and Wildlife Service.

Accessions worthy of special note received in the division of birds

include 547 bird skins, 26 skeletons, 1 egg, and 1 nest from Panama, received through Dr. Alexander Wetmore; 791 bird skins, 85 skeletons, and 1 nest from North America, by transfer from the Fish and Wildlife Service; 301 bird skins from Formosa, by transfer from the Department of Defense, Department of the Navy, U.S. Naval Medical Research Unit No. 2, through Dr. R. E. Kuntz; 190 bird skins from North Borneo, gift of the Bernice P. Bishop Museum through Dr. J. L. Gressitt; 175 bird skins from West Pakistan, gift from Bucknell University through Dr. Roy C. Tasker; 156 alcoholic specimens of birds from Prof. D. S. Rabor, Silliman University, Dumaguete City, Negros Oriental, Philippines; and 52 original watercolor paintings executed as illustrations for F. Salomonson's "The Birds of Greenland" by deposit from the artist, Aage Gitz-Johansen, Trorod, Denmark, through Dr. Carl Christensen, Cultural Counselor, Embassy of Denmark.

The division of reptiles and amphibians accessioned 2,639 specimens. Outstanding among these are 58 West Indian lizards and frogs, including paratypes of 13 new species and subspecies from Dr. Albert Schwartz of Miami, Fla.; 213 reptiles and amphibians from Madagascar collected by field parties under the direction of Dr. H. W. Setzer of the division of mammals; and 219 reptiles and amphibians from Darién, Panama, collected by Dr. Charles O. Handley, Jr., also of the division of mammals.

Among the largest accessions made in the division of fishes during the year were 5,777 specimens received by transfer from the U.S. Fish and Wildlife Service, mostly through the efforts of Dr. Daniel Cohen, Harvey R. Bullis, Jr., Willis King, J. H. Finucane, and P. J. Struhaker; a gift of 3,000 specimens of Panamanian fishes from Horace Loftin, Florida State University; and through exchange, 6,020 Virginia fishes from Dr. Robert Ross, Virginia Polytechnic Institute. Dr. Herbert R. Axelrod, T. F. H. Publications, Inc., Jersey City, N.J., donated 443 South American fishes and aided in securing 18 additional ones. Especially important acquisitions are holotypic and paratype specimens received from Dr. Jacques R. Géry, Dordogne, France; Dr. Edward C. Raney, Cornell University; Dr. John E. Randall, University of Puerto Rico; Dr. Eugenia Clark, Cape Haze Marine Laboratory; Wayne J. Baldwin, University of California; Dr. C. Lindsey, University of British Columbia; Dr. J. L. B. Smith, Rhodes University, Grahamstown, South Africa; and Dr. Stanley Weitzman, associate curator in the division of fishes. The addition of 47 shark specimens, some undescribed and others representing species not previously contained in the national collections, was made by the following: Dr. J. C. Briggs, University of Texas; H. Heyamoto and Susumu Kato, U.S. Fish and Wildlife Service; Donald Goff, Rehoboth Beach,

Del.; Dr. Carl L. Hubbs, Scripps Institution of Oceanography; Dr. T. Abe, University of Tokyo, Japan; Dr. F. H. Talbot, South African Museum; and Jeanette D. D'Aubrey, Oceanographic Research Institute, Durban, Natal, South Africa. Valuable specimens were also received from Mac Entel, Sumac Tropical Fish Hatchery, Miami, Fla.

The addition of 27,003 Antarctic specimens to the division of marine invertebrates, collected by Dr. Waldo L. Schmitt, was of special importance. Dr. Schmitt, research associate of the division, participated in the U.S. Antarctic Research Program aboard the *USS Staten Island* and made these collections during the Palmer Peninsula-South Shetlands Survey in 1963. Many existing gaps in the national collections of the fauna of these regions have now been filled. Acquisition of the A. Weir Bell collection of Oligochaeta, comprising about 900 slides of sections of these worms, a catalog, and a library of separates of scientific articles dealing with the oligochaetes, was a significant event during the year. This important collection was obtained from Dr. R. A. Boolootian, Department of Zoology, University of California, Los Angeles. A collection of 2,216 specimens of polychaete worms from the Bering Sea was received from Dr. Donald J. Reish, Long Beach State College, Long Beach, Calif.

In the division of mollusks, 69,288 specimens were added during the year, including 334 specimens from previously recorded accessions, the largest annual increment since 1953-54. This large increase is due mainly to three large accessions: The personal collection of Arnon L. Mehring consisting of approximately 23,800 specimens; a collection of 17,300 specimens mainly from Okinawa, Ryukyus, purchased through the Chamberlain Fund; and 7,600 specimens gathered by Dr. Harold A. Rehder in Tahiti utilizing funds provided by Gen. Frank R. Schwengel in memory of his wife, Jeanne S. Schwengel. Other large accessions include an exchange with the Academy of Natural Sciences of Philadelphia of 1,350 specimens, and a gift of 1,480 specimens from Duncan Emrich of Washington, D.C. Holotypes were received from the Institute of Marine Science, University of Miami, through Dr. F. M. Bayer; the U.S. Fish and Wildlife Service Laboratory, Pascagoula, Miss., through Harvey R. Bullis, Jr.; and from Richard E. Petit. A total of 843 specimens including a number of holotypes were added to the helminthological collection during the year. The largest accession, consisting of 339 lots collected in Panama in 1931-34, was presented by Dr. A. O. Foster.

Entomology.—The division of Coleoptera received a total of 49,528 specimens in 66 accessions. Major contributions include the following: 730 beetles from Nepal and Pakistan from Dr. J. Maldonado Capriles, University of Puerto Rico; 1,000 North American ground beetles from John D. Glaser, Baltimore, Md.; 5,500 beetles from Cen-

tral America and the United States from Dr. John Kingsolver, Insect Identification and Parasite Introduction Research Branch, U.S. Department of Agriculture; and 1,100 Mexican beetles from Dr. Alfred B. Lau, Mexican Indian Training Center, Cordoba, Vera Cruz, Mexico.

As a result of field work conducted by members of the Smithsonian staff the following were acquired: 1,100 miscellaneous South American beetles from Mrs. Doris H. Blake and Dr. Doris M. Cochran; 300 scarab beetles from South Carolina obtained by O. L. Cartwright; and 35,600 miscellaneous Mexican and North American beetles collected by Dr. Paul J. Spangler.

The division of Hemiptera received 81,757 specimens in 100 accessions during the year. The most important acquisition of the year was the J. Douglas Hood collection of Thysanoptera (thrips), which contains 1,055 holotypes and 11,203 paratypes of Hood and other workers. The transfer of the very important collection of North American fleas from the Rocky Mountain Laboratory of the National Institute of Allergy and Infectious Diseases, Department of Health, Education, and Welfare, was initiated through the efforts of Dr. William L. Jellison, retired, of that Institute. To date 12,780 carefully prepared slides from this collection have been received. The Scripps Institution of Oceanography, through the cooperation of Dr. Martin W. Johnson and H. George Snyder, presented over 1,300 specimens of the marine water-strider genus *Halobates*. Other important accessions are: 1,144 ants from the Nevada Atomic Test Site through the cooperation of Dr. Donald M. Allred, Atomic Energy Commission; 500 Australian ants from Prof. B. B. Lowery, St. Ignatius College, Sydney, Australia; and 215 South American ants from Dr. K. W. Cooper, Hanover, N.H. Other Hymenoptera, 130 named European wasps from W. S. Pulawski, University of Wroclawskiego, Warsaw, Poland; 486 North American wasps from Dr. K. V. Krombein, Arlington, Va.; 157 South American velvet ants from Dr. Osvaldo H. Casal, Instituto Nacional de Microbiología, Buenos Aires, Argentina; 443 Old World cercerid wasps from Dr. H. A. Scullen, Oregon State University, Corvallis, Oreg.; 450 North American and Russian chalcid-flies from C. D. F. Miller, Canadian Department of Agriculture, Ottawa, Canada; and 100 European chalcid-flies from Dr. A. Hoffer, Prague, Czechoslovakia.

The division of Lepidoptera¹ received 72,324 specimens as the result of field activity of staff members and cooperating agencies. Significant contributions made by staff members include 9,115 Mexican moths collected by Drs. Don R. Davis and W. Donald Duckworth; 1,280 butterflies from eastern United States collected by William D.

¹ See footnote on page 66.

Field; and 5,746 Lepidoptera (including 760 reared specimens) and 155 Diptera from the Island of Rapa, contributed by Dr. and Mrs. J. F. Gates Clarke. Dr. William L. Stern, Department of Botany, presented 134 Philippine butterflies and moths; C. W. Sabrosky, U.S. Department of Agriculture, contributed 297 North American flies; 2,718 North American flies were received from Dr. C. P. Alexander of Amherst, Mass.; 92 Asian flies, including 1 holotype and 9 paratypes, came from Dr. Edward L. Coher of Waltham, Mass.; Dr. D. Elmo Hardy, Honolulu, presented 146 South American flies, including 4 holotypes and 2 allotypes; and 103 Japanese moths were received from Dr. H. Kuroko of Fukuoka Prefecture, Japan. By transfer, 45,004 specimens, including all groups of insects, were received from the Insect Identification and Parasite Introduction Branch, U.S. Department of Agriculture.

The division of Myriapoda and Arachnida received some extremely valuable material totaling 4,369 specimens in 32 transactions. H. F. Loomis continued to enrich our millipede collection with approximately 300 Neotropical specimens, both typical and ordinary; Dr. G. E. Ball, University of Alberta, Edmonton, Alberta, presented 425 centipedes from Canada, southwestern United States, and Mexico. Dr. R. L. Hoffman, Radford College, Blacksburg, Va., sent 160 centipedes and millipedes, including types of the latter from the United States; Curator Ralph Crabill contributed 1,100 centipedes from upper Bavaria and Austria, including many specimens otherwise known only from the types; Dr. Nell B. Causey, Fayetteville, Ark., donated 215 centipedes from Arkansas and southeastern United States.

The most important single accession received in the division of neuropteroids consists of a synoptic collection of African dragonflies and damselflies received from Dr. E. C. G. Pinhey, Bulawayo, Southern Rhodesia; 2,421 identified North American aquatic insects were received from Dr. Stanley G. Jewett, Jr., Portland, Oreg.; Dr. A. E. Brower, Augusta, Maine, presented 4,296 caddisflies from northeastern United States; from Fritz Plaumann, Nova Teutonia, Brazil, 4,002 caddisflies were acquired by purchase; Dr. A. B. Gurney, Insect Identification and Parasite Introduction Research Branch, U.S. Department of Agriculture, presented 1,882 grasshoppers and lacewings from Texas and Virginia; Dr. O. S. Flint, Jr., of this division, collected and presented 6,768 caddisflies.

Botany.—An excellent set of 1,859 plants collected on the British Solomon Islands by T. C. Whitmore was received from the Forestry Department at Honiara. Mrs. Paul Bartsch presented the herbarium of the late Dr. Paul Bartsch consisting of 10,220 plants from Iowa and Virginia, many of them of historical interest. Also received as gifts were 482 plants of Bolivia from M. Cárdenas, Cochabamba, Bolivia;

1,055 specimens of Araceae from southeast Asia from Dan H. Nicolson; 2,215 lichens of Florida and Minnesota from Dr. Mason E. Hale; and 945 mosses from Dr. Frederick J. Hermann.

Received in exchange were 4,675 plants, which included many collections of historical importance, such as those of Guadichaud, Sieber, Sodiro, and Vieillard, from the Muséum National d'Histoire Naturelle, Paris; 1,790 specimens mostly collected in northern South America by Bassett Maguire et al., from the New York Botanical Garden; 1,733 specimens from New Guinea, Thailand, and Africa, from the Royal Botanic Gardens, Kew Surrey, England; 1,578 specimens from New Guinea received from the Commonwealth Scientific and Industrial Research Organization, Canberra, Australia; 1,380 plants collected in British Guiana by R. J. A. Goodland, from McGill University; 1,126 plants of Central America from the Escuela Agrícola Panamericana, Tegucigalpa, Honduras; 380 fine specimens collected in Argentina by Mydel-Peterson from the Botanical Museum, University of Copenhagen, Denmark; 306 selected specimens of South African plants from the University of Pretoria, South Africa; 500 mosses from the Naturhistoriska Riksmuseet, Stockholm, Sweden; 209 plants comprising issues 85-88 of Schedae ad Herbarium Florae Rossicae, from the Botanical Institute of the Academy of Sciences, Leningrad, U.S.S.R.; 345 woods from the Serviço Florestal, Rio de Janeiro, Brazil; and 187 woods from the Conservator of Forests, Kuching, Sarawak.

A total of 1,347 specimens comprising several collections was received from the Instituto Botánico, Caracas, Venezuela, and 1,142 from the Herbário "Barbosa Rodrigues," Itajaí, Santa Catarina, Brazil, in exchange for names. From the University of Michigan were received 542 grasses collected by Rogers McVaugh, and 2,629 woods from Sumatra, the Philippines, Mexico, and British Honduras, mostly collected by the late H. H. Bartlett.

Transferred from other Government departments were 9,354 specimens of Alaska from the Geological Survey through Dr. Robert S. Sigafos, and 1,240 plants of Thailand from the U.S. Army at Fort Detrick, Md. Collected for the Museum were 564 plants of Alaska from William J. L. Sladen, Baltimore, Md., 554 grasses collected on Trinidad by Dr. Thomas R. Soderstrom, and 205 grasses collected by Jason R. Swallen in South Africa.

Paleobiology.—In the division of paleobotany important specimens received as gifts include 36 prepared slides containing 84 fossil spore and pollen type specimens from West Africa, from the Jersey Production Research Co. through R. E. Rohn; 11 silicified stems of the tree fern genus *Cyatходendron* from the Eocene of Texas, from S. N. Dobie, Whitsett, Tex.; and a large, well-preserved limb section from

the Eocene of Wyoming from Mr. and Mrs. Jean Case. Dr. F. M. Hueber collected 2,000 specimens of Lower Devonian plant remains from the Gaspé and northern New Brunswick region of Canada, the field work supported by Walcott bequest.

Among the 372,000 specimens accessioned by the division of invertebrate paleontology are a number of collections which are of major importance. Transfers of type specimens from the U.S. Geological Survey included: 160 Cambrian trilobites described by A. R. Palmer; 46 cephalopods from the western interior; conodonts from the Great Basin; corals from the Ordovician of Alaska; and Foraminifera from the Tertiary of Equatorial Africa, and the Gilbert Islands in the Central Pacific.

Gifts included several noteworthy additions. Johns Hopkins University gave 3,700 type specimens described in the well-known Paleozoic volumes of the Maryland Geological Survey stratigraphic series. One thousand specimens of Middle Ordovician and Silurian invertebrates were collected in southwestern Ontario by Dr. and Mrs. G. A. Cooper. Dr. R. S. Boardman completed a major collection of more than 200,000 Paleozoic Bryozoa from a number of measured sections in the Ordovician of Oklahoma. Dr. Franco Rasetti donated 3,500 identified Cambrian trilobites including many type specimens. Dr. A. J. Boucot gave 7,000 Silurian brachiopods collected in Great Britain. A valuable collection of 5,000 mollusks from the Tertiary of Virginia and Maryland was given by Dr. R. J. Taylor.

Other valuable gifts were: 140 specimens of Upper Paleozoic brachiopods from Chihuahua, Mexico, given by Teodoro Diaz G.; a large number of Tertiary mollusks from Hampton, Va., by Dr. T. Walley Williams; 10 specimens of unique Tertiary mollusks from Florida by Mr. and Mrs. J. B. Williams; and an extensive collection of Mississippian endothyrid Foraminifera consisting of more than 1,000 thin sections, including many type specimens, donated by Dr. Edward Zeller.

Funds from the Walcott bequest were used to purchase more than 20,000 invertebrates, one of the world's most complete collections from the Jurassic and Cretaceous of Chile, from Mrs. Elsa de Biese, Santiago, Chile. With the cooperation of the Arabian American Oil Co., and financed partly by Walcott funds, Drs. P. M. Kier and E. G. Kauffman of the Museum staff collected more than 25,000 specimens of a variety of invertebrates from Mesozoic rocks of Saudi Arabia. The Springer fund made possible the purchase of 1,023 blastoids and crinoids from the Burlington limestone of Iowa and Missouri, and 120 Triassic echinoids from the Moenkopi formation of Utah.

Outstanding exchanges brought many important specimens including 1,050 species of Jurassic and Cretaceous mollusks from the Geologi-

cal Survey of Pakistan; 160 plastotypes of Mesozoic mollusks housed at the University de Lyon; 12 species of ammonites from Moscow University; and 50 plastotypes of Upper Cretaceous species in the collections of the Texas Bureau of Economic Geology.

Particular mention is made of a collection of 122 specimens of heterostrachian, acanthodian, and arthrodire fishes from a Lower Devonian quarry in Lucas County, Ohio, received in an exchange with the Chicago Natural History Museum.

An interesting collection of Pleistocene vertebrate remains from Cartersville, Ga., was donated to the Smithsonian Institution by Shorter College of Rome, Ga. The assemblage represented includes at least 20 species and is important as the most extensive Pleistocene vertebrate fauna yet discovered in Georgia.

In the division of vertebrate paleontology two outstanding accessions resulted from field collecting by the staff. Dr. C. L. Gazin assisted by Franklin L. Pearce, collected approximately 350 specimens of early Tertiary mammals. The specimens were taken principally from the Middle Eocene Bridger formation of southwestern Wyoming, but included also are small collections from the Paleocene of the Green River and Fossil basins of southwestern Wyoming and from the Bison Basin of south-central Wyoming. The collections are important for the wealth of small forms, such as Primates, rodents, insectivores, and carnivores from the Middle Eocene beds of the Bridger Basin.

Dr. D. H. Dunkle, assisted by Gladwyn B. Sullivan, collected approximately 307 fossil fishes mainly from new localities in the upper Madera formation of Permian or possibly Pennsylvanian age in central New Mexico and consisting principally of sharks and acanthodian, paleoniscoid, and coelacanth fishes. Other important collections of these forms were obtained from the Pennsylvanian Wea shale in Nebraska and Iowa. In addition, a small collection of *Leptolepis* remains was made in the Jurassic Todilto limestone of New Mexico, and various bones of arthrodiras and crossopterygians were collected in a Middle Devonian quarry in Ohio.

Mineral sciences.—In all, 9,230 specimens were received in the division of mineralogy. Outstanding among the many important gifts was an exceptionally fine gem-quality topaz crystal from Brazil, from Oscar Heyman & Brothers, Inc. Other important gifts were scapolite, Madagascar, from John B. Jago; rhodonite, Franklin, N.J., from Mrs. Frank A. Lewis; opal, Australia, from Leland Quick; and tourmaline, Brazil, from Bernard T. Rocca, Sr. Outstanding among specimens received by exchange was a fine example of cuprosklodowskite from the Congo, a very fine large brazilianite crystal from Brazil, and an exceptionally fine, large, gem-quality crystal of beryl, variety aquamarine, also from Brazil.

A total of 4,113 specimens were added to the Roebling collection by purchase or exchange. Outstanding among these were a very large Japanese twin of quartz, from Arizona; a fine specimen of scolecite from Brazil; a crystal of scapolite of unusually large size from Mexico; some fine francevillite and chervetite from Gabon; and some outstanding specimens of raspite from Australia. Acquired by purchase from the Canfield fund was a very large crystal of chrysoberyl from Russia and an extraordinary crystal of danburite from Baja California, Mexico.

Outstanding new additions to the gem collection included a 1,000-carat aquamarine, from Brazil, from Evyan Perfumes, Inc.; a very unusual star sapphire, showing four separate stars, from Ceylon, from Sidney Krاندall & Sons; a jade bowl, formerly in the Vetlesen collection, from Mrs. Mildred Tabor Keally; a Mexican opal, from Mrs. Frank A. Lewis; two fine kunzites from Brazil, weighing 296.78 and 336.16 carats, from Robert C. Nelson, Jr.; four diamonds of rare blue and green colors, from Van Cleef & Arpels, Inc.; and a collection of spheres of jade, petrified wood, and other gem materials from Albert R. Cutter. Gems acquired by purchase from the Chamberlain fund for the Isaac Lea collection included a 22.35 carat golden sapphire and a 24.15-carat cat's-eye diopside.

Five very exceptional gems, all from Brazil, were added to the collection by exchange. They were a golden green beryl weighing 1,363 carats, a 914-carat green beryl, a greenish-colored topaz weighing 1,469 carats, a 1,362-carat amethyst, and a heart-shaped kunzite weighing 880 carats. Received from an anonymous donor was the Portuguese diamond, a fine step-cut stone weighing 127.01 carats. The Portuguese diamond is the largest cut diamond from Brazil and the thirteenth largest in the world. In the 1920's it was recut to its present shape from a 150-carat cushion-shaped stone. Details of its early history are unknown, but it is said that it was once owned by the royal family of Portugal.

Eighty-three meteorites were accessioned during the year, 28 of which were not previously represented in the collection, making this the best year in some time. The most important single addition was the collection of the late Arthur R. Allen of Trinidad, Colo. It contained 45 meteorites and 636 grams of tektites and was purchased by a grant from the National Aeronautics and Space Administration. Specimens of particular interest were the 14 fine oriented individuals of the Pasamonte, N. Mex., fall (totaling 1.3 kg.) and a Canyon Diablo specimen containing a large diamond inclusion. Seven stony meteorites that had not been previously known were included: Alamosa, Colo. (1.8 kg.); Blackwell, Okla. (2.4 kg.); Georgetown, Colo. (0.68 kg.); Mosquero, N. Mex. (1.6 kg.); Thatcher, Colo. (2 g.);

Tobe, Colo. (5.4 kg.); and Mosca, Colo. (6.1). Outstanding among the donations was a specimen of the widely publicized Bogou iron presented by President Maurice Yameogo of the Republic of Upper Volta.

Science and technology.—In the division of physical sciences an outstanding accession was the gift from Vassar College of the large telescope built in 1863 by Henry Fitz, one of America's famous telescope makers, and used by Maria Mitchell at Vassar. Preston Bassett gave an 8-sided revolving mirror used by Albert Michelson in his famous determination of the velocity of light in 1924. A Collins helium cryostat, from Loyola University of New Orleans and Arthur D. Little, Inc., and an earlier Collins cryogenic expansion machine, from Samuel C. Collins, are basic artifacts in the recent development of commercially available low-temperature apparatus.

In the section of chemistry, outstanding accessions relating to the element fluorine were a replica of the platinum apparatus for electrolysis and distillation used by Henry Moissan in his epochal isolation of fluorine (1886), and a commercial fluorine cell made by the Harshaw Chemical Co., in 1942-43, and given the Museum by the company. The Moissan apparatus was fabricated through the courtesy of the Baker Platinum Division of Engelhard Industries, Inc.

The collection of adding and calculating machines in the section of mathematics was notably enriched by the gift of 76 specimens from the Victor Comptometer Corp. The gift includes several famous historical machines, such as the Schilt adding machine of 1851, the oldest European key-driven machine; a Bollee direct-multiplication machine, one of only three such machines made by Louis Bollee between 1888 and 1892; and the famous Scheutz difference engine of 1853, the first complete difference engine ever built. A replica of Charles Babbage's difference engine was donated by the International Business Machines Corp.

Among the most outstanding accessions in the section of light machinery and horology was a pocket watch made by Henry and James F. Pitkin of East Hartford, Conn., in about 1838. This specimen is an example of the first American attempt at watchmaking by machines. Other significant acquisitions by this section were a splendid example of a French skeleton clock of the late 18th century and a combination lock patented in 1841 by Dr. Solomon Andrews, an American inventor.

The section of tools acquired the J. R. Brown Linear Dividing Machine of 1859 from the Brown & Sharpe Co., which was a milestone in the history of measurement in American manufacturing. A fully operative reproduction of the gun-stocking lathe developed by Thomas Blanchard in 1820-22 was also received. This pioneer machine, the original of which is in the Springfield Armory in Springfield, Mass.,

represents the beginning of American mass production by machine tools. A rare 19th-century Holtzapffel ornamental turning lathe was acquired with a very comprehensive collection of accessories. Edvard Johansson, Royal Swedish Consul at Detroit, donated a set of Johansson gauge blocks for the hall. The adoption of the Johansson system of gauges invented by his father, C. E. Johansson in the late 19th century, revolutionized mass production by making it possible to achieve universal interchangeability of machine parts. This particular set was the first to be produced in stainless steel and was made especially to be given to the inventor on his 71st birthday in 1933. The presentation was made in a formal ceremony in the hall of tools on March 13 by the Royal Swedish Ambassador, His Excellency Hubert de Besch.

Among the outstanding models received by the division of transportation were a Pacific coast lumber steamer, a 4-masted barkentine, and the schooner *Fly* of 1812. A model of the new class of fast freight steamers, the *American Challenger*, 1962 record holder for the North Atlantic crossing by a freighter, was received from the United States Lines as a gift.

The oldest scale model of an American-built ship, His Majesty's 44-gun ship *America*, built at Portsmouth, N.H., in 1746-1747, was received as a 3-year loan by special agreement from the trustees of the Portsmouth Athenaeum, Portsmouth, N.H. The model will be repaired and exhibited by the marine section and, after a year, transferred to the division of naval history for a 2-year exhibition period.

Three early railway signals (1880-1905) were donated by Thomas T. Taber to the section of land transportation. The vehicle collection was enriched by several important additions. The Mack Bulldog truck (1930) is the first commercial motor vehicle to be added to the collection and was donated by Victor Ottilio & Sons. A fine Rockaway (1860) was the gift of Mr. and Mrs. Carl F. Flemer, Jr. A Hack Passenger Wagon (1880), more commonly called a mud wagon, was also added to the carriage collection.

The largest object accessioned in the division of electricity was an 85-ton alternating-current generator from the Adams station at Niagara Falls, donated jointly by Niagara-Mohawk Power Corp. and Westinghouse Electric Corp. It is this alternator that inaugurated in 1895 the modern era of central stations distributing electrical power over large areas. A somewhat smaller, but very important, magneto generator was received from the University of Virginia. It was made by Hippolyte Pixii in 1832 or 1833 and represents the first use of a commutator for the production of direct current. Only two other machines like this are known to exist in the world. A third generator, by Charles Wheatstone, was obtained on indefinite loan

from King's College, University of London. It is one of the first examples of a self-excited dynamo, a principle discovered coincidentally by Wheatstone in England and Werner Siemens in Germany in 1866. Excellent replicas of four alternating-current motors representing the pioneer work of Galileo Ferraris in 1885 were given to the museum by the Associazione Elettrotecnica ed Elettronica Italiana and Istituto Elettrotecnico Nazionale Galileo Ferraris of Turin.

Among the major accessions during the past year in the division of medical sciences were a collection of tools and research apparatus used in a late 19th century microbiology and biochemistry laboratory, donated by the University of Michigan, and a 1953 hydraulic turbine contra-angle handpiece with accessories and test model for dental drilling from the National Bureau of Standards. Also acquired were the office material, dental instruments, and personal memorabilia of Dr. Charles E. Kells as a gift from his daughter, Mrs. J. O. Pierson, through the School of Medicine of Tulane University. To the pharmaceutical collection, an ancient Egyptian mortar and pestle, weights, and amulets were added.

Civil history.—Several items with Presidential associations received in the division of political history include the "Resolute" desk, originally presented to President Hayes by Queen Victoria and used by President John F. Kennedy in his office in the White House; a pair of leather chaps worn by President Theodore Roosevelt in the Dakota Territory, the gift of Mr. and Mrs. Kermit Roosevelt; a meerschaum pipe used by President Ulysses S. Grant in the White House, from the estate of George W. Crouch; one of the microphones used by President Franklin D. Roosevelt during his "fireside chats" to the American people in the 1930's and 1940's, the gift of the Columbia Broadcasting System and WTOP-Radio, Washington, D.C.; a pen used on January 23, 1964, by President Lyndon B. Johnson to sign the bill establishing the John F. Kennedy Center for the Performing Arts, the gift of Senator Clinton P. Anderson. Important additions made to the First Ladies Collection are two dresses worn by Mrs. Grover Cleveland as First Lady and an evening cape that had belonged to her; these were the gift of Mr. and Mrs. Richard F. Cleveland. One of the new dresses, of black satin and iridescent taffeta, now represents Mrs. Cleveland in the exhibit in the First Ladies Hall.

The division of cultural history received the frame and woodwork of an entire house, the gift of Alexander B. C. Mulholland; built in Ipswich, Mass., the older portion of this house dates from the late 17th century, the later from about 1750. The Honorable David Bruce presented 18-century woodwork and paneling from two rooms of a Charleston, S.C., house. The architecture of Louis Sullivan is represented in one lot of ornaments from his Chicago Stock Exchange

Building, given by Mr. and Mrs. Leon M. Despres, and in another lot from Sullivan's Garrick Building, given by the Joint Committee on Preservation of the Garrick Building Ornament and World Book Encyclopedia. Mr. and Mrs. Fielding Pope Meigs, Jr., presented 223 miscellaneous pieces of furniture, utensils, portraits, and other items, all heirlooms of the Meigs family. Other gifts include 33 rare early maps, a gouache by D. Y. Cameron, a painting by Thomas Wood, and two silver cans by Samuel Edwards, from Mrs. Francis P. Garvan; an 18th-century account and letter book of Alexander Smith of Alexandria, from Mrs. Jean M. Dodd; two mahogany side chairs from Mrs. Wellington Powell; and four side chairs and a Pennsylvania rocking chair from Mrs. George Maurice Morris. The family of Harry T. Peters donated a poster advertising a traveling menagerie from the Zoological Institute of New York City, dated 1835, a rare and early example of its kind.

To the division of numismatics was added an original pewter striking of the noted Castorland token made for the officers of the French colony established at Carthage, N.Y., 1796, and a rare pattern half dollar of 1916, both given by Ben Douglas. Other outstanding additions to the United States series were a \$20 gold piece in high relief and a \$10 gold piece originally owned by Henry Hering, who completed the design of these coins in 1907 for Augustus St. Gaudens, and Mr. Hering's notes concerning the history of this gold coinage and the interest of President Theodore Roosevelt; these were the gift of Stack's of New York. A die used by the J. J. Conway Co. of Colorado in the striking of a private \$5 gold piece was donated by Robert Bashlow. Joseph B. Stack gave tintypes of the Bechtler family, well-known private gold coiners from North Carolina, a daguerreotype of John Little Moffat, a leading coiner in San Francisco during the gold rush, and the notebook of the mint engraver J. B. Longacre concerning the design of the 1856 flying eagle cent.

An important collection of silver bars, bullet money, and various forms of media of exchange used in Siam and China were donated by Mrs. F. C. C. Boyd; Harvey Stack gave the Edith and Jean Jacques Turc collection of necessity pieces issued in France and the French colonies during the 1914-26 period. Willis du Pont added 645 coins struck during the second part of the reign of Catherine II of Russia and 210 Russian silver and bronze medals. Mrs. Wayte Raymond gave 1,167 coins of the world struck during the 19th and 20th centuries. Mr. and Mrs. Mortimer Neinken made an important contribution of a specialized collection of checks of United States banks and nearly 10,000 items of European paper currencies and documents of value. The first instance of the use of paper in coinage, a quarter gulden in cardboard issued in Leyden in 1573 during the siege by the Spaniards, was a gift from Dr. V. Clain-Stefanelli.

To the division of philately and postal history Baron Takaharu Mitsui of Tokyo, Japan, donated an outstanding group of early letters and documents pertaining to the private posts of 19th-century Japan and the early government postal service of that country. Morrison Waud of Chicago, Ill., gave a large and comprehensive collection of United States newspaper stamps, proofs, essays, and forgeries and 669 examples of stamped revenue paper. Mr. and Mrs. R. O. D. Hopkins donated a collection of essays and die proofs of the stamps of China and placed additional material of that nature on loan. A large specialized collection of stamps of South Africa was given by Dr. O. L. Harvey. Dr. James Matejka donated early airmail stamps of Syria and a rare airmail stamp of France. Harry L. Lindquist donated a large number of United States and foreign covers, many of which bear special postal markings and commemorative stamps. Charles H. Wuerz, Jr., continued to contribute stamps of Siam in an effort to complete that section of the National Postage Stamp Collection.

Arts and manufactures.—Ralph E. Becker presented to the division of textiles a comprehensive collection of silk Jacquard woven pictures. These interesting examples of an unusual weaving art date from 1867 through the 1930's. The wide variety of subjects include pictures of Columbus sighting America, Betsy Ross stitching the flag, and facsimilies of the signatures of the Declaration of Independence. An excellent collection of American needlework was presented by Dr. Margaret R. Sandels. One of the embroidered pictures, "The Sea Beast," of Mrs. Theodore Roosevelt, Jr., a noted needlewoman, was given by Mr. and Mrs. Sidney de la Rue. A colorful 18th-century floral border by the distinguished French designer Philippe de Lasalle was added to the brocade collection.

Mrs. Clara W. Berwick supplemented her previous gifts to the division of ceramics and glass by 74 pieces of rare early American glass and 22 European and Oriental ivories. Robert H. McCauley presented 65 pieces of Liverpool type transfer printed earthenware, including a number of rare pitchers decorated with American themes. Mr. McCauley is the author of the definitive book *Liverpool Transfer Designs on Anglo-American Pottery*. Mrs. William A. Sutherland continued to add to the division's collection of 18th-century English porcelains. This year she gave 28 fine examples of the production of 10 important factories, including a splendid Derby pitcher and a rare Lowestoft coffeepot. Dr. Hans Syz presented by transfer 53 pieces of 18th-century European porcelain. One of the finest collections in America, the Syz collection is especially notable for examples of the important German factories, such as Meissen, Berlin, Höchst, Frankenthal, and Ludwigsburg, and of the extremely rare Viennese porcelain of the DuPaquier period.

The most important accession received in the division of graphic arts was a bequest of 243 Currier & Ives lithographs of sporting and western subjects from the Adele S. Colgate Estate. This gift greatly enhances the standing of the Museum's collection of Currier & Ives prints. The important gift of Erich Cohn of 20 drawings and etchings by the German expressionist artists Paul Kleinschmidt and Ludwig Meidner reflects what was probably the strongest group contribution to printmaking in this century. The Society of Washington Printmakers donated, through its president, Prentiss Taylor, the intaglio print *Image III*, by Lois Fine; the woodcut *The Valley*, by Isabella Walker; and the lithograph *Nova Scotia*, by Louis Lozowick.

The section of photography acquired a number of historically noteworthy specimens of photographs and equipment. Lucien G. Bull of Paris presented a large group of material related to the early history of high-speed photography, consisting of original negatives, prints, and an electromechanical timing device. Ansco, Binghamton, N.Y., presented a model of a photographic wagon of the type used by Mathew Brady during the Civil War. Nikon, Inc., presented a "Nikonos" 35-mm. underwater camera, with watertight lens and body, for use under water without a protective housing. The *New York Daily Mirror* donated a lightweight Zeiss Ikon, Ernemann plate camera, originally purchased in the 1930's by William Randolph Hearst to replace the bulkier cameras used by his newspapers, and another specially designed camera intended to take pictures from a concealed position.

The division of manufactures and heavy industries continued to collect for the various halls planned for the Museum of History and Technology. New York University presented to the section of nuclear energy the first subcritical reactor to be installed in a teaching institution. Improvised from 2 tons of fuel lent by the U.S. Atomic Energy Commission and installed in a pickle barrel, the university was able to secure at a cost of \$1,500 a teaching research facility which might otherwise have been unattainable.

Youngstown Sheet & Tube Co. presented a model of an electric weld pipe mill for the hall of iron and steel. A malleable iron air furnace was given by Erie Malleable Iron Co.; and some Roman nails from the Inchtuthil excavation in Scotland came from Colvilles, Ltd., of Glasgow.

The section of petroleum received further gifts as a result of the excellent work of the American Petroleum Institute's subcommittee. Among these were an animated model of a modern sea-going drilling installation from Kerr-McGee Oil Industries, Inc.; three models of drilling rigs from the Lee C. Moore Corp.; and an interesting survey model of the Velma field from Skelly Oil Co.

The division of agriculture and forest products has been principally concerned with obtaining materials for the hall of forest products. The Forest Products Laboratory, Department of Agriculture, Madison, Wis., gave a swellograph—a device that measures swelling changes in wood having a finished surface. Larus & Brother Co., Inc., reproduced a tobacco hogshead like those used 125 to 150 years ago. Permal, Inc., contributed samples of machined parts for electrical equipment and Fibron Products, Buffalo, N.Y., gave 17 handsome pieces of compressed wood products. To the agricultural collection has been added catalogs of agricultural implement companies around 1880 belonging to Sylvanus D. Locke, the inventor of the famous wire binder. Gordon Dentry donated a four-tined wooden fork used by his grandfather and possibly his great-grandfather in Baltimore County, Md.

Armed Forces history.—A fine example of a Gatling gun was presented by the Armed Forces of Honduras. Mrs. George C. Marshall presented several uniforms worn by General of the Army George C. Marshall during World War II. The division of naval history made significant additions to the national collection of historic warship models while projecting further units required to complete the hall of armed forces history. Particularly notable was a rigged model of Robert Fulton's *Steam Battery*, the world's first steam man-of-war, which was built by Adam and Noah Brown in 1814 for the defense of New York. Plans for this 26-gun blockship were provided by Howard I. Chapelle who in 1961 discovered a contemporary draft of the *Steam Battery* in the Danish Royal Archives at Copenhagen. By happy coincidence, the division of naval history also received an original Fulton draft of the armored torpedo boat *Mute* presented by the family of George F. Brown, descendants of her versatile builders, the Brown brothers of New York. The emergence of the steam navy was further represented with the completion of a superb model of the side-wheel steamer *Powhatan*, which served with Commodore Perry in the opening of Japan.

Through the generosity of the U.S. Coast Guard, the division of naval history received a fully equipped beach cart of the type used by the Life Saving Service for offshore rescue, a set of range lights from Alaska, and an oil painting by Hunter Wood of the topsail schooner *Massachusetts*, first cutter commissioned by the early Revenue Marine.

A patent model of the revolutionary K-1 firing device, the heart of the antenna mine employed in the North Sea mine barrage during World War I, was presented by Mrs. Ralph C. Browne, widow of its gifted inventor. Vivid memories of the Battle of Midway were evoked by the bullet-torn flight jacket and combat decorations donated by George H. Gay, sole survivor of Torpedo Squadron 8.

Among the more important objects acquired by the section of underwater exploration during the year are ships' fittings and equipment from a wreck site in Bermuda believed to date from the 1560's. These include a bar shot, several single blocks, two parrels, small- and medium-sized deadeyes, and a large collection of ceramic sherds, some of which will yield nearly complete vessels when reconstructed.

RESEARCH, EXPLORATION, AND FIELDWORK

Dr. T. D. Stewart, director of the Museum of Natural History, accompanied by exhibits specialist John C. Widener, went to Mexico City in mid-December 1963, the former to select examples of prehistoric filed and inlaid human teeth and the latter to make molds thereof. Mr. Widener will make casts from the molds for an exhibit in the planned hall of physical anthropology.

Dr. Stewart, serving as a member of the Committee on Research and Exploration of the National Geographic Society, inspected the Wetherill Mesa archeological project in Mesa Verde National Park late in June, stopping off enroute from a second trip to Mexico City where he attended the 33d annual meeting of the American Association of Physical Anthropologists.

At various times during the year Dr. I. E. Wallen, assistant director for oceanography, visited institutions in Massachusetts, Rhode Island, New York, Virginia, North Carolina, Georgia, Florida, Mississippi, Louisiana, Texas, California, and Hawaii in connection with the program of the Smithsonian Oceanographic Sorting Center. He also prepared several short papers dealing with developments in oceanography and the role of the Sorting Center.

Dr. H. Adair Fehlmann, supervisor of the Smithsonian Oceanographic Sorting Center, participated in Cruise 4B of the R/V *Anton Bruun*, of the International Indian Ocean Expedition, from early November to mid-December. This trip gave him a useful opportunity to study curatorial procedures on shipboard and to determine the need for a trained technician to oversee the handling of biological samples from the time of collection to the time the specimen cargo is consigned for shipment to the Sorting Center. Thanks to his recommendations, future collections should come through in better condition and with more complete documentation. Dr. Fehlmann also had an opportunity to observe the techniques and equipment used in handling plankton in the Indian Ocean Biological Laboratory at Ernakulam, South India.

Chairman of the department of anthropology Waldo R. Wedel completed a review of the prehistory and aboriginal ecology of north-central Colorado in which he emphasizes the importance of the foothills-hogback strip between the Plains and the Front Range in the

history of the region. In addition, he continued work on two manuscripts, one dealing with the 1961-62 Smithsonian excavations at the Lamb Spring archeological-paleontological site near Littleton, Colo., and the other with the 1952 Smithsonian-Princeton investigations at an ancient bison kill near Cody, Wyo. The latter site has recently been dated by the radiocarbon method at 8,750-8,840 years ago. At the close of the year he was back in the Middle West.

Dr. Clifford Evans, curator of archeology, and research associate Betty J. Meggers completed a major monograph on the Valdivia and Machalilla phases of the Early Formative period of coastal Ecuador. Twenty-two dates obtained by processing shell and charcoal samples in the Smithsonian's Carbon Dating Laboratory convincingly bracket the Valdivia phase at 5,150 to 3,400 years ago.

After joining the staff in December as associate curator of archeology, Dr. Richard B. Woodbury made two trips to the Tehuacán Valley in southern Puebla, Mexico, in continuation of his research on preindustrial systems of water management in arid regions. He found evidence of large-scale irrigation from Late Formative times on, that is, for about 2,500 years—probably the longest record of irrigation in the New World. Dr. Woodbury also continued working with research associate Nathalie F. S. Woodbury on a report dealing with the Hawikuh archeological site in New Mexico, based on the unpublished records obtained in 1917-23 by the late F. W. Hodge, following his departure from the Smithsonian's Bureau of American Ethnology.

In collaboration with Drs. Glen H. Cole of the Uganda Museum and A. Jamme of the Catholic University of America, Dr. Gus Van Beek, associate curator of archeology, completed a preliminary report on an archeological reconnaissance in Wadi Hadhramaut, South Arabia, undertaken in 1961-62. He also spent several weeks during April and May in an archeological reconnaissance in Yemen, at the invitation of the Yemen Arab Republic Government. On the way back to the States he visited sites in Ethiopia and conferred with colleagues in Aden and Jordan.

Museum specialist George Metcalf continued his studies of archeological materials from central Nebraska, encouraged by 11th- to 14th-century site dates supplied by the Smithsonian's Carbon Dating Laboratory. Dr. C. G. Holland, honorary collaborator, having visited 161 archeological sites in southwestern Virginia in 1963, progressed with his analysis of the collections and site data. Honorary research associate Neil M. Judd completed his final monograph (*The Architecture of Pueblo Bonito*) relating to the archeology of Chaco Canyon, N. Mex. During the summer of 1963, Dr. John M. Campbell, honorary research associate, carried out an archeological and ecological survey of the Koyukuk River drainage in northern Alaska. Follow-

ing this trip he continued preparation of a monograph on Nunamiut Eskimo prehistory.

Dr. Saul H. Riesenbergs, curator of ethnology, completed a monograph on the aboriginal political organization of Ponape, Caroline Islands. In addition, he progressed with the report on the megalithic structures of Nan Madol, Ponape, where a Smithsonian joint archeological-ethnological field project last year produced finds of unusual interest and made possible an evaluation by different disciplinary approaches.

Intensive exhibit work in the hall of the cultures of Africa and Asia, opened informally at the end of the year, left little time for other research by the associate curators involved, Drs. Gordon Gibson and Eugene Knez. On the other hand, associate curator William Crocker spent 2 weeks in July 1963 and approximately 4 months early in 1964 with the Canela Indians of Brazil, a tribe threatened with extinction. He was again with them as the year ended. Between trips to Brazil Dr. Crocker prepared two articles based on the Canela investigations.

Dr. J. Lawrence Angel, curator of physical anthropology, completed two manuscripts, one on osseous changes in the hip joint and the other on the human skeletons associated with extinct animals at the Tranquility site, California; he completed a paper on *hyperostosis spongiosa* to be included in a volume on paleopathology. With his technical assistant, Donald Ortner, Dr. Angel worked out a special form which will permit rapid coding of data on the anthropology of chronic disease for computer analysis. These data have been obtained mainly in a long-term study of students at Jefferson Medical College in Philadelphia, some of whom were restudied this year.

At the beginning of the year Miss L. E. Hoyme, then museum specialist (now associate curator of physical anthropology), was in England studying 19th-century skeletons of known age and sex at St. Bride's Church, Fleet Street, London, and visiting laboratories of physical anthropology. In July she successfully defended her doctoral dissertation at Oxford University and in December received her degree in absentia.

From the end of January to the beginning of April the chairman of the department of zoology, Dr. Horton H. Hobbs, Jr., participated in the Bredin-Archbold-Smithsonian Biological Survey of Dominica, studying the fresh-water decapod crustaceans of the island. As time permitted, he completed a manuscript on new entocytherids from Virginia and made progress on a revision of the entocytherid ostracods of Mexico and Cuba.

Senior scientist Fenner A. Chace, Jr., completed a study initiated by the late Belle A. Stevens on the mesopelagic caridean shrimp *Notostomus japonicus* Bate in the northeastern Pacific. Also, he

finished a report on the decapod crustaceans of the island of St. Helena in the South Atlantic.

Although the curator of mammals, Dr. David H. Johnson, was responsible for the general development of exhibits in the hall of osteology opened at the end of the year, he found time to study the distribution of hares and certain species of bats in southeastern Asia and to continue his general survey of the mammals of that area.

For the better part of the year, Dr. Henry W. Setzer, associate curator of mammals, directed from Washington the work in Iran and southern Africa of field parties collecting mammals and their ectoparasites. This program was carried out in cooperation with the Army Medical Research and Development Command. Dr. Setzer joined the African party in mid-September and the Iranian party in late October, staying until mid-December. His museum work consisted chiefly of identification of mammals from Egypt and the Sudan collected by a Naval Medical Research Unit.

From January to March Dr. Charles O. Handley, Jr., associate curator of mammals, collected specimens in the high mountains on the Colombian frontier of Darién Province, Panama, obtaining among other valuable materials, two species of bats new to the Panamanian fauna and a number of rare marsupials, shrews, and rodents. Late in June, in connection with attendance at a meeting of the American Society of Mammalogists in Mexico City, Dr. Handley spent 8 days studying fruit bats in the Instituto de Biología. This filled one of the last major gaps in his revision of this large and complex genus.

Dr. Robert A. Traub of the University of Maryland Medical School, honorary research associate in the division of mammals, was in Pakistan from the beginning of the fiscal year until October collecting mammals and other vertebrates and their ectoparasites in continuation of his studies of rickettsial infections.

The Pacific Ocean Biological Survey Program, under the direction of Dr. Philip S. Humphrey, curator of birds, has increased greatly in scope since its inception in October 1962. Because of its concern with the distribution, migrations, and ecology of central Pacific sea birds, collaborative relationships have been developed with the U.S. Bureau of Commercial Fisheries, the Bernice P. Bishop Museum, the State of Hawaii Division of Fish and Game, and others. Of approximately 50 people employed this year on the project many were graduate students who were gathering data for doctoral dissertations.

The Rockefeller Foundation has provided support for a field study enabling Dr. Humphrey to work with the Belém Virus Laboratory, Fundação Serviço Especial de Saúde Pública, and the Museu Paraense "Emilio Goeldi," Belém, Brazil. This cooperative field study deals with the relationship of birds and arthropod-borne virus diseases. As

time permitted, Dr. Humphrey continued his studies of plumage succession in birds and on the distribution, ecology, and classification of Patagonian and Brazilian birds. At the close of the year he was back in Brazil.

From the beginning of December 1963 to the latter part of March 1964, George E. Watson, associate curator of birds, served as official United States representative (observer) with the Chilean-Antarctic Commission. During delays in Chile for ship repairs and for the ice to break up he was able to spend 13 days in December at Peulla, Llanquihue Province, observing and collecting forest birds. During another delay of 22 days in January-February at Puerto Williams, he was able to make a catalog of birds breeding on Navarino Island and to collect specimens, among which are several important additions to the national collections. Mr. Watson's observations of birds made on shipboard in Antarctic waters will be useful in preparing an identification guide to Antarctic birds which he has planned. Upon his return from Chile he completed his doctoral dissertation dealing with ecology and evolution of passerine birds on the islands of the Aegean Sea and received in June the Ph.D. degree from Yale University.

Dr. Richard L. Zusi, associate curator of birds, spent a week in November at the University of Michigan working on three manuscripts, which he had begun there, and consulting with Dr. R. W. Storer concerning their joint research project on the myology of grebes. From January to April he was in Dominica studying birds as a participant in the Bredin-Archbold-Smithsonian biological survey of that island.

In continuation of his long-term field work on the birdlife of the Isthmus of Panama, Dr. Alexander Wetmore, honorary research associate and retired Secretary of the Smithsonian Institution, concentrated his efforts from January through March in Darién Province, mainly in the heavy rainforest adjacent to the Colombian boundary. The results were most successful, for both specimens of and observations on species that have been little known in Panama were obtained, and several new records of South American birds not previously recorded in the area were established.

Dr. Herbert Friedmann, honorary research associate and former curator of the division, continued his work on brood parasitism and completed a manuscript dealing with evolutionary trends in the avian genus *Clamator*.

Herbert G. Deignan, honorary research associate and former member of the division, was in Washington from mid-January to late April studying birds from Formosa in the Naval Medical Research Unit (NAMRU) collections and those from Viet-Nam and Cambodia collected by Bernard Feinstein, former museum specialist in the division.

Two new honorary research associates appointed this year, Prof. D. S. Rabor of Silliman University, Philippine Islands, and Dr. Robert W. Ficken of the University of Maryland, carried on important research. Prof. Rabor worked on the general ornithology of the Philippine Islands; Dr. Ficken undertook extensive field and laboratory research on the behavior of wood warblers.

Honorary research associate Oliver L. Austin, Jr., continued his technical editorial work on the two final volumes of A. C. Bent's *Life Histories of North American Birds*.

Dr. Doris M. Cochran, curator of reptiles and amphibians, in collaboration with Dr. C. J. Goin of Gainesville, Fla., made considerable progress on a manuscript dealing with Colombian frogs.

The curator of fishes, Dr. Leonard P. Schultz, accompanied by exhibits specialist Alfred Strohlein, spent a few days in October in the vicinity of Seattle, Wash., in search of a salmon-spawning area that would provide material for a diorama for the planned hall of cold-blooded vertebrates. They were successful and in addition returned with an 89-pound octopus, donated by the Point Defiance Aquarium at Tacoma. Otherwise Dr. Schultz continued his study of frogfishes and his recording of shark attacks throughout the world.

Two associate curators of the division of fishes, Drs. Robert H. Gibbs, Jr., and Ernest A. Lachner, participated this year in cruises of the International Indian Ocean Expedition. Dr. Gibbs was on Cruise 3 of the R/V *Anton Bruun*, the primary purpose of which was to sample deep-sea ichthyofauna in the western Indian Ocean and to relate the distributions of species and biomass to the physicochemical and biological properties of the water masses sampled in a north-south transect. The cruise began at Bombay on August 8 and terminated at Port Louis, Mauritius, on September 20. Following the cruise Dr. Gibbs spent 2 months working at museums in Paris, Berlin, Hamburg, Bremerhaven, and Copenhagen.

Dr. Lachner was on Cruise 4B of the same ship, the major objective of which was to evaluate the relative distribution and abundance of benthic organisms inhabiting the continental shelf and upper slope of the Arabian Sea. This cruise began at Bombay on November 12 and terminated off the Muscat coast of Arabia in mid-December. On his way to and from the cruise Dr. Lachner visited institutions in London, Paris, Bern, Jerusalem, Karachi, Sydney, Brisbane, Hong Kong, and several places in Japan.

Dr. Victor G. Springer, associate curator of fishes, expanded his studies on sharks, completing revisions of three genera. During the year he visited Stanford University and museums in Hamburg, Paris, and London, studying blennioid fish types and other specimens and bringing close to completion a revision of the genus *Entomacrodus*.

Dr. William R. Taylor, associate curator of fishes, developed a new technique in the preparation of specimens for osteological study involving the use of solutions of the enzyme trypsin buffered with sodium borate. This treatment, which removes the muscle tissue, has proved effective in making both preserved and fresh specimens translucent; the connective tissue, cartilage, bones, viscera, and major nerves remaining.

Associate curator Stanley H. Weitzman completed a study of two genera of Asiatic minnows, three manuscripts dealing with South American catfishes, and a study of the osteology and relationships of the characid subfamilies Lebiasininae and Erythrininae.

Dr. J. A. F. Garrick, honorary research associate, who worked in the division of fishes last year, returned to his home in Wellington, New Zealand, where he is continuing his world revision of carcharhinid sharks. During May he visited Australia to study specimens of sharks not available in museums of Europe, America, or Africa. His critical revision of carcharhinid sharks is the first ever attempted.

From the end of December 1963 to mid-February 1964 Dr. Donald F. Squires, curator of marine invertebrates, was a participant in the "MacQuarie Gap" cruise of the New Zealand Oceanographic Institute aboard HMNZS *Endeavour*. Although the nominal purpose of the cruise was to determine the topographic relationship between the MacQuarie Ridge and New Zealand, considerable marine biological work was scheduled. To Dr. Squires's profit, 11 of the 79 bottom dredgings and bottom trawls contained living corals. Through use of the ship's refrigerators, these were kept alive for up to 10 days, thus advancing culturing techniques. The most significant advance in marine knowledge resulting from the cruise was the location and dredging of the first deep-water coral structure found outside the North Atlantic.

In the museum, Dr. Squires finished, with the assistance of Ian W. Keys, senior paleontological technician, New Zealand Geological Survey, a study of the biomechanics of the scleractinian coral *Manicina areolata*. He also completed several other studies on fossil and recent corals.

Associate curator Thomas E. Bowman completed an account of an arostrate population of the planktonic calanoid copepod *Acartia lilljeborgii*, from St. Lucia, West Indies. He described a new genus and species of cirrolanid isopod from Madison Cave, Va., the first troglobitic cirrolanid to be found in the United States outside of Texas; a new anthurid isopod from the Caguanes Caves in Cuba; and a new mysid crustacean, abundant in Lake Ponchartrain, La. With L. J. Lancaster, he described a bloom of the planktonic blue-green alga *Skujjaella* in the Tonga Islands.

During most of April and May associate curator Charles E. Cutress, Jr., accompanied by Kjell Sandved serving as photographer,

collected marine materials along the coasts of Hawaii and southern California to be used in planned exhibits. Following this trip Mr. Cutress visited the Friday Harbor Laboratory of the University of Washington in search of clarification of the taxonomy of the swimming anemones *Stomphia*.

Dr. Raymond B. Manning, who joined the staff at the end of last year as associate curator of marine invertebrates, in May and June teamed with a research group from the Institute of Marine Science, University of Miami, for a 20-day offshore scientific cruise in the Gulf of Guinea. Following the cruise he spent several days collecting inshore marine invertebrates near Dakar, Senegal, before visiting natural history museums in Paris, Leiden, and London to study types of stomatopod crustaceans.

During the year, Dr. Manning finished most of a manuscript revising the stomatopods of the western Atlantic, collaborated with L. B. Holthuis, of the Rijksmuseum van Natuurlijke Historie, on a contribution dealing with stomatopods for the publication "Treatise on Invertebrate Paleontology," and completed two additional manuscripts on these animals.

Associate curator Marian H. Pettibone completed a revision of the polychaete family Pilargiidae, including a description of three new species from Virginia.

Museum specialist Henry B. Roberts completed a description of a new genus of Cretaceous crab, redescribed the Cretaceous crab *Campylostoma pierrense* Rathbun, and compiled a checklist and bibliography of the Pleistocene decapods of the Atlantic and Gulf Coastal Plain.

Dr. Waldo L. Schmitt, honorary research associate, completed the revision of "Crustaceans," a popular account prepared a few decades ago for the Smithsonian Scientific Series.

Curator Harald A. Rehder continued work on a study of the marine mollusks of Polynesia. He sorted and arranged the material he gathered in Tahiti last year, and identified and studied specimens from Tonga and Hawaii. A bibliography of Polynesian marine malacology was initiated, and progress was made on his monograph of the Harpidae and on a study of certain species of the family Volutidae.

From late October to late December, Dr. Joseph Rosewater, associate curator of mollusks, participated in the International Indian Ocean Expedition, Auxiliary Cruise "A" aboard the R/V *Te Vega*. After a delay of 2 weeks in Singapore for ship repairs, which gave him an opportunity to make local collection, the ship headed north through the Straits of Malacca along the west coast of Malaysia with stops at Kuala Lumpur and Penang, then to Phuket, Thailand, and north to the Similan Islands, westward to Sumatra and southeast-

ward down the Mentawai Islands south of Sumatra as far as Mega. Unfortunately, a break in the drive shaft occurred about 60 miles southeast of Padang, cutting the cruise short by about 2 weeks. However, there was obtained in the areas visited a representative collection of mollusks in which new records and range extensions already have been noted.

Associate curator Joseph P. E. Morrison completed a manuscript describing new species of the families Hydrobiidae, Pyramidellidae, and Mactridae, from Louisiana.

Dr. J. F. Gates Clarke, chairman of the new Department of Entomology, accompanied by Mrs. Clarke, visited the island of Rapa (Austral group) in French Polynesia from the beginning of September to mid-December. A large collection of Microlepidoptera and other insect groups was obtained, including 760 specimens reared by Mrs. Clarke. Also, the food plants of more than half of the approximately 75 species collected were ascertained and immature stages of all reared species were preserved. This is the first time that such information has been available for these small moths. A preliminary examination of the Microlepidoptera from Rapa suggests a close relationship with those in New Zealand and the Indo-Australian area.

In June Dr. Clarke spent 5 days on Mount Magazine in the Ozark National Forest of the Ouachita Mountains, Ark. The nearly 3,000 specimens he collected, of which 1,222 are Microlepidoptera, help fill a gap in the national collection.

Dr. Clarke completed a paper on the genera *Orsotricha* and *Palinorsa* of the families Gelechiidae and Oecophoridae, respectively.

Associate curators of Lepidoptera Don R. Davis and W. Donald Duckworth made a joint collection trip from early July to mid-August to a hitherto poorly collected area in northeastern Mexico that extends along the main highway south from Nuevo Laredo and eastward to the Gulf coast between Tampico and Tuxpan. Interest centered primarily on the microlepidopterous families Prodoxidae and Stenomidae with the result that much larval material was collected and many new records acquired. The total collection, including representatives of other insect groups, amounts to approximately 25,000 specimens.

From mid-April to the end of May, Dr. Duckworth again went into the field, this time to Barro Colorado Island, Panama. Through the help of Mrs. Duckworth another 25,000 specimens were collected here.

Dr. Davis completed a revision of the subfamily Prodoxinae and Dr. Duckworth completed several papers dealing with the large family Stenomidae.

In July associate curator of Lepidoptera William D. Field made a 28-day collecting trip for Rhopalocera through the mountains of New York and New England. Large series of several species of butterflies

needed for the national collection were taken. In May Mr. Field spent 12 days in the entomologically neglected area of western Virginia and West Virginia collecting information, especially on the extent of the ranges of boreal species in the southern mountains.

At the close of the year Dr. O. L. Cartwright, curator of Coleoptera, was on a trip to London and Paris to study type specimens of scarab beetles of the Bahamas and Micronesia.

Dr. Paul J. Spangler, associate curator of Coleoptera, spent 7 weeks during July and August in Mexico and southwestern United States collecting much needed material for his investigations on water beetles. So little is known about the merging of the Nearctic and Neotropical Zones in Mexico that all expeditions to this area are pointed toward the elucidation of this factor. Not less than 6 of the genera collected represent new records for Mexico and not less than 20 species are new to science. Larvae for nearly all the species were collected, and all the information on immature forms is new. Specimens of semiaquatic beetles of the very rare family Georyssidae were collected in quantity.

Ralph E. Crabill, Jr., curator of Myriapoda and Arachnida, was in Europe at the beginning of the fiscal year and stayed there until mid-August, during which time he visited the Zoologische Sammlung des Bayerischen Staates, Munich, and the British Museum (Natural History) for the purpose of studying typical and ordinary chilopod specimens. In upper Bavaria and northern Austria he undertook four collecting trips which netted some 1,200 specimens, including some topotypes and a host of species not previously represented in the national collections.

From mid-July to mid-August, Dr. Oliver S. Flint, Jr., associate curator of neuropteroids, was on a field trip to the islands of Jamaica, Dominica, St. Lucia, and Grenada, conducting studies on the Antillean caddisfly fauna. During 4 days spent on Jamaica and about a week each on the other islands he collected 2,000-3,000 insects, of which 500 or more are Trichoptera. In April and June he was back in Dominica as a participant in the Bredin-Archbold-Smithsonian biological survey of that island. Dr. Flint completed two papers dealing with certain species of Nearctic Trichoptera in the collection of the Museum of Comparative Zoology, Cambridge, and new species discovered in the United States.

Jason R. Swallen, chairman of the department of botany, visited South Africa in September and October at the invitation of the National Botanic Gardens of South Africa to join in the Golden Jubilee Celebration of the Gardens. The celebration included over a month's tour of the country, which afforded an opportunity to collect about 200 specimens of grasses, including a number of species new to the National Herbarium.

Associate curator of phanerogams Velva E. Rudd continued work on her manuscript on the papilionoid legumes of Mexico, bringing part one to completion. In connection with her studies in the Leguminosae, she spent 6 days in September at the herbarium of the Universidad Nacional Autónoma de México in Mexico City. This research opportunity was afforded by her attendance at the Segundo Congreso Mexicano de Botánica, which met in San Luis Potosí.

• From mid-June through August, Dr. Stanwyn G. Shetler, associate curator of phanerogams, traveled to Alaska and collected plants in the western Brooks Range with a University of Alaska expedition. He also studied collections in the herbarium of the University of Alaska and searched for a suitable setting for a diorama planned for the hall of plant life.

Associate curator of phanerogams Wallace R. Ernst completed a manuscript on "The Genus *Eschscholzia* in the South Coast Ranges of California" and, with Dr. H. J. Thompson of the University of California, Los Angeles, another manuscript on the pollination patterns and taxonomy of the genus *Eucnide*. At the American Institute of Biological Sciences (AIBS) meetings at Amherst, Mass., in August his joint paper with Dr. Thompson won an award in taxonomy. During the last 3 months of the year he was in Dominica, participating in the Bredin-Archbold-Smithsonian biological survey of that island.

Associate curator of phanerogams Dan H. Nicolson, along with associate curators Stanwyn Shetler and David Lellinger, visited the Great Smoky Mountains National Park in May in search of sites usable in preparing an eastern deciduous forest life-group in the planned Hall of Plant Life.

At the beginning of the fiscal year Dr. Thomas R. Soderstrom, associate curator of grasses, was in the Wilhelmina Mountains of Surinam, on a New York Botanical Garden expedition which collected until October. About from 5 to 8 percent of the collections represent grasses, all of which, including duplicates, are being identified in the National Herbarium for distribution to major herbaria.

C. V. Morton, curator of ferns, spent 3 weeks during July in libraries in London and Paris checking bibliographic information in connection with his study of the photographs he made of fern types in European herbaria. With associate curator David B. Lellinger, he prepared a treatment of the genus *Asplenium* in Venezuela, based largely on the extensive collections assembled from the Guayana Highlands region by the New York Botanical Garden and the Chicago Natural History Museum.

In August, on his way to the AIBS meetings in Amherst, Mass., Dr. Mason E. Hale, curator of cryptogams, collected lichens in northwestern New Jersey, in the Catskill Mountains in New York, and in

western Connecticut. During September and October he visited major herbaria in London, Stockholm, Uppsala, Lund, Turku, Helsinki, Leiden, Vienna, Munich, and Geneva. One of the purposes of the trip was to subject type specimens to chemical tests. In April Dr. Hale collected in southwestern Virginia, North Carolina, eastern Tennessee, Alabama, and Georgia, obtaining for chemical analysis approximately 1,000 specimens at 27 localities.

Associate curator of cryptogams Harold E. Robinson spent 3 months, from the end of January to the end of April in Dominica, as a participant in the Bredin-Archbold-Smithsonian biological survey of that island. Collections were made of both plant and animal material, including primarily bryophytes, with approximately 200 species, and Dolichopodidae, with approximately 90 species.

Associate curator of cryptogams Paul Conger completed a manuscript on a new species of epibenthic marine diatom from Honolulu Harbor, Hawaii.

Before resigning in August, associate curator Richard E. Norris completed a second cruise on the R/V *Anton Bruun* in the Indian Ocean and made a collection of marine algae and plankton, which is being processed at the Smithsonian Oceanographic Sorting Center.

Dr. William L. Stern, curator of plant anatomy, was transferred temporarily to the International Civil Service early in July so that he could spend a year in the Philippines as a forestry officer with the Food and Agricultural Organization of the United Nations.

On August 25, Dr. Richard H. Eyde, associate curator of plant anatomy, took part in an AIBS pre-meeting botanical field trip through the Berkshire Mountains. He also spent a long weekend in April visiting the Brookgreen Gardens in South Carolina for the purpose of obtaining preserved flowers of *Nyssa aquatica*, a species which does not grow in the Washington area. He arranged for additional flowers to be collected as they appear.

Dr. Eyde completed a comparative anatomical investigation of the flower *Garrya*, an American genus of debated affinities, concluding that the closest allies are the Old World cornaceous genera *Aucuba* and *Griselinia*.

Dr. G. A. Cooper, chairman of the department of paleobiology, in company with Dr. J. T. Dutro of the U.S. Geological Survey, made a field trip to New Mexico and Texas from mid-March to the latter part of April. They worked on the Devonian sequence in New Mexico, first at Silver City, and then at Hillsboro, Mud Springs and Caballos Mountains, and Alamogordo (San Andres and Sacramento Mountains). In Texas they collected blocks of fossil-bearing Permian rocks in the Guadalupe and Glass Mountains. Lastly, they collected Permian and Pennsylvanian fossils in the vicinity of Santa Anna and Jacksboro, Tex.

In collaboration with Dr. R. E. Grant of the U.S. Geological Survey, Dr. Cooper nearly finished a large manuscript on the Permian brachiopods of the Glass Mountains.

Dr. Francis Hueber, associate curator of paleobotany, made two trips to Canada this year in connection with his study of fossil plants. On the first trip, in August, he studied sites in Lower Devonian sediments along the shore of the Restigouche River in New Brunswick and type localities for certain species along the north shore of Gaspé Bay in Quebec. Sixteen crates of specimens were forwarded to the museum. His second trip, in May, took him to the Redpath Museum at McGill University, Montreal, and to the Geological Survey of Canada, Ottawa, to examine collections. One of his findings during the second trip is that the holotype of *Cladoxylon dawsoni*, an Upper Devonian plant from New York, is distributed among three separate museum collections.

Dr. Hueber spent the first week in April in Scotland examining collections of Rhynie Chert offered for sale. This is a classic Middle Devonian plant-bearing material no longer freely available from the type locality in Aberdeenshire. It contains exceptionally well-preserved and nearly intact examples of early land plants, the discovery and description of which in 1917-21 revolutionized botanical evolutionary thought. Thus the opportunity to select this material in quantity is quite rare. The lot purchased weighed 1,000 pounds.

Curator of invertebrate paleontology Richard S. Boardman, accompanied by museum specialist George T. Farmer, made a collecting trip to the Arbuckle Mountains in southern Oklahoma in September and October. The oldest known (approximately 480 million years) fossil Bryozoa on the continent occur here in sedimentary rocks 1,500 feet thick. Thus, enough time is represented to demonstrate the evolution of early genera and the phylogenetic connections and origin of many of the genera occurring more commonly in younger rocks.

Dr. Porter Kier, associate curator of invertebrate paleontology, was in Florida at the beginning of the fiscal year and continued there until July 12 studying the living habits of echinoids in the area of the Florida Keys. In company with Dr. Norman Sohl of the U.S. Geological Survey, he used SCUBA diving equipment to observe species distribution in relation to bottom conditions and depth. In April he transferred these investigations to Dominica as part of the Bredin-Archbold-Smithsonian biological survey of that island. Museum investigations enabled Dr. Kier to complete a major study of the evolutionary trends in Paleozoic echinoids.

Associate curator of invertebrate paleontology Richard Cifelli completed a paper on planktonic Foraminifera from the western Atlantic and another on concentration techniques of shelled organisms from plankton.

Associate curator of invertebrate paleontology Erle G. Kauffman and museum technician G. R. Paulson were in northern New Mexico at the beginning of the fiscal year, measuring sections and collecting mollusks from typically early Upper Cretaceous rocks. Shortly thereafter they extended the work into Colorado until the end of July. Approximately 4,000 specimens were obtained from 21 stratigraphic sections measured and collected. The data will permit revision of the Coloradoan stratigraphy in many areas of northern New Mexico and central Colorado, formation of a refined faunal zonation throughout the region, and precise correlation of the sequence across the Front Range of the Rocky Mountains.

Dr. Kauffman, accompanied by Dr. N. F. Sohl of the U.S. Geological Survey, spent the last half of March in Puerto Rico studying the Cretaceous biostratigraphy of the island and collecting invertebrate fossils. All major Cretaceous localities in southwest Puerto Rico, and along the central cordillera, were visited during the course of the work. Approximately 2½ tons of fossil material were collected, predominantly limestone blocks containing silicified mollusks, corals, sponges, and other invertebrates. These collections, added to those obtained previously by Survey personnel, form the largest and most diverse assemblage of invertebrate fossils from the Caribbean Cretaceous.

Dr. Martin A. Buzas, who joined the staff late last year as associate curator of invertebrate paleontology, completed manuscripts on the Foraminifera from a late Pleistocene clay near Waterford, Maine, and a distributional study of the species of Foraminifera in Long Island Sound.

Dr. C. L. Gazin, curator of vertebrate paleontology, accompanied by Franklin L. Pearce, chief of the laboratory of vertebrate paleontology, began exploration of the Middle Eocene Bridger formation of southwestern Wyoming at the beginning of the fiscal year. Unfortunately, at the end of the first week Mr. Pearce became ill and had to return to Washington for hospitalization. Dr. Gazin continued alone until early August. He devoted much time to a careful search for smaller mammals in the upper part of the formation, as exposed in the upper basin of Sage Creek, with some attention to the lower levels in the Grizzly Buttes and to the north of Cedar Mountain. He also made occasional profitable trips to localities of earlier years in the Paleocene and Early Eocene of adjacent basins. At the close of the year Dr. Gazin and Mr. Pearce were engaged in another field trip to New Mexico and Wyoming.

Dr. Gazin completed his morphologic study of the Early Eocene condylarthran mammal *Minicotherium*. This includes a detailed review of nearly the entire skeleton, which is compared with that of other condylarths, of which *Hyopsodus* provides much new information.

From the beginning of September to mid-October associate curator of vertebrate paleontology D. H. Dunkle, accompanied by museum technician G. B. Sullivan, conducted field work in northwestern Ohio, in the area around Council Bluffs, Iowa, and in the Manzano Mountains of central New Mexico. The 370 specimens collected and the stratigraphic observations made will permit important additions and revisions of the known paleoichthyological faunas of the Middle Devonian silica shale of Ohio and several Late Paleozoic horizons of the midcontinent and Rocky Mountain regions. The New Mexico occurrence investigated is of especial interest; it is practically the one known source in North America of a varied marine assemblage of well-preserved fishes, invertebrates, and plants of the Permo-Carboniferous interval.

In September associate curator of vertebrate paleontology Nicholas Hotton III left Washington for field work in Africa. In addition to collecting in the Permo-Triassic beds of the Karroo region of South Africa, which has yielded a variety of mammal-like reptiles, he carried on during a greater part of the year a detailed stratigraphic study of the Beaufort series with a view toward a better understanding of the distribution and ecology of the forms. At the end of the year he had left Africa for Europe to study at certain of the leading museums.

On December 18, 1963, Dr. Clayton E. Ray joined the staff as associate curator of vertebrate paleontology. During the next few months, in continuation of his studies of fossil and modern terrestrial vertebrates, especially rodents, of the Antillean region, he completed reports on a new species of capromyid rodent and an undescribed miniature ground sloth, both from a cave in the Dominican Republic. From mid-May to the latter part of June he conducted a field investigation of Pleistocene occurrences in the vicinity of Puebla, Mexico, in collaboration with an archeological party from the Peabody Museum in Cambridge, Mass.

On three occasions during the year Dr. Remington Kellogg, honorary research associate, made day-long trips to the Chesapeake Bay area, in company with one or more members of the staff, to inspect exposed remains of Miocene vertebrates. The trip in July to Parker Creek, Calvert County, Md., yielded a good part of the skeleton of a Miocene cetothere (*Mesocetus cephaloculus*) which is especially useful to Dr. Kellogg in connection with studies now in progress on this group of extinct whalebone whales. The trip to King George, Va., in May revealed a shoreline concentration of mixed and abraded porpoise and sea-cow bones and a variety of shark teeth. Inland occurrences such as this are only rarely encountered, and the distribution record is of interest. In the course of the year Dr. Kellogg completed a report on the skeleton of one of the larger Calvert Miocene whalebone whales.

Chairman George Switzer of the department of mineral sciences completed his annual review of the diamond industry and, with analytical chemist Roy S. Clarke, Jr., et al., completed a manuscript on "Fluorine in Hambergite."

Dr. Paul E. Desautels, associate curator of mineral sciences, completed a study of one of the rare uranium minerals known as "sklodowskite," a hydrous magnesium uranyl silicate, from a new locality in Mexico.

At the beginning of the year associate curator of mineral sciences Dr. E. P. Henderson was in Australia prospecting for meteorites and tektites. He continued working there until October, in company with Dr. Brian Mason of the American Museum of Natural History, New York, and Dr. R. V. Chalmers of the Australian Museum. They collected meteorite material from four well-known Australian craters, Henbury, Boxhole, Wolf Creek, and Dalgarrange; relocated the Dalgety Downs meteorite and recovered nearly 500 pounds of material; and collected many fine tektite specimens. Exchanges arranged during the stay in Australia, and on the return trip through the Middle East and Europe, added a number of fine new specimens to the collections. At the close of the year Dr. Henderson was back in Australia on another prospecting trip.

Dr. Henderson completed two manuscripts: one, a study of the hexahedrite meteorite groups, and the other, a discussion of the legendary and probably nonexistent Port Orford, Oreg., meteorite. He also completed a metallographic study of the Bogou, Upper Volta, iron meteorite.

Analytical chemist Roy S. Clarke, Jr., in cooperation with R. J. Gettens and E. W. FitzHugh of the Freer Gallery of Art, investigated an iron-oxide corrosion product of a metal blade in the Gallery's collection and proved that it was fabricated from meteoritic iron. He also completed chemical analysis of the mineral "phosphyllite" from Bolivia.

Silvio A. Bedini, curator of mechanical and civil engineering of the Museum of History and Technology, toured technical museums and other institutions of learning in Great Britain and on the continent, presenting lectures at the Astrophysical Observatory in Arcetri and at the Istituto Nazionale della Ottica in Florence. Later, in collaboration with Francis R. Maddison of the Museum of the History of Science at Oxford University, he completed a book on the de Dondi astrarium entitled "Mechanical Universe." Mr. Bedini completed three more articles about antique science instruments in the national collections; also articles on the invention of the orrery (including study of an unrecorded instrument recently discovered in an American collection), on the evolution of science museums, and on early

Italian science museums. In addition, he competed articles on Galileo's preoccupation with the measurement of time, on a comparison of Galileo's instruments, and on the craftsmen who produced the instruments used by Galileo.

Associate curator Edwin A. Battison, assisted by summer intern Bruce H. White, completed the first draft of a translation of Jacques Besson's *Theatrum Instrumentarum et Machinarum* from the 16th-century French. This significant contribution to the history of technology has not previously been available in English.

Curator of transportation Howard I. Chapelle made three trips to Spain to inspect the reconstruction of Columbus's *Santa Maria* being produced by the Cardona Yard in Barcelona for exhibition at the World's Fair in New York, and to do research on Spanish shipbuilding of the 18th and early 19th centuries.

Grace Rogers Cooper, curator of textiles, completed her monograph on the Robertson and the Clark dolphin and cherub sewing machines of the 1850's. At the end of the year she was studying textiles at the Rijksmuseum, Amsterdam, the Netherlands.

Paul V. Gardner, curator of ceramics and glass, visited 64 museums, private collections, and glass factories in 11 European countries between September and December, to evaluate the recently donated Syz collection of 18th-century porcelains, to meet and confer with collectors and museum personnel in the ceramic and glass field, and to examine new exhibit techniques used in ceramic and glass displays.

Jacob Kainen, curator of graphic arts, made trips to Sarasota, Philadelphia, and New York City for material relating to his study of the Dutch engraver Hendrick Goltzius (1558-1617). He served as juror for two art exhibitions: the 1963 All-Army Art Contest at Fort George G. Meade, Md., and the 25th National Exhibition of the Society of Washington Printmakers. He also had an exhibition of his own paintings at the Roko Gallery in New York City.

On a trip to Europe, Eugene Ostroff, associate curator in charge of the section of photography, visited museums, photographic equipment factories, dealers, galleries, private collectors, and photographers for the purpose of acquiring apparatus and prints for exhibits and of establishing contacts for exchanges.

Peter C. Welsh, curator under the chairman of the department of civil history, completed three manuscripts bearing the following titles: "The Metallic Bench Plane: An American Contribution to Hand Tool Design," "Hand Tools as Decorative Objects," and "Woodworking Tools: 1600-1900."

Assistant curator Doris Esch Borthwick completed a typescript of the letters of Charles Wilkes, leader of the United States Exploring Expedition.

Keith M. Melder, associate curator of political history, completed a biographical sketch of Mrs. Josephine S. Griffing, a 19th-century American reformer and feminist, and revised his manuscript on "Bryan the Campaigner."

The division of cultural history joined the Corning Museum of Glass, serving as principal sponsor, in a second 10-day archeological investigation of the site of John Frederick Amelung's New Bremen Glassworks, which operated between 1785 and 1795 in Frederick County, Md. Ivor Noel Hume, research associate, was archeological director, with Paul N. Perrot, director of the Corning Museum, as administrative director. John N. Pearce, associate curator, and Richard J. Muzzrole, archeological aide, represented Smithsonian participation. The excavations revealed an astonishingly complex foundation structure, evidence of a complete factory unit, having two furnaces, fritting areas, and the other appurtenances of a typically Germanic glass-house of the 18th century. This archeological discovery confirms documentary hints that Amelung's enterprise was an elaborate one. The project has thus become one of the most important in industrial site archeology thus far undertaken in this country.

C. Malcolm Watkins, curator of cultural history, worked with Joan Pearson Watkins, research collaborator, in recording by film and tape the still living tradition of pottery-making practiced in Moore County, N.C., since the second half of the 18th century. A photographic record of all the processes used there in making a pot, from digging the clay to firing the vessel, as well as tape-recorded interviews with the area's leading potter, were made this year.

Cynthia Adams Hoover, associate curator in charge of musical instruments, completed a paper on "The Slide Trumpet of the 19th Century."

Carl Scheele, associate curator of philately and postal history, completed an article which surveys the history of the division and traces the development of its new exhibits.

At the beginning of the year, Dr. V. Clain-Stefanelli, curator of numismatics, and Mrs. E. Clain-Stefanelli, associate curator, were in Israel at the invitation of the Israeli Government. Dr. Stefanelli traveled also in Greece, the Netherlands, Belgium, Germany, and England, undertaking research on ancient, as well as United States, coins in museums and private collections, and studying the history of coining techniques. Mrs. Stefanelli studied ancient Greek coinage of Messina at the British Museum, the Ashmolean Museum in Oxford, the Fitzwilliam Museum in Cambridge, and the Penningkabinet in The Hague.

Dr. Stefanelli completed research concerning a mission from Peru to procure in Philadelphia modern equipment for the Lima mint, and

the striking in 1855, at the United States mint, of pattern coins for Peru. Mrs. Stefanelli prepared for publication a select numismatic bibliography comprising about 5,000 entries arranged in a topical order.

In July and August, chairman of the department of Armed Forces history Mendel L. Peterson, and museum specialist Alan B. Albright, investigated two underwater sites in Bermuda through the cooperation of E. B. Tucker of the Government of Bermuda. At the close of the year Mr. Peterson was preparing for another diving season. He finished work on a preliminary report on the marking and decoration of muzzle-loading cannon.

Philip K. Lundeborg, curator of naval history, was awarded the Moncado Prize of the American Military Institute for his publication on "The German Naval Critique of the U-Boat Campaign, 1915-1918."

Melvin H. Jackson, associate curator of naval history, in cooperation with Howard I. Chapelle, completed a revision of plans of the schooner *Prince de Neufchatel* preparatory to the construction of a model of that handsome privateer. Dr. Jackson also completed a reassessment of the battle of Negro Head in 1814, involving Revenue cutter *Eagle*, H.M. sloop *Dispatch*, and H.M. frigate *Narcissus*.

Alan B. Albright, museum specialist, completed a paper on the preservation of organic materials recovered from underwater sites.

EXHIBITIONS

A significant milestone in the history of the exhibits program at the Smithsonian Institution was passed when the equivalent of 10 exhibit halls on the first and second floors of the Museum of History and Technology were presented to the public on January 23, 1964. These exhibition areas, totaling more than 75,000 square feet of attractive and instructive displays, include the Flag Hall, First Ladies Hall, and the halls of Everyday Life in the American Past, American Costume, Farm Machinery, Light Machinery, Tools, Vehicles, Railroads, a portion of Heavy Machinery, the Greenough statue of George Washington flanked by eight cases of outstanding national treasures, the centrally located Foucault pendulum, and a temporary exhibition which presents examples of exhibits to be installed in other halls of the museum. This achievement was made possible through nearly 8 years of advanced planning, design of exhibition halls, and design and production of individual displays, some of which had been placed on temporary exhibition in the Arts and Industries Building prior to their installation in the new museum. It could not have been accomplished without the contribution of knowledge and of talent by many individuals on the curatorial staff, the Office of Exhibits, the Buildings Management Division, and private contractors.

Colorful new exhibits of objects from the Near East, Japan, Korea, China, and North and West Africa were first placed on public view when the west portion of the Hall of the Cultures of Asia and Africa was informally opened in late June. Among the exhibits interpreting the traditional cultures of the Asiatic peoples are a life-size group portraying an episode from a Chinese opera, with accompanying push-button sound recording, a display of objects illustrating the evolution of farming in Japan, and a unit on the daily and religious life in Tibet. The Republic of Korea has lent one of its national art treasures, a cast-iron figure of Buddha from the Koryo dynasty (A.D. 935-1392), which is presented in a temple setting with a paneled screen of red silk brocade. North and West African cultures present many striking works of art from peoples whose accomplishments have had a profound influence upon modern art in Europe and America. One of the most dramatic displays is a diorama portraying the smelting of iron ore in primitive furnaces and the fashioning of iron tools by tribesmen from the Mandara Mountain region of the Northern Camaroons. This miniature group was created by exhibits specialists John Weaver, Robert Caffrey, and Peter De Anna. The exhibits in this hall were planned by associate curators of ethnology Gordon R. Gibson and Eugene Knez. The hall layout was made by exhibits designer Dorothy Guthrie and the graphic design of individual units was executed by exhibits designer Lucius Lomax.

The completely renovated life-size group portraying quarrying operations and making of stone artifacts by Indians some 500 years ago at the Piney Branch site, within the present boundaries of the District of Columbia, was opened to the public in the Hall of North American Archeology. Another life-group illustrating Indian copper mining in present Michigan was nearing completion at year's end. Contract construction in the new Hall of Classical Archeology was virtually completed at year's end; the hall was designed by exhibits designer Rolland O. Hower under the scientific supervision of associate curator Gus Van Beek.

The construction contractor's work in the new Hall of Physical Anthropology also was nearing completion at the end of June. About half of the exhibit units for this hall have been completed by exhibits designer Joseph Shannon, who also served as architectural designer for the hall. The contents of the exhibits have been specified by T. Dale Stewart, director of the Museum of Natural History, and Lawrence Angel, curator-in-charge of the Division of Physical Anthropology.

During the spring of 1964, Dr. Knez supervised the exhibits installation of 41 outstanding examples of Chinese, Buddhist, and Hindu stone sculpture, bronze, and other items from China, India, Cambodia,

and Java, which were received from the Alien Property Office of the Department of Justice. Dr. Van Beek worked with the Department of State and the Smithsonian Institution Traveling Exhibition Service on arrangements for loan of the Dead Sea Scrolls and associated materials from the Government of Jordan. In May, during an overseas detail, he conferred with officials of the Jordanian Government, the United States Embassy, and the Palestine Archeological Museum and selected specimens and photographs for use in the exhibition, which is scheduled to be opened in the Museum of Natural History in March 1965. Thereafter it will circulate for 6 months among other museums in the United States under the Smithsonian Institution Traveling Exhibition Service.

At the end of June the exhibits in the east of the half of the Hall of Osteology, comprising the sections on mammals and birds, were informally opened to the public. The skeletons in this exhibition range in size from one of the gray whale to those of small birds. Skeletal materials are supplemented by graphic portrayals of the appearance of the particular examples displayed in the flesh. Among the many interesting displays in the mammal section is one comparing the skeleton of man with those of other Primates. In the section on birds a unit points out the bony structure differences which serve as bases for scientific classification of birds. The sections of this hall devoted to reptiles, amphibians, and fishes are in process of preparation and installation. Planning of the exhibits in this hall has been coordinated by David H. Johnson, curator-in-charge of the division of mammals, with the cooperation of the staff members of all the divisions of this department. Hall design was by Anthony Di Stefano and graphic design by exhibits designer Morris M. Pearson.

On February 19, 1964, a temporary exhibition entitled "Return to the Sea" was opened on the mezzanine of the Hall of Life in the Sea. This display, a joint effort of the federal Interagency Committee of Oceanography and the Smithsonian Institution, has as its theme the renewal of interest in oceanography and the marine environment.

Associate curator Charles Cutress and Kjell Sandved spent approximately 2 months at Honolulu, Hawaii, Dillon Beach, Calif., and Friday Harbor, Wash., obtaining photographs and well-preserved specimens of animals of which models will be made for display in additional permanent exhibits in this hall.

Preparation of models and the securing of specimens for the Hall of Cold-blooded Vertebrates (fishes, amphibians, and reptiles) was continued during the year. Leonard P. Schultz, curator-in-charge of the division of fishes, who is coordinating the planning of exhibits for this hall, and Alfred Strohleim spent several days in the vicinity of Seattle, Wash., during October collecting red salmon and background ma-

terials for the group on salmon spawning. Exhibits designer Barbara Craig prepared the architectural layout for this hall. Graphic design is by Joseph Shannon.

Planning for the Hall of Plant Life in the Museum of Natural History has continued at an accelerated rate since January 1964. At that time a planning committee was established consisting of Assistant Director R. S. Cowan, chairman, and curators M. E. Hale, Jr., T. R. Soderstrom, Stanwyn G. Shetler, Dan Nicolson, and Richard H. Eyde. This group met regularly with exhibits designer Rolland O. Hower to develop specific plans for the construction of exhibits. Preliminary statements of the intent and content of each unit are in preparation and a study model of a proposed organization of exhibits in this large hall was prepared by Mr. Hower. In the late spring three members of the committee visited localities in the eastern part of the United States to select study sites in which to obtain data for construction of some of the habitat groups. Preparation of botanical models for use in the exhibits in this hall was in progress in the exhibits laboratory.

Planning and design of the new physical geology and meteorite exhibits were completed in preparation for the beginning of construction in this area in the summer of 1964. Additional space for the gem exhibits will be provided in the same construction project. The physical geology exhibit will interpret the nature and properties of materials composing the earth, the distribution of materials throughout the globe, the processes by which they are formed, altered, transported, and distorted, and the nature and development of the landscape. The new hall has been planned by curator-in-charge of the division of mineralogy and petrology, George S. Switzer, and associate curators Paul E. Desautels and Edward P. Henderson. The hall layout has been prepared by exhibits designers Dorothy Guthrie and Barbara Craig.

The fourth and last of the remarkable series of mural paintings in the Hall of the Age of Mammals in North America, representing a Pliocene mammalian assemblage was completed in June by the artist Jay H. Matternes.

Associate curator Clayton E. Ray initiated preliminary planning of displays in the hall to be devoted to life of the Pleistocene, the geologic epoch immediately preceding the present, in consultations with members of the exhibit staff. Much of the time of the paleontological laboratory staff was devoted to repairing and remounting skeletons of the various larger Pleistocene mammals that were previously exhibited and in restoring new skeletal remains for presentation in this hall.

Four halls of the Department of Science and Technology in the east

portion of the first floor were opened in January when the Museum of History and Technology was opened to the public.

The Railroad Hall interprets the history of street railways, as well as railroads, through a few choice full-scale vehicles and an extended series of accurately and precisely executed scale models. The giant 280-ton Pacific-type steam locomotive No. 1401, largest and one of the most impressive 3-dimensional specimens in the museum, stands near the row of east windows through which it may be viewed from outside of the building at night, as well as by daylight. A cut-away scale model of a Diesel-electric locomotive shows a type that has supplanted the steam locomotive on American railroads in recent years. A full-size cable car used in Seattle, Wash., at the turn of the century stands on a section of narrow-gauge track in an elevated position so that visitors can see the underground construction required for its operation. Basic developments in street cars, locomotives, and railroad cars are illustrated by nearly 80 models, most of them built to the same scale. The hall was planned by associate curator John H. White, Jr., in collaboration with exhibits designers James Mahoney, Virginia Mahoney, and Deborah Bretzfelder.

The adjacent Vehicle Hall traces the development of various types of road vehicles in the United States from the 18th century to the present day. Among the outstanding horse-drawn vehicles on display are two variations of the famous stagecoach, widely used in the East and West beyond the lines of the early railroads; the finely constructed Lawrence family coach built in 1851; a city omnibus built by E. M. Miller of Quincy, Ill. The automobiles illustrate the rapid evolution of automobile design and manufacture from the 1890's. Along with the Balzer and Haynes motor wagons appear the famous Winton mile-a-minute racer of 1902, the Winton in which Dr. H. Nelson Jackson drove the first transcontinental motor trip in 1903, and a sturdy Mack Bulldog truck. One of the very rare Draisines, known also as a hobby horse, is shown in the cycle collection. Museum Specialist Donald Berkebile planned the exhibits in this hall with assistance in layout from exhibits designer Riddick Vann.

The Hall of Tools illustrates the history and development of machine tools. Introductory exhibits display hand tools with which men performed laboriously the same tasks as were later accomplished with much greater speed and precision by machine. A short sound film in color describes the five basic machining operations—planing, milling, drilling and boring, turning, and grinding. The attainment of greater precision in measurement, important to the development of machine tools, is emphasized in a series of exhibits tracing the history of measurement from the Roman cubit to modern times. An outstanding feature of this hall is a reconstructed full-size machine

shop of about 1855 equipped with some of the oldest machine tools in the collection. Silvio Bedini, curator-in-charge of the division of mechanical and civil engineering, and his predecessor, Eugene S. Ferguson, selected the machines and planned the case exhibits in this hall with the cooperation of exhibits designers Bright Springman, Harry Hart, and John Clendening. William Henson installed the machines and placed them in operating condition.

A major portion of the Hall of Light Machinery illustrates the evolution of timekeeping. The introductory exhibit, through a revolving globe bearing small sundials on its surface, demonstrates the basic importance of the daily cycle of the earth's rotation as the foundation of man's timekeeping systems. The series of timekeeping exhibits illustrates the gradual developments from early sundials, sandglasses, and waterclocks to the most precise modern electronic clocks. In the center of the hall is a reconstruction of a Renaissance clock tower, the four sides of which will display a sun dial and civil, astronomical, and automation dials actuated by an American tower clock of 1786. Both the sun dial and civil time dials have been installed, the former by museum specialist Dorothy Briggs and the latter by its maker, Thwaites & Reed of London, England. The exhibits in other sections of this hall show machines derived from the skills developed by clock and instrument makers. One series traces the development of the phonograph from Thomas Edison's original invention through the work of Alexander Graham Bell's Volta Laboratory and the more recent talking machines. Exhibits on the evolution of the typewriter include early original machines and patent models. Exhibits in this hall were planned by associate curator Edwin A. Battison in cooperation with hall designer Bright Springman and exhibits designer Barbara Bowes.

At the close of the year installation of exhibits in the Hall of Civil Engineering was nearing completion. This hall interprets the story of bridge- and tunnel-building through the ages. It shows how the use of new materials enabled bridge builders to construct longer spans and illustrates through scale models many of the classic bridges of history. The tunnels section features a series of cut-away scale models illustrating the development of methods in both soft-ground and hard rock tunneling and depicting men at work constructing some of the major tunnels in which new drilling methods and mechanisms were employed. Associate curator Robert M. Vogel prepared the technical specifications for this hall. Exhibits layout and design are the work of exhibits designers John Brown and Harry Hart.

Considerable progress also was made in the design, production, and installation of exhibits in the Hall of Heavy Machinery. Exhibits interpreting the early development of the steam engine—including a

reconstruction of the Watt engine—were opened to the public in January. It is planned to open the series of exhibits on refrigeration and the Diesel engine when the adjoining Civil Engineering Hall is opened in July 1964. Robert M. Vogel is responsible for planning this hall's contents. The layout and units designs have been prepared by exhibits designer Harry Hart.

A considerable number of the scale models of historic types of vessels from the museum's outstanding watercraft collection have been placed in free-standing exhibition cases in the American Merchant Shipping Hall by exhibits specialists James A. Knowles, Jr., under the supervision of Howard I. Chapelle, curator-in-charge of the division of transportation.

A temporary exhibition of communications satellites is being installed in the Hall of Electricity; as a nucleus for this exhibit the back-up satellite for *Telstar I*—presented to the museum on July 10, 1963, the first anniversary of its launching—will be on view. Installation of cases for permanent exhibits which will interpret current-electricity, was nearing completion at year's end. These exhibits have been planned by Bernard S. Finn, associate curator in charge of the division of electricity. Exhibits designer Nadya Kayloff has nearly completed the design on these displays.

In the Halls of Pharmacy, Medicine, and Dentistry installation neared completion of an 1890-period drugstore, of period interiors depicting a portion of a room in the Massachusetts General Hospital, and a midwestern dentist's office. The Old World Apothecary Shop, formerly on view in the Arts and Industries Building, has been moved and is being installed in the new Hall of Pharmacy. Two new exhibits destined for exhibition in the new museum were placed on temporary display in the Arts and Industries Building. One depicts in diorama form Dr. Philip S. Physick removing a large paratoid gland tumor in the circular room of the Pennsylvania Hospital in 1805, long before the discovery of anesthesia. The other is an enlarged model of the human ear donated by the Lambert Institute of Otolaryngology of New York City. Dr. Sami K. Hamarneh, curator-in-charge of medical sciences, assisted by Dr. Alfred R. Henderson, consultant, are completing exhibit plans for the medical science exhibits, in cooperation with John Clendening, exhibits designer.

The Foucault pendulum, prepared by the California Institute of Technology and exhibited in the central rotunda of the new museum, has fascinated visitors since the opening of the building. The division of physical sciences, placed in charge of this exhibit, has been making careful studies of its operation and of the problem of interpreting it to the public. A large graphic explanation has been planned by Dr. Walter F. Cannon, curator-in-charge of the division,

which is being produced by the exhibits laboratory. Development of exhibits for the Hall of Physical Sciences progressed with the completion of a layout plan for the mathematics section and the production of all but one unit in the section on astronomy.

The Farm Machinery Hall was on view when the new Museum of History and Technology building opened in January. Through displays of original objects and accurate scale models this hall shows how the invention and use of labor-saving machines played a major role in the rapid expansion of American agriculture since the early 19th century. The earlier hand-wielded and horse-drawn implements are contrasted with later self-propelled machines which performed the same basic tasks of plowing, planting, cultivating, and harvesting food crops. Thomas Jefferson's plan for a more efficient moldboard which any farmer of his time could make with his own tools and fit to his plow is a feature display in the series on the development of the plow. John Deere's "steel" plow is shown, as are scale models of the McCormick and Hussey reapers of the 1830's. Colorful portable steam engines which supplied belted power to the old threshers and other farm machines are displayed along with gasoline and diesel tractors which pulled and powered large farm implements. The exhibits in this hall were planned by associate curator Edward C. Kendall in cooperation with exhibits designer Riddick Vann. The human figures which help to establish scale and add interest to the miniature models of reapers were executed by exhibits technician Susan Wallace.

Installation of exhibits in the new Hall of Graphic Arts was begun in the spring of 1964 in anticipation of a fall opening. This hall will explain the processes and present outstanding examples of graphic works created and produced by hand and by photomechanical processes. These exhibits have been planned by curator-in-charge Jacob Kainen and associate curator Fuller O. Griffith of the division of graphic arts in cooperation with exhibits designer Nadya Kayaloff.

Among the displays in the preview of future exhibits in the temporary exhibits gallery on the first floor of the new museum are a number of outstanding objects from the collections of this department, including the Benjamin Franklin Press, the Kelmscott Chaucer, three prints of old masters, and an early American handloom, built by a pioneer settler of western Pennsylvania about 1800. The loom was prepared for weaving and is used for weekly demonstrations by associate curator of textiles Rita Adrosko.

Miss Bowman, Mrs. Lois Vann, and Miss Maureen Collins of the division of textiles assisted in preparing the backing of the Star-Spangled Banner prior to its installation in the new museum. Miss Collins also assisted Mrs. Murray in the preparation of specimens for exhibition in the Hall of American Costume. Several textiles speci-

mens were loaned to the American Museum in Britain, at Claverton Manor near Bath, England.

A reproduction of the figure 8 stellerator developed by Dr. Lyman Spitzer of Princeton University was placed on exhibition in the west window area on the first floor of the new museum shortly before the building was opened to the public. It is symbolic of the research involving the generation of temperatures in excess of 100 million degrees Centigrade.

Three of the four halls of the Department of Civil History were on public view when the new museum opened in January. The fourth, the Hall of Historic Americans, was formally opened to the public in June.

The Hall of Everyday Life in the American Past, comprising the largest exhibition gallery in the museum, displays the material evidences of domestic life in America before 1900. The furnishings, utensils, decorative arts, and other objects illustrating aspects of the cultural life of the country are presented in a series of cases, period rooms, and platform groupings progressing chronologically from an initial series of displays devoted to the European backgrounds of early settlement groups. Among the outstanding exhibits are a reproduction of a room from an 18th-century Spanish New Mexican adobe home and objects of religious art from the Franciscan missions of the Southwest; displays ranging from artifacts obtained archeologically to fine furniture, pewter, and silver of the English colonies of the eastern seaboard, and an entire log house from Mill Creek Hundred, Del., dating from about 1740 showing both the exterior and interior construction and the furnishings of this home. This hall was planned and installed under the direction of C. Malcolm Watkins, curator-in-charge, assisted by associate curators Rodris Roth and John N. Pearce of the division of cultural history. It was designed by John E. Anglim, exhibits chief, with the assistance of exhibits designer Deborah Bretzfelder. Period rooms and the log house were executed by George H. Watson and his staff of restoration specialists with the professional assistance of Mrs. E. Boyd, curator of Spanish Colonial art, Museum of New Mexico, and architects Robert L. Raley of Newark, Del., and Robert E. Plettenberg of Santa Fe, N. Mex.

The new First Ladies Hall provides a more appealing medium for continuing the Smithsonian Institution's tradition of exhibiting the dresses worn by the wife or official hostess of each President of the United States. These dresses show the changes in American costume from the 18th-century style worn by Martha Washington to the simple lines and elegant fabrics of more recent First Ladies. The dresses are displayed upon mannequins in a series of eight room settings, each appropriately finished and furnished to indicate the periods and en-

vironments in which the dresses are worn. Two rooms reproduce those in the house at 190 High Street in Philadelphia where President and Mrs. Washington lived before the White House was built and display furniture and fixtures owned and used by them. The other room settings combine architectural details from the White House, including four original White House mantels and the 1902 paneling from the East Room, with furniture and accessories used both in the White House and in Presidential family homes. This hall was developed by associate curator Margaret Brown Klaphor in cooperation with exhibits chief Benjamin W. Lawless.

The new Hall of American Costume adequately presents for the first time the Museum's rich and extensive collection of men's, women's, and children's clothing of the 18th, 19th, and 20th centuries. It includes accessories of dress such as shoes, hats, handkerchiefs, parasols, and gloves and such decorative accessories as fans, embroidered and beaded purses, and many fine examples of period jewelry. Many of the clothing items are exhibited on mannequins which portray the hair dress appropriate to the costumes, and some are shown in groupings in partial room settings. Illustration of various types of clothing selected from paintings and engravings dealing with the history of costume supplements the original specimens on display. The entire hall has been one of great interest for historians, artists, and students of American style and taste. The exhibits were planned and installed under the direction of assistant curator Anne W. Murray. Hall design was by exhibits designer Robert M. Widder; graphic design by exhibits designers Judith Borgogni, Virginia Mahoney, and Deborah Bretzfelder.

The Hall of Historic Americans is unlike other museum presentations in the United States. A portion of the hall is devoted to a capsule history of American political campaign techniques, tracing their development from the era of genteel "parlor politics" to the modern political use of the mass media of communications. A dramatic political parade illustrates the development of Presidential campaigning between 1840 and 1930 with papier mâché marchers carrying authentic political banners, pennants, and torchlights and wearing campaign clothing and badges. An adjoining area, illustrating the important relationship between politics and the press, radio, and television, includes microphones used by Franklin D. Roosevelt in delivering his historic fireside chats on radio and by Dwight D. Eisenhower in television broadcasts. Several exhibits display memorabilia of distinguished families and individuals—the Washington and Adams families, Ulysses S. Grant, and Abraham Lincoln. In one of these a newly sculptured figure of Abraham Lincoln wearing the business suit which he wore on the day of his assassination, stands

in a setting which closely resembles that shown in several Mathew Brady photographs of the President. Planning and installation of the exhibits in this hall were under the direction of curator-in-charge Wilcomb E. Washburn, assisted by associate curator Keith E. Melder and assistant curator Herbert R. Collins of the division of political history in association with exhibits designer Robert Widder. At the formal ceremonies opening the hall on the evening of June 29, featured speakers included the Honorable Frances P. Bolton, Member of the House of Representatives from Ohio, and the Honorable Claiborne Pell, United States Senator from Rhode Island.

Marked progress was made in the preparation of the Hall of Philately and Postal History. During March several examples of stamp production equipment were transported to the Museum and moved into position in the stamp production alcove of this hall by the Bureau of Printing and Engraving. The series of exhibits on the history of the world's posts were produced, exhibit cases for models of vehicles used to transport the mails and for postage meter and canceling machines were delivered to the hall, and the refinishing of the pull-out frames which will exhibit by country and systematic National Postage Stamp Collection was completed. This hall has been planned by curator Carl H. Scheele with the assistance of museum technician Francis E. Welch in collaboration with exhibits designer John Clendening.

Associate curator of numismatics Elvira Clain-Stefanelli with the assistance of the Medallic Art Co. and the United States Mint prepared a display of contemporary United States medals for the Museum's Hall of Monetary History and Medallic Art. A temporary display illustrating the history of the traveler's check, including James C. Fargo's announcement of 1891 initiating the issuance of traveler's checks by the American Express Co., was installed in February. On March 27 a special exhibition of original mint models and designs for the John F. Kennedy half dollar was placed on display through the good offices of the Director of the Mint, Miss Eva Adams, and the Superintendent of the Philadelphia Mint, Michael H. Sura. In April a large display of the currencies of the Austrian Empire was installed, employing material recently received from the Mortimer and Anna Neinken Collection.

The Star-Spangled Banner, the original flag which flew over Fort McHenry at Baltimore during the attack of the British fleet on September 13-14, 1814, and which inspired Francis Scott Key to write the words of what is now our National Anthem, was installed in the new Museum of History and Technology when it was opened to the public in January. Although this most important museum object related to the history of the United States had been exhibited in the Arts and

Industries Building since it was presented to the Smithsonian Institution in 1912, it is now displayed for the first time at full length, undraped, and in a place of honor befitting its importance as a national symbol. The flag is displayed over a supporting fabric large enough to indicate its original dimensions of 30 by 42 feet and completely covers a specially designed metal grid which holds the flag and its supporting fabric in a vertical position and hangs in an atmosphere of filtered air carefully controlled for the proper temperature and humidity. The flag was prepared for exhibition and installed under the direction of Edgar M. Howell, curator-in-charge of the division of military history, with the assistance of Grace Rogers Cooper, curator-in-charge, division of textiles. The setting for the flag was designed by Walker Cain of the firm of Steinmann, Cain & White, architects for the new Museum. The cased exhibit was designed by Robert Widder, exhibits designer.

The entire professional staff of the department has been deeply concerned with the development of exhibits for the Armed Forces history halls in the new Museum. The exhibit of Armed Forces history in the Arts and Industries Building will remain until the early fall of 1964.

Assistant director John C. Ewers coordinated the varied exhibits activities of the Museum of History and Technology, with the able assistance of John N. Edy who planned the physical movement of materials. Benjamin W. Lawless continued to supervise the design, production, and installation of exhibits, aided by Robert Widder in design, Bela S. Bory and William Clark in production, Robert Klinger in the model shop, Stanley Santoroski in supervision of installation, and Carroll Lusk, lighting specialist. Editing of the curators' drafts of exhibits scripts was continued by George Weiner, assisted by Constance Minkin and Edna Wright. The timely assistance of buildings manager Andrew F. Michaels and his staff contributed substantially to the success of this program, as did the services of John E. Cudd, liaison architect, and George Watson, skilled specialist in the renovation and installation of period interiors.

John E. Anglim, exhibits chief, continued in charge of the planning and preparation of all exhibits and directly supervised the operation of the exhibits laboratory in the Natural History Building, with the assistance of Gilbert Wright. Julius Tretick supervised the production and installation of natural history exhibits. Substantial portions of the Hall of the Cultures of Asia and Africa and the Hall of Osteology in the Museum of Natural History were opened to the public in June and progress was made on hall layout and/or exhibits design in five other galleries in that building. Director T. Dale Stewart continued to serve as chairman of the committee coordinating the

exhibits modernization program in natural history, and assistant director Richard S. Cowan was responsible for integrating the work of curators and exhibits personnel in the development of natural-history exhibits.

DOCENT SERVICE

The Junior League of Washington conducted its volunteer guide program for the school classes of the greater Washington area through the Smithsonian museums for the tenth consecutive year. The program was carried out through the cooperation of G. Carroll Lindsay, curator of the Smithsonian Museum Service, with Mrs. Dickson R. Loos as chairman of the League's guide service and Mrs. Arnold B. McKinnon as cochairman. Mrs. McKinnon will serve as chairman for the forthcoming year with Mrs. Joseph Smith, Jr., as cochairman.

During the 1963-64 school year 20,044 children were conducted on 701 tours. During the year, the 100,000th child to participate in the program was conducted on a tour by the volunteers.

Tours were conducted in the Halls of Mammals, Native Peoples of the Americas, and Textiles for grades 3 through 6; and in the Halls of Gems and Minerals and Prehistoric Life for grades 5 through junior high. The Prehistoric Life tour was given for the first time this year. The Power Hall, in which tours had been conducted for the past 6 years, was closed to tours because of its move to the Museum of History and Technology. Since the beginning of Power Hall tours in 1958, about 12,000 children have been conducted through this hall.

Tours were offered 5 days a week, four tours each day, every half hour beginning at 10:00 a.m. through 11:30 a.m. in the Halls of Mammals and Native Peoples of the Americas. Tours in the Halls of Gems and Minerals and Prehistoric Life were offered Monday through Friday at 10:00 a.m. and 11:00 a.m. The textile tour was offered only on Wednesdays and Fridays at 10:00 a.m. and 11:00 a.m.

Tours were conducted from October 2 through May 29, with the exception of the month of April 1964, when, as usual, tours were suspended because of the exceedingly heavy visitor traffic in all museum halls during the Easter and cherry-blossom seasons. During May, for the first time, the volunteers made use of compact, portable amplifiers. With the aid of these amplifiers it is possible to conduct tours even when the exhibit halls are heavily crowded.

In addition to Mrs. Loos and Mrs. McKinnon, the members of the League's guided tour committee were:

Mrs. Timothy Atkeson, Mrs. Leon Bernstein, Mrs. Thomas A. Bradford, Jr., Mrs. Challen E. Caskie, Mrs. Thomas R. Cate, Mrs. F. David Clarke, Mrs. Steven Conger, Mrs. Henry M. deButts, Mrs. Lee M. Folger, Mrs. Rockwood Foster, Mrs. George Gerber, Mrs. Gilbert Grosvenor, Mrs. James Harvey, Mrs. William

Henry, Mrs. Walter M. Johnson, Jr., Mrs. Vernon Knight, Mrs. Lansing Lamont, Mrs. Edward Leonard, Mrs. John Manfuso, Jr., Mrs. H. Roemer McPhee, Mrs. R. Kendall Nottingham, Mrs. L. Edgar Prina, Mrs. W. James Sears, Mrs. Walter Slowinski, Mrs. Joseph Smith, Jr., Mrs. James H. Stallings, Jr., Mrs. Edwin F. Stetson, Mrs. E. Tilman Stirling, Mrs. John S. Vorhees, Mrs. Richard Wallis, and Mrs. Mark White.

The Institution deeply appreciates the able and devoted efforts of these volunteers, whose services to the schools of the Washington area encourage effective use of Smithsonian museum exhibits by teachers and students.

BUILDINGS AND EQUIPMENT

The contract for the construction of the west wing of the Natural History Building, including the last stage of renovation of the original building, was signed in August 1963. Excavation for the wing was begun in November and, owing to a mild winter, the foundations were laid and the superstructure erected at a rapid rate. By the end of the fiscal year most of the granite facing was in place.

Within the original building a large L-shaped area in the northwest corner of the third floor was cleared for renovation by October. Work in this area proceeded slowly, owing to the need for preliminary installation of electrical conduits. This area was still not finished by the end of the fiscal year, but work was proceeding at a faster pace.

The General Services Administration accepted all remaining areas and systems of the Museum of History and Technology, not previously accepted, effective August 30, 1963, with certain exceptions.

President Lyndon B. Johnson dedicated the building at ceremonies held in the evening of January 22, 1964. The Museum was opened to the public at 9:00 a.m., January 23, 1964. The Museum has been visited by record-breaking crowds and has become the focus of the attention of scholars, university departments, and museum professionals, who are interested by the impact which the scholarly staff and great collections of the Smithsonian can have on education at all levels from the elementary student to the postgraduate.

CHANGES IN ORGANIZATION AND STAFF

Approval for the establishment of a Department of Entomology was given by former Secretary Leonard Carmichael on April 30, 1963. Accordingly, on July 1, 1963, the division of insects was separated from the Department of Zoology and became the Department of Entomology. The five divisions in the department are: Neuropteroids, Lepidoptera, Coleoptera, Myriapoda and Arachnida, and Hemiptera.²

² For administrative purposes, and until new divisions are established in the new Department of Entomology, the newly created units will deal with subject matters not necessarily closely related; the division of neuropteroids will handle administrative matters pertaining to the Orthoptera and Isoptera; the division of Lepidoptera will handle Diptera; the division of Hemiptera will process transactions involving Hymenoptera.

Likewise, a plan to divide the Department of Geology into two departments, Mineral Sciences and Paleobiology, was approved on August 20, 1963, and the reorganization became effective on October 15, 1963. The diversity of disciplines in the old geology department made the partition logical and desirable. The purely physical subjects of mineralogy, petrology, and meteoritics are now separated from the biological subjects of paleontology and ecology. The Department of Mineral Sciences consists of three divisions, Mineralogy, Meteorites, and Petrology. The Department of Paleobiology consists of four divisions: Invertebrate Paleontology, Vertebrate Paleontology, Paleobotany, and Sedimentology.

By direction of the Secretary, a new system was inaugurated in May whereby certain administrative duties within the Museum are rotated in order to free senior staff members for research and publication, permitting others to participate more widely in administration. While it is believed that it is at the department level that such moves are most needed, the designation of more than one full curator within a division will make it possible to rotate appointments in the divisions as well. This will be done by detailing a member of the division curatorial staff to serve as "curator in charge." The curator formerly in charge of that division will either become a senior scientist or historian or continue on the personnel rolls as a full curator. Such rotations may be scheduled by museum directors in response to recognized needs, although they will not become a matter of set schedule or routine. The title "head curator" has accordingly been discontinued, and the title for the administrative head of each department will be "chairman." The former chairman of a department may be appointed a senior scientist or continue to serve as a full curator, upon the recommendation of his Museum director.

During fiscal year 1964 the following appointments were made to the scientific staff of the Museum of Natural History: Dr. Wallace R. Ernst, associate curator of phanerogams, on July 29, 1963; David B. Lellinger, associate curator of ferns, on August 26, 1963; Dr. Richard C. Froeschner, associate curator in charge of Hemiptera, on August 26, 1963; Dr. Richard L. Zusi, associate curator of birds, on September 3, 1963; Dr. Richard B. Woodbury, associate curator of archeology, on December 15, 1963; Dr. Clayton E. Ray, associate curator of vertebrate paleontology, on December 18, 1963; Dr. Dan H. Nicolson, associate curator of phanerogams, on January 5, 1964; Dr. David L. Pawson, associate curator of marine invertebrates, on May 20, 1964; Dr. Walter H. Adey, associate curator of paleobotany, on June 30, 1964; and Dr. Richard H. Benson, associate curator of invertebrate paleontology, on June 30, 1964.

Among the additions to the staff of the Museum of History and

Technology were the appointments of Miss Deborah J. Mills, assistant curator in the chairman's office, Department of Science and Technology, on July 16, 1963; Miss Rita J. Adrosko, associate curator in the division of textiles, Department of Arts and Manufactures, on August 4, 1963; Miss Anne Castrodale, assistant curator, growth of the United States, Department of Civil History, on September 29, 1963; and Miss Uta C. Merzbach, associate curator, division of physical sciences, Department of Science and Technology, on October 28, 1963.

Mrs. Agnes Chase, world-famous agrostologist and Smithsonian honorary research associate, died on September 24, 1963.

Francis J. McCall, curator of the division of philately and postal history, died on July 20, 1963. He had headed the division since November 6, 1962, and had just begun to see the results of some of the fine programs he had inaugurated.

Miss Ellen Joy Finnegan, assistant curator in the section of growth of the United States, left the Museum of History and Technology on August 14, 1963, to accept a teaching position in Thailand. Junior curator Barbara F. Bode resigned from the numismatics division on September 20, 1963, and Anthony W. Hathaway, assistant curator in the division of cultural history, resigned on June 23, 1964.

Mrs. Jacqueline S. Olin became the research chemist to assist the conservator-in-charge of the conservation research laboratory on June 21, 1964.

Bela S. Bory, production supervisor of the Museum of History and Technology exhibits laboratory, accepted another governmental position and left the office of exhibits on June 27, 1964.

Respectfully submitted.

FRANK A. TAYLOR, *Director.*

S. DILLON RIPLEY,
Secretary, Smithsonian Institution.

Report on the International Exchange Service

SIR: I have the honor to submit the following report on the activities of the International Exchange Service for the fiscal year ended June 30, 1964:

The original plan of organization of the Smithsonian Institution presented to the Board of Regents by Joseph Henry in 1847 provided for a system of exchange of current publications which would afford the Smithsonian Institution the most ready means of entering into friendly relations and correspondence with all the learned societies in the world and of enriching the Smithsonian library with the current transactions and proceedings of foreign institutions.

When the first of the Smithsonian's long series of scientific publications, *Ancient Monuments of the Mississippi Valley*, was issued, copies were sent to scientific and learned institutions abroad. In return, the Smithsonian Institution received many valuable publications from foreign institutions. To continue this desirable international exchange of scientific information, the Smithsonian Institution appointed agents in a number of foreign countries to distribute the publications received from the Smithsonian Institution and to forward to the Smithsonian Institution the publications received from the foreign institutions.

In 1851 the privilege of transmitting scientific, cultural, and literary publications through the Smithsonian Institution to other countries, and of receiving similar publications from foreign institutions in return, was extended to Government agencies and a number of scientific societies in the United States. This opportunity to distribute their publications abroad was eagerly accepted and the system grew so rapidly that today most Government agencies, many universities, and scientific organizations representing every State in the Union utilize the International Exchange Service. The International Exchange Service functions as a medium for developing and executing in part the broad and comprehensive objective of the Smithsonian Institution—"the increase and diffusion of knowledge among men." This service has grown from a few hundred packages of publications transmitted per year to more than a million packages during the past fiscal year.

Publications weighing 891,148 pounds were received during the year from Government bureaus and departments, congressional committees, members of Congress, universities, agricultural experiment stations, learned societies, scientific organizations, and individuals for transmission to addressees in more than 100 different countries. Representative of these publications are the following: *Language, Journal of the Linguistic Society of America; Journal of the National Education Association; Journal of Science; Yale University Bulletin; Yearbook of the Carnegie Institution; Zoologica; Transactions of the American Association of Physicians; Expedition; Brevoria; Oregon Law Review; Museum of Art Register; Paleontological Contributions; Anthropological Record; Novitates; Proceedings of the American Philosophical Society; Contributions of the Scripps Institution of Oceanography; and Proceedings of the California Academy of Sciences.*

Publications are accepted for transmission to addressees in all countries except to the mainland of China, North Korea, and Communist-controlled areas of Viet-Nam. Packages of publications from domestic sources intended for addressees in the United States or in a territory subject to the jurisdiction of the United States are not accepted for transmission.

Listed below are the names and addresses of the foreign exchange bureaus to whom the International Exchange Service forwards addressed packages of publications for distribution.

LIST OF EXCHANGE SERVICES

- AUSTRIA: Austrian National Library, Vienna.
- BELGIUM: Service des Échanges Internationaux, Bibliothèque Royale de Belgique, Bruxelles.
- CHINA: National Central Library, Taipei, Taiwan.
- CZECHOSLOVAKIA: Bureau of International Exchanges, University Library, Prague.
- DENMARK: Institut Danois des Échanges Internationaux, Bibliothèque Royale, Copenhagen.
- EGYPT: Government Press, Publications Office, Bulaq, Cairo.
- FINLAND: Library of the Scientific Societies, Helsinki.
- FRANCE: Service des Échanges Internationaux, Bibliothèque Nationale, Paris.
- GERMANY (Eastern): Deutsche Staatsbibliothek, Berlin.
- GERMANY (Western): Deutsche Forschungsgemeinschaft, Bad Godesberg.
- HUNGARY: Service Hongrois des Échanges Internationaux, Országos Széchenyi Könyvtár, Budapest.
- INDIA: Government Printing and Stationery Office, Bombay.
- INDONESIA: Minister of Education, Djakarta.
- ISRAEL: Jewish National and University Library, Jerusalem.
- ITALY: Ufficio degli Scambi Internazionali, Ministero della Pubblica Istruzione, Rome.
- JAPAN: Division for Interlibrary Services, National Diet Library, Tokyo.

- KOREA: National Central Library, Seoul.¹
- NETHERLANDS: International Exchange Bureau of the Netherlands, Royal Library, The Hague.
- NEW SOUTH WALES: Public Library of New South Wales, Sydney.
- NEW ZEALAND: General Assembly Library, Wellington.
- NORWAY: Service Norvégien des Échanges Internationaux, Bibliothèque de l'Université Royale, Oslo.
- PHILIPPINES: Bureau of Public Libraries, Department of Education, Manila.
- POLAND: Service Polonais des Échanges Internationaux, Bibliothèque Nationale, Warsaw.
- PORTUGAL: Serviço Português de Trocas Internacionais, Biblioteca Nacional, Lisbon.
- QUEENSLAND: Bureau of International Exchange of Publications, Chief Secretary's Office, Brisbane.
- RUMANIA: International Exchange Service, Biblioteca Centrala de Stat, Bucharest.
- SOUTH AUSTRALIA: South Australian Government Exchanges Bureau, Government Printing and Stationery Office, Adelaide.
- SPAIN: Junta de Intercambio y Adquisición de Libros y Revistas para Bibliotecas Públicas, Ministerio de Educación Nacional, Madrid.
- SWEDEN: Kungliga Biblioteket, Stockholm.
- SWITZERLAND: Service Suisse des Échanges Internationaux, Bibliothèque Centrale Fédérale, Berne.
- TASMANIA: Secretary of the Premier, Hobart.
- TURKEY: National Library, Ankara.
- UNION OF SOUTH AFRICA: Government Printing and Stationery Office, Cape Town.
- UNION OF SOVIET SOCIALIST REPUBLICS: Bureau of Book Exchange, State Lenin Library, Moscow.
- VICTORIA: State Library of Victoria, Melbourne.
- WESTERN AUSTRALIA: State Library, Perth.
- YUGOSLAVIA: Bibliografski Institut FNRJ, Belgrade.

The Smithsonian Institution received during the fiscal year 664,067 publications weighing 250,677 pounds for transmission to the recipients of the full sets of official United States Government publications, and 69,436 publications weighing 45,823 pounds for transmission to the recipients of the partial sets. The recipients of the full sets receive copies of all of the official publications, while the recipients of the partial sets receive a selected list of the official publications.

RECIPIENTS OF THE FULL SETS

- ARGENTINA: División Biblioteca, Ministerio de Relaciones Exteriores y Culto, Buenos Aires.
- AUSTRALIA: National Library of Australia, Canberra.
- NEW SOUTH WALES: Public Library of New South Wales, Sydney.
- QUEENSLAND: Parliamentary Library, Brisbane.
- SOUTH AUSTRALIA: Public Library of South Australia, Adelaide.
- TASMANIA: Parliamentary Library, Hobart.
- VICTORIA: State Library of Victoria, Melbourne.
- WESTERN AUSTRALIA: State Library, Perth.

¹ Change in name.

- AUSTRIA: Administrative Library, Federal Chancellery, Vienna.
- BELGIUM: Service Belge des Échanges Internationaux, Bruxelles.
- BRAZIL: Biblioteca Nacional, Rio de Janeiro.
- BURMA: Government Book Depot, Rangoon.
- CANADA: Library of Parliament, Ottawa.
 MANITOBA: Provincial Library, Winnipeg.
 ONTARIO: Legislative Library, Toronto.
 QUEBEC: Library of the Legislature of the Province of Quebec.
 SASKATCHEWAN: Legislative Library, Regina.
- CEYLON: Department of Information, Government of Ceylon, Colombo.
- CHILE: Biblioteca Nacional, Santiago.
- CHINA: National Central Library, Taipei, Taiwan.
 National Chengchi University, Taipei, Taiwan.
- COLOMBIA: Biblioteca Nacional, Bogotá.
- COSTA RICA: Biblioteca Nacional, San José.
- CUBA: Dirección de Organismos Internacionales, Ministerio de Relaciones Exteriores, Habana.
- CZECHOSLOVAKIA: University Library, Prague.
- DENMARK: Institut Danois des Échanges Internationaux, Copenhagen.
- EGYPT: Bureau des Publications, Ministère des Finances, Cairo.
- FINLAND: Parliamentary Library, Helsinki.
- FRANCE: Bibliothèque Nationale, Paris.
- GERMANY: Deutsche Staatsbibliothek, Berlin.
 Free University of Berlin, Berlin-Dahlem.
 Parliamentary Library, Bonn.
- GREAT BRITAIN:
 British Museum, London.
 London School of Economics and Political Science. (Depository of the London County Council.)
- INDIA: National Library, Calcutta.
 Central Secretariat Library, New Delhi.
 Parliament Library, New Delhi.
- INDONESIA: Ministry for Foreign Affairs, Djakarta.
- IRELAND: National Library of Ireland, Dublin.
- ISRAEL: State Archives and Library, Hakiryá, Jerusalem.
- ITALY: Ministero della Pubblica Istruzione, Rome.
- JAPAN: National Diet Library, Tokyo.¹
- MEXICO: Secretaría de Relaciones Exteriores, Departamento de Información para el Extranjero, México, D.F.
- NETHERLANDS: Royal Library, The Hague.
- NEW ZEALAND: General Assembly Library, Wellington.
- NORWAY: University Library, Oslo.¹
- PERU: Sección de Propaganda y Publicaciones, Ministerio de Relaciones Exteriores, Lima.
- PHILIPPINES: Bureau of Public Libraries, Department of Education, Manila.
- PORTUGAL: Biblioteca Nacional, Lisbon.
- SPAIN: Biblioteca Nacional, Madrid.
- SWEDEN: Kungliga Biblioteket, Stockholm.
- SWITZERLAND: Bibliothèque Centrale Fédérale, Berne.
- TURKEY: National Library, Ankara.

¹ Change in name.

² Receives two sets.

UNION OF SOUTH AFRICA : State Library, Pretoria, Transvaal.
 UNION OF SOVIET SOCIALIST REPUBLICS : All-Union Lenin Library, Moscow.
 UNITED NATIONS : Library of the United Nations, Geneva, Switzerland.
 URUGUAY : Oficina de Canje Internacional de Publicaciones, Montevideo.
 VENEZUELA : Biblioteca Nacional, Caracas.
 YUGOSLAVIA : Bibliografski Institut FNRJ, Belgrade.²

RECIPIENTS OF THE PARTIAL SETS

AFGHANISTAN : Library of the Afghan Academy, Kabul.
 BELGIUM : Bibliothéque Royale, Bruxelles.
 BOLIVIA : Biblioteca del Ministerio de Relaciones Exteriores y Culto, La Paz.
 BRAZIL : MINAS GERAIS : Departamento Estadual de Estatística, Belo Horizonte.
 BRITISH GUIANA : Government Secretary's Office, Georgetown, Demerara.
 CAMBODIA : Les Archives et Bibliotheque Nationale, Phnom-Penh.
 CANADA :
 ALBERTA : Provincial Library, Edmonton.
 BRITISH COLUMBIA : Provincial Library, Victoria.
 NEW BRUNSWICK : Legislative Library, Fredericton.
 NEWFOUNDLAND : Department of Provincial Affairs, St. John's.
 NOVA SCOTIA : Provincial Secretary of Nova Scotia, Halifax.
 DOMINICAN REPUBLIC : Biblioteca de la Universidad de Santo Domingo, Santo Domingo.
 ECUADOR : Biblioteca Nacional, Quito.
 EL SALVADOR :
 Biblioteca Nacional, San Salvador.
 Ministerio de Relaciones Exteriores, San Salvador.
 GREECE : National Library, Athens.
 GUATEMALA : Biblioteca Nacional, Guatemala.
 HAITI : Bibliothéque Nationale, Port-au-Prince.
 HONDURAS :
 Biblioteca Nacional, Tegucigalpa.
 Ministerio de Relaciones Exteriores, Tegucigalpa.
 ICELAND : National Library, Reykjavik.
 INDIA :
 BOMBAY : Sachivalaya Central Library, Bombay.
 BIHAR : Revenue Department, Patna.
 KERALA : Kerala Legislature Secretariat, Trivandrum.
 UTTAR PRADESH :
 University of Allahabad, Allahabad.
 Secretariat Library, Lucknow.
 WEST BENGAL : Library, West Bengal Legislative Secretariat, Assembly House, Calcutta.
 IRAN : Imperial Ministry of Education, Tehran.
 IRAQ : Public Library, Baghdad.
 JAMAICA :
 Colonial Secretary, Kingston.
 University College of the West Indies, St. Andrew.
 LEBANON : American University of Beirut, Beirut.
 LIBERIA : Department of State, Monrovia.
 MALAYA : Federal Secretariat, Federation of Malaya, Kuala Lumpur.
 MALTA : Minister for the Treasury, Valletta.

² Receives two sets.

- NICARAGUA : Ministerio de Relaciones Exteriores, Managua.
 PAKISTAN : Central Secretariat Library, Karachi.
 PANAMA : Ministerio de Relaciones Exteriores, Panamá.
 PARAGUAY : Ministerio de Relaciones Exteriores, Sección Biblioteca, Asunción.
 PHILIPPINES : House of Representatives, Manila.
 SCOTLAND : National Library of Scotland, Edinburgh.
 SINGAPORE : Chief Secretary, Government Offices, Singapore.
 SUDAN : Gordon Memorial College, Khartoum.
 THAILAND : National Library, Bangkok.
 VIET-NAM : Direction des Archives et Bibliothèques Nationales, Saigon.

INTERPARLIAMENTARY EXCHANGE OF THE OFFICIAL JOURNALS

There are being sent on exchange through the International Exchange Service 108 copies of the daily issues of the *Congressional Record* and 86 copies of the daily issues of the *Federal Register*. Listed below are the names and addresses of the recipients of the official journals.

RECIPIENTS OF THE CONGRESSIONAL RECORD AND FEDERAL REGISTER

ARGENTINA :

- Biblioteca del Poder Judicial, Mendoza.³
 Dirección General del Boletín Oficial e Imprentas, Buenos Aires.
 Cámara de Diputados Oficina de Información Parlamentaria, Buenos Aires.

AUSTRALIA :

- National Library of Australia, Canberra.
 NEW SOUTH WALES : Library of Parliament of New South Wales, Sydney.
 QUEENSLAND : Chief Secretary's Office, Brisbane.
 VICTORIA : State Library of Victoria, Melbourne.³
 WESTERN AUSTRALIA : Library of Parliament of Western Australia, Perth.

BELGIUM : Bibliothéque du Parlement, Palais de la Nation, Brussels.⁴

BRAZIL :

- Biblioteca da Câmara dos Deputados, Brasília, D.F.⁴
 Secretaria da Presidência, Rio de Janeiro.⁴

CAMBODIA : Ministry of Information, Phnom-Penh.

CAMEROON : Imprimerie Nationale, Yaoundé.³

CANADA :

- Clerk of the Senate, Houses of Parliament, Ottawa.
 Library of Parliament, Ottawa.

CEYLON : Ceylon Ministry of Defense and External Affairs, Colombo.⁴

CHILE : Biblioteca del Congreso Nacional, Santiago.⁴

CHINA :

- Legislative Yuan, Taipei, Taiwan.⁴
 Taiwan Provincial Assembly, Taiwan.¹

CUBA :

- Biblioteca del Capitolio, Habana.
 Biblioteca Pública Panamericana, Habana.³

CZECHOSLOVAKIA : Ceskoslovenska Akademie Ved, Prague.⁴

¹ Change in name.

³ *Federal Register* only.

⁴ *Congressional Record* only.

EGYPT: Ministry of Foreign Affairs, Egyptian Government, Cairo.⁴

FINLAND: Library of the Parliament, Helsinki.⁴

FRANCE:

Bibliothèque Assemblée Nationale, Paris.

Bibliothèque Conseil de la République, Paris.

Library, Organization for European Economic Cooperation, Paris.⁴

Bibliothèque du Conseil de l'Europe, Strasbourg.^{1,4}

Service de la Documentation Étrangère Assemblée Nationale, Paris.⁴

GABON: Secretary General, Assemblée Nationale, Libreville.⁴

GERMANY:

Amerika Institut der Universität München, München.⁴

Archiv, Deutscher Bundestag, Bonn.

Bibliothek des Instituts für Weltwirtschaft an der Universität Kiel,
Kiel-Wik.

Bibliothek Hessischer Landtag, Wiesbaden.⁴

Deutsches Institut für Rechtswissenschaft, Potsdam-Babelsberg II.²

Deutscher Bundesrat, Bonn.⁴

Deutscher Bundestag, Bonn.⁴

Hamburgisches Welt-Wirtschafts-Archiv, Hamburg.

Westdeutsche Bibliothek, Marburg, Hessen.^{4,6}

GHANA: Chief Secretary's Office, Accra.⁴

GREAT BRITAIN:

Department of Printed Books, British Museum, London.

House of Commons Library, London.⁴

N.P.P. Warehouse, H.M. Stationery Office, London.^{3,6}

Printed Library of the Foreign Office, London.⁴

Royal Institute of International Affairs, London.⁴

GREECE: Bibliothèque Chambre des Députés, Hellénique, Athens.

GUATEMALA: Biblioteca de la Asamblea Legislativa, Guatemala.

HAITI: Bibliothèque Nationale, Port-au-Prince.

HONDURAS: Biblioteca del Congreso Nacional, Tegucigalpa.

HUNGARY: Országos Széchenyi Könyvtár, Budapest.

INDIA:

Civil Secretariat Library, Lucknow, United Provinces.³

Jammu and Kashmir Constituent Assembly, Srinagar.⁴

Legislative Assembly, Government of Assam, Shillong.⁴

Legislative Assembly Library, Lucknow, United Provinces.

Kerala Legislature Secretariat, Trivandrum.⁴

Madras State Legislature, Madras.⁴

Parliament Library, New Delhi.

Gokhale Institute of Politics and Economics, Poona.⁴

IRELAND: Dail Eireann, Dublin.⁴

ISRAEL: Library of the Knesset, Jerusalem.

ITALY:

Biblioteca Camera dei Deputati, Rome.

Biblioteca del Senato della Repubblica, Rome.

International Institute for the Unification of Private Law, Rome.³

Periodicals Unit, Food and Agriculture Organization of the United Nations,
Rome.³

¹ Change in name.

² Federal Register only.

³ Congressional Record only.

⁴ Three copies.

⁵ Two copies.

IVORY COAST: Chef des Services Legislatifs, Assemblée Nationale, Abidjan.^{4,7}

JAPAN:

Library of the National Diet, Tokyo.

Ministry of Finance, Tokyo.

JORDAN: Parliament of the Hashemite Kingdom of Jordan, Amman.⁴

KOREA: Library, National Assembly, Seoul.

LUXEMBOURG: Assemblée Commune de la C.E.C.A., Luxembourg.

MEXICO:

Dirección General de Información, Secretaría de Gobernación, México, D.F.

Biblioteca Benjamin Franklin, México, D.F.

AGUASCALIENTES: Gobernador del Estado de Aguascalientes, Aguascalientes.

BAJA CALIFORNIA: Gobierno del Estado de Baja California, Mexicali.³

CAMPECHE: Gobernador del Estado de Campeche.

CHIAPAS: Gobernador del Estado de Chiapas, Tuxtla Gutiérrez.

CHIHUAHUA: Gobernador del Estado de Chihuahua, Chihuahua.

COAHUILA: Periódico Oficial del Estado de Coahuila, Palacio de Gobierno, Saltillo.

COLIMA: Gobernador del Estado de Colima, Colima.

GUANAJUATO: Secretaría General de Gobierno del Estado, Guanajuato.³

JALISCO: Biblioteca del Estado, Guadalajara.

MÉXICO: Gaceta del Gobierno, Toluca.

MICHOACÁN: Secretaría General de Gobierno del Estado de Michoacán, Morelia.

MORELOS: Palacio de Gobierno, Cuernavaca.

NAYARIT: Gobernador de Nayarit, Tepic.

NUEVO LEÓN: Biblioteca del Estado, Monterrey.

OAXACA: Periódico Oficial, Palacio de Gobierno, Oaxaca.²

PUEBLA: Secretaría General de Gobierno, Puebla.

QUERÉTARO: Secretaría General de Gobierno, Sección de Archivo, Querétaro.

SINALOA: Dirección del Periódico Oficial 'El Estado de Sinaloa, Culiacán.³

SONORA: Gobernador del Estado de Sonora, Hermosillo.

TAMAULIPAS: Secretaría General de Gobierno, Victoria.

VERACRUZ: Gobernador del Estado de Veracruz, Departamento de Gobernación y Justicia, Jalapa.

YUCATÁN: Gobernador del Estado de Yucatán, Mérida.

NETHERLANDS: Koninklijke Bibliotheek, The Hague.³

NEW ZEALAND: General Assembly Library, Wellington.

NIGERIA:

Office of the Clerk of the Legislature, Enugu.⁴

Office of the Western Nigeria Legislature, Ibadan.^{4,7}

NORWAY: Library of the Norwegian Parliament, Oslo.

PAKISTAN: Secretary, Provincial Assembly West Pakistan, Lahore.⁴

PANAMA: Biblioteca Nacional, Panama City.⁴

PHILIPPINES: House of Representatives, Manila.

POLAND: Kancelaria Rady Państwa, Biblioteka Sejmowa, Warsaw.

RHODESIA AND NYASALAND: Federal Assembly, Salisbury.²

RUMANIA: Biblioteca Centrala de Stat RPR, Bucharest.

RWANDA: Service de la Législation, Cabinet du Président, Kigali.^{2,7}

SENEGAL: Secrétaire-Général, Assemblée Nationale, Dakar.^{4,7}

SIERRA LEONE: Office of the Clerk, House of Representatives, Freetown.^{4,7}

¹ Change in name.

² Federal Register only.

⁴ Congressional Record only.

⁷ Added during the year.

SPAIN : Boletín Oficial del Estado, Presidencia del Gobierno, Madrid.²

SWEDEN : Universitetsbiblioteket, Uppsala.

SWITZERLAND :

International Labour Office, Geneva.^{3,6}

Library, United Nations, Geneva.

TANGANYIKA : Library, University College, Dar es Salaam.⁴

TOGO : Ministère d'État, de l'Intérieur, de l'Information et de la Presse, Lomé.

UGANDA : National Assembly of Uganda, Parliament House, Kampala.^{4,7}

UNION OF SOUTH AFRICA :

CAPE OF GOOD HOPE : Library of Parliament, Cape Town.

TRANVAAL : State Library, Pretoria.

UNION OF SOVIET SOCIALIST REPUBLICS : Fundamental'nii Biblioteka Obshchestvennykh Nauk, Moscow.

UPPER VOLTA :

Président de la Commission des Affaires Sociales et Culturelles, Assemblée Nationale, Ouagadougou.^{4,7}

Chef de Cabinet, Présidence, Ouagadougou.^{3,7}

URUGUAY : Diario Oficial, Calle Florida 1178, Montevideo.

YUGOSLAVIA : Bibliografski Institut FNRJ, Belgrade.⁹

During the fiscal year 1964, the International Exchange Service received for transmission publications weighing over 1 million pounds from foreign and domestic sources—the largest amount of publications received for transmission during any one year by the Service. The number and weight of the packages of publications received from sources in the United States for transmission abroad, and the number and weight of packages received from foreign sources intended for domestic addresses, are classified for fiscal 1964 in table 1.

Publications weighing 118,091 pounds were received during the year from foreign sources for distribution to addresses in the United States.

Publications weighing 621,353 pounds, 69.7 percent of the total received for transmission abroad, were forwarded by ocean freight at a cost to the Smithsonian Institution of \$36,187 or approximately 5.8 cents per pound.

Packages of publications are mailed directly to the addresses in the countries that do not have exchange bureaus. During the past fiscal year publications weighing 269,773 pounds, 30.3 percent of the total received for transmission abroad, were mailed to the intended addresses, at a cost of \$63,073 or approximately 23.4 cents per pound.

² Federal Register only.

⁴ Congressional Record only.

⁶ Two copies.

⁷ Added during the year.

TABLE 1.—*The number and weight of outgoing and incoming packages handled by the International Exchange Service, fiscal year 1964*

Classification	Received by the Smithsonian Institution for transmission			
	For transmission abroad		For distribution in the United States	
	Number of packages	Weight in pounds	Number of packages	Weight in pounds
U.S. parliamentary documents received for transmission abroad.....	744, 398	339, 842	-----	-----
Publications received from foreign sources for U.S. parliamentary addressees.....	-----	-----	8, 297	11, 038
U.S. departmental documents received for transmission abroad.....	285, 071	289, 263	-----	-----
Publications received from foreign sources for U.S. departmental addressees.....	-----	-----	5, 937	13, 749
Miscellaneous scientific and literary publications received for transmission abroad.....	205, 890	262, 043	-----	-----
Miscellaneous scientific and literary publications received from abroad for distribution in the United States.....	-----	-----	54, 016	93, 304
Total.....	1, 235, 359	891, 148	68, 250	118, 091
Total packages received.....	1, 303, 609	-----	-----	-----
Total pounds received.....	-----	-----	-----	1,009,239

The chart on the opposite page gives the comparative weight of the packages of publications received for transmission through the Service between the years 1850 and 1964, by 5-year periods.

Respectfully submitted.

J. A. Collins, *Chief.*

S. Dillon Ripley,
Secretary, Smithsonian Institution.

CHART 1.—Comparative weight of packages received for transmission through the International Exchange Service between 1850 and 1964, by 5-year periods

FIVE YEAR PERIOD	EACH COLUMN EQUAL TO 200,000 POUNDS	WEIGHT IN POUNDS
1850 - 1854		46,696
1855 - 1859		95,154
1860 - 1864		96,609
1865 - 1869		113,750
1870 - 1874		159,409
1875 - 1879		364,495
1880 - 1884		613,888
1885 - 1889		763,257
1890 - 1894		1,102,742
1895 - 1899		1,452,485
1900 - 1904		2,261,814
1905 - 1909		2,327,420
1910 - 1914		2,775,150
1915 - 1919	A.	1,532,463
1920 - 1924		2,794,213
1925 - 1929		2,833,276
1930 - 1934		3,270,362
1935 - 1939		3,206,444
1940 - 1944	B.	1,734,428
1945 - 1949		3,066,323
1950 - 1954		4,098,909
1955 - 1959		3,954,631
1960 - 1964		4,676,366

A. INTERRUPTION TO THE SERVICE DUE TO WORLD WAR I.
 B. INTERRUPTION TO THE SERVICE DUE TO WORLD WAR II.

Report on the Bureau of American Ethnology

SIR: I have the honor to submit the following report on the field researches, office work, and other operations of the Bureau of American Ethnology during the fiscal year ended June 30, 1964, conducted in accordance with the act of Congress of April 10, 1928, as amended August 22, 1949, which directs the Bureau "to continue independently or in cooperation anthropological researches among the American Indians and the natives of lands under the jurisdiction or protection of the United States and the excavation and preservation of archeologic remains."

SYSTEMATIC RESEARCHES

Dr. Frank H. H. Roberts, Jr., devoted most of the first quarter of the fiscal year to office duties and to general supervision of the activities of the Bureau and the River Basin Surveys. In mid-October he went on extended sick leave and retired on June 5, 1964, after 37 years 10 months of service. During his absence from the office and the period from his retirement to the end of the fiscal year, Dr. Henry B. Collins assumed administrative responsibility for the Bureau as acting director, and Dr. Robert L. Stephenson functioned in a similar capacity for the River Basin Surveys.

In August, Dr. Henry B. Collins, anthropologist, made a trip to L'Anse aux Meadows, northern Newfoundland, on behalf of the National Geographic Society, to check the authenticity of an archeological site which its discoverer, Helge Ingstad, of Oslo, Norway, believed to be of Norse origin. As a result of his examination of the site, Dr. Collins was able to verify this conclusion. The ruins of sod-walled houses excavated by Mr. Ingstad at L'Anse aux Meadows are definitely not Indian or Eskimo, and there is nothing to indicate that they were the work of later English, French, or Portuguese fishermen. On the other hand, the house ruins and associated features are closely similar to those found at Viking sites in Greenland and Iceland. Thirteen radiocarbon dates, based on charcoal from the house ruins, cluster around the year A.D. 1000. This is the period of the Vinland voyages, when, according to the sagas, Leif Ericson, Thorfinn Karlsefni, and other Norsemen sailed westward and discovered the American mainland.

Dr. Collins continued to serve as a member of the board of governors of the Arctic Institute of North America, as a member of its publications committee and as chairman of the committees directing two of the Arctic Institute's projects—a Russian translation program and the *Arctic Bibliography*. The latter is a comprehensive reference work which abstracts and indexes in English the contents of publications in all languages and in all fields of science pertaining to the Arctic and subarctic regions of the world. This work, which is supported by a number of military and civilian agencies of the United States and Canada, began operating in 1947, and to date has published 11 large volumes containing abstracts of 69,455 scientific publications on the Arctic. The other Arctic Institute project being carried out under Dr. Collins' direction, *Anthropology of the North: Translations from Russian Sources*, continued its operations under a renewed grant from the National Science Foundation. The latest volume in the translation series, *Studies in Siberian Shamanism*, edited by Dr. Henry N. Michael, was published by the University of Toronto Press in December 1963.

Dr. Robert L. Stephenson was transferred on September 29, 1963, from chief of the Missouri Basin Project, River Basin Surveys, Lincoln, Nebr., to the regular staff of the Bureau of American Ethnology as assistant director of the River Basin Surveys. He has devoted his time to familiarizing himself with the activities of the Washington headquarters of the River Basin Surveys, to the general supervision of that unit, and to sorting materials and writing his reports on past field researches. In November he attended the Southeastern Archeological Conference in Macon, Ga. He spent the period November 29 to December 5 in Lincoln, Nebr., consulting with representatives of the National Park Service and State cooperative agencies on research plans for the River Basin Surveys for the coming year. On February 12-13 he participated in the annual meeting of the Committee for the Recovery of Archeological Remains, in Washington, D.C., and detailed the program of systematic researches of the River Basin Surveys. During May 7-9 he attended the annual meeting of the Society for American Archeology at Chapel Hill, N.C. On May 10 he was the featured speaker at the semiannual meeting of the Maryland Archeological Society in Washington, D.C., and presented an illustrated lecture on the "Archeology of the Middle Atlantic Seaboard Area."

During the early part of the fiscal year, Dr. William C. Sturtevant, ethnologist, was engaged in completing his paper on "Studies in Ethnoscience" (still in press at the end of the year) and in preparing for a year's field work in Burma. In July he flew to Gainesville, Fla., to work with Dr. Irving Rouse, of Yale University, and Dr. Charles

H. Fairbanks, of the University of Florida, on projects concerning the editing of the obituary and collected writings of the late Dr. John W. Goggin. He also advised the University's Department of Anthropology on the disposition of the Goggin manuscripts, notes, papers, etc., and outlined plans for the publication of nearly completed manuscripts.

Publications issued by Dr. Sturtevant during the fiscal year 1964 included the translation and annotation of "A Jesuit Missionary in South Carolina, 1569-70," by Father Juan Rogel, pp. 167-175 in *The Indian and the White Man* (edited by Wilcomb E. Washburn); (with John M. Goggin) "The Calusa, a Stratified, Non-Agricultural Society (with notes on sibling marriage)," pp. 179-219 in *Explorations in Cultural Anthropology: Essays Presented to George Peter Murdock* (edited by W. H. Goodenough); "Five Civilized Tribes," *Encyclopedia Britannica*, vol. 9, pp. 396-397; "Seminole," *Encyclopedia Britannica*, vol. 20, p. 313H; "John White's Contributions to Ethnology," pp. 37-43 in vol. 1 of *The American Drawings of John White, 1577-1590* (edited by Paul H. Hulton and David B. Quinn); and obituary of John M. Goggin, 1916-1963, *American Anthropologist*, vol. 66, No. 2, pp. 385-394.

Dr. Sturtevant¹ left the country on October 4 for Burma, to undertake field work supported by a grant from the National Science Foundation.

From July to October Dr. Robert M. Laughlin, ethnologist, continued field work in Chiapas, Mexico, where he recorded and translated a series of 251 dreams of the Tzotzil Indians of Zinacantán, Chiapas. He discovered that dreams are recognized by the natives to be a form of mental telepathy, a two-way communications system, whereby the dreamer's soul is in contact with the divine and with the souls of fellow (usually hostile) mortals. Dreams are held to be an indication of an individual's success in withstanding enemy attack.

Dr. Laughlin spent November and December in Santa Fe, N. Mex., accompanied by two Zinacantec informants who provided additional material for the compilation of a Tzotzil dictionary. His time in Washington was devoted to continuing research on his dictionary which involved the study of 17th- and 18th-century Tzotzil-Spanish manuscripts. He selected much of his own textual materials for use by the Coordinated Study of Tzeltal-Tzotzil Drinking of the University of Rochester. Selections of music from Zinacantán and Martinique were contributed to the Cantometrics Research Project of Columbia University for cross-cultural analysis.

In collaboration with Dr. B. N. Colby, of the Laboratory of Anthropology, Museum of New Mexico, Dr. Laughlin initiated a computer

¹ Temporarily transferred to Smithsonian private roll.

analysis of the values expressed in Tzotzil myths and dreams. It is hoped that the results will demonstrate in specific terms the close relationship between mythic and oneiric expression.

A chapter on Zinacantec dream interpretation written by Dr. Laughlin was accepted for publication in *Ensayos Sobre Zinacantán* (E. Z. Vogt, ed.). His chapter, entitled "Tzotzil," for the *Handbook of Middle American Indians*, is in preparation.

In addition, Dr. Laughlin attended the 62d annual meeting of the American Anthropological Association (San Francisco, November 21-24) in company with his Zinacantec informants. A journal of their travels in Mexico and the United States was written by the informants in their native language. Dr. Laughlin conducted library research at Harvard University (May 27-29) and participated in an informal conference at Palo Alto (June 4-6) as a consultant for the Chicago-Harvard-Stanford Chiapas Aerial Survey Project.

RIVER BASIN SURVEYS

(Prepared by Robert L. Stephenson, acting director, from data submitted by staff members)

The River Basin Surveys, a unit of the Bureau of American Ethnology, continued its activities throughout the year. This unit was organized in 1945 to cooperate with the National Park Service and the Bureau of Reclamation of the Department of the Interior, the Corps of Engineers of the Department of the Army, and State and local institutions in the program for salvage archeology in areas to be flooded or otherwise destroyed by the construction of large dams. Its purpose has remained the same over the years and its activities during the current year were directed toward the same objectives. The research investigations during 1963-64 were supported by a transfer of \$254,500 from the National Park Service and a carryover of \$95,768 of Missouri Basin money to support investigations within the Missouri River Basin. Additional funds were available from two other sources. A previous grant from the Appalachian Power Co. had a carryover of \$5,038 to support the research along the Roanoke River in southern Virginia at the Smith Mountain Project. Another earlier contribution by the Idaho Power Co. to support the researches in the Hells Canyon Reservoir area on the Snake River in Oregon and Idaho had a carryover of \$4,080. The latter investigation was carried on as a cooperative project between the River Basin Surveys and the Museum of Idaho State University at Pocatello. The grand total of funds available for the River Basin Surveys in 1963-64 was \$359,386.

Field researches consisted largely of surveys and excavations. Most

of the work was concentrated in the digging or testing of sites, but surveys were made in four new reservoir areas in North Dakota and one new reservoir area in South Dakota. At the beginning of the fiscal year there were 12 crews at work. One field crew was operating in the Smith Mountain Reservoir area in southern Virginia, seven parties were at work in the Oahe and Big Bend Reservoir areas of South Dakota, one party was excavating in the Yellowtail Reservoir area in Montana and Wyoming, and another was working in the Pony Creek drainage area in Iowa. A special crew was in Lawrence, Kans., studying human skeletal remains from the Oahe Reservoir, and one survey team was at work in North and South Dakota. During the second quarter of the year, parties worked briefly in Alabama, Nebraska, and Wyoming. In May two brief surveys were made in South Dakota, and in June nine parties began major operations in the Missouri Basin, where they were at work at the end of the fiscal year.

As of June 30, 1964, archeological surveys and excavations had been made, since the start of the salvage program, in a total of 269 reservoir areas, located in 29 States, as well as in 2 lock projects, 4 canal areas, and 2 watershed areas. Since 1946, when the field work of the program got underway, 5,040 sites have been located and recorded; of that number 1,186 were recommended for excavation or limited testing. Because of the emergency conditions under which the salvage program must operate, it is rarely possible to fully excavate a site. "Excavation," as used here, usually means that about 10 percent of the site was dug. By the end of the fiscal year, 526 sites in 55 reservoir basins and 2 watershed areas had been tested or excavated to a degree where good information about them had been obtained. These sites range in nature from simple camping areas, once occupied by early hunting and gathering Indians of some 10,000 years ago, to village remains left by the historic Indians of the mid-19th century and the remains of frontier trading posts and military installations of European origin.

The results of these extensive investigations have been incorporated in technical reports that have been published in various scientific journals, in Bureau of American Ethnology Bulletins, and in the Smithsonian Miscellaneous Collections. *River Basin Surveys Papers Nos. 33-38*, constituting *Bureau of American Ethnology Bulletin 189*, were released in June. These papers pertain to excavations carried out in North Dakota, South Dakota, and Kansas. Reports of other excavations in the Dakotas and in Oregon and Idaho are now being assembled for another Bulletin. Staff members cooperated throughout the year with representatives of other Federal agencies in the preparation of short popular pamphlets about some of the major reservoir projects.

As in previous years, the River Basin Surveys received helpful cooperation from the National Park Service, the Bureau of Reclamation, the Corps of Engineers, the Geological Survey, and numerous State and local institutions. The National Park Service continued to serve as liaison, among the various agencies, both in Washington and in the field, and prepared budget estimates and justifications for the funds needed to support the salvage program. Party leaders were assisted in many ways by personnel of all the cooperating agencies, and the relationship was outstanding in all areas.

General direction and supervision of the program were continued from the main office in Washington. Work in the Missouri Basin was directed by the field headquarters and laboratory in Lincoln, Nebr. The project in Virginia was supervised by the Washington office.

Washington office.—Dr. Frank H. H. Roberts, Jr., continued the direction of the entire River Basin Surveys from the main headquarters in the Bureau of American Ethnology until October 15 when he went on sick leave. At that time, Dr. Robert L. Stephenson, who had been transferred from the field headquarters in Lincoln, Nebr., on September 30, to be assistant director, was designated acting director and served in that capacity during the remainder of the year. Carl F. Miller and Harold A. Huscher, archeologists, were based at the headquarters office throughout the year.

At the beginning of the year Mr. Huscher was in the Washington office working on his materials from the Walter F. George Reservoir area and other areas along the Chattahoochee River. At the end of October he visited the recently flooded Walter F. George Reservoir area to recheck some of the sites along the shore that were beginning to erode, and to examine sites in the vicinity of Columbus, Ga., and Montgomery, Ala., that are threatened with destruction from industrial development. During the period December 12–25, he returned to Montgomery, Ala., to assist the Montgomery Museum of Fine Arts in the emergency salvage of parts of the Shine Mound site, which was threatened with destruction by a municipal waterplant. This work was done in cooperation with David W. Chase, curator of the Montgomery Museum of Fine Arts.

On September 6–8, Mr. Huscher attended the joint Plains-Pecos Conference at Fort Burgwin, Taos, N. Mex., where he presented a paper on "Plains Influences Directly Recorded in Navajo and Western Apache Culture." In November he attended the Southeastern Archeological Conference in Macon, Ga., and presented a paper entitled "A Summary of the Walter F. George River Basin Surveys Salvage Program." His paper read at the preceding conference was published under the title "The Archaic of the Walter F. George Reservoir Area" in *Proceedings of the 19th Southeastern Archeological Conference*,

Bulletin 1, March 1964. He attended the Eastern States Archeological Conference during November 9-10 and there presented a report on "The Cool Branch Site (9QU5), Quitman County, Georgia, a Fortified Mississippian Town with Tower Bastions." He participated in a roundtable discussion of current Early Man problems at the annual meeting of Section H of the American Association for the Advancement of Science, in Cleveland, Ohio, December 26-30. Early in May he attended the annual meeting of the Society for American Archeology in Chapel Hill, N. C., and read a paper, "The Standing Boy Flint Industry, an Early Archaic Manifestation on the Chattahoochee River in Alabama and Georgia," which consisted of an interim report on three archeological sites near Columbia, Ala. The latter paper and an ethnographic background paper on aboriginal salt trade, "Salt Traders of Cibola," have been accepted for publication in professional journals.

At the beginning of the year Mr. Miller was in charge of a field party in southern Virginia. On July 28 this project was brought to a close and he returned to the office in Washington. During the remainder of the year he devoted his time to research on some of his past fieldwork. He completely revised and enlarged his preliminary manuscript on "Prehistoric Occupations of the Ft. Lookout Site (39-LM57), Ft. Randall Reservoir, South Dakota." He had two papers accepted for publication in *Southern Indian Studies*: "A Napier-like Pottery Vessel from Russell Cave" and "Human-headed Adornos from Western Georgia." He had one paper accepted for publication in *The Masterkey*: "Bone Flutes from Southern Virginia." He attended the annual meetings of the Southeastern Archeological Conference in Macon, Ga., early in November and presented a paper on "The Appearance of Certain Projectile Points through Time at Russell Cave, Alabama." On December 30 he presented a paper at the annual meeting of the American Association for the Advancement of Science, in Cleveland, Ohio, entitled "Paleo-Indian and Early Archaic Projectile Point Forms from Russell Cave, Northern Alabama." In February he served as judge at two science fairs in Alexandria, Va., where he evaluated 195 public-school science exhibits. He prepared a bibliography on "Hopewell Culture" and one on "The Red Paint People" to answer inquiries from college students.

On March 21 Mr. Miller presented a paper, "The Archeology of Southern Virginia," at the meeting of the Shenandoah chapter of the Archeological Society of Virginia, in Strasburg, and while there examined several local collections of Indian materials and advised the chapter on their plans for a spring excavation program. During May 7-9 he participated in the annual meeting of the Society for American Archeology at Chapel Hill, N.C., and presented a paper on "The

Archeological Horizons within Russell Cave, Alabama." His article "Polyhedral Cores from Northeastern Kansas," published in the *Plains Anthropologist*, was reprinted in *The Chesopican*, a journal of Atlantic coast archeology. His monograph "The Archeological Investigations at the Hosterman Site (39PO7), Oahe Reservoir Area, Potter County, South Dakota" was published as *River Basin Surveys Paper No. 35* in *Bureau of American Ethnology Bulletin 189*.

Missouri Basin.—At the end of its 18th year of operation, the Missouri Basin Project was well established in new quarters at 1835 P Street, Lincoln, Nebr. Although the move to the new location was made during fiscal year 1963, much of the new physical plant was not completed until well into the first quarter of 1964. For the first time in many years the Project has had enough space to meet with its current and immediately foreseeable needs. Office accommodations are now adequate, storage problems have been eased, and processing facilities are vastly improved.

Activities during fiscal year 1964 included large-scale excavations, surveys, processing and analysis of materials, preparation of manuscripts, and the reporting of archeological results. During the summer months, major efforts were devoted to excavations; the remainder of the year was devoted largely to analyses and the preparation of reports. The special chronology program begun in January 1958 was continued throughout the year. Dr. Robert L. Stephenson served as chief of the Project through the first quarter of the fiscal year. At the beginning of the second quarter he was succeeded by Dr. Warren W. Caldwell, who continued in the position through the remainder of the year.

At the beginning of the year the permanent staff, in addition to the chief, consisted of 9 archeologists, 1 administrative assistant, 1 secretary, 1 administrative clerk, 2 clerk-typists, 1 scientific illustrator, 1 photographer, and 4 museum aides. The temporary staff consisted of 73 persons. There were 3 archeologists, 2 physical anthropologists, 4 cooks, and 64 field crewmen.

During July and August, 12 field crewmen were added to the temporary staff. By the end of the last week in September the employment of all the field crewmen and cooks had been terminated, with the exception of one crewman who was later transferred to the permanent staff as museum aide. The services of all the other temporary employees were terminated by early October. Other changes in the permanent staff were: termination of positions of one museum aide, one archeologist, and the administrative clerk; the death of one museum aide, and the appointment of one museum aide and one laborer. The chief was transferred to the Bureau of American Ethnology on September 30. Additions to the temporary staff during June were 2 archeologists, 5 cooks, and 66 field crewmen.

At the end of the fiscal year the permanent staff consisted of 19 persons; these were, in addition to the chief, 7 archeologists, 1 administrative officer, 1 secretary, 1 administrative clerk (typist), 1 clerk-typist, 1 scientific illustrator, 1 photographer, 4 museum aides, and 1 laborer. The temporary staff consisted of 73 persons. There were 2 archeologists, 5 cooks, and 66 field crewmen.

During the year there were 24 Smithsonian Institution, River Basin Surveys, field parties at work in the Missouri Basin. Eleven of these were in operation during July and August, 2 during October and November, and 11 during June.

At the beginning of the year John J. Hoffman and a crew of 10 men were excavating at the La Roche sites (39ST9, 39ST232)² in the Big Bend Reservoir of central South Dakota. Site 39ST9, on the right bank of the Missouri near the mouth of P L creek, consists of about 90 house depressions scattered over an area of about 80 acres. Seven circular houses were excavated, all of which were essentially similar and which appear to be representative of the Chouteau Aspect.

The site also produced evidence of the Grand Detour Phase, an early development within the prehistoric Middle Missouri Tradition, as well as a small oval structure assignable, on the basis of the ceramics, to the Plains Woodland Phase. Fortunately, the stratigraphic evidence is clear. The Plains Woodland component precedes the Grand Detour component which in turn underlies the principal Chouteau occupation. While these temporal relationships have been recognized for some time, there have been few instances of such satisfactory superimposition.

Site 39ST232 occupies something less than 40 acres of level terrace $1\frac{1}{2}$ miles north of 39ST9. Of the six or seven depressions visible, two were investigated. Both proved to contain circular houses of the Chouteau Aspect. However, one was distinctive in its large diameter (75 feet) and in the presence of six central support posts instead of the usual pattern of four. On the basis of artifacts and architectural evidence, the Chouteau components of 39ST232 and 39ST9 appear to be intimately related. The field party completed work on August 30, after 79 days in the field.

A second field party of nine men, directed by Richard E. Jensen, was at work in the cul-de-sac in the central part of the Big Bend Reservoir. This region, on the left bank of the Missouri, within the great bend that gives the reservoir its name, contains a large number

² Site designations used by the River Basin Surveys are trinomial in character, consisting of symbols for State, county, and site. The State is indicated by the first number, according to the numerical position of the State name in an alphabetical list of the United States; thus, for example, 32 indicates North Dakota, 39 indicates South Dakota. Counties are designated by a two-letter abbreviation; for example, ME for Mercer County, MN for Mountrail County, etc. The final number refers to the specific site within the indicated State and county.

of archeological sites. Although 10 of them were excavated or tested by the field group, results were not encouraging. Apparently the area was occupied quite extensively but cultural debris is scanty and the habitation sites thin.

At the Gregg site (39HY222), one of the largest in the pocket, portions of two earth lodges were excavated and five interhouse areas were tested. A single circular lodge and several tests were dug at the Fry site (39HU223), two lodges were exposed at site 39HU224 nearby, and a lodge and two large cache pits were cleared at the Hawk site (39HU238). Architectural features were not found at the remaining sites, but several clusters of exterior cache pits were cleared at the Saint John site (39HU213) and artifact collections were made at sites 39HU225, 39HU230, 39HU231, 39HU249, and 39HU250.

The earth-lodge structures excavated within the area of the cul-de-sac are all quite similar. Each was circular, with an irregular pattern of wall posts and four central supports. Entrance passages, where found, opened to the south or southwest. A small central hearth was characteristic and there were usually secondary firepits and one or more small basin-like or bell-shaped cache pits.

Ceramics were preponderantly simple-stamped, with Talking Crow and "Category B" rims most usual. Other artifacts were not distinctive, and except for several copper pendants and an iron blade hafted in a split bison rib from the Hawk site, there was no evidence of European contact.

On August 12 Jensen transferred his field party to the right bank of the Missouri where he assisted Hoffman in the excavation of the La Roche sites. The party completed work on August 23, after 72 days in the field.

At the beginning of the year, a third party of nine men, directed by William J. Folan, was assisting John J. Hoffman in excavations at the La Roche sites. On July 16 the Folan party moved to the left bank of the Missouri to begin work at the Chapelle Creek or Grandle site (39HU60), a large, fortified, multicomponent village in the central Big Bend Reservoir. Extensive trenching, exposing sections of three houses, a section of the defensive ditch, and a number of other features, was completed. Evidence of the earliest occupation consists solely of artifacts that are invariably found in the prehistoric, rectangular house complexes of the Big Bend region. The second component consists of the fortified settlement proper, which seems to be attributable to the historic Stanley-Le Beau complexes usually regarded as Arikara. The uppermost deposits contain additional European materials that are suspected to be the remains of a small (and poorly documented) trading post. In view of our present knowledge of the early history of the Big Bend region, it may be difficult, if not impos-

sible, to distinguish the traders' remains from those of the 18th-century Arikara.

During the first half of the field season the Folan group shared camp facilities with the Hoffman crew. The party completed work in August 30, after 79 days in the field.

At the beginning of the year a fourth party of five men, directed by G. Hubert Smith, was investigating historic sites within the Big Bend Reservoir. Excavations were made at the Red Cloud Agency (39LM247), on the right bank of the Missouri near Medicine Creek. The Agency, established for the Oglala Sioux, under Red Cloud, was used only briefly (1877-78) before the group was settled permanently on the Pine Ridge Reservation. Although little survived at the Red Cloud site (apparently the buildings had been systematically removed), some structural details were recovered together with a small group of representative specimens.

A thorough search was made of Dorion or Cedar Island, near the mouth of Cedar Creek, for the site of a trading post established in 1802 or 1803 by Regis Loisel. Despite excellent descriptions left by members of the Lewis and Clark Expedition, the post could not be located; however, another site (39HU301) found on the island was partially excavated. Cultural remains were not abundant but the appearance of the site and the presence of a number of machine-made objects suggest that the site was occupied during the 1860's by White "squatters" who supplied wood for steamboat fuel.

An intensive reconnaissance was made near the mouth of Medicine Creek, continuing a search begun some years ago for the Fort Defiance (or Bouis) trading post known to have been in existence in the 1840's. Although there were several hopeful leads, the search was fruitless. The Smith party shared camp facilities with Hoffman's crew. They returned to Lincoln on August 30 after 79 days in the field.

Three field parties were at work in the Oahe Reservoir at the beginning of the fiscal year. The first, a crew of 10 men, directed by Robert W. Neuman, was excavating at two prehistoric sites in Dewey County on the right bank of the Missouri near Mobridge, S. Dak. The Grover Hand Mounds (39DW240) include five tumuli, one of which was excavated by Neuman in 1963. Two additional examples were dug during the current year. The first was 90 feet in diameter and slightly more than 4 feet high. It covered a central subfloor burial pit containing about 23 secondary human burials of both sexes and various ages, some of which were sprinkled with hematite. The burials were in association with a number of implements and ornaments of bone and stone. Support logs overlay the burial pit, and above was another secondary burial partly covered by an inverted basket and associated with stone and shell artifacts. On the mound floor, adjacent to the

pit, were the partially articulated skeletons of at least six bison. The second mound was much the same as the first. However, the burial pit did not contain more than 12 individuals, and there were no human remains above.

Artifact materials from the two mounds included a few cord-paddled pottery sherds, rentalium, busycon and olivella ornaments, an antler pin, worked antler butts and tines, bone awls, beads, serrated fleshers, beaver incisors, stone projectile points, matting, pigments, and a considerable variety of other materials. On the basis of burial pattern and the artifacts excavated, the Grover Hand Mounds show a very close relationship to the neighboring Swift Bird Mounds (39DW233) and to the Boundary and Baldhill Mound sites in North Dakota.

At the end of July the Neuman party shifted to the Stelzer site (39DW242) to continue excavations begun during 1963. This site is a large camp area only a short distance from the Grover Hand Mounds. The occupation level, less than $1\frac{1}{2}$ feet below the present surface, is characterized by scattered midden heaps, small firepits, and circular pits filled with detritus. There were also 17 randomly distributed bison long bones stuck vertically into the occupation surface. Artifacts from the Stelzer site, particularly projectile points and pottery, are closely comparable to those from the adjacent mound sites. There seems to be good evidence here for the first direct relationship between burial mounds and a habitation site in the northern Plains.

The party concluded work on August 23 after 74 days in the field. Subsequently, Neuman and a single crewman visited previously unreported mound sites along the Sheyenne River in Barnes County, N. Dak., and another above Wolfe Creek in the James River Valley, S. Dak.

A second party of seven men, under the leadership of Oscar L. Mallory, conducted test excavations at a large group of sites in Dewey County, along the right bank of the Missouri a short distance upstream from the mouth of the Moreau River. Site 39DW231, a small village on a terrace spur defended by two ditches, was tested extensively. A midden area, part of a circular house, and sections of the defensive system were exposed. Present evidence suggests that the principal occupation falls within the Chouteau Aspect and appears to be related to the Potts (39CD19) and No Heart (39AR1) villages of northern South Dakota.

A second fortified village, 39DW1, situated at the mouth of the Moreau River, was also tested. It differs from 39DW231 in that it lay on a higher terrace and was completely surrounded by a defensive ditch. The ceramic collections have much in common but apparently differences are such that they cannot be related on the focus level.

The remaining sites investigated, 39DW230, 39DW229, 39DW228, 39DW253, and 39DW254, were unfortified; pottery attributed to the La Roche horizon was usual. Portions of houses were excavated at 39DW228, 39DW229, and 39DW230. In each case the houses were circular with a central firepit and four central roof supports.

A number of additional sites were mapped or examined and a brief period was devoted to explorations at the Stelzer site. The latter is quite large, extending along the river for at least three-quarters of a mile. Mallory's tests were placed near the eastern end of the site. The pottery found here was identical to that found by Neuman's continuing excavations near the western edge. The Mallory party shared camp facilities with the Neuman crew, and returned to Lincoln on August 23 after 74 days in the field.

A third party of 12 men was directed by Dr. Alfred W. Bowers of the University of Idaho but temporarily attached to the Smithsonian Institution. The Bowers crew excavated at three small fortified village sites in the immediate vicinity of Mobridge, S. Dak. At the Red Horse Hawk site (39CO34), on the right bank of the Missouri, continuing work begun in the summer of fiscal year 1963, the excavation of 15 shallow circular houses was completed and the fortification ditch was tested in several places. This village, which is probably protohistoric, has produced a wealth of museum display specimens and is one of the two or three completely excavated sites within the Oahe Reservoir.

Work was also renewed at the Davis site (39CO14), a fortified village adjacent to the Red Horse Hawk site, continuing 1963 excavations. During the current season investigations were hampered by drought conditions which made the soil both intractable and "unreadable." With the use of a water wagon and power equipment, one lodge was completely excavated and the covering fill was removed from four others, but work could be carried no further.

The Davis site is an exceedingly important one because it appears to bridge the temporal gap between the rectangular and circular house complexes. The early component at the Davis site is distinctive in that lodges are placed within the bastions at the corners of the fortification, thus limiting the entrance passage to a narrow lane around the lodge.

Work was begun at the Larson site (39WW2), a small compact village on the left bank of the Missouri River south of Mobridge. The site consists of 29 circular depressions tightly clustered within an oval fortification ditch. Ten of the lodge depressions were trenched and two were completely excavated. The latter seem to have been rebuilt several times, but each new construction was smaller than the previous one. The most recent occupation seems to have been brought to an

end by the smallpox epidemic of A.D. 1780. There is no documentary evidence to this effect but human remains were strewn over the lodge floors. The skeletons of at least 30 individuals were exposed in one house, 8 in another, and there is evidence of additional skeletons in the remaining lodges. Since the deaths do not appear to have been due to violence, epidemic disease is inferred. In addition to the historic component or components at the Larson site, there are indications of an earlier Woodland occupation.

Bowers also conducted a limited survey along the now eroding banks of the Oahe Reservoir. A large collection of artifacts and bison bone was secured from the Rygh (39CA4) and Bamble (39CA6) villages where shoreline cutting has been extensive. Since the origin of these materials can be localized within the respective sites, they will be exceedingly useful for comparative studies. The party completed work on September 7 after 89 days in the field.

At the beginning of the fiscal year a field crew of five men, directed by Wilfred M. Husted, was excavating in the Yellowtail Reservoir along the Big Horn River of southern Montana and northern Wyoming. At the Mangus site (24CB221), a small rock shelter on the left bank of the river in Carbon County, Mont., three distinct occupation levels were found, the most recent of which was Late Prehistoric. A variety of artifacts was recovered here, including small triangular projectile points with and without side notches, stone knives, scrapers, fragments of sewn hide, cordage, and basketry. The middle zone carried obvious evidence of human use, but artifacts were too few to identify the nature of the occupation. The lowest level contained Agate Basin points, knives, scrapers and a mortar and pestle. Subsequently, a radiocarbon date of 1070 ± 70 B.P. (A.D. 880) was obtained from charcoal in a roasting pit found in the Late Prehistoric level, and two dates, 8690 ± 100 B.P. (6740 B.C.) and 8600 ± 100 B.P. (6650 B.C.) were secured from charcoal from the Agate Basin level.

Three other rock shelters in the vicinity, the Ledge site (24BH 252), the Greene site (24BH 253), and site 24BH255, all in Big Horn County, Mont., yielded artifacts of the Late Prehistoric Period. The Red Earth site (24BH251), another small shelter, contained a Late Prehistoric level, an unidentified occupation characterized by shallow, circular firepits, numerous small flakes, a mano and knife fragments.

Site 24BH 250, also in Big Horn County, Mont., was a small shelter with the entrance barricaded with rocks and juniper branches. A large fireplace outlined by rocks was intact on the surface, and below it was another containing burned stones and associated with a triangular projectile point.

A large, shallow, rock-filled firepit was excavated at site 24BH257, a small shelter formed by a large block fallen from the canyon wall.

Three corner-notched projectile points and several flakes were in association with the firepit. Until this site was excavated only simple triangular points or triangular points with side notches had been found with such firepits.

Three firepits, projectile points, scrapers, and a variety of worked flakes were found in tests at 24BH210, a large open site in Big Horn County. Two additional open sites, 24BH254 and 24BH259, were located in a badly eroded area, and tests showed that artifacts were restricted to the surface.

Site 24BH204 at the mouth of Porcupine Creek was tested but with negative results. Animal bone was abundant but it may have originated from gold camps that once operated at this location. Site 24BH214, about 1 mile above the mouth of Porcupine Creek, was only slightly more productive. Artifacts were limited to a corner-notched projectile point and a few scrapers.

Late in the season, the Husted party made exploratory tests at site 48BH217, in Big Horn County, Wyo., a short distance south of the Montana border. An Agate Basin point was found here in the course of land leveling for a cabin. Although tests were extensive, little of significance was recovered. The party completed its work on August 29 after 72 days in the field.

Another field party of nine men, under the direction of Lionel A. Brown, was working in the Pony Creek watershed in southwestern Iowa. A survey of the area added a number of new sites to the record, a number of tests were made, and five sites were excavated. Unfortunately, most of the endangered sites examined by the field party had been damaged in some degree by erosion or cultivation; nonetheless, architectural remains were found at four of them.

Two square houses were excavated at the Stonebrook Village (13ML219) and fragments of house floors were found at both the Downing (13ML218) and Steinheimer (13ML222) sites. The house structures ranged from 20 to 30 feet square, with deep vertical walls and entrances approaching 15 feet in length. The associated artifacts include ceramics of the Beckman and McVey series, clay effigies and pipestems, side-notched projectile points, ovoid to triangular knives, planoconvex end scrapers, pecked and chipped celts, but surprisingly very little worked bone.

The Thomas site (13ML204) contained a mixture of pottery primarily representative of the Woodland horizon and the Central Plains Tradition. The rimsherd collection includes examples of Sterns Creek, Beckman Ware, Swoboda Ware, and one example classified as Anderson Low Rim. The primary feature at the site was a pit, 20 feet square, similar to house pits reported for the Woodland of eastern Nebraska.

The Lungren site (13ML224) is an archaic camp first noted at a depth of 10 feet below the surface in a high cutbank. The cultural deposit proved to consist of a narrow (ca. 2 inches thick) zone of charcoal-stained soil mixed with large quantities of chipping debris and bone fragments. The only projectile point recovered is side-notched with basal grinding. It is similar to those from the Long Creek site in Saskatchewan, the Logan Creek and Spring Creek sites in Nebraska, and the Simonsen and Hill sites in Nebraska. Other artifacts include triangular to ovoid knives, small planoconvex end scrapers, hammerstones, chipped celts and choppers. Bone artifacts were absent. Several midden areas and a basin-shaped firepit constitute the only nonartifact features of the deposit. The party completed work on August 30 after 81 days in the field.

A special field party consisting of a varying number of students directed by Dr. William M. Bass III, assisted by Walter Birkby, was working in the laboratory at the University of Kansas, Lawrence, Kans., at the beginning of the fiscal year. Dr. Bass was continuing a study of the human skeletal remains and burial patterns from the Sully site (39SL4) begun in 1957.

A total of 557 burials was excavated from the cemeteries at the Sully Village. This is the largest single sample from a site in the Plains. It is not likely to be equaled in the immediate future. If the ethnic affiliation of the site is substantiated, the sample provides a baseline for the study of the early historic Arikara population.

In addition to observations and metric analyses, the group tabulated data on burial orientation, burial goods, and grave types. At the same time, three members of the University of South Dakota medical staff examined the physical material to record the incidence of nose, throat, and ear diseases occurring the population. Bass completed his study on August 2 after 63 days of work.

A field party, consisting of a crew of two men under the leadership of Dr. Elden Johnson, of the University of Minnesota, but temporarily attached to the Smithsonian Institution, began work on June 22 surveying several small reservoirs in North Dakota. A single, very thin, habitation site (39BE1), was found at the James River damsite in Beadle County, S. Dak. Although the area was trenched extensively, the results were minimal. No additional sites were found within the proposed reservoir, but a number of local collections that originated in adjacent areas were examined. Since the James River Dam is part of the much larger Oahe Diversion Project, these collections will become important for future research when the larger project is activated.

The Garrison Diversion Project proposes construction of four major reservoirs and an extensive system of feeder canals within eastern

North Dakota. Archeological work during the current year was concentrated within the reservoir areas since the canal routes are not yet established. The Taayer Reservoir east of Oakes, N. Dak., is presently an open water slough. No sites were found to be endangered but a probable bison kill site (32SA1) was reported here in the 1930's when the reservoir was dry. A "stone ring" site (32SA2) was recorded by the survey party but it lies in the uplands outside of the reservoir. Hamburg Reservoir on the upper James River produced no sites. New Home Reservoir, in McLean County, N. Dak., east and south of the Garrison Dam, is in a long glacial drainage trench. Only a single site, 32ML212, was found here. It consisted principally of bison bone eroding from a cutbank but a number of chalcedony flakes were found in association.

The Lone Tree Reservoir, which will include the headwaters of the Sheyenne River, held a number of sites and others were found in the immediate vicinity. Probably the most significant within the reservoir is 32SH2, a large complex of boulder burial mounds. At least 14 mounds are included, and associated habitation sites are possible. The party completed its survey on September 20. Because work was intermittent, the field season totaled only 49 days.

A postseason (October 21–November 4) field party of two men, directed by Wilfred M. Husted, excavated at Fort Laramie National Historic Site, testing in four localities that will be affected by future expansion of visitor facilities. The remains of what is probably the Ward and Guerrier trading post were found, as well as evidences of an aboriginal occupation. The latter was far too scanty to even hazard an ethnic or archeological affiliation.

Late in September representatives of the Nebraska Game, Forestation and Parks Commission contacted the Missouri Basin Project concerning certain stone and pottery artifacts found during biological research in the Little Nemaha drainage of southeastern Nebraska. The artifacts examined by the Missouri Basin Project staff included materials suggesting the presence of Stearns Creek, Logan Creek, and Agate Basin complexes. On November 12, after the heavy summer vegetation was gone, Robert W. Neuman reexamined the area in company with Nebraska game biologists. Previous find spots were examined on Brownell Creek and Wolf Creek, but unfortunately the artifacts found to date have been secondary deposits and no true occupation sites were discovered.

Cooperating institutions working in the Missouri Basin at the beginning of the fiscal year included the University of Montana, the University of South Dakota, the University of Nebraska, the University of Missouri, and the Kansas State Historical Society.

Dr. Dee C. Taylor of the University of Montana continued the

shoreline survey of Fort Peck Reservoir of east-central Montana, locating archeological sites exposed by shoreline erosion. Robert Gant of the W. H. Over Museum, University of South Dakota, surveyed the shoreline of Lewis and Clark Lake (the former Gavins Point Reservoir). Dr. Preston Holder, assisted by James Marshall with a crew of students from the University of Nebraska, began salvage excavations in the Glen Elder Reservoir of northwestern Kansas. Several University of Missouri field parties, directed by Dr. Carl H. Chapman, excavated in the Kaysinger Bluff, Stockton, and Meramec Basin Reservoirs of Missouri. Each of these field parties operated under agreements with the National Park Service and the Smithsonian Institution in the Inter-Agency Salvage Program.

The 1964 field season began with two small survey teams examining sites in the upper Big Bend Reservoir. During the winter of 1964 the Missouri Basin Project staff had become aware that the waters behind the Big Bend Dam were rising faster than had been anticipated. Under the circumstances it was impossible to plan fieldwork for the approaching summer season without a close check on the changing conditions. On April 6 and 7, Richard E. Jensen and Oscar L. Mallory of the Project staff visited archeological sites along the left bank of the reservoir between Chapelle Creek and the city of Pierre. Severe weather conditions made it impossible to examine other areas, but as of that time water damage did not appear to be extensive. The reservoir level had reached a point just below many sites, and at least one, 39HU60 at Chapelle Creek, was then an island. Another reconnaissance was made by Jensen and Lionel A. Brown on May 7 and 8, but despite a slight interim rise of water level, the archeological situation had not changed significantly.

On June 9, a group of seven men directed by Wilfred M. Husted, began work in the Yellowtail Reservoir of Montana and Wyoming. This is the third and last season of excavation within the reservoir area. Previously, Smithsonian Institution field parties had concentrated in the lower and central parts of the reservoir. This year excavations are restricted to the upper Big Horn Canyon, thus completing the investigation of major sites within the reservoir. At the end of the fiscal year the crew was surveying within the upper reservoir.

On June 10 three additional field parties began work within the Big Bend Reservoir of central South Dakota. The first, a group of nine men directed by Richard E. Jensen, was carrying out large-scale testing at the Sommers site (39ST56) on the right bank of the Missouri adjacent to the La Roche sites. It is one of the most significant villages of the Middle Missouri Tradition surviving within the reservoir. The village contains at least 70 house depressions and has a particularly

thick mantle of debris. It is probable that two or more seasons of work will be required to secure an adequate sample from the site. As a consequence, the current excavations are exploratory, designed to provide an outline for further work. As of the end of the fiscal year, tests were underway in two long-rectangular houses in preparation for the use of power equipment to remove the heavy layer of overburden.

A second field party of 11 men, under the leadership of John J. Hoffman, was excavating at site 39ST17, a compact fortified village on the right bank of the Missouri near the mouth of Fort George Creek. The site is a relatively late one and probably can be attributed to the Arikara of the 18th century. Since the village is small, it is planned to excavate the entire occupied area. By the end of the fiscal year several tests were completed and a small circular house was exposed. Artifacts were few but indicate an affiliation with the Phillip Ranch site. The Hoffman and Jensen parties shared a camp near Fort George Creek, only a short distance from 39ST17.

A third party, consisting of eight men, directed by Lionel A. Brown, was working at the Chapelle Creek site, 39HU60, continuing excavations begun during the summer of 1963. A considerable amount of material has already been excavated from the site, but much of it is inconclusive. The purpose of the Brown party is to find the necessary relationships essential to bring the previous work into focus. At the end of the fiscal year the ravages of the past winter had been repaired and excavation of a shallow earth lodge of the historic period was well underway.

On June 22, a party of three men under the leadership of David T. Jones, temporarily attached to the Smithsonian Institution, was surveying, mapping, and testing the sites remaining within the upper Big Bend Reservoir. The results of the survey will be used as a basis for selecting the sites to be investigated during the next (and probably final) year of work within the reservoir.

On June 15, two field parties, one under the general direction of Robert W. Neuman, with field supervision by Oscar L. Mallory, and the other under Mallory's direction, began work in the Oahe Reservoir. The first, consisting of nine men, was excavating at the Stelzer site (39DW242) near Mobridge, S. Dak., continuing the excavations of 1963. The second party of eight resumed work at site 39DW231, a multicomponent, fortified village first tested last year. By the end of the fiscal year both groups had removed the overwinter slumpage and had begun the excavation of a number of habitation features.

A third party of 12 men, working under the direction of Dr. Alfred W. Bowers, began excavations in the Mobridge area of the Oahe Reservoir on June 17. The Bowers party was to complete the investigation of the Red Horse Hawk (39CO14) and Larson (39WW2) sites begun during earlier field seasons. At the end of the fiscal year the

fill had been removed from several houses and a large cut had been made across the defensive ditch.

A final field party of two men, under the direction of G. Hubert Smith, conducted a survey of historic sites in the Big Bend, Oahe, and Fort Randall Reservoirs from June 23 to 28. As was the case with the aboriginal sites, high water within the reservoirs has become a threat to previously undamaged historic sites. The Smith party examined a number of sites, made a photographic record of sites now destroyed or in the process of destruction, and secured data necessary for future work.

There were seven cooperating institutions working within the Missouri Basin at the end of the fiscal year. The St. Paul Science Museum completed a survey of the Bowman-Haley Reservoir of northwestern South Dakota and in late May and in early June began a shoreline reconnaissance of the Garrison Reservoir in North Dakota. In both instances the field parties were directed by Vernon R. Helmen. University of Missouri field parties, under the direction of Dr. Carl F. Chapman, were surveying and excavating in the Stockton and Kaysinger Bluff Reservoirs in Missouri, continuing the work of past seasons. University of Nebraska parties, directed by Dr. Preston Holder, were excavating in the Glen Elder and Milford Reservoirs of northwestern Kansas. A State University of South Dakota group, led by Dr. James H. Howard, was continuing investigations within the Lewis and Clark Lake area along the border of South Dakota and Nebraska. A field group of the State Historical Society of North Dakota, under the direction of Dr. Donald J. Lehmer, was excavating at the Fire Heart Creek Village (32SI2) in the Upper Oahe Reservoir of southern North Dakota. A field party of the Kansas State Historical Society, under the general direction of Thomas A. Witty, was excavating in the Council Grove Reservoir of eastern Kansas, and a field group from Iowa State University, directed by David Gradwohl, was excavating in the Red Rock Reservoir of central Iowa.

During the period that the Missouri Basin Project archeologists were not in the field, they were engaged in analyses of their materials and in laboratory and library research. They also prepared manuscripts of technical reports and wrote articles of a popular nature. In addition to the regular staff, Dr. Alfred W. Bowers, of the University of Idaho; Dr. William M. Bass, of the University of Kansas; and Dr. Elden Johnson, of the University of Minnesota, joined the Missouri Basin Project to complete short-term laboratory and field research assignments. Dr. Bowers again became a temporary staff member on June 17, and David T. Jones, West Nottingham Academy, Maryland, on June 22. Both were on duty through the end of the fiscal year.

By the end of the fiscal year the Missouri Basin Chronology Program has been in operation 6½ years. The cooperation of other institutions and individuals within the anthropological profession continued as in the past. Dendrochronological research has been much reduced because personnel were lacking. However, some new material was studied and plans have been completed for a renewed attack during the coming year. The carbon-14 section continued to progress with the addition of 15 new dates. Eight dates, from three sites, apply to villages of both the Middle Missouri and Coalescent Tradition of the Big Bend Reservoir, central South Dakota. Three additional dates derive from two sites, a group of burial mounds and a late fortified village, in the Oahe Reservoir of northern South Dakota. The remainder date various preceramic horizons from a stratified site in the Yellowtail Reservoir, Mont. The Missouri Basin Chronology Program continued to use the facilities of Isotopes, Inc., as well as those of the division of radiation and organisms of the Smithsonian Institution.

The laboratory and office staff of the Missouri Basin Project devoted most of its effort during the year to the processing of materials for study, preparing specimen records, typing, filing, and illustrating records and manuscripts. The accomplishments of the laboratory and office staff are listed in tables 1 and 2.

During the first quarter, Dr. Robert L. Stephenson, chief, devoted most of his time to the overall management of the Missouri Basin Project, including the office and laboratory in Lincoln and the several field parties. He devoted a portion of his time to laboratory analysis of materials he had excavated in previous years. His report, "The Accokeek Creek Site: A Middle Atlantic Seaboard Culture Sequence," was published by the University of Michigan, and he submitted several book reviews for publication. Until September 30, when he assumed his new duties as assistant director of the River Basin Surveys in Washington, D.C., he continued to serve as chairman of the Missouri Basin Chronology Program, as assistant editor of "Current Research" in the Plains area for *American Antiquity*, and as editor of the *Plains Anthropologist*.

Dr. Warren W. Caldwell worked in the laboratory through the first quarter, analyzing materials excavated in the previous two field seasons. A substantial portion of a manuscript entitled, "The Grand Detour Phase: Early Village Sites in the Big Bend Reservoir, South Dakota" (with Richard E. Jensen) was completed by September 30, at which time Dr. Caldwell assumed the duties of Chief of the Missouri Basin Project. During the remainder of the year, Dr. Caldwell devoted a substantial portion of his time to the management of the Project, to budgetary matters, and to the planning of the forthcoming field

TABLE 1.—Specimens processed July 1, 1963, through June 30, 1964¹

Reservoir	Number of sites	Catalog numbers assigned	Number of specimens processed
Almena.....	1	1	2
Angus.....	2	19	60
Big Bend.....	18	5,008	39,993
Fort Scott.....	6	67	67
Garnett.....	7	62	64
Garrison Diversion Project.....	7	32	166
Gavins Point.....	1	66	527
James Diversion Project.....	1	11	22
Oahe.....	18	5,852	29,141
Pony Creek.....	14	1,025	4,590
Round Mound.....	2	13	16
Tuttle Creek.....	9	2,806	15,943
Yellowtail.....	22	1,870	5,072
Sites not in a reservoir.....	2	22	68
Total.....	110	16,854	95,731
Collections not assigned site numbers.....	6	7	20
Grand total.....	116	16,861	95,751

¹ As of June 30, 1964, the Missouri Basin Project has cataloged 1,485,104 specimens from 2,250 numbered sites and 66 collections not assigned site numbers.

Specimens restored included 2 pottery vessels and 5 vessel sections.

Specimens donated to the Missouri Basin Project included ca. 100 rim sherds and 1 vessel section from the Swan Creek site (39WW7) (donated by the South Dakota State Museum, University of South Dakota), 15 projectile points from the Rinchardt Buffalo Kill No. 2 (24LT00) (donated by Carle Leavitt of Conrad, Mont.), a surface collection from 39YK203 (donated by George Kostal and Ansel Petersen, civil engineers at the Gavins Point Dam), and a collection of pottery sherds from the Southwest (donated by Dr. Frank H. H. Roberts).

Specimens collected at Fort Laramie, Wyo., were cleaned but not cataloged by the Missouri Basin Project.

TABLE 2.—Record material processed, July 1, 1963, through June 30, 1964

MISSOURI BASIN PROJECT

Reflex copies of records.....	6,563
Photographic negatives made.....	1,299
Photographic prints made.....	7,169
Photographic prints mounted and filled.....	4,625
Transparencies mounted in glass.....	1,507
Kodachrome pictures taken in lab.....	180
Cartographic tracings and drawings.....	50
Illustrations.....	74
Lettering of plates.....	49
Profiles drawn.....	14
Plate layouts made for manuscripts.....	64

season. In addition, he continued to work with Jensen on the "Grand Detour Phase" manuscript and prepared a monograph, "Archeological Salvage Investigations in the Hells Canyon area, Snake River, Oregon and Idaho," for publication by the Bureau of American Ethnology. During the year several papers of which Dr. Caldwell was author or co-author were published. These include "Excavations in the Lower Big Bend Reservoir, South Dakota," *Plains Anthropologist*, vol. 8, No. 20, p. 118; "Taxonomy Revisited," *Plains Anthropologist*, vol. 8, No. 20, pp. 84-85; (with G. Hubert Smith) *The Oahe Reservoir: Archeology, Geology, History*, U.S. Army Corps of Engineers, Omaha, pp. 1-44; (with Lee G. Madison and Bernard Golden) "Archeological Investigations at the Hickey Brothers Site (39LM4), Big Bend Reservoir, Lyman County, South Dakota," *River Basin Surveys Papers No. 36, Bureau of American Ethnology, Bulletin 189*, pp. 267-290; "Fortified Villages in the Northern Plains," *Plains Anthropologist*, vol. 9, No. 23, pp. 1-7.

At the 20½ Plains Conference held at Pierre, S. Dak., on July 20 Dr. Caldwell spoke on the problem of the firearms trade and Plains archeology. He also attended the Governors' Conference for the Lewis and Clark Reenactment Pageant at Camp Ashland on November 19 and presented a brief statement regarding the potential contribution of the Missouri Basin Project to region-wide recreational planning. On September 6 and 7 he participated in the joint Plains-Pecos Conference at Fort Burgwin, near Taos, N. Mex., and spoke on "The LaRoche Problem." He also attended the meetings of the Committee for the Recovery of Archeological Remains, in Washington, D.C., on February 12 and 13; the 74th Meeting of the Nebraska Academy of Sciences, Lincoln, May 1 and 2; and the annual meeting of the Montana Archeological Society, Havre, May 16 and 17. At the last-named he presented a paper, "The Northwestern Plains and the Missouri River Basin," and participated in a panel discussion of Plains archeological problems. He continued to serve as dendrochronology chairman of the Missouri Basin Chronology Program and, until December, as contributing editor for reviews for the *Plains Anthropologist*. As of that time he replaced Dr. Stephenson as editor of the journal and continued in that capacity through the year. Dr. Caldwell participated in the Visiting Scientist Program of the Nebraska Academy of Sciences, speaking before student groups at Utica, Nebr., on January 8. In addition, he presented talks or lectures to eight civic and university groups. In October he was named as one of the organizers for the Plains Field Conference preceding the 1965 INQUA meeting at Boulder, Colo. During the period of September to June he continued to serve, on annual leave, as part-time assistant professor of anthropology at the University of Ne-

braska, and in January he was elected to the Graduate College. At the end of the year Dr. Caldwell was in the Lincoln office continuing his administrative duties.

Lionel A. Brown, archeologist, when not in the field, devoted his time to laboratory study and reporting of materials from his 1962 and 1963 surveys and excavations. In addition, he assumed responsibility for a portion of the backlog of unreported sites contained in the Missouri Basin Project files. During the spring Mr. Brown made a preliminary analysis of the specimens excavated from the Chapelle Creek Village (39HU60) during the 1963 season as a guide to further work at the site. A manuscript entitled "Archeological Investigations in the Lower Yellowtail Reservoir, Montana," was rewritten in second draft. Another, a comprehensive report, "Archeological Investigations in the Pony Creek Watershed, Iowa," was in rough draft form, and "The Gillette Site (39ST23), Oahe Reservoir, South Dakota," was in near final form. During the year his survey report, "An Appraisal of the Archeological and Paleontological Resources of Six Reservoir Areas in Kansas and Nebraska," was issued for limited distribution. Two brief field reports, "Survey of the Pony Creek Watershed, Iowa," and "Archeology of the Lower Yellowtail Reservoir, Montana," (*Plains Anthropologist*, vol. 8, No. 20, p. 117, and vol. 8, No. 20, p. 119, respectively) and two articles "The Fort Smith Medicine Wheel, Montana" and "A Crow Lodge Frame" were published in the *Plains Anthropologist* (vol. 8, No. 22, pp. 225-230, 273-274, respectively). Another, "The Lungren Site: An Archaic Manifestation in Southeastern Iowa," appeared in abstract in the *Proceedings of the 74th Annual Meeting of the Nebraska Academy of Sciences*, Lincoln (p. 3). On May 24, at the annual meeting of the Iowa Archeological Society, he presented a summary of recent work in southwestern Iowa, and on the 25th he made a brief survey of sites in the Rathbun Reservoir of south-central Iowa. At the end of the year Mr. Brown was again in the field engaged in archeological excavations at the Chapelle Creek site, S. Dak.

John J. Hoffman, archeologist, when not in the field, devoted most of his efforts to the laboratory analysis and preparation of reports, based upon materials excavated during his field work of the past two years. In addition, he has undertaken a reanalysis of certain pottery collections that have been previously described in the literature to bring them into accord with current concepts. A large site report, "Molstad Village: A Fortified Site in the Oahe Reservoir, South Dakota," was completed in first draft, and a shorter paper reexamining a number of late prehistoric and early historic sites in the Mobridge area, South Dakota, and an analysis of materials from the La Roche sites are under way. Previous studies of Mr. Hoffman's, published

during the year, include "Temporal Ordering and the Chouteau Aspect," *Plains Anthropologist*, vol. 8, No. 20, pp. 91-97; "Prehistoric Houses Along the Middle Missouri River," *Progress*, Oct.-Dec., 1963, *Missouri Basin Field Committee*, Billings, pp. 43-57; "Investigation of the Swift Bird House (39DW233) in the Oahe Reservoir, South Dakota," *Plains Anthropologist*, vol. 8, No. 22, pp. 249-256; a field report, "Excavations at Molstad Village in the Oahe Reservoir," *Plains Anthropologist*, vol. 8, No. 20, pp. 118-119; and two short book reviews also published in the *Plains Anthropologist*.

Mr. Hoffman served as chairman of the 20½ Plains Conference at Pierre on July 20, which he reported briefly in the *Plains Anthropologist*, vol. 8, No. 22, p. 262. He also participated in the joint Plains-Pecos meeting at Taos, N. Mex., September 6-7, where he presented a paper entitled, "La Roche: Some New Data," and attended the annual meeting of the Montana Archeological Society at Havre, May 16 and 17. He also spoke before several school and civic groups in Nebraska and Iowa. At the end of the year Mr. Hoffman was again in the field engaged in archeological excavations in the Big Bend Reservoir of South Dakota.

Wilfred M. Husted, archeologist, when not in the field, prepared reports, based upon materials excavated during his 1963 field investigations, and continued to work on the backlog of site collections from the Missouri Basin Project files. A manuscript report entitled "Archeological Test Excavations at Fort Laramie National Historic Site, Wyoming, 1963" was completed and accepted by the U.S. National Park Service, Midwest Region. A final draft of "The Bice Site (39LM31) and the Clarkstown Site (39LM47): Salvage Excavations in the Fort Randall Reservoir, South Dakota" was completed, and major drafts of three as yet untitled reports dealing with sites in the Big Bend and Fort Randall Reservoirs are substantially finished. Mr. Husted submitted two papers, "Early Occupation of the Colorado Front Range" and "Pueblo Pottery from Northern Colorado," for publication, and two short reports, "Investigations in the Upper Yellowtail Reservoir, Montana and Wyoming" and "A Rock Alignment in the Colorado Front Range," were published in the *Plains Anthropologist* (vol. 8, No. 20, p. 119, and vol. 8, No. 22, pp. 221-224, respectively). At the end of the year he was in the field excavating sites in the Yellowtail Reservoir of Wyoming and Montana.

Richard E. Jensen, archeologist, when not in the field, worked primarily on the analysis and reporting of site collections excavated by staff members in previous years, but following the death of Dean E. Clark, laboratory supervisor, he assumed direction of the processing and cataloging staff in addition to his regular duties. He cooperated with Dr. Caldwell in the preparation of a major study entitled, "The

Grand Detour Phase: Early Village Sites in the Big Bend Reservoir, South Dakota," and completed a first draft of "The Peterson Site (39LM215), An Earth Lodge Village in the Big Bend Reservoir." A study concerned with recent work in the Big Bend Reservoir, "A Temporal Ordering of Several Rectangular House Occupations in Central South Dakota" (abstract), was published in the *Proceedings of the 74th Annual Meeting of the Nebraska Academy of Sciences*, Lincoln, 1964, p. 4. On July 20, Mr. Jensen attended the 20½ Plains Conference at Pierre, S. Dak., where he reported the progress of his fieldwork. He also participated in the Plains-Pecos meeting at Taos, N. Mex., presenting a brief paper entitled, "Notes on the Archeology of the Big Bend Area." At the end of the year he was in the field excavating at the Sommers site in the Big Bend Reservoir.

Oscar L. Mallory, archeologist, when not in the field, continued the analysis and reporting of materials that he excavated or collected in previous field seasons. A reconnaissance report, "An Archeological Appraisal of the Missouri Breaks Region in Montana," was completed and issued for limited distribution, and a short note entitled "Survey of the Missouri Breaks Region, Montana," summarizing the work, was published in the *Plains Anthropologist* (vol. 8, No. 20, p. 120). In addition, Mr. Mallory completed a detailed study of the artifacts from the Mouat Cliff Burials (24TE401), Mont., which will be a part of a larger study of the excavations carried out by members of the Billings Archeological Society. Another manuscript concerned with a group of sites in the vicinity of the Moreau River, Oahe Reservoir, is well under way. At the end of the year Mr. Mallory was in the field excavating sites in the Oahe Reservoir.

Robert W. Neuman, archeologist, when not in the field, devoted most of his time to the analysis and reporting of data resulting from his excavations during previous field seasons. He has begun a major monograph concerned with early burial mound complexes in the northern Plains. He has also completed an article entitled "Projectile Points from Pre-ceramic Occupations near Fort Thompson, South Dakota," which has been accepted by the *Plains Anthropologist*, and, in addition, a number of Mr. Neuman's research papers, most of which were written during the current year, were published. These include: "Check-stamped Pottery on the Northern and Central Great Plains," *American Antiquity*, vol. 29, No. 1, 1963, pp. 17-26; "Field Work in Dewey County, South Dakota, Oahe Reservoir Area," *Plains Anthropologist*, vol. 8, No. 20, pp. 121-122; "Archeological Salvage Investigations in the Lovewell Reservoir Area, Kansas," *River Basin Surveys Papers No. 32, Bureau of American Ethnology Bulletin 185*, pp. 257-306; (with Carl R. Kendle and Larry A. Witt) "Prehistoric Artifacts from the Little Nemaha River Drainage, Otoe County, Nebraska,"

Plains Anthropologist, vol. 9, No. 23, pp. 22-28; "The Good Soldier Site (39LM238), Big Bend Reservoir, Lyman County, South Dakota," *River Basin Surveys Papers No. 37, Bureau of American Ethnology Bulletin 189*, pp. 291-318.

Mr. Neuman attended the 20½ Plains Conference in Pierre, S. Dak., July 20, the annual meeting of the Nebraska Academy of Sciences, Lincoln, May 1 and 2, and the meeting of the Society for American Archeology, Chapel Hill, N.C., May 7-9, where he presented a paper on "A Woodland Camp and Burial Mound Complex in Dewey County, South Dakota." He continued to serve as chairman of the Radiocarbon Section of the Missouri Basin Chronology Program, was appointed assistant editor for current research (Plains area) for *American Antiquity*, and contributing editor for Plains facts for the *Plains Anthropologist*. Mr. Neuman participated in the Visiting Scientist Program of the Nebraska Academy of Sciences, speaking before school groups at Eddyville, Nebr., and he also presented an illustrated talk to the National Professional Geographical Fraternity at the University of Nebraska. At the end of the year Mr. Neuman was at work in the Lincoln laboratory.

G. Hubert Smith, archeologist, when not in the field, was concerned with the preparation of reports based upon his previous work at several historic sites. By the end of the year he had completed a comprehensive report on investigations by the Missouri Basin Project and the State Historical Society of North Dakota at the sites of Like-A-Fishhook Village and Fort Berthold I and II (32ML2), in the Garrison Reservoir area, North Dakota. In addition, he had made substantial progress on reports of excavations of Fort George (39ST202) and 39HU301, in the Big Bend Reservoir of South Dakota and had begun preparation (with Caldwell and others) of the booklet "The Big Bend Reservoir: Archeology and History," to be published by the U.S. Army Corps of Engineers. An article written by Mr. Smith, "Archeological Explorations at Fort McHenry, 1958," was published in the *Maryland Historical Magazine* (vol. 58, No. 3, pp. 247-250), and a brief note, "Excavations at Fort George, South Dakota," appeared in the *Plains Anthropologist* (vol. 8, No. 20, p. 122).

On July 20 he took part in discussions of northern Plains ethnohistory, at the 20½ Plains Conference at Pierre, S. Dak. At the Plains-Pecos meeting at Taos, N. Mex., on September 6 and 7, he reported recent investigations at historic sites within the Missouri Basin reservoir areas. During the period October 24-30 he examined historic sites in Missouri at the request of Dr. Carl H. Chapman and other University of Missouri staff members. On October 28 Mr. Smith addressed the annual meeting of the Missouri Archeological Society at Columbia, Mo., and that evening spoke before the Big Bend chapter of the

Society at Marshall, Mo. On April 10, he presented an illustrated lecture, "Archeological Salvage within the Missouri Basin," before the annual meeting of the Minnehaha County Historical Society at Sioux Falls, S. Dak., and on May 2 he read a paper entitled "The Viking Site in Newfoundland" before the anthropological section of the Nebraska Academy of Sciences (published in abstract in the *Proceedings of the 74th Annual Meeting of the Nebraska Academy of Sciences*, Lincoln, p. 5). In April Mr. Smith became contributing editor for reviews for the *Plains Anthropologist*. At the end of the year he was at work in the Lincoln Laboratory of the Missouri Basin Project.

Virginia.—Carl F. Miller, at the beginning of the fiscal year, had an excavation crew at work on the Hales Ford site (44FR14) in the Smith Mountain Reservoir area near Rocky Mount in southern Virginia. He completed the work at this site on July 2, having excavated 144 archeological features and recovered various tool types, burial patterns and offerings, and, of particular interest, a series of bone flutes that suggested much in the way of social life of these Early to Middle Woodland Indians. The power screen was used during these excavations, making possible a nearly complete recovery of the cultural remains.

Mr. Miller and his crew of five men moved to the Booth Farm site (44FR15) on July 2, and between then and July 28, when the field work ended, they excavated 202 archeological features. A number of Savannah projectile points of the Late Archaic and Early Woodland Periods were found lying on sterile hardpan at the base of the site and in association with several random post molds. Noteworthy were the remains of 70 feet of stockade found at the south edge of the site. In this stockade, posts had been placed at intervals and reinforced with rocks in the postholes. Wooden stringers had connected the vertical posts, and to these had been attached other posts, much as a modern fence would be built.

Idaho-Oregon.—Under an agreement with the Smithsonian Institution, the Idaho State University Museum continued the work on the Hells Canyon Reservoir material that was excavated during the latter part of last fiscal year. The project, under the direction of Dr. Earl H. Swanson, director of the Museum, was continued by Max G. Pavesic, a graduate student at the University of Colorado. Work was confined largely to laboratory analysis of the excavated material, rechecking a few of the field locations, and preparation of the report.

ARCHIVES

Mrs. Margaret C. Blaker continued her duties as archivist, assisted until August 1 by Regina M. Solzbacher and for the remainder of the fiscal year by Margaret V. Lee.

An extensive series of photographic prints and lantern slides, made

in the 1880's and 1890's and showing Indian students at Hampton Institute, as well as views made on a number of western reservations, was borrowed from the Huntington Memorial Library of Hampton Institute, Hampton, Va. Approximately 400 copy negatives were made from this loan collection and are now in the Bureau's active files.

Over 150 photographs of Osage Indians, including many full-length portraits of individuals in native costume taken in the 1880's and 1890's in the studios of G. W. Parsons and J. M. Fowler of Pawhuska, Okla., were received on loan from the Osage Tribal Museum, Pawhuska, Okla. in May and are currently being copied.

Approximately 100 glass plate negatives exposed by Dr. Robert Charles Gebhardt in the period 1900-1907, showing Indians on the streets of Black River Falls, Wis., and their homes and burial grounds near the cranberry marshes outside the town, were acquired from the photographer's son, Paul Gebhardt of Towson, Md.

Thirty photographs of Florida Seminole Indians, and Seminole camps, boats, and agricultural scenes, made in 1910-11 by Lorenzo D. Creel, special agent, were copied from Creel's manuscript report in the National Archives.

Thirteen studio and outdoor photographs of Winnebago Indians taken in the period from the 1870's to about 1900 by H. H. Bennett, pioneer photographer of Kilbourn, Wis., now Wisconsin Dells, were acquired from the Bennett Studio in Wisconsin Dells. This studio and its files of glass negatives of persons, places, and events in the Wisconsin Dells area in the period 1865 to 1907 is now maintained by the photographer's daughters, Miss Miriam Bennett and Mrs. Ruth Bennett Dyer.

Three original prints from negatives made about 1899 in the vicinity of Chadron, Nebr., by Ed Edson were received from Dr. R. W. Breckinridge, through the Lincoln, Nebr., office of the River Basin Surveys. They are portraits of Red Cloud and Little Wound, Oglala Dakotas, and a view of a Sioux camp near Chadron, Nebr.

Individual portraits of five Sioux Indians, taken in 1899 by Robert Gish Parker of Chicago, were donated by a nephew of the photographer, Mr. Leslie B. Taylor of Miami, Fla. The photographs include a portrait of the famous show Indian, Iron Tail.

Four negatives made by Dr. Francis Harper on the Poosapatuck Reservation, Mastic, Long Island, in 1909 were donated by Dr. Harper and filed with related negatives previously donated by him.

A group of 10 photographic reproductions on postcards were donated by Philip Sampson of Arlington, Va. They included a full-length portrait as well as front and profile bust portraits of the Kaw (Kansa) chief Washunga, taken about 1880.

Eugene Heflin of Reedsport, Oreg., submitted an account of his

attempts to salvage skeletons and artifacts from the site of the historic village of Shet-le-shin, on Pistol River, southwest Oregon. This site has now been destroyed by road construction. A microfilm copy of Mr. Heflin's account, which included news clippings, photographs and pen-and-ink drawings, was made and the original returned to him.

A Micmac vocabulary and grammatical notes recorded by P. L. Muschamp while he was a graduate student at Yale University were deposited by Mr. Muschamp. Unfortunately Mr. Muschamp's more extensive notes on his Micmac fieldwork had been lost in a fire that destroyed his home a number of years ago. These notes are on 3×5" slips and occupy one file box.

EDITORIAL WORK AND PUBLICATIONS

The editorial work of the Bureau continued during the year under the immediate direction of Mrs. Eloise B. Edelen, assisted by Mrs. Phyllis W. Prescott and Miss Susan Colby. The following publications were issued:

Eightieth Annual Report of the Bureau of American Ethnology, 1962-1963, ii+34 pp., 2 pls. 1964.

Bulletin 178. Index to Bulletins 1-100 of the Bureau of American Ethnology, with index to contributions to North American Ethnology, introductions, and miscellaneous publications, by Biren Bonnerjea. vi+726 pp. 1963.

Bulletin 186. Anthropological Papers, Nos. 63-67. iv+310 pp., 60 pls., 35 figs., 2 maps. 1963.

No. 63. Tarqui, an early site in Manabi Province, Ecuador, by Matthew W. and Marion Stirling.

No. 64. Blackfoot Indian pipes and pipemaking, by John C. Ewers.

No. 65. The Waribio Indians of Sonora-Chihuahua: An ethnographic survey, by Howard Scott Gentry.

No. 66. The Yaqui deer dance: A study in cultural change, by Carleton Stafford Wilder.

No. 67. Chippewa mat-weaving techniques, by Karen Daniels Petersen.

Bulletin 187. Iroquois music and dance: Ceremonial arts of two Seneca Longhouses, by Gertrude P. Kurath. xvi+268 pp., 3 pls., 164 figs. 1964.

Bulletin 189. River Basin Surveys Papers, Nos. 33-38, Frank H. H. Roberts, Jr., editor. xiv+406 pp., 58 pls., 66 figs., 13 maps. 1964.

No. 33. The Paul Brave site (32SI4), Oahe Reservoir area, North Dakota, by W. Raymond Wood and Alan A. Woolworth.

No. 34. The Demery site (39CO1), Oahe Reservoir area, South Dakota, by Alan R. Woolworth and W. Raymond Wood.

No. 35. Archeological investigations at the Hosterman site (39PO7), Oahe Reservoir area, Potter County, South Dakota, 1956, by Carl F. Miller.

No. 36. Archeological investigations at the Hickey Brothers site (39LM4), Big Bend Reservoir, Lyman County, South Dakota, by Warren W. Caldwell, Lee G. Madison, and Bernard Golden.

No. 37. The Good Soldier site (39LM38), Big Bend Reservoir, Lyman County, South Dakota, by Robert W. Neuman.

No. 38. Archeological investigations in the Toronto Reservoir area, Kansas, by James H. Howard.

Bulletin 190. An ethnography of the Huron Indians, 1615-1649, by Elisabeth Tooker. iv+184 pp. 1964.

Publications distributed totaled 35,314 as compared with 17,722 for the fiscal year 1963.

ILLUSTRATIONS

Throughout the year, E. G. Schumacher, the staff artist for the Bureau of American Ethnology, prepared and executed many varied illustrations in the fields of ethnology and archeology, to appear in Bureau publications. The bulk of the art work concerned the retouching and/or restoration and assembling of photographs, the drawing of maps, charts, diagrams, graphs, and sundry text figures. Mr. Schumacher also performed miscellaneous assignments for other units of the Smithsonian Institution, including the Editorial and Publications Division.

MISCELLANEOUS

Dr. M. W. Stirling and Sister Inez Hilger continued as research associates of the Bureau. Dr. A. J. Waring, formerly research associate, died on March 21, 1964. Mrs. Phyllis W. Prescott, who had assisted in editing many of the Bureau publications, died on June 12, 1964, after a brief illness.

The Bureau continued its extensive service to scholars, teachers, students, and the interested layman in providing information on technical questions, bibliographies, and leaflets on special topics relating to the American Indian.

Specialists on the Bureau staff identified and supplied information on many specimens, both ethnological and archeological, which were brought in or received by mail.

Respectfully submitted.

HENRY B. COLLINS, *Acting Director.*

S. DILLON RIPLEY,
Secretary, Smithsonian Institution.

Report on the National Zoological Park

SIR: I have the honor to submit the following report on the activities of the National Zoological Park for the fiscal year ended June 30, 1964:

BIRTHS

One of the most beautiful animals in the Zoo is Mohini of Rewa, the so-called white tiger. With her cream-colored coat, striped with varying hues of gray to black, her ice-blue eyes, her great size and majestic mien, she has been an extremely popular exhibit since her arrival in 1960. Her mate, Samson, is a normal-colored tiger but comes from the same strain and hence carries the genes for whiteness. Mated to a white female, he could be expected to sire white cubs.

On January 6, 1964, three young were born to the pair; one white, the other two orange. Through the courtesy of Metromedia, a closed-circuit television was installed, and the actual birth of the cubs was witnessed by members of the Zoo staff on a monitor placed in the vestibule of the lion house. Until the cubs were 6 weeks old the lion house was closed to the public. Zoo visitors could, however, watch the little family on either one of two television screens. Mohini proved to be an exceptional mother; she took the greatest care of her cubs, and all three, now weaned, are thriving. When they were first put on exhibition they were so popular that it was necessary to put a sign on the cage asking visitors to move on and let others enjoy the scene; some people actually arrived in the morning and spent the entire day standing in front of the cage until the building closed in the evening. A film of the birth, combined with a film made at the palace of the Maharajah of Rewa in India, was shown on a half-hour nationwide television program.

For many years, the National Zoological Park was famous for its success in breeding pygmy hippopotamuses. Then the old male died, and it was several years before a replacement for him could be secured. In 1960 President William V. S. Tubman of Liberia donated a male pygmy hippo, which has now sired seven offspring, three of them within the past year. Two Nile hippopotamuses were also born at the National Zoo this year.

On September 9, 1961, the first gorilla to be bred and born at the National Zoological Park arrived, the offspring of Moka and

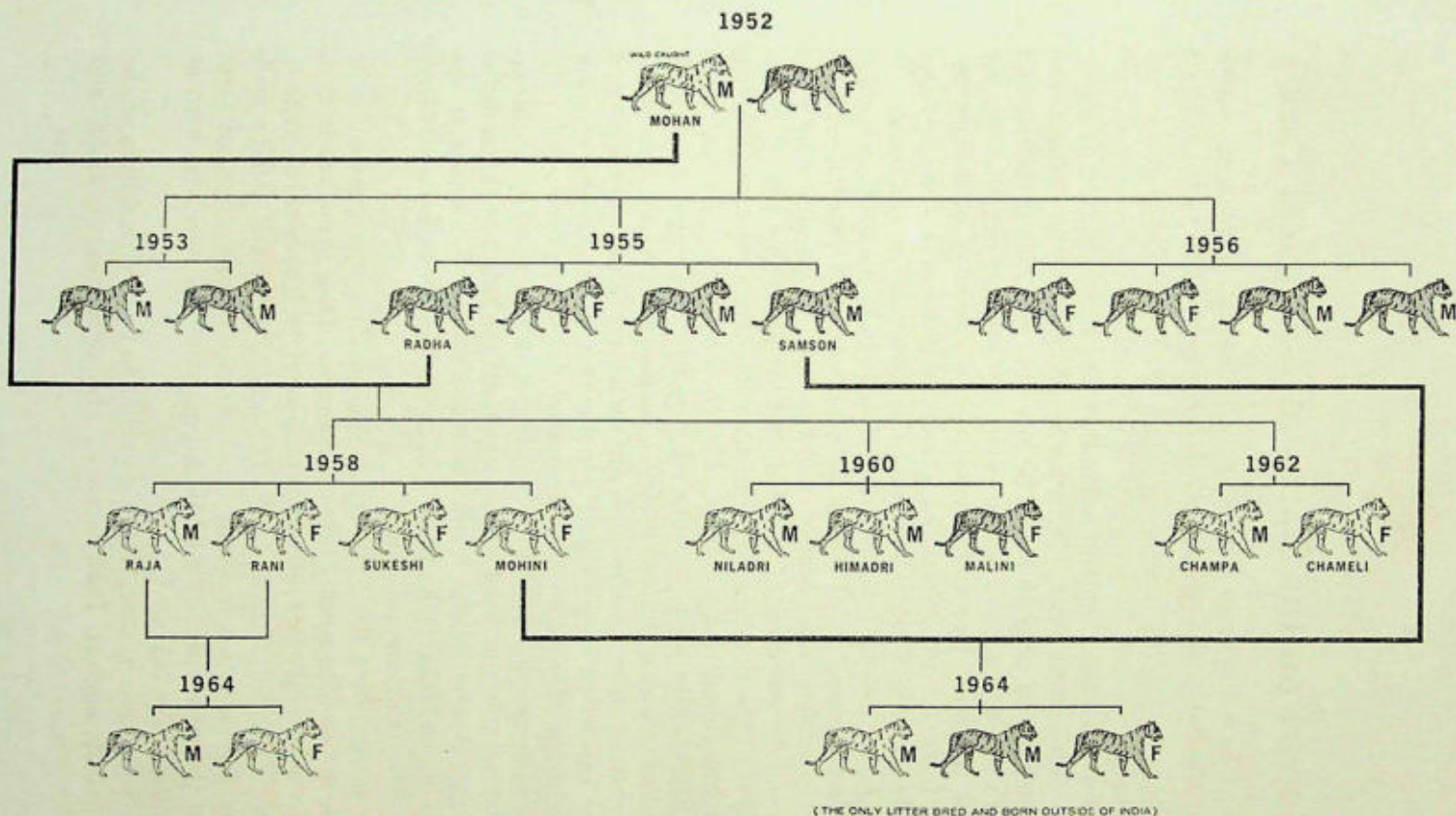


FIG. 1.—Family tree of all the white tigers in captivity on June 30, 1964, shows relationship of the National Zoological Park's Mohini Rewa and her mate, Samson. The white cub born on January 6, 1964, in Mohini's first litter is the first white tiger born outside of India. M=male; F=female.

Nikumba, lowland gorillas. The baby was named Tomoka and was successfully reared by the wife of Keeper Bernard M. Gallagher. Moka's first pregnancy was carefully watched, and the birth of the baby was eagerly anticipated. After her pregnancy, like some human mothers, she began to put on weight, and although her diet was carefully supervised she continued to gain. This, and the fact that the male gorilla suffered an attack of paralysis in June 1963 (see p. 143), account for her second baby, Leonard, arriving as something of a surprise package on January 10, 1964. Leonard, like his brother, is being raised in Keeper Gallagher's home and gives every evidence of being a normal, healthy young gorilla.

Four more calves were born to the Dorcas gazelles, increasing the number of these graceful little animals to a herd of eight. The original pair were gifts from President Habib Bourguiba of Tunisia in 1960.

Other interesting additions were two hybrids between a male cottontop marmoset (*Saguinus oedipus*) and a female red-handed tamarin (*S. midas*), born on February 19. The babies closely resemble their mother, lacking the white pompadour of the cottontop.

Following the procedure of previous years, all births and hatchings are listed below, whether or not the young were successfully reared. In many instances, the record of animals having bred in captivity is of interest.

MAMMALS

Common name	Number	Common name	Number
Rat kangaroo	1	Leopard	**3
Vampire bat	2	Lion	3
Ring-tailed lemur	1	Bengal tiger	3
Squirrel monkey	1	Sea-lion	2
Black spider monkey	2	Rock hyrax	2
Hybrid marmoset	2	Grant's zebra	3
Rhesus monkey	1	Brazilian tapir	*1
Barbary ape	2, *1	Collared peccary	5
Sooty mangabey	1	Nile hippopotamus	2
Chimpanzee	1	Pygmy hippopotamus	3
Lowland gorilla	1	Llama	4
Two-toed sloth	1	White fallow deer	2
Prairie-dogs	6	Axis deer	4
Egyptian spiny mouse	10	Red deer	2
Patagonian cavy	4, *2	Sika deer	1
Hairy-rumped agouti	3	White-tailed deer	1
Timber wolf	1	Reindeer	3, *1
Hybrid fox	1	Caribou X reindeer	1
European brown bear	3	Cape buffalo	1
Hybrid bear	1	Brindled gnu	2
Grizzly bear	1	Dorcas gazelle	4
Neumann's genet	**1	African pygmy goat	1
Bobcat	1	Aoudad	1
Black leopard	2	Big-horn sheep	1

*Stillborn.

**Second litter destroyed by mother.

BIRDS

Black-crowned night heron.....	3	Mallard duck.....	110
Crested screamer.....	1	Peafowl.....	1
Black swan.....	4	Nanday parrot.....	3
Wood duck.....	54	Formosan red-billed pie.....	2

REPTILES

Snapping turtle.....	21	Tokay gecko.....	1
Box turtle.....	7	African spiny lizard.....	2
Eastern box turtle.....	6	Pilot black snake.....	9
Red-lined turtle.....	1	Tessellated snake.....	1
Red-bellied turtle.....	1	Cantil.....	26
Red-eared turtle.....	1		

FISHES

Red swordtails.....	40
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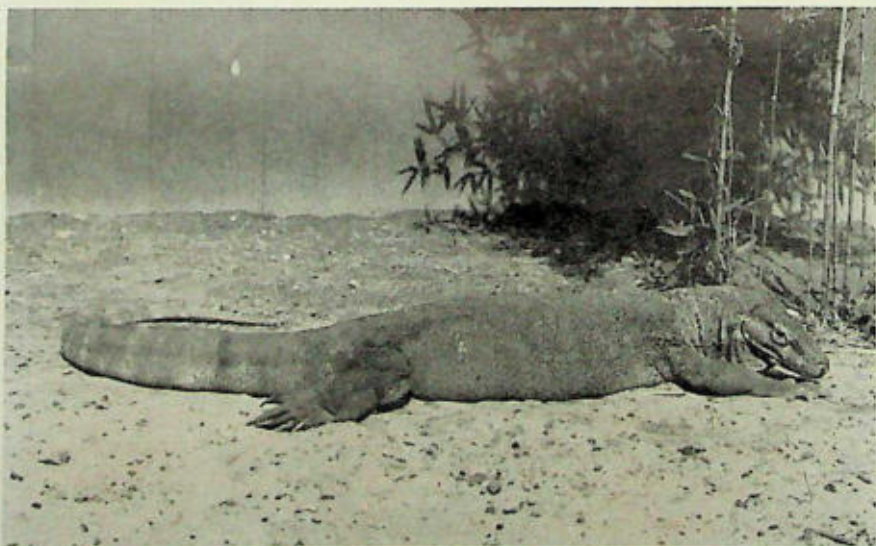
GIFTS

More than a year ago the Government of Assam, India, offered the National Zoological Park a female rhinoceros as a mate for Tarun, the male rhino that came to the Zoo in May 1960. An adult female was secured from the Kazirangi Game Reserve, and negotiations began to transport her from India to Washington. Then it was discovered that "Deepali" was pregnant, and all plans for her trip to the United States were held in abeyance until her calf was born. In April 1963 she produced a female calf, subsequently named Rajkumari, and it was necessary to wait until the young one was weaned. In October Associate Director J. Lear Grimmer and Mrs. Grimmer went to India to arrange transportation for the huge animal. They found, to their delight, that the Indian Government was including the baby in the generous gift to the United States. Crates were built under Mr. Grimmer's supervision, and both animals were brought to the zoo in Calcutta. No commercial airline could handle the shipment (Deepali, crated, weighed 4,000 pounds). Fortunately a number of planes from the American Air Force were in India at the time, participating in joint Indo-Anglo-American air exercises, and through the good offices of the then Vice President, Lyndon B. Johnson, who was a Regent of the Smithsonian Institution, and Air Force Chief of Staff Curtis LeMay, it was possible to load both animals on a C-130 transport. The animals arrived December 17, and were unloaded at the elephant house at dusk. Only 11 days later Deepali succumbed to an acute attack of gastroenteritis. This was a tragic loss for the Zoo, but Rajkumari (the name means "princess") has adapted nicely to the Zoo regime, is eating well, gaining weight, and of course is the most valuable single acquisition made by the Zoo during the past year.

On February 12 the director left for Indonesia with gifts of whis-



Caiman lizard (*Dracaena guianensis*) currently at the National Zoological Park. This unusual lizard is fed clams, oysters, lobster tails, snails, and fish.



Female Komodo dragon (*Varanus komodoensis*) in her outdoor summer enclosure. National Zoological Park.



The rare and vanishing Texas red wolf (*Canis niger rufus*). This female was acquired on November 19, 1958, as a 6-month-old pup. National Zoological Park.



One of the rarest animals in the National Zoological Park's collection, the South American round-eared dog (*Atelocinus microtis*).



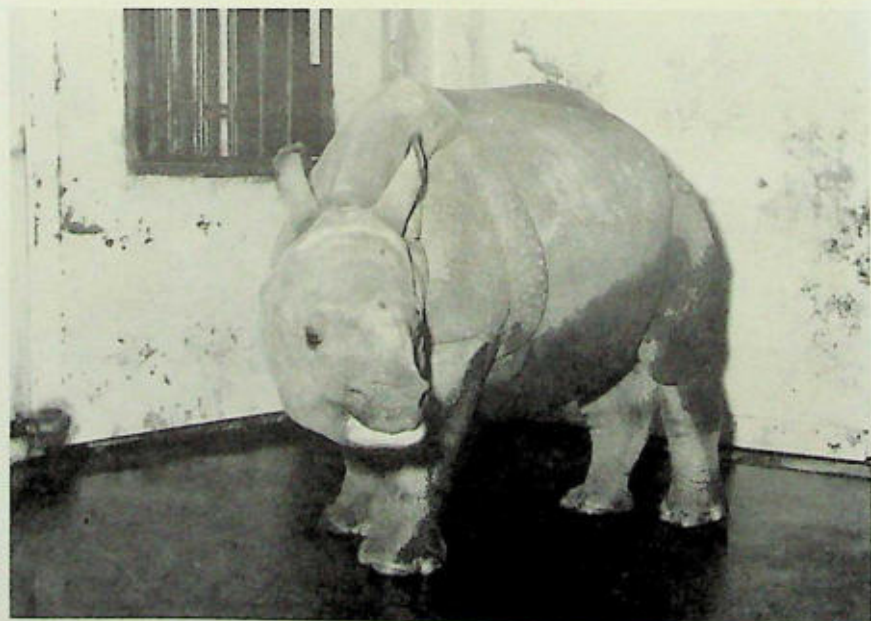
Mohini Rewa and 2-month-old son, the first white tiger bred and born outside of India. National Zoological Park. Wide World Photos.



Hybrid marmosets, born February 19, 1964, to a female red-handed marmoset (*Saguinus midas*) and male cottontop (*Saguinus oedipus*). National Zoological Park.



Leonard, second lowland gorilla bred and born at the National Zoological Park, at 6 months of age.



Rajkumari, young female Indian one-horned rhinoceros (*Rhinoceros unicornis*). National Zoological Park.

ling swans, ducks, and geese from Attorney General Robert Kennedy to President Sukarno of Indonesia. While there he accepted a most generous gift from the Government of Indonesia of a pair of the giant monitor lizards found on a few small islands in Indonesia and known as Komodo dragons. The male was nearly 9 feet long and weighed approximately 200 pounds; the female was about half that size. Again, the Zoo was most unfortunate, as the big male, a truly impressive specimen, died of systematic amebiasis on June 1, after only 12 weeks and 4 days on exhibition at the Park. The female has the same infestation with amebae, and every effort is being made to cure her, as she is the only one of this species in the United States at the present time.

Space does not permit listing all gifts received in the course of the year, but the following are of interest:

- Allan, Karen, Fairfax County, Va., brush-tailed porcupine.
 Amis, Mrs. Esther V., Washington, D.C., Patas monkey.
 Birch, Mrs. H. M., Bethesda, Md., lesser hill mynah.
 Chester Zoo, Chester, England, 2 axolotls (white phase).
 Cochran, Dr. Doris, Washington, D.C., 5 tropical American turtles of 2 species.
 Collette, Mrs. B. B., Alexandria, Va., sooty mangabey.
 DesPres, Mrs. Helen, Monrovia, Liberia, Maxwell's duiker.
 Dietlein, Lt. Donald R., Alameda, Calif., Galápagos tortoise, sulphur-breasted toucan.
 Godet, Dr. René, Dakar, Senegal, lungfish.
 Greenhall, Arthur, Washington, D.C., 4 spear-nosed bats, 8 vampire bats.
 Greeson's Flying Squirrel Ranch, Arlington, Va., southern fox squirrel.
 Harding, Grayson E., New York, N.Y., kura kura turtle, Amazon spotted turtle, red-faced turtle, chicken turtle, southern soft-shelled turtle, diamond-back terrapin.
 Harris, Lester E., Takoma Park, Md., 6 timber rattlesnakes, 10 fer-de-lance.
 Houston, Robert, Arlington, Va., Swan Island iguana.
 Keegan, Lt. Col. Hugh L., U.S. Army Medical Command, Japan, 5 rat snakes of 4 species, Dinodon, 2 many-banded kraits, 2 palm vipers, 3 Ryukyu green snakes, Japanese water snake, Japanese pit viper, 4 habus of 3 species, 3 Erabu sea snakes.
 Kennedy, Robert F., McLean, Va., 2 Geoffroy's marmosets.
 Klikna, Mrs. Vincent, Falls Church, Va., 5 chinchillas.
 Kuntz, Dr. R. E., Washington, D.C., 2 axolotls.
 Marcus, Dr. Leonard, Washington, D.C., 3 Pacific tree frogs, caiman lizard.
 Maryland Game Department, through David J. Smith, Annapolis, Md., bald eagle.
 McKittrick, F. A., Ithaca, N.Y., capybara.
 Miller, Robert Fox, Jr., Washington, D.C., 5 South American sucker catfish (*Piccostomus*).
 Norfolk, John E., Upper Marlboro, Md., boa constrictor.
 Ripley, Dr. S. Dillon, Washington, D.C., 2 rosy-billed pochards.
 Rivero, Vincentes Carlos, Caracas, Venezuela, rainbow boa.
 Stair, Gary, Washington, D.C., antelope ground squirrel.
 Sweeney, Philip Niles, Washington, D.C., striped sand snake.

Szaba, Mrs. Renée, Glen Burnie, Md., 3 North African pond turtles, 2 red-eared turtles.

Thompson, Lynda, Vienna, Va., 2 golden-mantled ground squirrels.

U.S. Fish and Wildlife Service, Hawaii, nene or Hawaiian goose.

U.S. Naval Medical Research Unit No. 2, Taipei, Taiwan, Far East forest cat.

Ward, Mrs. Bettina B., Middleburg, Va., blue and yellow macaw.

DEPOSITS

During the past year rare or valuable specimens have been dispersed to locations thought to have good breeding conditions as well as better living accommodations than could be provided at the National Zoological Park while new construction is in progress under its capital improvement program. Other animals have been dispersed with the understanding that they or similar specimens will be returned when suitable exhibition areas have been completed here in the park.

These deposits are:

Brookfield Zoo, Brookfield, Ill., female Dall sheep.

Busch Gardens, Tampa, Fla., male concave-casqued hornbill, female Solomon Islands cockatoo.

Dallas Zoo, Dallas, Tex., a female saiga antelope.

Defense General Supply Center Preserve, Richmond, Va., male American elk.

Houston Zoo, Houston, Tex., 2 purple-crested touracos.

National Geographic Society, Washington, D.C., macaw.

Patuxent Wildlife Refuge, Laurel, Md., barred owl.

St. Louis Zoo, St. Louis, Mo., male gaur, 3 king penguins, Adélie penguin, female chimpanzee.

EXCHANGES

The National Zoological Park participates in a continuing program of exchanging surplus animals with zoos of other countries. Notable exchange arrangements were made with several foreign organizations. Ueno Zoological Gardens, Tokyo, Japan, received a pair of Townsend's chipmunks and a pair of golden-mantled ground squirrels. Dudley Zoo, Worcestershire, England, received an assortment of 19 snakes. The zoo in West Berlin received a pair of canvasback ducks, a pair of wood ducks, and a female whistling swan. The Hanover Zoo in Germany received a female black leopard cub. A pair of jaguars and a pair of Canadian lynxes were shipped to the Alipore Zoo in Calcutta, India, and other surplus animals will be shipped later as part of an exchange agreement under which the associate director acquired several hundred birds from India, including such interesting specimens as koels, racket-tailed drongos, several hornbills, painted and black-necked storks, over a hundred assorted parakeets, and many other colorful small birds.

Animals obtained through exchange were:

Baltimore Zoo, Baltimore, Md., 2 whistling swans.

Bronx Zoo, New York, N.Y., springhaas.

- Brookfield Zoo, Brookfield, Ill., Arabian camel.
 Calgary Zoological Society, Alberta, Canada, 2 hoary marmots, 5 Canadian lynxes.
 Cincinnati Zoo, Cincinnati, Ohio, jaguar.
 Franklin Park Zoo, Boston, Mass., giant salamander, 2 rhinoceros iguanas.
 Gillmore, Harry, Monrovia, Liberia, 3 African pythons.
 Handleman, Stanley, New York, N.Y., 2 Negev spiny mice.
 Highland Park Zoo, Pittsburgh, Pa., spotted leopard.
 Houston Zoo, Houston, Tex., 10 southern copperheads, 2 blotched water snakes, yellow-bellied water snake, 3 broad-banded water snakes, nine-banded armadillo.
 Louisville Zoo, Louisville, Ky., olingo.
 Portland Zoological Gardens, Portland, Oreg., Kodiak bear cub.
 Rand, Peter, Washington, D.C., slow loris.
 Roundlake Waterfowl Station, Roundlake, Minn., 8 giant Canada geese.
 Ruhe, Heinz, Thousand Oaks, Calif., 2 Celebes apes, 2 Moor macaques.
 San Diego Zoo, San Diego, Calif., 6 salvator lizards.
 Southwick Game Farm, Blackstone, Mass., jaguar.
 Tote-Em-In-Zoo, Wilmington, N.C., 2 curly-crested toucans, 4 titi monkeys, 3 macaws, 2 tamanduas, 2 yellow-banded kraits, 2 northern copperheads, 30 water snakes.
 Ueno Zoo, Tokyo, Japan, 2 Seibold's chipmunks, 2 Formosan tree squirrels.
 Wild Cargo, Hollywood, Fla., 3 day geckos.
 Zinner, Hermann, Vienna, Austria, 4 skinks, 6 Agamid lizards, 2 European glass snakes, 6 worm snakes, 3 Contina snakes, 7 European vipers, 3 European smooth snakes, 11 European glass lizards, 1 European grass snake, 2 tessellated water snakes, 4 Aesculapian snakes.

The following animals were sent to other zoos and to private collectors in exchange:

- Boehm, Edward M., Trenton, N.J., 2 junglefowl, 2 wood ducks.
 British Embassy, Washington, D.C., peacock.
 Canal Zone Biological Area, Balboa, Canal Zone, Panama, 5 titi monkeys.
 Cincinnati Zoo, Cincinnati, Ohio, ring-tailed lemur, chimpanzee.
 Cunningham Wild Animal Park, Augusta, Kans., red deer.
 Delmarva Zoological Society, Salisbury, Md., 4 wood ducks.
 Detroit Zoo, Royal Oak, Mich., Patagonian cavy.
 Franklin Park Zoo, Boston, Mass., Patagonian cavy, 2 lion cubs, European brown bear cub.
 Palmer Chemical Company, Douglasville, Ga., black spider monkey, Java macaque.
 Rand, Peter, Washington, D.C., boa constrictor.
 Roger Williams Park Zoo, Providence, R.I., 2 wood ducks.
 Ruhe, Heinz, Thousand Oaks, Calif., 20 wood ducks, 17 canvasback ducks, 12 ringneck ducks, 12 lesser scaups, 5 red-headed ducks.
 Southeast Pet Shop, Washington, D.C., 22 chinchillas.
 Southwick Game Farm, Blackstone, Mass., black leopard, 5 canvasback ducks, mute swan, 3 black swans, 12 lesser scaups, 5 whistling swans, gibbon.
 Tote-Em-In-Zoo, Wilmington, N.C., Canadian lynx, 4 gelada baboons, 2 woodchucks, Central American opossum, spotted leopard, 3 sika deer, red deer, axis deer, 2 Virginia deer, 2 white fallow deer.
 Wild Cargo, Hollywood, Fla., 2 northern copperheads, 2 Taiwan cobras.

PURCHASES

While the associate director was in India, he was able to acquire 10 Indian flying foxes. These are the first of their kind to be brought into the United States under the revised regulations of the Department of the Interior through the cooperation of D. H. Janzen, director, Bureau of Sport Fisheries and Wildlife, Fish and Wildlife Service.

Other specimens purchased in India were 2 pairs of rosy pelicans, 6 lion-tailed macaques, a female golden cat, a female leopard cat, 8 spot-billed ducks, 12 pairs of assorted parakeets, 12 comb ducks, and 2 lesser pied hornbills. Arrangements were made for the purchase of other specimens which will be shipped when accommodations have been completed for them here at the zoo.

Other purchases of interest were:

3 Costa Rican rear-fanged snakes	2 purple-created touracos
2 hyraxes	4 Townsend's chipmunks
1 South American short-eared dog	1 Eastern diamondback rattlesnake
3 Gila monsters	1 red uakari
1 scarlet macaw	1 wattled guan
2 wood rails	5 pygmy marmosets
3 chuckwallas	2 cantils
2 beaded lizards	1 Malayan box turtle
1 caiman	12 Southwestern fence lizards
6 Western skinks	

STATUS OF THE COLLECTION

Class	Orders	Families	Species or subspecies	Individuals
Mammals.....	14	51	237	666
Birds.....	20	65	340	1,033
Reptiles.....	4	28	199	739
Amphibians.....	2	9	25	105
Fishes.....	4	9	23	120
Arthropods.....	3	3	4	78
Mollusks.....	1	1	1	30
Total.....	48	166	829	2,771

In the following lists of mammals and birds, sex is given where known; 1.0 indicates one male, 0.1 indicates one female, 1.1 indicates one male and one female. A plus sign (+) indicates young animals of which the sex is not yet known.

ANIMALS IN THE COLLECTION ON JUNE 30, 1964

MAMMALS		
MONOTREMATA		
Family and common name	Scientific name	Number
Tachyglossidae:		
Echidna, or spiny anteater.	<i>Tachyglossus aculeatus</i>	0.1
MARSUPIALIA		
Didelphidae:		
Opossum.....	<i>Didelphis marsupialis virginiana</i>	1.0
Central American opossum.	<i>Didelphis marsupialis</i>	1.0
Phalangeridae:		
Sugar glider.....	<i>Petaurus breviceps</i>	1.1
Squirrel glider.....	<i>Petaurus norfolcensis</i>	1.2
Phascalomidae:		
Hairy-nosed wombat....	<i>Lasiorhinus latifrons</i>	2.0
Mainland wombat.....	<i>Wombatus hirsutus</i>	0.1
Macropodidae:		
Rat kangaroo.....	<i>Potorous</i> sp.....	2.3
INSECTIVORA		
Erinaceidae:		
European hedgehog....	<i>Erinaccus europaeus</i>	2.0
Soricidae:		
Short-tailed shrew....	<i>Blarina brevicauda</i>	1
Talpidae:		
Eastern mole.....	<i>Scalopus aquaticus</i>	1
CHIROPTERA		
Pteropodidae:		
Flying fox, or giant fruit bat.	<i>Pteropus giganteus</i>	10
PRIMATES		
Lemuridae:		
Ring-tailed lemur....	<i>Lemur catta</i>	1.2
Brown lemur.....	<i>Lemur fulvus</i>	1.0
Lorisidae:		
Tickell's slow loris....	<i>Nycticebus c. tenasserimensis</i>	0.1
Great galago.....	<i>Galago crassicaudatus</i>	1.1
Bushbaby.....	<i>Galago senegalensis zanzibaricus</i>	2.0
Common potto.....	<i>Perodicticus potto</i>	0.1
Cebidae:		
Douroucoulli	<i>Aotus trivirgatus</i>	2.0
Red uakari.....	<i>Cacajao rubicundis</i>	0.1
White-faced saki.....	<i>Pithecia pithecia</i>	0.1
Capuchin	<i>Cebus capucinus</i>	3.5
Weeping capuchin....	<i>Cebus griseus</i>	1.0
Squirrel monkey.....	<i>Saimiri sciureus</i>	2.3+1
Spider monkey.....	<i>Ateles geoffroyi</i>	1.5
Black spider monkey..	<i>Ateles fusciceps</i>	1.3+2
Woolly monkey.....	<i>Lagothrix</i> sp.....	1.2

Family and common name	Scientific name	Number
Callithricidae:		
Pygmy marmoset.....	<i>Cebuella pygmaea</i>	1.1
Geoffroy's marmoset.....	<i>Oedipomidas spixii</i>	1.1
Cottontop marmoset.....	<i>Saguinus oedipus</i>	1.0
Hybrid marmoset.....	<i>Saguinus midas</i> × <i>S. oedipus</i>	1
Moustached marmoset.....	<i>Saguinus mystax</i>	1.1
Cercopitheciidae:		
Toque, or bonnet macaque.	<i>Macaca sinica</i>	1.1
Philippine macaque....	<i>Macaca philippinensis</i>	1.0
Crab-eating macaque....	<i>Macaca irus</i>	0.1
Hybrid macaque.....	<i>M. i. mordax</i> × <i>M. philippinensis</i>	1.0
Rhesus monkey.....	<i>Macaca mulatta</i>	3.1
Javan macaque.....	<i>Macaca irus mordax</i>	2.1
Formosan macaque.....	<i>Macaca cyclopis</i>	1.1
Red-faced macaque.....	<i>Macaca speciosa</i>	0.1
Wanderoo, or lion-tailed macaque.	<i>Macaca silenus</i>	1.2
Barbary ape.....	<i>Macaca sylvanus</i>	5.8+2
Moor macaque.....	<i>Macaca maurus</i>	1.2
Crested macaque, or Celebes ape.	<i>Cynopithecus niger</i>	1.0
Gray-cheeked mangabey.	<i>Cercocebus albigena</i>	0.1
Agile mangabey.....	<i>Cercocebus agilis</i>	1.0
Golden-bellied mangabey.	<i>Cercocebus chrysogaster</i>	1.0
Red-crowned mangabey.	<i>Cercocebus torquatus</i>	1.1
Sooty mangabey.....	<i>Cercocebus fuliginosus</i>	3.2
Crested mangabey.....	<i>Cercocebus aterrimus</i>	1.0
Black-crested mangabey.	<i>Cercocebus aterrimus</i>	1.1
Drill.....	<i>Mandrillus leucophaeus</i>	1.0
Olive baboon.....	<i>Papio anubis</i>	3.2
Gelada baboon.....	<i>Theropithecus gelada</i>	3.4
Chacma baboon.....	<i>Papio comatus</i>	1.0
Vervet guenon.....	<i>Cercopithecus aethiops</i>	2.1
Green guenon.....	<i>Cercopithecus aethiops</i>	1.2
Grivet guenon (color variant).	<i>Cercopithecus aethiops</i>	0.1
Moustached monkey....	<i>Cercopithecus cephus</i>	1.2
Diana monkey.....	<i>Cercopithecus diana</i>	1.0
Roloway monkey.....	<i>Cercopithecus diana rolowayi</i>	0.1
DeBrazza's monkey.....	<i>Cercopithecus neglectus</i>	1.0
White-nosed guenon....	<i>Cercopithecus nictitans</i>	0.1
Allen's swamp monkey.	<i>Allonpithecus nigroviridis</i>	1.1
Patas monkey.....	<i>Erythrocebus</i> sp.....	1.0
Spectacled, or Phayre's, langur.	<i>Presbytis phayrei</i>	1.0
Langur.....	<i>Presbytis entellus</i>	0.1
Crested entellus monkey.	<i>Presbytis e. cristatus</i>	1.0

Family and common name	Scientific name	Number
Pongidae:		
White-handed gibbon	<i>Hylobates lar</i>	1.0
Wau-wau gibbon	<i>Hylobates moloch</i>	0.1
Hybrid gibbon	<i>Hylobates lar</i> × <i>Hylobates</i> sp.	0.4
Siamang gibbon	<i>Symphalangus syndactylus</i>	1.0
Sumatran orangutan	<i>Pongo pygmaeus</i>	1.1
Bornean orangutan	<i>Pongo pygmaeus</i>	0.1
Chimpanzee	<i>Pan satyrus</i>	3.2
Lowland gorilla	<i>Gorilla gorilla</i>	3.1
EDENTATA		
Myrmecophagidae:		
Giant anteater	<i>Mymecophaga tridactyla</i>	0.1
Tamandua, or collared anteater.	<i>Tamandua tetradactyla</i>	1.1
Bradypodidae:		
Two-toed sloth	<i>Choloepus didactylus</i>	3.3
Dasypodidae:		
Nine-banded armadillo	<i>Dasypus novemcinctus</i>	2.2
RODENTIA		
Sciuridae:		
European red squirrel	<i>Sciurus vulgaris</i>	2.2
Gray squirrel, albino	<i>Sciurus carolinensis</i>	0.2
Tassel-eared, or Abert's, squirrel.	<i>Sciurus aberti</i>	1.0
Western fox squirrel	<i>Sciurus niger</i>	1.0
Southern fox squirrel	<i>Sciurus niger</i>	0.1
Indian palm squirrel	<i>Funambulus palmarum</i>	0.1
Tricolored squirrel	<i>Callosciurus prevosti</i>	0.1
Formosan tree squirrel	<i>Callosciurus erythracus</i>	2.2
Woodchuck, or groundhog.	<i>Marmota monax</i>	1.2
Hoary marmot	<i>Marmota caligata</i>	1.1
Prairie-dog	<i>Cynomys ludovicianus</i>	24
California ground squirrel.	<i>Citellus beecheyi</i>	1.2
Washington ground squirrel.	<i>Citellus washingtoni</i>	1.0
Antelope ground squirrel.	<i>Citellus</i> sp.	1.0
Golden-mantled ground squirrel.	<i>Citellus lateralis</i>	1.3
Round-tailed ground squirrel.	<i>Citellus tereticaudus</i>	1.0
Eastern chipmunk	<i>Tamias striatus</i>	1.2
Eastern chipmunk, albino.	<i>Tamias striatus</i>	1.0
Yellow pine chipmunk	<i>Eutamias amoenus</i>	0.1
Siebold's chipmunk	<i>Eutamias sibiricus</i>	1.1
Eastern flying squirrel	<i>Glaucomys volans</i>	1.2
Heteromyidae:		
Kangaroo rat	<i>Dipodomys</i> sp.	3.0

Family and common name	Scientific name	Number
Castoridae:		
Beaver.....	<i>Castor canadensis</i>	3
Pedetidae:		
Cape jumping hare.....	<i>Pedetes capensis</i>	2.2
Cricetidae:		
White-footed mouse.....	<i>Peromyscus</i> sp.....	1.4
East African maned rat.....	<i>Lophiomy's ibcanus</i>	2.0
Fat-tailed gerbil.....	<i>Pachyuromys duprasi</i>	2.2
Muridae:		
Egyptian spiny mouse.....	<i>Acomys cahirinus</i>	11.11
Egyptian spiny mouse.....	<i>Acomys dimidiatus</i>	1.5
Negev spiny mouse.....	<i>Acomys</i> sp.....	2
Giant forest rat.....	<i>Cricetomys gambianus</i> ssp.....	1.0
Slender-tailed cloud rat.....	<i>Phloeomys cunningii</i>	1.0
Gliridae:		
Garden dormouse.....	<i>Eliomys quercinus</i>	0.1
Hystricidae:		
Malay porcupine.....	<i>Acanthion brachyura</i>	1.0
African porcupine.....	<i>Hystrix cristata</i>	2.4
Brush-tailed porcupine.....	<i>Atherurus</i> sp.....	1
Palawan porcupine.....	<i>Thecurus pumilus</i>	1.1
Caviidae:		
Patagonian cavy.....	<i>Dolichotis patagonum</i>	3.2
Dasyproctidae:		
Hairy-rumped agouti.....	<i>Dasyprocta prymnolopha</i>	2.0
Agouti, dark phase.....	<i>Dasyprocta prymnolopha</i>	2.1
Acouchy.....	<i>Myoprocta acouchy</i>	1.0
Chinchillidae:		
Mountain viscacha.....	<i>Lagidium</i> sp.....	0.1
Chinchilla.....	<i>Chinchilla chinchilla</i>	2.2
Hydrochoeridae:		
Capybara.....	<i>Hydrochocrus hydrochoerus</i>	0.1
CARNIVORA		
Canidae:		
Dingo.....	<i>Canis familiaris dingo</i>	1.2
Coyote.....	<i>Canis latrans</i>	0.1
Common jackal.....	<i>Canis aureus</i>	1.1
Timber wolf.....	<i>Canis lupus nubilus</i>	1.4
Texas red wolf.....	<i>Canis niger rufus</i>	0.1
Fennec.....	<i>Fennecus zerda</i>	1.1
Gray fox.....	<i>Urocyon cinercoargenteus</i>	1.2
Red fox.....	<i>Vulpes fulva</i>	1.0
Raccoon dog.....	<i>Nyctereutes procyonoides</i>	0.1
Short-eared dog.....	<i>Atelocynus microtis</i>	0.1
Cape hunting dog.....	<i>Lycan pictus</i>	1.1
Ursidae:		
Spectacled bear.....	<i>Tremarctos ornatus</i>	1.0
Himalayan bear.....	<i>Selenarctos thibetanus</i>	0.1
Japanese black bear.....	<i>Selenarctos thibetanus japonicus</i>	1.0

Family and common name	Scientific name	Number
Ursidae—Continued		
Korean bear.....	<i>Ursus thibetanus ussuricus</i>	1.1
European brown bear..	<i>Ursus arctos</i>	1.1
Iranian brown bear....	<i>Ursus arctos syriacus</i>	1.1
Grizzly bear.....	<i>Ursus horribilis</i>	1.1
Kodiak bear.....	<i>Ursus middendorffi</i>	1.0
Black bear.....	<i>Euarctos americanus</i>	1.1
Polar bear.....	<i>Thalarchos maritimus</i>	1.2
Hybrid bear.....	<i>Thalarchos maritimus</i> × <i>Ursus middendorffi</i>	2.1
Malayan sun bear.....	<i>Helarctos malayanus</i>	0.2
Sloth bear.....	<i>Melchus ursinus</i>	1.1
Procyonidae:		
Cacomistle.....	<i>Bassariscus astutus</i>	2.2
Raccoon.....	<i>Procyon lotor</i>	1.3
Raccoon, albino.....	<i>Procyon lotor</i>	0.1
Raccoon, black phase..	<i>Procyon lotor</i>	1.0
Coatimundi.....	<i>Nasua nasua</i>	1.2
Peruvian coatimundi..	<i>Nasua nasua dorsalis</i>	1.1
Kinkajou.....	<i>Potos flavus</i>	2.2
Olingo.....	<i>Bassaricyon gabbi</i>	1.1
Mustelidae:		
Marten.....	<i>Martes americana</i>	0.1
Fisher.....	<i>Martes pennanti</i>	0.1
Yellow-throated mar- ten.....	<i>Martes flavigula heurici</i>	0.2
British Guiana tayra..	<i>Eira barbara poliocephala</i>	1.1
Grison.....	<i>Galictis allimandi</i>	1.0
Zorilla.....	<i>Ictonyx striatus</i>	1.0
Wolverine.....	<i>Gulo gulo luscus</i>	0.1
Ratel.....	<i>Mellivora capensis</i>	1.0
Eurasian badger.....	<i>Meles meles</i>	0.1
American badger.....	<i>Taxidea taxus</i>	1.0
Golden-bellied ferret- badger.....	<i>Melogale moschata subaurantiaca</i>	1.2
Common skunk.....	<i>Mephitis mephitis</i>	0.1
River otter.....	<i>Lutra canadensis</i>	2.0
Viverridae:		
Genet.....	<i>Genetta genetta neumanni</i>	2.5
Formosan spotted civet..	<i>Viverricula indica</i>	1.1
Linsang.....	<i>Prionodon linsang</i>	0.1
African palm civet....	<i>Nandinia binotata</i>	1.1
Formosan masked civet..	<i>Paguma larvata taivana</i>	1.0
Binturong.....	<i>Arctictis binturong</i>	1.0
African water civet....	<i>Atilax paludinosus</i>	1.4+2
African banded mon- goose.....	<i>Mungos mungo grisonax</i>	1.1
Cusimanse.....	<i>Crossarchus fasciatus</i>	0.1
White-tailed mongoose..	<i>Ichneumia albicauda</i>	1.0
Black-footed mongoose..	<i>Bdeogale</i> sp.....	1.1
Hyaenidae:		
Striped hyena.....	<i>Hyaena hyaena</i>	1.1

Family and common name	Scientific name	Number
Felidae:		
Bobcat.....	<i>Lynx rufus</i>	1.1
Canadian lynx.....	<i>Lynx canadensis</i>	1.2
Jungle cat.....	<i>Felis chaus</i>	1.1
Pallas's cat.....	<i>Felis manul</i>	1.0
Serval.....	<i>Felis serval</i>	0.2
Far East forest cat.....	<i>Felis euptilura</i>	0.1
Leopard cat.....	<i>Felis bengalensis</i>	1.0
Golden cat.....	<i>Felis aurata</i>	1.1
Ocelot.....	<i>Felis pardalis</i>	1.1
Jaguarondi.....	<i>Felis yagouaroundi</i>	1.1
Puma.....	<i>Felis concolor</i>	1.1
Leopard.....	<i>Panthera pardus</i>	3.1
Black leopard.....	<i>Panthera pardus</i>	1.1
Lion.....	<i>Panthera leo</i>	2.2
Bengal tiger.....	<i>Panthera tigris</i>	3.2
White Bengal tiger.....	<i>Panthera tigris</i>	1.1
Jaguar.....	<i>Panthera onca</i>	1.0
Clouded leopard.....	<i>Neofelis nebulosa</i>	2.0
Snow leopard.....	<i>Uncia uncia</i>	1.0
Cheetah.....	<i>Acinonyx jubata</i>	1.1
PINNIPEDIA		
Otaridae:		
California sea-lion.....	<i>Zalophus californianus</i>	3.3
Patagonian sea-lion.....	<i>Otaria flavescens</i>	0.1
Phocidae:		
Harbor seal.....	<i>Phoca vitulina</i>	1.1
TUBULIDENTATA		
Orycteropodidae:		
Aardvark.....	<i>Orycteropus afer</i>	1.0
PROBOSCIDIA		
Elephantidae:		
African elephant.....	<i>Loxodonta africana</i>	0.1
Forest elephant.....	<i>Loxodonta cyclotis</i>	1.0
Indian elephant.....	<i>Elephas maximus</i>	0.2
HYRACOIDEA		
Procaviidae:		
Rock hyrax.....	<i>Procavia capensis</i>	2.2
PERISSODACTYLA		
Equidae:		
Mongolian wild horse.....	<i>Equus przewalskii</i>	1.0
Grevy's zebra.....	<i>Equus grevyi</i>	1.2
Grant's zebra.....	<i>Equus burchelli</i>	1.5
Burro, or donkey.....	<i>Equus asinus</i>	1.0
Tapiridae:		
Brazilian tapir.....	<i>Tapirus terrestris</i>	1.1
Rhinocerotidae:		
Indian one-horned rhinoceros.....	<i>Rhinoceros unicornis</i>	1.1

Family and common name	Scientific name	Number
Rhinocerotidae—Continued		
African black rhinoceros.	<i>Diceros bicornis</i>	1.1
White, or square-lipped, rhinoceros.	<i>Ceratotherium simum</i>	1.1
ARTIODACTYLA		
Tayassuidae:		
Collared peccary.....	<i>Tayassu tajacu</i>	6.6
Hippopotamidae:		
Hippopotamus.....	<i>Hippopotamus amphibius</i>	2.1
Pygmy hippopotamus.....	<i>Choeropsis liberiensis</i>	3.5
Camelidae:		
Arabian camel.....	<i>Camelus dromedarius</i>	1.0
Bactrian camel.....	<i>Camelus bactrianus</i>	0.1
Llama.....	<i>Lama glama</i>	3.4
Guanaco.....	<i>Lama glama guanicoe</i>	1.0
Alpaca.....	<i>Lama pacos</i>	1.1
Cervidae:		
White fallow deer.....	<i>Dama dama</i>	2.3
Axis deer.....	<i>Axis axis</i>	4.2
Red deer.....	<i>Cervus elaphus</i>	1.5
Sika deer.....	<i>Cervus nippon</i>	1.7
Père David's deer.....	<i>Elaphurus davidianus</i>	1.0
White-tailed, or Virginia, deer.	<i>Odocoileus virginianus</i>	0.2
American elk.....	<i>Cervus canadensis</i>	*1.0
Forest caribou.....	<i>Rangifer caribou</i>	0.1
Reindeer.....	<i>Rangifer tarandus</i>	3.9
Hybrid reindeer.....	<i>Rangifer tarandus</i> × <i>R. caribou</i>	0.1
Giraffidae:		
Masai giraffe.....	<i>Giraffa c. tippelskirchi</i>	1.2
Bovidae:		
Sitatunga.....	<i>Tragelaphus spekii</i>	1.0
Anoa.....	<i>Anoa depressicornis</i>	1.1
Yak.....	<i>Poepagus grunniens</i>	1.3
Gaur.....	<i>Bibos gaurus</i>	*2.0
Cape buffalo.....	<i>Syncerus caffer</i>	1.4
American bison.....	<i>Bison bison</i>	1.0
Brindled gnu.....	<i>Connochactes taurinus</i>	1.4
Maxwell's duiker.....	<i>Cephalophus maxwellii</i>	1.0
Dorcas gazelle.....	<i>Gazella dorcas</i>	3.5
Saiga antelope.....	<i>Saiga tatarica</i>	*0.1
Rocky Mountain goat.....	<i>Oreamnos americanus</i>	0.1
Himalayan tahr.....	<i>Hemitragus jemlahicus</i>	0.1
African pygmy goat.....	<i>Capra hircus</i>	4.1
Ibex.....	<i>Capra ibex</i>	1.0
Aoudad, or Barbary sheep.	<i>Ammotragus lervia</i>	1.1
Dall sheep.....	<i>Ovis dalli</i>	*0.1
Big-horn sheep.....	<i>Ovis canadensis</i>	1.1

*On deposit at another zoo or sanctuary.

BIRDS

Family and common name	Scientific name	Number
SPHENISCIFORMES		
Spheniscidae:		
King penguin.....	<i>Aptenodytes patagonica</i>	*3
Adélie penguin.....	<i>Pygoscelis adeliae</i>	*1
STRUTHIONIFORMES		
Struthionidae:		
Ostrich	<i>Struthio camelus</i>	1.0
RHEIFORMES		
Rheidae:		
Rhea	<i>Rhea americana</i>	1.0
CASUARIIFORMES		
Casuariidae:		
Double-wattled casso- wary.	<i>Casuarus bicarunculatus</i>	1.1
Dromiceidae:		
Emu	<i>Dromiceus novae-hollandiae</i>	1.1
TINAMIFORMES		
Tinamidae:		
Pileated tinamou.....	<i>Crypturellus soui panamensis</i>	1
PROCELLARIIFORMES		
Diomedidae:		
Black-footed albatross	<i>Diomedea nigripes</i>	1.0
PELECANIFORMES		
Pelecanidae:		
Rose-colored pelican---	<i>Pelecanus onocrotalus</i>	2.2
White pelican.....	<i>Pelecanus erythrorhynchos</i>	2
Brown pelican.....	<i>Pelecanus occidentalis</i>	1
Dalmatian pelican.....	<i>Pelecanus crispus</i>	2
Phalacrocoracidae:		
Double-crested cormo- rant.	<i>Phalacrocorax auritus auritus</i>	3
European cormorant---	<i>Phalacrocorax carbo</i>	6
CICONIIFORMES		
Ardeidae:		
American egret.....	<i>Dichromanassa rufescens rufescens</i>	7
Eastern green heron---	<i>Butorides virescens</i>	2
Louisiana heron.....	<i>Hydranassa tricolor</i>	1
Black-crowned night heron.	<i>Nycticorax nycticorax</i>	11
American bittern.....	<i>Botaurus lentiginosus</i>	1
Tiger bittern.....	<i>Tigrisoma lineatum</i>	1
Balaenicipitidae:		
Shoebill	<i>Balaeniceps rex</i>	0.1
Ciconiidae:		
American wood ibis....	<i>Mycteria americana</i>	2
European white stork---	<i>Ciconia ciconia</i>	2
White-bellied stork---	<i>Sphenorhynchus abdimia</i>	2
Black-necked stork....	<i>Xenorhynchus asiaticus</i>	2
Painted stork.....	<i>Ibis leucocephalus</i>	2

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Family and common name	Scientific name	Number
Threskiornithidae:		
White ibis.....	<i>Guara alba</i>	1
Scarlet ibis.....	<i>Guara ruber</i>	2
Black-faced ibis.....	<i>Theristicus melanopis</i>	1
Black-headed ibis.....	<i>Threskiornis melanocephala</i>	1
Eastern glossy ibis.....	<i>Plegadis falcinellus falcinellus</i>	1
Phoenicopteridae:		
Chilean flamingo.....	<i>Phoenicopterus chilensis</i>	1
Cuban flamingo.....	<i>Phoenicopterus ruber</i>	1
Old World flamingo.....	<i>Phoenicopterus antiquorum</i>	1
ANSERIFORMES		
Anhimidae:		
Crested screamer.....	<i>Chauna torquata</i>	5
Anatidae:		
Coscoroba swan.....	<i>Coscoroba coscoroba</i>	2.2
Mute swan.....	<i>Cygnus olor</i>	1.1
Black-necked swan.....	<i>Cygnus melanocoriphus</i>	2
Whooper swan.....	<i>Olor cygnus</i>	1.2
Trumpeter swan.....	<i>Olor buccinator</i>	1.1
Black swan.....	<i>Chenopsis atrata</i>	2.2+2
Egyptian goose.....	<i>Alopochen aegyptiacus</i>	4
White-fronted goose.....	<i>Anser albifrons</i>	3
Indian bar-headed goose.	<i>Anser indicus</i>	3.2
Emperor goose.....	<i>Anser canagicus</i>	2
Blue goose.....	<i>Anser caerulescens</i>	5
Lesser snow goose.....	<i>Anser caerulescens caerulescens</i>	2
Greater snow goose.....	<i>Anser caerulescens atlanticus</i>	5
Ross's goose.....	<i>Anser rossii</i>	4
Nene, or Hawaiian goose.	<i>Branta sandvicensis</i>	2.0
Red-breasted goose.....	<i>Branta ruficollis</i>	2.2
Canada goose.....	<i>Branta canadensis</i>	22
Canada goose × Les- ser snow goose, hy- brid.	<i>Branta canadensis</i> × <i>Anser caerulescens</i>	1
Lesser Canada goose.....	<i>Branta canadensis</i>	4
Giant Canada goose.....	<i>Branta canadensis maxima</i>	4.6
Cackling goose.....	<i>Branta canadensis</i>	1.1
White-checked goose.....	<i>Branta canadensis</i>	2
Fulvous tree duck.....	<i>Dendrocygna bicolor</i>	0.1
Wood duck.....	<i>Aix sponsa</i>	90
Mandarin duck.....	<i>Aix galericulata</i>	3.2
Pintail duck.....	<i>Anas acuta</i>	1.1
Green-winged teal.....	<i>Anas crecca</i>	1.0
Gadwall.....	<i>Anas strepera</i>	3.1
European widgeon.....	<i>Anas penelope</i>	2.0
Spot-billed duck.....	<i>Anas poecilorhyncha</i>	3.2
Mallard duck.....	<i>Anas platyrhynchos</i>	60
Black duck.....	<i>Anas rubripes</i>	6.2
Greater scaup duck.....	<i>Aythya marila</i>	5.0
Lesser scaup duck.....	<i>Aythya affinis</i>	6.3

Family and common name	Scientific name	Number
Anatidae—Continued		
Redhead.....	<i>Aythya americana</i>	1.0
Ring-necked duck.....	<i>Aythya collaris</i>	7.0
Canvasback duck.....	<i>Aythya valisineria</i>	1.0
Indian cotton teal.....	<i>Nettapus coromandelianus</i>	0.1
Rosy-billed pochard.....	<i>Mctopiana peposaca</i>	2.1
American goldeneye.....	<i>Bucephala clangula</i>	0.1
Baldpate.....	<i>Mareca americana</i>	5.0
Hooded merganser.....	<i>Lophodytes cucullatus</i>	1.0
Comb duck.....	<i>Sarkidiornis melanotos</i>	4.2
Ruddy shelduck.....	<i>Casarca ferruginea</i>	3.3
FALCONIFORMES		
Cathartidae:		
Andean condor.....	<i>Vultur gryphus</i>	1.0
King vulture.....	<i>Sarcoramphus papa</i>	1
Sagittariidae:		
Secretarybird.....	<i>Sagittarius serpentarius</i>	1.1
Accipitridae:		
Hooded vulture.....	<i>Necrosyrtes monachus</i>	1
Griffon vulture.....	<i>Gyps fulvus</i>	1
Rüppell's vulture.....	<i>Gyps ruppellii</i>	1
Red-winged hawk.....	<i>Heterospizias meridionalis</i>	1
Red-tailed hawk.....	<i>Buteo jamaicensis</i>	2
Swainson's hawk.....	<i>Buteo swainsoni</i>	1
Red-shouldered hawk.....	<i>Buteo lineatus</i>	1
Manduyt's hawk eagle.....	<i>Spizaetus ornatus</i>	1
Black-crested eagle.....	<i>Lophaetus occipitalis</i>	1
Golden eagle.....	<i>Aquila chrysaetos</i>	5
Imperial eagle.....	<i>Aquila heliaca</i>	2
White-breasted sea eagle.....	<i>Haliaeetus leucogaster</i>	1
Pallas's eagle.....	<i>Haliaeetus leucoryphus</i>	1
Bald eagle.....	<i>Haliaeetus leucoccephalus</i>	8
Bateleur eagle.....	<i>Terathopius ccaudatus</i>	1
Lammergeier.....	<i>Gypaetus barbatus</i>	1
Falconidae:		
Sparrow hawk.....	<i>Falco sparverius</i>	2
Duck hawk.....	<i>Falco peregrinus anatum</i>	1
Red-footed falcon.....	<i>Falco vespertinus</i>	1
Feilden's falconet.....	<i>Neohierax cinereiceps</i>	1
Forest falcon.....	<i>Micrastur semitorquatus</i>	2
Audubon's caracara.....	<i>Polyborus cheriway</i>	2
White-throated caracara.....	<i>Phalcoboenus albogularis</i>	1
CALLIFORMES		
Megapodiidae:		
Brush turkey.....	<i>Alectura lathamii</i>	1.0
Cracidae:		
Wattled curassow.....	<i>Crax globulosa</i>	1.1
White-headed piping guan.....	<i>Pipile cumanensis</i>	1.0
Wattled guan.....	<i>Pipile</i> sp.....	0.1

Family and common name	Scientific name	Number
Crauidae—Continued		
Gambel's quail.....	<i>Lophortyx gambeli</i>	1.0
Valley quail.....	<i>Lophortyx californica vallicola</i>	2
Rain quail.....	<i>Turnix</i> sp.....	11
Argus pheasant.....	<i>Argusianus argus</i>	1.0
Golden pheasant.....	<i>Chrysolophus pictus</i>	0.2
Black-backed kaleege pheasant.....	<i>Gennaeus melanonotus</i>	1.1
Silver pheasant.....	<i>Gennaeus nycthemerus</i>	1.0
Ring-necked pheasant.....	<i>Phasianus colchicus</i>	1.2
Ring-necked pheasant, albino.....	<i>Phasianus colchicus</i>	0.1
Ring-necked pheasant × Green pheasant, hybrid.....	<i>Phasianus colchicus</i> × <i>Phasianus versicolor</i>	1.0
Bhutan, or gray peacock-pheasant.....	<i>Polyplectron bicalcaratum</i>	2.1
Palawan pheasant.....	<i>Polyplectron chinquis</i>	1.1
Peafowl.....	<i>Pavo cristatus</i>	3.3
Red junglefowl.....	<i>Gallus gallus</i>	1.0
Chukar partridge.....	<i>Allectoris graeca</i>	1
Painted partridge.....	<i>Francolinus pictus</i>	1
Gray partridge.....	<i>Francolinus pondicerianus</i>	1.1
Black partridge.....	<i>Melanoperdix nigra</i>	3.4
Numididae:		
Vulturine guineafowl.....	<i>Acryllium vulturinum</i>	1
GRUIFORMES		
Gruidae:		
Siberian crane.....	<i>Grus leucogeranus</i>	1.0
European crane.....	<i>Grus grus</i>	2
Sarus crane.....	<i>Grus antigone</i>	1
Demoiselle crane.....	<i>Anthropoides virgo</i>	4
African crowned crane.....	<i>Baalcarica pavonina</i>	5
Rallidae:		
Cayenne wood rail.....	<i>Aramides cajanca</i>	1
Purple gallinule.....	<i>Porphyryula martinica</i>	1
Indian moorhen.....	<i>Gallinula chloropus</i>	9
Eurypygidae:		
Sun bittern.....	<i>Eurypyga helias</i>	1
Cariamidae:		
Cariama, or seriama.....	<i>Cariama cristata</i>	1
Otididae:		
Kori bustard.....	<i>Eupodotis kori</i>	2.0
Senegal bustard.....	<i>Eupodotis senegalensis</i>	1.0
CHARADRIIFORMES		
Jacanidae:		
Common jaçana.....	<i>Jacana spinosa</i>	2
Pheasant-tailed jaçana.....	<i>Hydrophasianus chirurgus</i>	2
Charadriidae:		
Australian banded plover.....	<i>Zonifer tricolor</i>	2
Gray plover.....	<i>Pluvialis squatarola</i>	1

Family and common name	Scientific name	Number
Charadriidae—Continued		
European lapwing.....	<i>Vanellus vanellus</i>	3
South American lapwing.	<i>Belonopterus cayennensis</i>	3
Crocodile bird.....	<i>Pluvianus aegyptius</i>	7
Recurvirostridae:		
Black-necked stilt.....	<i>Himantopus mexicanus</i>	1
Laridae:		
Ring-billed gull.....	<i>Larus delawarensis</i>	3
Laughing gull.....	<i>Larus atricilla</i>	3
Herring gull.....	<i>Larus argentatus</i>	1
Great black-backed gull.	<i>Larus marinus</i>	1
Silver gull.....	<i>Larus novae-hollandiae</i>	5
COLUMBIFORMES		
Columbidae:		
High-flying Budapest pigeon.	<i>Columba livia</i>	1
Black-billed pigeon.....	<i>Columba nigrirostris</i>	1
Triangular spotted pigeon.	<i>Columba guinea</i>	2
Imperial green pigeon.....	<i>Ducula aenea</i>	2
Orange-breasted green pigeon.	<i>Treron bicincta</i>	2
Crowned pigeon.....	<i>Goura victoria</i>	1
Blue ground dove.....	<i>Claravis pretiosa</i>	2
Ruddy ground dove.....	<i>Chaemepelia rufipennis</i>	1
Indian emerald-winged tree dove.	<i>Chalcophaps indica</i>	3
Diamond dove.....	<i>Geopelia cuneata</i>	1
Plain-breasted ground dove.	<i>Columbigallina minuta</i>	2
Ground dove.....	<i>Columbigallina passerina</i>	1
Ring-necked dove.....	<i>Streptopelia decaocto</i>	3
Blue-headed ring dove	<i>Streptopelia tranquebarica</i>	2
White-winged dove.....	<i>Zenaida asiatica</i>	1
Mourning dove.....	<i>Zenaidura macroura</i>	2
PSITTACIFORMES		
Psittacidae:		
Kea parrot.....	<i>Nestor notabilis</i>	1
Banksian cockatoo.....	<i>Calyptorhynchus magnificus</i>	1.0
White cockatoo.....	<i>Kakatoe alba</i>	1
Solomon Islands cockatoo.	<i>Kakatoe ducrops</i>	*1
Sulphur-crested cockatoo.	<i>Kakatoe galerita</i>	2
Bare-eyed cockatoo.....	<i>Kakatoe sanguinea</i>	1
Great red-crested cockatoo.	<i>Kakatoe moluccensis</i>	1
Leadbeater's cockatoo.	<i>Kakatoe leadbeateri</i>	5
Cockatiel.....	<i>Nymphicus hollandicus</i>	1

*On deposit at another zoo or sanctuary.

Family and common name	Scientific name	Number
Psittacidae—Continued		
Yellow-and-blue macaw.	<i>Ara araurana</i>	8
Red-and-blue macaw...	<i>Ara chloroptera</i>	5
Red - blue - and-yellow macaw.	<i>Ara macao</i>	5
Illiger's macaw.....	<i>Ara maracana</i>	2
Brown-throated conure.	<i>Conurus acruinosus</i>	5
Petz's parakeet.....	<i>Aratinga canicularis</i>	1
Rusty-cheeked parrot...	<i>Aratinga pertinax</i>	1
Tovi parakeet.....	<i>Brotogeris jugularis</i>	1
Yellow-naped parrot...	<i>Amazona auropalliata</i>	2
Blue-fronted parrot...	<i>Amazona aestiva</i>	1
Double yellow-headed parrot.	<i>Amazona oratrix</i>	2
Black-headed, or Nanday, parrot.	<i>Nandayus nanday</i>	10
Lineolated parakeet...	<i>Bolborhynchus lincolatus</i>	4
White-winged parakeet.	<i>Brotogeris versicolorus</i>	1
African gray parrot...	<i>Psittacus erithacus</i>	1
Red-sided eclectus.....	<i>Eclectus pectoralis</i>	2.1
Greater ring-necked parakeet.	<i>Psittacula eupatria</i>	5
Rose-breasted parakeet.	<i>Psittacula alexandri</i>	1
Moustached parakeet...	<i>Psittacula fasciata</i>	1
Lesser ring-necked parakeet.	<i>Psittacula krameri</i>	23
Blossom-headed parakeet.	<i>Psittacula cynocephala</i>	20
Malabar parakeet.....	<i>Psittacula columboides</i>	5
Quaker parakeet.....	<i>Myiopsitta monacha</i>	6
Grass parakeet.....	<i>Melopsittacus undulatus</i>	1
Red-faced lovebird...	<i>Agapornis pullaria</i> ssp.....	2
Rosy-faced lovebird...	<i>Agapornis roscicollis</i>	1
Masked lovebird.....	<i>Agapornis personata</i>	2
Black-headed caique, or seven-color parrot.	<i>Pionites melanocephala</i>	2
Yellow-thighed caique.	<i>Pionites leucogaster</i>	1
CUCULIFORMES		
Musophagidae:		
White-bellied go-away bird.	<i>Crinifer leucogaster</i>	1
White-cheeked turaco...	<i>Tauraco leucotis leucotis</i>	3
Purple-crested turaco...	<i>Gallirix porphyreolophus</i>	2
Cuculidae:		
Koel.....	<i>Eudynamis scolopacea</i>	2
Roadrunner.....	<i>Geococcyx californianus</i>	2
Red-winged crested cuckoo.	<i>Clamator coromandus</i>	1

STRIGIFORMES		
Family and common name	Scientific name	Number
Tytonidae:		
Barn owl	<i>Tyto alba</i>	1
Strigidae:		
Screech owl	<i>Otus asio</i>	2
Spectacled owl	<i>Pulsatrix perspicillata</i>	2
Malay fishing owl	<i>Ketupa ketupu</i>	1
Snowy owl	<i>Nyctea nyctea</i>	4
Barred owl	<i>Strix varia</i>	5
Nepal brown wood owl	<i>Strix leptogrammica newarensis</i>	1
CORACIFORMES		
Alcedinidae:		
Kookaburra	<i>Dacelo gigas</i>	12
White-breasted kingfisher	<i>Halcyon smyrnensis</i>	2
Coraciidae:		
Lilac-breasted roller	<i>Coracias caudata</i>	2
Indian roller	<i>Coracias benghalensis</i>	2
Bucerotidae:		
Concave-casqued hornbill	<i>Buceros bicornis</i>	2
Pied hornbill	<i>Anthracoceros malabaricus</i>	4
Lesser pied hornbill	<i>Anthracoceros coronatus</i>	2
Abyssinian ground hornbill	<i>Bucorvus abyssinicus</i>	2
Leadbeater's ground hornbill	<i>Bucorvus leadbeateri</i>	1.0
Wreathed hornbill	<i>Rhyticeros undulatus</i>	1
Gray hornbill	<i>Tockus birostris</i>	0.1
Crowned hornbill	<i>Tockus alboterminatus</i>	1
Yellow-billed hornbill	<i>Tockus flavirostris</i>	0.1
Great black-casqued hornbill	<i>Ceratogymna atrata</i>	0.1
PICIFORMES		
Capitonidae:		
Asiatic great barbet	<i>Megalaima virens</i>	1
Blue-throated barbet	<i>Megalaima asiatica</i>	4
Streaked barbet	<i>Megalaima lineata</i>	7
Ramphastidae:		
Keel-billed toucan	<i>Ramphastos culminatus</i>	2
Sulphur-and-white-breasted toucan	<i>Ramphastos vitellinus</i>	1
Curly-crested toucanet	<i>Pteroglossus beauharnaesii</i>	3
Razor-billed toucanet	<i>Pteroglossus castanotis</i>	2
Picidae:		
Flicker	<i>Colaptes auratus</i>	1
PASSERIFORMES		
Tyrannidae:		
Kiskadee flycatcher	<i>Pitangus sulphuratus</i>	3
Eastern kingbird	<i>Tyrannus tyrannus</i>	1
Alaudidae:		
Horned lark	<i>Eremophila alpestris</i>	1

Family and common name	Scientific name	Number
Dicruridae:		
Racket-tailed drongo	<i>Dicrurus paradiseus</i>	9
Corvidae:		
Magpie	<i>Pica pica</i>	1
Yellow-billed magpie	<i>Pica nuttalli</i>	1
Asiatic tree pie	<i>Crypsirina formosae</i>	1
Magpie jay	<i>Calocitta formosa</i>	1
European jay	<i>Garrulus glandarius</i>	1.1
African white-necked crow.	<i>Corvus albus</i>	2
American crow	<i>Corvus brachyrhynchos</i>	1
Raven	<i>Corvus corax principalis</i>	2
Formosan red-billed pie.	<i>Cissa caerulea</i>	9
Occipital blue pie	<i>Cissa occipitalis</i>	3
Hunting crow	<i>Cissa chinensis</i>	7
Paridae:		
Great tit	<i>Parus major</i>	1
Sittidae:		
Chestnut-bellied nut-hatch.	<i>Sitta castanca</i>	1
Timaliidae:		
Scimitar babbler	<i>Pomatorhinus schisticeps</i>	1
White-crested laughing thrush.	<i>Garrulax bicolor</i>	4
Black-headed sibia	<i>Heterophasia capistrata</i>	2
Silver-eared mesia	<i>Mesia argentauris</i>	5
Pekin robin	<i>Liciothrix luteus</i>	9
Pycnonotidae:		
Black-headed bulbul	<i>Pycnonotus atriceps</i>	2
Red-vented bulbul	<i>Pycnonotus cafer</i>	4
White-cheeked bulbul	<i>Pycnonotus leucogenys</i>	3
White-eared bulbul	<i>Pycnonotus leucotis</i>	1
Red-whiskered bulbul	<i>Pycnonotus jocosus</i>	7
White-throated bulbul	<i>Criniger flavcolus</i>	4
Chloropseidae:		
Gold-fronted chloropsis.	<i>Chloropsis aurifrons</i>	9
Blue-winged fruitsucker.	<i>Chloropsis hardwickii</i>	1
Blue-mantled fairy bluebird.	<i>Irena puella malayensis</i>	1.1
Turdidae:		
Robin, albino	<i>Turdus migratorius</i>	1
European song thrush	<i>Turdus cricetorum</i>	2
Blackbird	<i>Turdus merula</i>	1
Cliff chat	<i>Thamnolaea cinnamomeiventris</i>	1
Orange-headed ground thrush.	<i>Geocichla citrina</i>	5
Shama thrush	<i>Copsychus malabaricus</i>	3
Muscicapidae:		
Verditer flycatcher	<i>Muscicapa thalassina</i>	2

Family and common name	Scientific name	Number
Bombycillidae:		
Cedar waxwing.....	<i>Bombycilla cedrorum</i>	1
Sturnidae:		
Rose-colored pastor....	<i>Pastor roscus</i>	1
Purple starling.....	<i>Lamprocolius purpureus</i>	3
Burchell's long-tailed starling.....	<i>Lamprotornis caudatus</i>	1
Amethyst starling.....	<i>Cinnyricinclus leucogaster</i>	1
Tri-colored starling....	<i>Spreo superbus</i>	1
Jungle mynah.....	<i>Acridotheres tristis</i>	1
Lesser hill mynah.....	<i>Gracula religiosa indica</i>	3
Greater Indian hill mynah.....	<i>Gracula religiosa intermedia</i>	2
Rothschild's mynah....	<i>Lencopsar rothschildi</i>	2
Ball mynah.....	<i>Sturnus contra jalla</i>	3
Nectariniidae:		
Variable sunbird.....	<i>Cinnyris venustus raceis</i>	1
Scarlet-tufted mala- chite sunbird.....	<i>Nectarinia johnstoni</i>	1
Purple sunbird.....	<i>Nectarinia asiatica</i>	1
Zosteropidae:		
White-eye.....	<i>Zosterops palpebrosa</i>	2
Coerebidae:		
Black-headed sugar- bird.....	<i>Chlorophanes spiza</i>	2
Bananaquit.....	<i>Coccyba flavcola</i>	1
Parulidae:		
Kentucky warbler.....	<i>Oporornis formosus</i>	1
Redstart.....	<i>Setophaga ruticilla</i>	1
Ovenbird.....	<i>Seiurus aurocapillus</i>	1
Ploceidae:		
Red-naped widowbird..	<i>Coliuspasser laticauda</i>	4
Giant whydah.....	<i>Diatropura procne</i>	1
Baya weaver.....	<i>Ploceus baya</i>	3
Vitelline masked weav- er.....	<i>Ploceus vitellinus</i>	1
Red bishop weaver....	<i>Euplectes orix</i>	1
White-headed nun.....	<i>Lonchura maja</i>	2
Indian silverbill.....	<i>Lonchura malabarica</i>	1
Bengalese finch.....	<i>Lonchura sp.</i>	2
Black-headed munia....	<i>Lonchura malacca</i>	3
Spotted munia.....	<i>Lonchura punctulata</i>	5
Red munia.....	<i>Estrilda amandava</i>	2
Cut-throat weaver finch.....	<i>Amadina fasciata</i>	1
Lavender finch.....	<i>Estrilda coerulescens</i>	1
Common waxbill.....	<i>Estrilda troglodytes</i>	1
Zebra finch.....	<i>Poephila castanotis</i>	5
Gouldian finch.....	<i>Poephila gouldiae</i>	1
Icteridae:		
Yellow-headed black- bird.....	<i>Xanthocephalus xanthocephalus</i>	1
Rice grackle.....	<i>Psomocolax oryzivora</i>	2

Family and common name	Scientific name	Number
Icteridae—Continued		
Swainson's grackle.....	<i>Holoquiscalus lugubris</i>	1
Glossy cowbird.....	<i>Molothrus bonariensis</i>	2
Brown-headed cowbird.	<i>Molothrus ater</i>	1
Bay cowbird.....	<i>Molothrus badius</i>	1
Colombian red-eyed cowbird.	<i>Tangavius armenti</i>	1
Red-winged blackbird..	<i>Agelaius phoeniceus</i>	2
Red-breasted marsh-bird.	<i>Leistes militaris</i>	4
Thraupidae:		
Blue tanager.....	<i>Thraupis cana</i>	1
White-edged tanager..	<i>Thraupis leucoptera</i>	1
Yellow-rumped tanager	<i>Ramphocelus icteronotus</i>	1
Passerini's tanager....	<i>Ramphocelus passerinii</i>	1
Maroon, or silver-beaked, tanager.	<i>Ramphocelus jacapa</i>	1
Fringillidae:		
Tropical seed finch....	<i>Oryzoborus torridus</i>	2
Black-throated cardinal.	<i>Paroaria gularis</i>	2
European goldfinch....	<i>Carduelis carduelis</i>	1
Green finch.....	<i>Chloris chloris</i>	1
Lesser yellow finch....	<i>Sicalis luteola</i>	1
Saffron finch.....	<i>Sicalis flaveola</i>	3
White-lined finch....	<i>Spermophila lincola</i>	3
Slate-colored junco....	<i>Junco hyemalis</i>	1
Buff-throated saltator.	<i>Saltator maximus</i>	1
Tawny-bellied seed-eater.	<i>Sporophila minuta</i>	5
Song sparrow.....	<i>Melospiza melodia</i>	1
Dickcissel.....	<i>Spiza americana</i>	3
White-crowned sparrow.	<i>Zonotrichia leucophrys</i>	2
Yellowhammer.....	<i>Emberiza citrinella</i>	1
European bunting....	<i>Emberiza calandra</i>	1
Jacarini finch.....	<i>Volatinia jacarini</i>	2

REPTILES

LOPHICATA

Alligatoridae:		
Caiman.....	<i>Caiman sclerops</i>	16
Black caiman.....	<i>Melanosuchus niger</i>	3
American alligator....	<i>Alligator mississippiensis</i>	14
Chinese alligator....	<i>Alligator sinensis</i>	2
Crocodillidae:		
Broad-nosed crocodile.	<i>Osteolaemus tetraspis</i>	2
African crocodile....	<i>Crocodylus niloticus</i>	3
Narrow-nosed crocodile.	<i>Crocodylus cataphractus</i>	1
Salt-water crocodile..	<i>Crocodylus porosus</i>	1
American crocodile....	<i>Crocodylus acutus</i>	1

Family and common name	Scientific name	Number
Gavialidae:		
Indian gavial.....	<i>Gavialis gangeticus</i>	1
CHELONIA		
Chelydridae:		
Snapping turtle.....	<i>Chelydra serpentina</i>	15
Alligator snapping turtle.	<i>Macrochelys temminckii</i>	1
Kinosternidae:		
Stinkpot	<i>Sternotherus odoratus</i>	4
Mud turtle.....	<i>Kinosternon subrubrum</i>	5
Tropical American mud turtle.	<i>Kinosternon spurrelli</i>	3
South American mud turtle.	<i>Kinosternon cruentatum</i>	1
Emydidae:		
Tropical American pointed-nosed turtle.	<i>Geoemyda puncturia</i>	2
Box turtle.....	<i>Terrapene carolina</i>	63
Gulf Coast box turtle..	<i>Terrapene carolina major</i>	1
Three-toed box turtle..	<i>Terrapene carolina triunguis</i>	2
Florida box turtle.....	<i>Terrapene carolina bauri</i>	5
Ornate box turtle.....	<i>Terrapene ornata ornata</i>	1
Kura kura box turtle..	<i>Cuora amboinensis</i>	3
Diamondback terrapin.	<i>Malaclemys terrapin</i>	7
Map turtle.....	<i>Graptemys geographica</i>	1
Barbour's map turtle..	<i>Graptemys barbouri</i>	4
Mississippi map turtle.	<i>Graptemys pseudogeographica kohni</i>	3
Painted turtle.....	<i>Chrysemys picta</i>	10
Western painted turtle.	<i>Chrysemys picta belli</i>	9
Southern painted turtle.	<i>Chrysemys picta dorsalis</i>	1
Cumberland turtle.....	<i>Pseudemys scripta troostii</i>	7
South American red-lined turtle.	<i>Pseudemys scripta callirostris</i>	2
Yellow-bellied turtle..	<i>Pseudemys scripta scripta</i>	18
Red-eared turtle.....	<i>Pseudemys scripta elegans</i>	36
Red-bellied turtle.....	<i>Pseudemys rubriventris</i>	8
Cooter	<i>Pseudemys floridana</i>	7
Florida red-bellied turtle.	<i>Pseudemys nelsoni</i>	2
Central American turtle.	<i>Pseudemys ornata</i>	2
Cuban water turtle....	<i>Pseudemys decussata</i>	1
Chicken turtle.....	<i>Deirochelys reticularia</i>	3
Spotted turtle.....	<i>Clemmys guttata</i>	2
Wood turtle.....	<i>Clemmys insculpta</i>	5
Iberian pond turtle....	<i>Clemmys leprosa</i>	5
European water terrapin.	<i>Clemmys caspica rivulata</i>	13
European pond turtle..	<i>Emys orbicularis</i>	2
Blanding's turtle.....	<i>Emys blandingii</i>	5
Reeves's turtle.....	<i>Chinemys reevesii</i>	4

Family and common name	Scientific name	Number
Testudinidae:		
Duncan Island tortoise	<i>Testudo ephippium</i>	2
Galapagos tortoise	<i>Testudo clephantopus vicina</i>	2
Galapagos tortoise	<i>Testudo clephantopus</i>	2
Giant Aldabra tortoise	<i>Testudo gigantea</i>	2
South American tortoise.	<i>Testudo denticulata</i>	5
Star tortoise	<i>Testudo elegans</i>	2
Mountain tortoise	<i>Testudo emys</i>	2
Gopher tortoise	<i>Gopherus polyphemus</i>	2
Texas tortoise	<i>Gopherus berlandieri</i>	1
Pelomedusidae:		
African water turtle	<i>Pelomedusa sinuata</i>	2
African black mud turtle.	<i>Pelusios subniger</i>	1
Red-faced turtle	<i>Podocnemis catanantius</i>	1
Amazon spotted turtle	<i>Podocnemis unifilis</i>	5
Chelydidae:		
South American side-necked turtle.	<i>Batrachemys nasuta</i>	2
Australian side-necked turtle.	<i>Chelodina longicollis</i>	3
Matamata turtle	<i>Chelys fimbriata</i>	1
Small side-necked turtle.	<i>Hydromedusa tectifera</i>	2
Large side-necked turtle.	<i>Phrynops hilarii</i>	7
Kreff's turtle	<i>Emydura krefftii</i>	3
Murray turtle	<i>Emydura macquarrii</i>	3
South American gibba turtle.	<i>Mesoclemmys gibba</i>	2
Flat-headed turtle	<i>Platemys platycephala</i>	2
Trionychidae:		
Spiny softshell	<i>Trionyx ferox</i>	5
Texas softshell	<i>Trionyx ferox emoryi</i>	1
African softshell	<i>Trionyx triunguis</i>	2
SAURIA		
Gekkonidae:		
Tokay gecko	<i>Gekko gekko</i>	27
Day gecko	<i>Phelsuma cepedianum</i>	3
Day gecko	<i>Phelsuma sp.</i>	1
Agamidae:		
Agamid lizard	<i>Agamid stellio</i>	4
Agamid lizard	<i>Agamid sp.</i>	1
Blood-sucker lizard	<i>Calotes versicolor</i>	5
Iguanidae:		
Common iguana	<i>Iguana iguana</i>	7
Swan Island iguana	<i>Iguana delicatissima</i>	1
Basilisk lizard	<i>Basiliscus sp.</i>	1
Rhinoceros iguana	<i>Cyclura cornuta</i>	2
Carolina anole	<i>Anolis carolinensis</i>	50
Fence lizard	<i>Sceloporus undulatus</i>	11

Family and common name	Scientific name	Number
Iguanidae—Continued		
Fence lizard.....	<i>Sceloporus</i> sp.....	3
Plica lizard.....	<i>Plica plica</i>	1
Chuckwalla.....	<i>Sauromatus obesus</i>	4
Scincidae:		
Mourning skink.....	<i>Egernia luctuosa</i>	2
White's skink.....	<i>Egernia whitei</i>	2
Skink.....	<i>Eumeces anthracinus</i>	1
Skink.....	<i>Eumeces</i> sp.....	1
Five-lined skink.....	<i>Eumeces fasciatus</i>	1
Four-lined skink.....	<i>Eumeces tetragrammus</i>	10
Great Plains skink.....	<i>Eumeces obsoletus</i>	2
Stump-tailed skink.....	<i>Tiliqua rugosa</i>	1
Malayan skink.....	<i>Mabuya multifasciata</i>	2
Gerrhosauridae:		
African plated lizard...	<i>Zonosaurus</i> sp.....	1
Madagascar plated lizard.	<i>Zonosaurus madagascariensis</i>	1
Plated lizard.....	<i>Gerrhosaurus major</i>	1
Lacertidae:		
European lizard.....	<i>Lacerta strigata trilineata</i>	1
Teiidae:		
Ameiva lizard.....	<i>Ameiva ameiva praesignis</i>	1
Caiman lizard.....	<i>Dracaena guianensis</i>	1
Cordylidae:		
South African spiny lizard.	<i>Cordylus vandami perkoensis</i>	2
African spiny lizard...	<i>Cordylus polyzonus</i>	2
Varanidae:		
Komodo dragon.....	<i>Varanus komodoensis</i>	1
Indian monitor.....	<i>Varanus flavescens</i>	1
Duméril's monitor.....	<i>Varanus dumerili</i>	1
Philippine monitor.....	<i>Varanus nuchalis</i>	1
Malayan monitor.....	<i>Varanus salvator</i>	7
Helodermatidae:		
Gila monster.....	<i>Heloderma suspectum</i>	4
Mexican beaded lizard.	<i>Heloderma horridum</i>	3
Beaded lizard, black phase.	<i>Heloderma horridum alvernensis</i>	1
Anguidae:		
Eastern glass lizard...	<i>Ophisaurus ventralis</i>	1
European glass lizard...	<i>Ophisaurus apodus</i>	4
European glass lizard, or slow worm.	<i>Anguis fragilis</i>	8
San Diego alligator lizard.	<i>Gerrhonotus multicarinatus webbi</i>	1
SERPENTES		
Boidae:		
Cook's tree boa.....	<i>Boa cooki</i>	3
Boa constrictor.....	<i>Constrictor constrictor</i>	4
Emperor boa.....	<i>Constrictor imperator</i>	1
Cuban ground boa.....	<i>Tropidophis melanura</i>	1
Rainbow boa.....	<i>Epicrates cenchria</i>	2

Family and common name	Scientific name	Number
Boidae—Continued		
Sand boa	<i>Eryx conica</i>	1
Ball python.....	<i>Python regius</i>	1
Indian rock python.....	<i>Python molurus</i>	3
Regal python	<i>Python reticulatus</i>	4
African python.....	<i>Python sebae</i>	3
Colubridae:		
Eastern king snake.....	<i>Lampropeltis getulus getulus</i>	2
Speckled king snake.....	<i>Lampropeltis getulus holbrooki</i>	2
Florida king snake.....	<i>Lampropeltis getulus floridana</i>	2
Sonora king snake.....	<i>Lampropeltis getulus splendida</i>	1
Scarlet king snake.....	<i>Lampropeltis doliata doliata</i>	2
Tropical king snake.....	<i>Lampropeltis doliata polyzonus</i>	1
Eastern milk snake.....	<i>Lampropeltis doliata triangulum</i>	1
Coastal Plain milk snake.....	<i>Lampropeltis doliata temporalis</i>	1
Mole snake	<i>Lampropeltis calligaster rhombomaculata</i>	2
Eastern garter snake.....	<i>Thamnophis sirtalis sirtalis</i>	2
Garter snake, melanistic phase.....	<i>Thamnophis sirtalis</i>	1
Eastern hog-nosed snake.....	<i>Heterodon platyrhinos</i>	1
Common water snake.....	<i>Natrix sipedon</i>	3
Broad-banded water snake.....	<i>Natrix sipedon confluens</i>	1
Red-bellied water snake.....	<i>Natrix erythrogaster erythrogaster</i>	1
Blotched water snake.....	<i>Natrix erythrogaster transversa</i>	1
Yellow-bellied water snake.....	<i>Natrix erythrogaster flavigaster</i>	1
European grass snake.....	<i>Natrix natrix natrix</i>	8
European grass snake.....	<i>Natrix natrix bilineata</i>	1
Diamondback water snake.....	<i>Natrix rhombifera</i>	4
Brown water snake.....	<i>Natrix taxispilota</i>	2
Tessellated water snake.....	<i>Natrix tessellatus</i>	3
Eastern indigo snake.....	<i>Drymarchon corais couperi</i>	1
Texas indigo snake.....	<i>Drymarchon corais crebennus</i>	1
Mexican indigo snake.....	<i>Drymarchon corais ssp.</i>	1
Black rat snake.....	<i>Elaphe obsoleta obsoleta</i>	5
Black rat snake, albino.....	<i>Elaphe obsoleta obsoleta</i>	1
Yellow rat snake.....	<i>Elaphe obsoleta quadrivittata</i>	1
Texas rat snake.....	<i>Elaphe obsoleta lindheimeri</i>	2
Corn snake.....	<i>Elaphe guttata guttata</i>	4
Great Plains rat snake.....	<i>Elaphe guttata emoryi</i>	1
Asiatic striped rat snake.....	<i>Elaphe taeniura</i>	6
Japanese rat snake.....	<i>Elaphe climacophora</i>	1
Chinese rat snake.....	<i>Elaphe carinata</i>	2
Aesculapian snake.....	<i>Elaphe longissima</i>	3
Aesculapian snake.....	<i>Elaphe longissima subgrisea</i>	1

Family and common name	Scientific name	Number
Colubridae—Continued		
Banded red snake.....	<i>Dinodon rufozonatum</i>	4
Rainbow snake.....	<i>Abastor erythrogrammus</i>	1
Northern black racer.....	<i>Coluber constrictor constrictor</i>	1
European racer.....	<i>Coluber jugularis caspius</i>	2
Red racer.....	<i>Masticophis flagellum piccus</i>	1
Western coachwhip.....	<i>Masticophis flagellum testaceus</i>	1
Northern ringneck snake.....	<i>Diadophis punctatus edwardsii</i>	1
Eastern worm snake.....	<i>Carphophis amoenus amoenus</i>	1
Brown snake.....	<i>Storeria dekayi</i>	1
Green vine snake.....	<i>Dryophis prasinus</i>	1
Bull snake.....	<i>Pituophis catenifer sayi</i>	2
Great Basin gopher snake.....	<i>Pituophis catenifer deserticola</i>	1
File snake.....	<i>Simocephalus capensis</i>	1
Wolf snake.....	<i>Lycodon flavomaculatus</i>	1
Cat-eyed snake.....	<i>Eteirodipsas</i> sp.....	1
Green-headed tree snake.....	<i>Leptophis mexicanus</i>	1
Typhlopidae:		
Blind snake.....	<i>Typhlops vermicularis</i>	3
Blind snake.....	<i>Typhlops blamus</i>	3
Elapidae:		
Indian cobra.....	<i>Naja naja</i>	1
Taiwan cobra.....	<i>Naja naja atra</i>	9
King cobra.....	<i>Ophiophagus hannah</i>	2
Many-banded krait.....	<i>Bungarus multicinctus</i>	3
Banded krait.....	<i>Bungarus fasciatus</i>	2
Acrochordidae:		
Elephant trunk snake.....	<i>Acrochordus javanicus</i>	1
Crotalidae:		
Southern copperhead.....	<i>Ancistrodon contortrix contortrix</i>	12
Northern copperhead.....	<i>Ancistrodon contortrix mokeson</i>	4
Broad-banded copperhead.....	<i>Ancistrodon contortrix laticinctus</i>	1
Cottonmouth.....	<i>Ancistrodon piscivorus</i>	3
Western cottonmouth.....	<i>Ancistrodon piscivorus leucostoma</i>	3
Japanese pit viper.....	<i>Ancistrodon halys</i>	1
Green palm viper.....	<i>Trimeresurus gramineus</i>	1
Mamushi.....	<i>Trimeresurus elegans</i>	1
Habu.....	<i>Trimeresurus flavoviridis</i>	2
Okinawa habu.....	<i>Trimeresurus okinawensis</i>	1
Taiwan habu.....	<i>Trimeresurus mucrosquamatus</i>	1
Eastern diamondback rattlesnake.....	<i>Crotalus adamanteus</i>	1
Timber rattlesnake.....	<i>Crotalus horridus</i>	1
Western diamondback rattlesnake.....	<i>Crotalus atrox</i>	6
Viperidae:		
European viper.....	<i>Vipera berus bosniensis</i>	1

AMPHIBIANS

Family and common name	CAUDATA Scientific name	Number
Cryptobranchidae:		
Giant salamander.....	<i>Megalobatrachus japonicus</i>	3
Amphiumidae:		
Congo eel.....	<i>Amphiuma means</i>	1
Ambystomatidae:		
Axolotl, white phase....	<i>Ambystoma tigrinum</i>	2
Axolotl.....	<i>Ambystoma tigrinum</i>	3
Spotted salamander....	<i>Ambystoma maculatum</i>	1
Salamandridae:		
Japanese red-bellied newt.....	<i>Diemictylus pyrrhogaster</i>	8
Red-spotted newt.....	<i>Diemictylus viridescens viridescens</i>	14
Broken-striped newt....	<i>Diemictylus viridescens dorsalis</i>	7

SALIENTIA

Bufonidae:		
American toad.....	<i>Bufo terrestris americanus</i>	1
Fowler's toad.....	<i>Bufo woodhousei fowleri</i>	1
Blomberg's toad.....	<i>Bufo blombergi</i>	1
Giant toad.....	<i>Bufo marinus</i>	9
Cuban toad.....	<i>Bufo peltoccephalus</i>	6
Crested Central Ameri- can toad.....	<i>Bufo typhonius</i>	2
South American point- ed-nosed toad.....	<i>Bufo granulatus</i>	1
Colorado River toad....	<i>Bufo alvarius</i>	2
Western toad.....	<i>Bufo boreas</i>	1
Pipidae:		
Surinam toad.....	<i>Pipa pipa</i>	6
African clawed frog....	<i>Xenopus laevis</i>	3
Hylidae:		
Pacific tree frog.....	<i>Hyla regilla</i>	3
Gray tree frog.....	<i>Hyla versicolor</i>	1
Microhylidae:		
Narrow-mouthed toad....	<i>Microhyla carolinensis</i>	2
Ranidae:		
American bullfrog.....	<i>Rana catesbeiana</i>	1
Green frog.....	<i>Rana clamitans melanota</i>	1
Leopard frog.....	<i>Rana pipiens</i>	25

FISHES

NEOCHERATOONTOIDEI

Protopteridae:		
African lungfish.....	<i>Protopterus annectens</i>	3

OSTARIOPHYSOIDEI

Characidae:		
Piranha.....	<i>Serrasalmus niger</i>	1
Black tetra.....	<i>Gymnocorymbus ternetzi</i>	1
Metynnis, or silver dollar.....	<i>Metynnis maculatus</i>	1

Family and common name	Scientific name	Number
Cyprinidae:		
Zebra danio.....	<i>Brachydanio rerio</i>	1
Tiger barb.....	<i>Barbus partipentazona</i>	1
White cloud mountain fish.	<i>Tanichthys albonubes</i>	1
Loricariidae:		
South American sucking catfish.	<i>Hypostomus plecostomus</i>	3
Black bullhead.....	<i>Ictalurus melas</i>	1
Electrophoridae:		
Electric eel.....	<i>Electrophorus electricus</i>	6
CYPRINODONTOIDEI		
Poeciliidae:		
Flag-tailed guppy.....	<i>Lebistes reticulatus</i>	10
Guppy.....	<i>Lebistes reticulatus</i>	15
Black mollie.....	<i>Mollienesia latipinna</i>	1
Platy, or moonfish.....	<i>Xiphophorus maculatus</i>	5
Green swordtail.....	<i>Xiphophorus</i> sp.....	20
Red swordtail.....	<i>Xiphophorus</i> sp.....	40
POMPOPHOROIDEI		
Anabantidae:		
Kissing gourami.....	<i>Helostoma temminckii</i>	1
Centrarchidae:		
Common bluegill.....	<i>Lepomis macrochirus</i>	1
Cichlidae:		
Peacock cichlid.....	<i>Astronotus ocellatus</i>	1
Jack Dempsey fish.....	<i>Cichlasoma biocellatum</i>	3
Egyptian mouth-breeder.	<i>Haplochromis multicolor</i>	1
African mouth-breeder.	<i>Pelmatochromis guentheri</i>	1
Angelfish.....	<i>Pterophyllum eimckei</i>	1
Gobiidae:		
Bumblebee fish.....	<i>Brachygobius doriae</i>	1
CRUSTACEANS		
Cenobitidae:		
Land hermit crab.....	<i>Coenobita clypeatus</i>	29
Key West hermit crab.	<i>Coenobita diogenes</i>	13
ARANEIDA		
Aviculariidae:		
Tarantula.....	<i>Eurypelma</i> sp.....	1
ORTHOPTERA		
Blattidae:		
Tropical giant cockroach.	<i>Blaberus giganteus</i>	35
MOLLUSKS		
Planorbidae:		
Pond snail.....	<i>Helisoma trivolvis</i>	30

REPORT OF THE VETERINARIAN

Nikumba, the adult male gorilla, whose paraplegia was mentioned in last year's Report, made an essentially complete recovery in 8 months. A tentative diagnosis was made of a selective spotty viral infection of the spinal cord. Nikumba was treated daily for approximately 3 months. Chloromycetin succinate and Bejectal, a vitamin-B complex, were injected intramuscularly, by the use of the projectile syringe and the Cap-Chur gun. Methylprednisolone was given orally in Coca Cola syrup. The most noteworthy progress was seen approximately 2½ months after the onset of the paralytic attack when Nikumba was able to stand erect and take two or three steps before returning to a sitting position. His progress since that time has been slow and steady; he has regained his original weight and is moving in a normal manner.

One of the most interesting things that occurred during the treatment period was the gorilla's reaction to the use of the Cap-Chur gun equipment. One could enter the room with empty hands and Nikumba would come to the bars with a desire to hold your arm or your hand, and displayed every evidence of affection. As soon as the equipment was produced, however, Nikumba would retreat to a far corner of the cage or climb to the top of the shift cage. He became very nervous and would swing from the horizontal bars in the cage to escape the administration of the medication. Immediately following the injection Nikumba would realize that the treatment had been completed and would then come forward to the bars and display his normal friendliness.

His recovery has been observed with a great deal of interest because he is not only an excellent specimen of the male lowland gorilla but also a proven sire. The first baby, Tomoka, was born on September 9, 1961. Leonard, a second male, was born on January 10, 1964. The last observed mating of the parent gorillas took place on April 24 and 25, 1963, approximately 2 months before the onset of the paraplegia of the breeding male. It has been necessary for both babies to be raised by the wife of a keeper, since Moka had no milk following either birth. The entire staff is anxiously awaiting Moka's return to a regular menstrual cycle to observe Nikumba's ability to mate following his paralysis.

On December 16, 1963, Deepali, an adult Indian rhinoceros and her baby were received by air from India. Eleven days following the arrival symptoms of an intestinal colic were noted in the adult at 1 p.m., and death occurred at 9 o'clock that evening. An immediate autopsy was performed and the cause of death was found to be a peracute hemorrhagic gastroenteritis. Approximately 4 liters of free blood were found in the stomach and the anterior portion of the small

intestine. This problem was further complicated by the presence of a large number of fringed and diphyllbothrium tapeworms and intestinal flukes, as well as numerous strongyloides. Treatment was instituted immediately to relieve the parasitic infestation of the baby rhino, Rajkumari, with excellent results, and her growth has been quite satisfactory.

On March 4, 1964, the director of the National Zoological Park returned from Djakarta, Indonesia, with a pair of Komodo dragons (*Varanus komodoensis*). The male dragon was 8 feet 11 inches long and weighed approximately 200 pounds. The smaller female was 6 feet long and weighed 75 pounds. The first fecal samples harvested following their arrival revealed a heavy infestation of protozoa with ameboid-like nuclei. On May 21 the large dragon became affected with severe gastric cramps which were relieved by the injection of atropine sulfate, but it died the next day. An intensive autopsy was performed, and the cause of death was established as intestinal and extraintestinal amebiasis. Histopathological sections were made from tissues harvested during the autopsy. Outstanding degeneration was noted in the liver, in which no functional tissue could be found; it consisted entirely of a mass of ameboid-like cysts. This has been reported only once in literature and much more extensive studies are being conducted by the veterinary division in cooperation with the Parasitology Department of George Washington University Medical School and the staff of the Armed Forces Institute of Pathology to determine the incidence of such liver cyst occurrence in our available lizards.

With the assistance of Dr. Thomas Sappington, an internal medicine specialist in Washington, a research program is being developed in the incidence and extent of tissue damage caused by amebae in lizards. This will include a study of the blood picture, parasite history, and possible liver damage caused by amebiasis in the monitor lizard.

A 6-day treatment of the female Komodo dragon consisted of retention enemas of 200 cc. of physiological saline, containing 650 mg. of diodoquin, and intramuscular injections of 500 mg. of tetracycline. In the meantime, tests were being conducted on *Varanus salvator* to determine the lizard's tolerance of 0.0325 mg. of intramuscular emetine hydrochloride as an effort to arrest the extraintestinal amebiasis. This test continued for 6 days with no apparent side effects. After establishing the safety of the drug, the Komodo dragon then received the same dosage. The results were a marked reduction in the number of amebae and flagellates in the stool.

Studies are continuing in the hope of finding a more satisfactory parasiticide for use in various species of mammals, birds, and reptiles. Ambutochloride has been used in canines, as well as reptiles; thiaben-

dazole has been used in equines, rhinoceroses, tapirs, and several monkeys; and a research product, called Alcopar, which contains the bphenium ion, shows a great deal of promise in selected species of animals. To generalize, thiabendazole has been the first product we have used in the zebras that has been so thorough that routine worming has become unnecessary; and the use of Alcopar in the large cats has caused a reduction in the egg count of both ascarid and hookworm.

Bird losses on the shipment arriving from India on December 16 were high, owing primarily to travel trauma. Among 69 waterfowl and pheasants quarantined at Clifton, N.J., 8 undiagnosed deaths occurred. Psittacine birds are required to be quarantined for a period of 90 days under the direction of the U.S. Public Health Service, and 101 birds were placed in a closed quarantine area. Quarantine procedure consists of 45 days on tetracycline-treated seeds, and a further 45-day period of observation. Of the quarantined birds, 48 died and were sent to the Communicable Disease Center. Psittacosis virus was isolated in some of the birds.

Every effort is being made to improve the effectiveness of the veterinary division in the care of animal health in the Park. X-ray equipment purchased early in the year has been invaluable in the correction of several fractures. Equipment and supplies have been obtained to institute a system of bacteriological culturing in both living animals and autopsy specimens in an effort to establish the cause of death more definitely, and diagnose illnesses and infections in the living animals more rapidly.

The veterinary division has been fortunate in having the cooperation and assistance of various specialists in the fields of clinical investigation and medicine. Among these men were Dr. Henry Feffer, orthopedist; Dr. Hugo Rizzoli, neurosurgeon; Dr. A. G. Karlsen of the Mayo Clinic in Rochester, Minn.; Dr. F. R. Lucas, director of the Livestock Sanitary Laboratory in Centerville, Md.; Dr. Anthony Morris of the National Institutes of Health, Bethesda, Md.; and Dr. Leonard Marcus and staff, of the Armed Forces Institute of Pathology. Dr. Clarence Hartman, Dr. William McCarten, and Miss Bessie Sonnenberg, parasitologists on the staff of George Washington Medical School, connected with the Tropical Disease Program, have given assistance in the diagnosis of and identification of the parasites that we have encountered in the Zoo, and their advice on treatment has been most helpful.

A Brahminy kite (*Haliastur indus*) collected for the National Zoological Park by the National Geographic Society-Smithsonian Institution Expedition to the East Indies, received September 28, 1937, died on April 18, 1964. This bird had been in the collection 26 years 5 months 21 days.

Following are autopsy statistics for the mortality which occurred at the National Zoological Park during the last fiscal year, and a table of comparison with the past 6 years:

TABLE 1.—Autopsy statistics, 1958-64

Cause	Mortality, fiscal year 1964			Total mortality past 7 years
	Reptiles ¹	Birds	Mammals	
No autopsy for sundry reasons ²	126	27	17	1958....550
Attrition (within 14 days after arrival)...	1	26	20	1959....472
Systemic diseases ³	39	36	19	1960....532
Infectious diseases ⁴	-----	5	1	1961....517
Parasites.....	9	3	1	1962....584
Injuries, accidents.....	19	74	41	1963....636
Euthanasia.....	-----	2	6	-----
Miscellaneous (stillborn, old age, shock).....	7	-----	18	-----
Undetermined.....	36	57	29	-----
Total.....	237	230	152	1964....619

¹ Included with reptile deaths are amphibians, fishes, and insects.

² Reasons include preserving of intact specimen for museum and research, progressed decomposition, insufficient remains in case of predators, etc.

³ Systemic diseases include acute and chronic diseases of lung, liver, kidney and heart, and intestinal ailments other than parasite involvement, as well as CNS disorders.

⁴ Infectious diseases include TB, viremia, toxoplasmosis, etc.

RESEARCH

The National Zoological Park is expanding its scope in the field of animal behavioral studies to programs designed to develop a greater knowledge of animal husbandry as it applies to worldwide conservation efforts.

All possible efforts and means must immediately be turned to the task of preserving representative fauna from all parts of the world. International and national organizations of zoos and wildlife conservators do consonantly strive to preserve those species which are threatened in the countries of habitat. To foster and breed such species is a task well within the capabilities of the zoos and conservation societies of the world. It remains only to know enough about these vanishing animals to recreate at least minimum niches which may result in reversal and establishment of breeding units. To this end the National Zoological Park is participating and cooperating in the following projects:

Group relationships and social niches of the Barbary ape, *Macaca sylvanus*; investigators, Dr. R. K. Lahiri, Director Alipore Zoo, Calcutta, India, and Dr. Charles Southwick, Director, School of Biomedicine, Johns Hopkins University.

Social behavior of titi monkeys, *Callicebus*; investigator, Dr. Martin Moynihan, Canal Zone Biological Area, Balboa, Panama.

Ecology and behavior of *Suncus murinus*; investigator, Dr. Kyle Barbehenn. This work is continuing with emphasis on captive behavior at the National Zoological Park.

The arrangement and structure of the genetic complex in wild animals is an active project in which the National Zoological Park is contributing culture bases to Dr. Kurt Benirschke, department of genetics, Dartmouth University. A great deal of information, which should lead to better understanding of breeding programs, is anticipated.

The National Zoological Park will continue to devote, within the organization, as much time and effort as possible to increase the knowledge of the requirements of wild animals both captive and free. To this end, the zoo plans, at the first opportunity, to activate a section of Animal Research and Behavior.

VISITORS

The 16th International Congress of Zoology was held in Washington from August 20 to 26, and many of the delegates visited the National Zoo. On the night of August 20 approximately 2,000 were taken on a night tour and served refreshments. Members of the American Association of Zoological Parks and Aquariums, meeting in Washington from September 23 to 26, visited the Park frequently and on September 24 were taken on a late-afternoon tour of the Zoo. The annual meeting of the Virginia Herpetological Society was held in the reptile house on December 28 and was attended by 62 members. On June 6, 1964, the same society met again in the reptile house and heard an illustrated lecture on the snakes of Taiwan, given by Dr. R. E. Kuntz.

About 2 p.m. each day the cars then parked in the Zoo are counted and listed according to the State or country from which they come. This is, of course, not a census of the cars coming to the Zoo but is valuable in showing the percentage of attendance by States of people in private automobiles. Many District of Columbia, Maryland, and Virginia cars come to the Zoo to bring guests from other States. The tabulation for fiscal year 1964 is as follows:

	Percentage		Percentage
Maryland -----	33.5	Connecticut -----	.6
Virginia -----	24.4	South Carolina -----	.6
District of Columbia -----	18.8	California -----	.6
Pennsylvania -----	4.3	Illinois -----	.5
New York -----	2.3	Michigan -----	.5
North Carolina -----	1.8	Texas -----	.5
New Jersey -----	1.4	Georgia -----	.4
Ohio -----	1.3	Delaware -----	.4
West Virginia -----	1.2	Indiana -----	.4
Florida -----	1.0		
Massachusetts -----	.9	Total -----	96.0
Tennessee -----	.6		

The remaining 4 percent came from other States, Belgium, Canada, Canal Zone, England, France, Germany, Honduras, Japan, Mexico, Puerto Rico, Thailand, and Turkey. On the days of even small attendance there are cars parked in the Zoo from at least 15 States, Territories, the District of Columbia, and foreign countries.

Owing to the construction work in progress in the Zoo in connection with the redevelopment program, the number of available parking spaces fluctuates between 650 and 1,100.

TABLE 2.—Number of bus groups visiting the Zoo in fiscal year 1964

Locality	Number of groups	Number in groups	Locality	Number of groups	Number in groups
Alabama.....	17	616	Mississippi.....	2	46
Arkansas.....	1	33	Missouri.....	1	32
California.....	2	49	New Hampshire....	3	107
Connecticut.....	11	339	New Jersey.....	29	1,288
District of Columbia.....	286	9,978	New York.....	203	7,532
Delaware.....	12	422	North Carolina....	203	6,484
Florida.....	32	1,139	Ohio.....	29	1,025
Georgia.....	15	554	Pennsylvania.....	392	14,079
Illinois.....	17	578	Rhode Island.....	12	389
Indiana.....	10	330	South Carolina....	55	2,022
Iowa.....	2	50	Tennessee.....	53	1,808
Kansas.....	1	18	Texas.....	9	203
Kentucky.....	13	433	Virginia.....	894	35,227
Massachusetts....	20	727	Vermont.....	1	39
Maryland.....	1,161	44,028	Washington.....	1	29
Maine.....	2	80	West Virginia....	51	1,977
Michigan.....	4	132	Wisconsin.....	5	197
Minnesota.....	4	174	Total.....	3,553	132,191

PERSONNEL

Eppie Bell was transferred from the Smithsonian Institution to become maintenance general foreman of the National Zoological Park on May 24, 1964. John Monday, transferred from the District of Columbia Government Water Department, was appointed gardener foreman on March 15, 1964. Wilbur Banner, formerly with the Navy Department in Norfolk, Va., was appointed mason lead foreman on December 31, 1962.

During the year only three employees left the Zoo. Dr. W. T. Roth, general curator since August 7, 1961, resigned on June 30, 1964. Pvt. George McLeod, a member of the police force since September 1, 1928, retired on December 31, 1963. Lt. Earl King, appointed to the police force on August 4, 1944, retired because of disability on January 14, 1964.

The director attended the annual meeting of the International Union of Directors of Zoological Gardens in Chester, England, from September 9 to 13. At the annual conference of the American Association of Zoological Parks and Aquariums, held in Washington September 23 to 26, the director was elected president of the Association. He attended the meetings of the executive board of the American Institute of Park Executives, held in New York January 17 to 20, and a committee meeting of the AAZPA in New York on February 7. From October 30 to November 3, he was in Sumter, S.C., as consultant to city officials who plan to build a zoo in that city. On May 17, he was present at the dedication of a new feline house in City Park Zoo, Denver, Colo., and on the following 3 days he attended the Western Regional Zoo Conference in Salt Lake City, Utah. On June 21 he left for London, England, as a delegate to a symposium on the role of zoos in animal conservation. Following the conference in London he visited zoos in Munich, Turin, and Barcelona.

The director gave three radio talks and made three television appearances. He addressed the College Park (Md.) Rotary Club and also spoke at a meeting of the D.C. Veterinary Medical Association.

J. Lear Grimmer, associate director, on January 20 made a sound film to be broadcast in India over the Voice of America. On April 3 he gave a half-hour talk over WETA-TV, an educational channel, and on June 27 appeared on a film for the U.S. Information Agency. He spoke on a radio program about new animals at the Zoo (June 10) and addressed the Virginia Herpetological Society on June 6. While in India he had an opportunity to visit zoos in Delhi, Calcutta, and Guahati, as well as wildlife sanctuaries in Assam and in Sundarbans bordering the Bay of Bengal. On May 14 and 15 he attended meetings of the Inland Field Conference at the National Science Foundation, Washington, D.C.

In June Travis E. Fauntleroy, assistant to the director, visited zoos in Buffalo, Detroit, Milwaukee, Chicago, Indianapolis, Cincinnati, Columbus, Toledo, and Cleveland, observing children's zoos in particular and management operations in general.

Keeper H. Stroman appeared on a television program for the U.S. Information Agency on May 18, showing a European brown bear cub and a baby pygmy hippopotamus.

In the fiscal year 1964 the Zoo had 211 authorized positions: office of the director, 11; operations and maintenance department, which includes the mechanical division, police division, grounds division, and services division, 122; animal department, 77 (an increase of 1 night keeper); and scientific research department, 1.

POLICE DIVISION

Alterations to the topography of the Park during the past year created problems for the Zoo police, but they have made the necessary adjustments to meet the changes in flow of traffic, congested areas, dangerous locations, and changed sites of parking lots.

Four new members joined the force to replace men who retired or transferred. A new police cruiser replaced the old one, and two more horses were acquired for patrolling remote parts of the Park. Additional walkie-talkie sets facilitate direct communication between men working in widely scattered locations.

The police locker room and improved kitchen facilities were relocated to eliminate congestion in the police station and add to the comfort of the division.

AFGE Lodge No. 185 was recognized by the Smithsonian Institution as the official bargaining agent in disputes and discussion between the police department and management.

Eight letters of commendation were received, citing various officers for the courtesy, kindness, and assistance to the public.

Twenty-five officers qualified on the pistol range. The division now has seven experts, nine sharpshooters, and nine marksmen.

Lieutenant Wolfe attended the President's Conference on Occupational Safety. Captain Brink attended a seminar on management and employee relations, held at the Civil Service Commission. Lt. D. B. Bell conducted a refresher course in law enforcement. Sgt. A. L. Canter and Pvt. D. R. Bowman held classes in first aid.

During the year at the Zoo there were 1,501 traffic violations, 131 juvenile arrests, 62 criminal arrests, 106 truant children, 295 lost children, 535 minor first-aid cases, and 47 serious first-aid cases. A total of 9,395 visitors asked for information or assistance at the police station.

Through the efforts of Lieutenant Wolfe, blood procurement officer, 38 pints of blood were donated to the Red Cross Blood Bank. Thirty-seven pairs of eyeglasses, found and unclaimed, were donated to the D.C. Chapter of the Society for the Prevention of Blindness; 12 bags of clothing and miscellaneous articles, found and unclaimed, were turned over to Goodwill Industries.

Nine groups of handicapped children and 11 busloads of patients from St. Elizabeth's Hospital were escorted through the Zoo by various police officers throughout the year. On May 9 a total of 7,378 School Safety Patrol children, transported in 190 buses, visited the Park after the annual parade. Buses were parked and dispersed efficiently by the police in the limited parking areas available.

MAINTENANCE, CONSTRUCTION, AND GROUNDS

The mechanical division has the responsibility for the maintenance and repair of the buildings and facilities of the National Zoological Park. This responsibility is met by the heating and ventilating section and by the building section which, in addition to continuing maintenance, constructs new shelters, paddocks, and cages for the animals.

Considerable work was done on the monkey house this year. The wooden partitions and floors in the inside cages were rebuilt, new shifting doors installed, and inside and outside cages painted. New doors were built and installed at the building's entrance. The relocation of the Connecticut Avenue-Harvard Street road necessitated the installation of fences for visitor safety and animal protection. The small stone house for hoofed stock, back of the small mammal house, was remodeled to make it suitable for camels. One of the large alligator cages on the north end of the reptile house was remodeled and now is provided with radiant heat in the floor to make it more comfortable for the Komodo dragon. The small waterfowl pond behind the main bear line was remodeled as an exhibit area for the Komodo dragon and the Malayan monitors during the summer months.

Plumbers, electricians, carpenters, and painters are constantly at work keeping the old buildings in a decent state of repair. One of the year's tasks was to build a crate for a full-grown giraffe.

Work of the grounds division included the planting of 107 trees (some of them flowering), 63 shrubs, 78 evergreens, and various bulbs and annuals. These were planted along the new road, on banks near the shop, and throughout the Zoo lawns. Other projects included seeding new areas where contractors had been working on the road; seeding of deer paddocks, which had never before had grass; making several new flowerbeds; renewing the soil and preparing a special medium for the Komodo dragon's outdoor cage; gathering forage and grass clippings for animal food; filling in holes in lawns and walkways; and cutting of perches desired for birds and animals. The ground division also cut back branches overhanging bridle paths and cleared horse trails along the fence line; removed dead wood from 195 trees over walks, roads, and public areas; felled 92 trees that were dead or in bad condition; cut 49 unsightly stumps from Zoo lawns with the aid of a stump chipper borrowed from the U.S. Army, Cameron Station, Va.; moved snow and ice from sidewalks and building steps; sprayed bees' nests to protect the public from stings; and helped other departments in the Zoo with the Skyworker. Gifts of plants were received from the District Waterworks, Botanical Garden, Bureau of Standards, Glendale Nursery, Walter Reed Hospital, Naval Hospital, St. Elizabeth's Hospital, and the management of the annual Flower and Garden Show.

INFORMATION AND EDUCATION

The major activity of the information-education department was the continuation of signing and relabeling. During the year a total of 457 animal identification labels were completed; since the program began in October 1962, a total of eight buildings and units of the Zoo have been relabeled—the puma house, main bear dens, short bear line and ring cages, elephant house, reptile house, lion house, beaver valley, and all outdoor hoofed stock. Also produced were 221 supporting informational signs (safety signs, building signs, directional maps, etc.) and 131 other visual information projects such as maps, charts, and graphs. Four scale models were produced in conjunction with the renovation plans for the Zoo. The mechanical department assisted in framing and erecting the information signs on cages and exhibits throughout the Park.

Additional department activities during the year included dissemination of animal information by telephone and correspondence, library maintenance, and five special guided tours for groups of handicapped children, visiting schools and colleges, and foreign guests. Two such groups of interest were delegates of the Foreign Museum Professionals, sponsored by the American Association of Museums in cooperation with the Department of State, and children from the United Cerebral Palsy of Northern Virginia.

To study educational programs, labeling-exhibit techniques, and children's zoos, the zoologist visited zoos, aquariums, and museums in Texas (Dallas and Fort Worth), Arizona (Tucson), and California (San Diego, Los Angeles, and San Francisco), from October 27 to November 13. From May 20 to May 28, the zoologist toured zoos and museums in Atlanta, Ga., and Tampa and Miami, Fla., for the same purpose.

SAFETY SUBCOMMITTEE

The National Zoological Park's safety subcommittee consists of Lt. John R. Wolfe, chairman; Capt. C. E. Brink, police division; F. M. Dellar, administration office; Bert J. Barker, animal department; Reily Straw, maintenance and construction; John Monday, grounds department; and Mrs. W. M. Holden, secretary. Monthly meetings were held to suggest, discuss, and make recommendations to the director on safety improvements.

The safety subcommittee is constantly on the alert for dangers that might arise due to the construction program. Three contractors are working on separate projects at the present time. Committee mem-

bers are also vigilant in seeing that previous recommendations for safety measures are carried out.

Safety precautions taken included paving 600 feet of sidewalk, repairing potholes in roadways, installation of handrails at front and rear entrances of administration building, extending the step on the loading platform at the shop, and putting guards on power mowers.

FINANCES

Funds for the operation of the National Zoological Park are appropriated annually under the District of Columbia Appropriation Act. The operation and maintenance appropriation for the fiscal year 1964 totaled \$1,597,356, which was \$127,156 more than for the preceding year. The increase consisted of \$25,010 to cover salary increases for general-schedule employees in accordance with Public Law 87-793; \$43,260 to cover salary increases for wage-board employees; \$18,560 for within-grade salary advancements for both general-schedule and wage-board employees; \$21,030 to cover costs of reallocations; \$8,750 for annualization of five positions established in fiscal year 1963; \$4,841 to employ temporary police; \$3,505 to establish one position for one-half of the year; \$1,200 for miscellaneous supplies; and \$1,000 for the purchase of new equipment.

Of the total appropriation, 84.5 percent (\$1,349,407) was used for salaries and related personnel costs, and 15.5 percent (\$247,949) for the maintenance and operation of the Zoo. Included in the latter figure were \$85,150 for animal food; \$23,700 for fuel for heating; \$24,188 for materials for building construction and repairs; \$12,473 for electricity; \$12,119 for the purchase of animals; \$6,933 for telephone, postal, and telegraph services; and \$7,660 for veterinarian equipment and supplies. The balance of \$75,726 in operational funds was expended for other items, including freight, sundry supplies, uniforms, gasoline, road repairs, equipment replacement, and new equipment.

COOPERATION

At all times special efforts are made to maintain friendly contacts with other Federal and State agencies, private concerns and individuals, and scientific workers for mutual assistance. As a result, the Zoo receives much help and advice and many valuable animals, and in turn it furnishes information and, whenever possible, animals it does not need.

Special acknowledgement is due William Taback and John Pulaski, in the office of the Dispatch Agent in New York City, and Stephen E. Lato, Dispatch Agent in San Francisco, who are frequently called upon to clear shipments of animals coming from abroad, often at times of personal inconvenience.

When it is necessary to quarantine animals coming into this country, they are taken to the U.S. Department of Agriculture's station in Clifton, N.J. During the past year Dr. H. A. Waters and Andy Goodel, two of the officials stationed there, were most cooperative in keeping the National Zoological Park informed as to the well-being of animals and birds being held there for quarantine.

Animals that die in the Zoo are offered to the U.S. National Museum. If the Museum does not need them, either as study specimens or as exhibits, they are sent on request to research workers in other institutions. Specialists at the Museum are always willing to be of help in identifying rare specimens acquired at the Zoo.

The National Zoological Park cooperated with the National Capital Parks and lent small animals to Park naturalists and to the Nature Center in Rock Creek Park for demonstration. A Taiwan cobra was lent to the New England Aquarium in Boston, Mass., for a television showing.

FRIENDS OF THE NATIONAL ZOO

The Board of Governors of the Friends of the National Zoo, at their regular monthly meeting in April, passed the following resolution:

Resolved: That the Board of Governors of the Friends of the National Zoo does hereby designate the Society's primary purpose and function to be the encouragement of a broader zoological interest and knowledge, formed particularly in the National Zoological Park. To achieve this goal, we propose that the Society promote the development of an educational service which would utilize all effective contemporary media.

Therefore, the President is authorized to establish an Educational Steering Committee, not necessarily limited in membership to present members of the Society, which would formulate and recommend to the Board programs designed to achieve these above-mentioned ends.

Since the 10-year program of capital improvements is so well under way, physically and financially, it was felt that the urgency of working in behalf of the physical rehabilitation of the Zoo was no longer great, and that the Friends could turn their energies toward developing various programs aimed at increasing and strengthening the educational potential of the National Zoological Park.

In March of this year the Friends published the first issue of their newsletter, called *Spots and Stripes*, which elicited much favorable comment. Present plans are for it to be published quarterly. The Zoo has long felt the need for this sort of publication, and staff members were glad to cooperate with the Friends in getting out the first two issues.

The annual Zoo Night was held on June 12, 1964. Approximately 250 members, with their families, were taken on a tour of the buildings, which were illuminated for the evening.

CAPITAL IMPROVEMENTS

Money in this year's Smithsonian Institution Appropriation Act amounted to \$1,275,000 for the capital improvement program at the National Zoological Park. A portion of this is being used for the advance planning of the multiclimate house and aquatic mammal exhibit, preliminary studies of the sewage system, and detailed planning for the Connecticut Avenue entrance, hardy hoofed-stock and delicate hoofed-stock enclosures, and additional parking lots. A portion of the remainder is being used to construct new deer pens and new parking lots near the Connecticut Avenue entrance. The balance will be combined with fiscal 1965 money to construct the hardy hoofed-stock and delicate hoofed-stock exhibits. A portion of the money was used to build an incinerator between the shop and the heating plant. Construction of the Connecticut Avenue entrance and the hardy hoofed-stock exhibit have been combined with the delicate hoofed stock in 1965 because of delays in design due to refinements and improvements suggested by the Fine Arts Commission.

During this fiscal year work continued on the remodeling of the birdhouse and construction of a new flight cage. It is hoped that construction will be finished and the house stocked and opened to the public in late December or early January.

The relocation of the east-west access road from Connecticut Avenue to Beach Drive was completed and opened to the public. The elephant house parking lot is utilized by the visitors. Through traffic in the center of the Zoo has been completely eliminated except for Zoo vehicles. The removal of intrusive and dangerous automobile traffic has created a more leisurely and parklike atmosphere in the heart of the Zoo. As with any change, there have been some objections from the public; however, it is gratifying that many more compliments have been received than complaints.

The incinerator was constructed by the Edrow Engineering Co. It is now possible for the National Zoological Park to destroy completely all combustible waste material on the Zoo grounds. A long-standing source of embarrassingly poor housekeeping has been eliminated.

National Capital Parks, Department of the Interior, has completed the first phase of the relocation of Beach Drive, which consists of a tunnel under "Administration Hill," retaining walls, a roadbed, and new bridle trail on the east side of Rock Creek.

The Department of Sanitary Engineering of the District of Columbia installed a new 60-inch relief interceptor sewer beginning in the Zoo downstream from the wolves, near "Purcell Rock," and continuing along the west bank of the creek adjacent to an already existing sewer line crossing Beach Drive within the Zoo just below the lower

ford and continuing down through Rock Creek Park. This is part of a program of sewage improvement of the District of Columbia. Unfortunately the installation of such a large sewer necessitated the removal of most of the trees along the west bank of Rock Creek, and also the closing of the fords for many more days this year than is normal.

At various times during the year there was construction going on in five different areas of the Zoo. This caused some inconvenience to visitors and necessitated changes in their parking and established traffic patterns. These changes, however, were met with ready acceptance by the visiting public and a great deal of friendly interest by local citizens.

There was a drop in the number of organized bus groups visiting the Zoo because of the difficulty of parking buses during the construction program.

All redevelopment work is being done under the direction of the District of Columbia Department of Buildings and Grounds. Special acknowledgment is due the director of that department and his able staff.

Respectfully submitted.

THEODORE H. REED, *Director.*

S. DILLON RIPLEY,
Secretary, Smithsonian Institution.

Report on the Astrophysical Observatory

SIR: I have the honor to submit the following report on the operations of the Smithsonian Astrophysical Observatory for the fiscal year ended June 30, 1964:

DIVISION OF ASTROPHYSICAL RESEARCH

The Smithsonian Astrophysical Observatory's broad research program* this past year embraced six major areas—planetary science, meteoritic studies, cometary science, solar observation, stellar observation, and stellar theory. This division of the research program is wholly arbitrary, and the six areas are strongly interrelated.

A recent work of the director of the Observatory is an example of the amalgamation of several of these topics. For the 100th anniversary of the U.S. National Academy of Sciences, held in Washington in October 1963, Dr. Whipple was invited to present a critical summary on the history of the solar system. This lecture, considerably expanded to present his interpretation of the present state of theory of the evolution of the solar system, is now in press for the Academy's *Proceedings*. In preparing this summary, Dr. Whipple reviewed critically a number of the processes visualized as operative in the earlier stages of the evolution of our solar system. In the coming years Observatory scientists will expand their explorations in these areas.

A strong feature of the Observatory's scientific program is the ease with which a scientist investigating a particular topic may draw on experience and techniques generated by others pursuing different topics. Thus the expertise developed by the Baker-Nunn network for tracking satellites has been applied to an enlarged program of comet and flare star observations.

Planetary sciences.—With each year of mounting space activity, the other planets seem less remote. Popular response and scientific attention to planetary studies seem destined to increase as we approach the ultimate objective of manned exploration. The current studies of the earth, facilitated and stimulated by satellite observations, will eventually be repeated for the other planets. At present these geo-

*Unless otherwise noted, research is supported from Federal funds appropriated to Smithsonian Institution. The Observatory, by paying scientists' salaries, shares in the support of all research. Support from outside sources is detailed in footnotes 1-17 (p. 177).

physical investigations predominate in the planetary research activities of the Observatory and much of the scientific community.

Scientists of the Observatory, using precise satellite-tracking data from the network of Baker-Nunn cameras,¹ investigate three major geophysical topics: the detailed representation of the earth's gravitational field; the geometrical relation between points on the earth's surface; and the density and temperature of the upper atmosphere and their variations. These topics are interrelated in a way that requires that they be investigated concurrently. The director of the Observatory is responsible for initiating the coordinated attack on these problems and for monitoring their interaction with national and international programs.

As a satellite moves in its orbit, the details of its motion reflect the many irregularities in the gravitational field corresponding to the nonuniform mass distribution within the earth. The gravitational potential is conventionally represented mathematically as a series expansion in spherical harmonics. Imre G. Izsak has used a total of 26,447 precisely reduced Baker-Nunn observations of 11 objects to obtain least-squares estimates for the coefficients of tesseral and sectorial harmonics of the geopotential.¹ The method yields estimates of geophysical significance for harmonics up to the sixth degree. Evaluations of zonal-harmonics coefficients in the earth's gravitational potential up to the 14th order have been made by Dr. Y. Kozai,¹ who used precisely reduced Baker-Nunn observations of 1959 $\alpha 1$, 1959 η , 1960 $\alpha 2$, 1961 ν , 1961 $\sigma 1$ and 2, 1961 $\alpha \delta 1$, and 1962 $\alpha \epsilon$, inclinations of which are between 28° and 95°.

A basic computer program used in all analyses of satellite motions is the Differential Orbit Improvement program (DOI), which has been extended by Mr. Izsak, M. J. Davies, and E. M. Gaposchkin to incorporate the effects of the tesseral harmonics in the geopotential.¹

Dr. Walter Köhnelein has analyzed the geometrical structure of the earth's gravitational field in the harmonic representation.¹ Of particular interest were the shapes of the surfaces of constant potential (geoid) and constant gravity, their Gaussian and mean curvatures, and the curvature and torsion of the plumb lines.

Theoretical studies by Dr. Chi-yuen Wang on the correlation between the satellite-derived geoid and the heat flow distribution on the surface of the earth have justified the hypothesis that the irregular undulations of the satellite geoid can be explained as the consequence of uneven thermal expansion of the earth's mantle, resulting from some heating process, perhaps an inhomogeneous distribution of radioactive heat sources.¹ Computation of variations of temperature corresponding to several proposed models of distribution of heat

¹ See footnotes, p. 177.

sources has led to the following conclusions: 1. The inhomogeneous layer is extended from the top of the mantle to a depth of approximately 100 to 200 km. 2. The isothermal surfaces are not simple geometrical surfaces. Temperatures on a "level surface" near the top mantle have fluctuations with amplitude of about 100° C.

The Satellite-Tracking Program is now at fruition in its geodetic objectives, not only for the earth's geopotential but also in the area of geodetic positions and the establishment of a much more precise worldwide geodetic system.¹ Several independent calculations of improved coordinates of the Baker-Nunn stations have been made during the past year. When all detailed questions in these different approaches to the problems have been resolved, a consolidated, consistent result is expected.

Over 45,000 observations from the 12 Baker-Nunn Stations were analyzed by Dr. George Veis, with the assistance of Mrs. Elizabeth Wombwell, to derive the coordinates of the stations and the absolute deflection of the vertical for seven datums.¹ Although these results are preliminary, a value of 6,378,169 meters for the semimajor axis of the earth's ellipsoid is obtained from the above derived deflections. A total of 26,447 precisely reduced photographic observations of 11 objects were analyzed by Mr. Izsak to obtain least-squares estimates for the corrections to the coordinates of the 12 camera stations. The latter calculation was made in conjunction with determinations of the coefficients for the tesseral and sectorial harmonics of the geopotential.

Using simultaneous observations of satellites from pairs of the five Baker-Nunn cameras in the Americas, Dr. Veis and Antanas Girnius have determined the directions of the lines connecting the stations with an accuracy of better than 1 second of arc. More data from simultaneous observations are now under analysis. These will allow the determination of directions in both the North American and the European datums and will permit a connection between them. Dr. Köhnlein also devised several computer programs for the adjustment of space triangulations. By using the correlation of already adjusted coordinate values, he combines a pure geometrical method and a dynamical method for a joint adjustment computation of the station coordinates.¹

Although instrumented satellites are beginning to be important, satellite drag determined from tracking data continues to be the most productive source of information concerning the atmosphere above 200 km. Recent work at the Observatory, made possible by the *Injun 3* and *Explorer 17* satellites, includes the study of the atmosphere under conditions of low solar activity and at low heights and

¹ See footnotes, p. 177.

high latitudes.¹ Atmospheric density variations, which directly influence satellite drag, are interpreted as the result of temperature changes in the atmosphere. Dr. Luigi G. Jacchia generated a comprehensive model of the major temperature variations—diurnal, with solar activity, with geomagnetic activity and semiannual—for presentation at the fifth International Space Science Symposium in Florence in May. Dr. Jacchia and Jack W. Slowey found that the heating accompanying geomagnetic disturbances was greater in the auroral zones than at middle latitudes; on quiet days, however, there is no detectable latitude effect. The relation between atmospheric heating and the geomagnetic index A_p , which had been found to be nearly linear during magnetic storms, was found to depart very markedly from linearity on near-quiet days. This finding implies greater heating from this source than had been suspected before.

Plans are being drafted for a construction of quasi-static atmospheric models to be followed by dynamic models to fit the observed density data.

Techniques other than satellite tracking are also useful in high-atmosphere studies by Observatory scientists. Instrumentation augmenting the Radio Meteor Project has been developed by Dr. Mario D. Grossi to measure wind velocities at altitudes about 90 km. above ground level by collecting and processing doppler information contained in radar returns from meteor trails.² A network of three stations about 50 km. apart will allow at least two determinations per hour of the three components of the wind velocity vector with an accuracy of a few m sec⁻¹.

Dr. N. P. Carleton conducts a program of research that includes laboratory study of certain atomic collision processes and analysis of phenomena of the aurora and airglow in terms of the collision processes involved.³ In the laboratory Dr. Carleton and Dr. Charles H. Dugan have been continuing study of excitation of metastable states of N₂, O₂, CO, and O by electron impact, combined with a study of subsequent collision processes involving these metastable atoms and molecules. Dr. Carleton has modified computer programs to examine the solution of two new problems: (1) the exact heating effects of the input of energetic photoelectrons into the ionosphere during the day, with application to the excitation of the dayglow, and (2) the calculation of the heating effects that could be produced in the ionosphere by a rocket-borne transmitter.

Dr. Carl Sagan and his colleagues considered several phenomena and properties of the planet Venus. The 8–13 micron limb-darkening observations of Venus from *Mariner II* and other observations have been shown to be consistent with a wide variety of models of the

See footnotes, p. 177.

Cytherean clouds and atmosphere, including semi-infinite, purely absorbing atmospheres in radiative or convective equilibrium, and multiple-scattering cloud layers with a range of single-scattering albedos, again in radiative or convective equilibrium. Calculations in another paper show that the microwave phase effect can be explained in terms of the thermal and electrical properties of certain geochemically abundant materials at the temperatures of Venus's surface, assuming very slow planetary rotation.

Conditions on Mars have also been studied by Dr. Sagan, who has found that the wave of darkening is preferentially localized in times and locales on Mars when the mean daytime temperatures in the nuclei of the dark areas are above the freezing point of water. This result is consistent with the hypothesis that the wave of darkening is a biological response to local increases in humidity and temperature. From investigations of the question of nitrogen oxides on Mars, Dr. Sagan and his associates find that previously published observations of Mars in the infrared, visible, and ultraviolet set an upper limit to the NO_2 abundance there of about 1 mm-atm. If there is no water on Mars, the theoretical upper limit obtained from photochemical and thermodynamic equilibrium is also 1 mm-atm. With 10 microns of precipitable water in the Martian atmosphere, the NO_2 upper limit is reduced by an order of magnitude. These quantities of NO_2 are so small that it seems unlikely that the nitrogen oxides play a significant role in any observable on Mars, except possibly the blue haze.

Life may have evolved on other planets of this or other solar systems as it has on the planet earth. Dr. Sagan and his colleagues have reported the laboratory synthesis of one of the key molecules implicated in the origin of life. The molecule, adenosine triphosphate (ATP), supplies most of the energy for chemical processes in all terrestrial organisms. The work was performed in collaboration with Cyril Ponnampertuma and Ruth Mariner, at NASA's Ames Research Center. The ATP was synthesized by shining ultraviolet light on a solution of adenine, ribose, and a phosphorus compound. Adenine and ribose have previously been synthesized in similar experiments; phosphates are thought to have been present in the primitive oceans. Because of the absence of ozone from the primitive atmosphere of the earth, ultraviolet light is thought to have penetrated to the primitive oceans. The efficiency with which ATP was produced in these experiments suggests the possibility that the first organisms on earth obtained most of their energy from ATP synthesized abiologically by ultraviolet solar radiation, instead of from metabolically produced ATP, as contemporary organisms do.

Drs. Fred Franklin and Allan F. Cook have continued their study

of the structure of Saturn's rings. The dynamics of the rings are considered in a rediscussion of Maxwell's Adams Prize Essay on the stability of the rings. Photometry of rings A and B has been used to derive the optical thickness of five representative portions of the rings and the phase variation and albedo of the ring particles.

The theory of diffuse reflection from scattering layers based on the equations of radiative transfer breaks down for dense dispersions of scattered particles very large relative to the wavelength. Dr. William M. Irvine's recent examinations of the necessary correction to the usual multiple-scattering theory may relate to the situation of Saturn's rings.

Disturbances to the motion of Neptune previously attributed to the planet Pluto have been reexamined by Dr. Whipple. Other evidence indicates that Pluto is too small to produce the observed effects. Dr. Whipple has shown that a belt of comets outside the orbit of Neptune can account for the disturbances.

A long-range project of Mr. Izsak's concerns the utilization of digital computers for the complex algebraic manipulations required by analytical perturbation theories in celestial mechanics. A computer program for the analytical development of the planetary disturbing function has just been completed.¹ With the help of this program the duplication of Leverrier's classical development for Jupiter and Saturn takes about one minute of computing time.

Meteoritic science.—Many rich clues to the origin and workings of the solar system are provided by meteorites, meteoroids, interplanetary dust, and the wide range of phenomena related to them. These phenomena must be contained comfortably in any satisfactory picture of the evolution of the solar system. To exploit the diverse information offered by these bits and fragments of solid matter, the research program of the Observatory is correspondingly broad.

Fiscal year 1964 was particularly noteworthy for the meteoritic science program, because several important instrumentation complexes were completed. Large-trough antennas were added to all five remaining sites of the Radio Meteor Project⁴; the full 16-station Prairie Meteorite Network⁵ went into operation; the simultaneous optical and radar networks for observing artificial meteors from Wallops Island became operational⁶; and the mass spectrometer for stable-isotope analyses of meteorites was finished.⁷ Since observational data are the backbone of any scientific program, the availability of these new facilities holds promise of many productive investigations.

The addition of large-trough antennas to all the sites of the Harvard-Smithsonian Radio Meteor Project permitted the collection of reliable data on meteors smaller than any we have previously been

¹ See footnotes, p. 177.

able to study. Thus a long-standing objective has been met, and major results from the operation of the improved network are imminent. Using data selected from that obtained over the past several years, Drs. Gerald S. Hawkins and Richard B. Southworth have examined the physical characteristics of the small radio meteors; they find that the majority of the faint radio meteors show total fragmentation. The decrease in average velocity as the size of the bodies decreases, originally reported by Drs. Hawkins, Southworth, and B. A. Lindblad, was studied further by Kenneth Baker.⁴

The relationship between the flux of meteors incident on the earth and the observed rate of radio meteors has been determined by Dr. W. G. Elford⁴ in terms of (1) the distribution law as a function of magnitude; (2) the density of meteor radiants over the celestial sphere; (3) the parameters of the radio equipment; and (4) a simple form for the ionized trail. The theory has been applied to the Harvard-Smithsonian Radio Meteor system at Havana, Illinois, and an estimate has been made of the average flux over the earth of meteors of magnitude $\geq +12$. A provisional value of $80 \text{ km}^{-2}\text{hr}^{-1}$ has been obtained. The analysis is being extended to determine the relative density of meteor radiants over the celestial sphere.⁴

A new analysis of 413 precisely reduced meteors photographed some years ago with the Super-Schmidt cameras has been made by Dr. Jacchia, Dr. Franco Verniani, and Robert Briggs.¹ Several physical characteristics of meteor bodies, together with their interdependences, have been determined more accurately than has hitherto been possible.

Dr. Verniani's investigations of the luminous and ionizing efficiencies of meteors have been completed. These two quantities are essential for the determination of meteor masses and densities. The photographic luminous efficiency τ_p , measured with respect to kinetic energy, has been rederived from Super-Schmidt photographic data, taking fragmentation into account. The dependence of τ_p on the meteor velocity v is found to take the form $\tau_p \sim v^n$. The exponent n turns out to be 1.0 ± 0.15 for both faint and bright photographic meteors. The present evaluation of τ_p has also allowed the determination of the ionizing efficiency τ_q . Drs. Verniani and Hawkins⁴ have found $\tau_q \sim v^2$. The comparison of the rates of photographic and radio meteors of about the same magnitude confirms this relation.

The Observatory has established a field operation to observe the luminosity and ionization produced by artificial meteors fired from rockets launched at Wallops Island, Virginia.⁶ The Observatory now operates two Super-Schmidt cameras for this program. A third camera site will be built, and a prism will be added to an additional Super-Schmidt at the Wallops Island site. Four radar-receiving

See footnotes, p. 177.

systems have been established at sites along the coast of North Carolina. These receivers, together with a transmitter and receiver on an ocean-going vessel, can make measurements of the ionization of artificial meteors simultaneously with the optical observations. Dr. Richard E. McCrosky is responsible for analysis of the optical data, and Drs. Hawkins and Southworth, for the radar data.

The entire 16-station Prairie Meteorite Network⁵ has been in full operation since early May 1964. Dr. McCrosky is principal investigator. During the first months of operation the network obtained double-station photographs of two extremely bright objects. With magnitudes of the order of -12 and -15 , both these meteors far exceed in luminosity any object on which data have previously been acquired. Their analysis is expected to yield interesting results. In each case, unfortunately, the terminal mass was judged to be too small to justify a search for the meteorite.

Dr. Cook has continued work⁶ with Dr. Peter M. Millman of the National Research Council, Ottawa, and Dr. Ian Halliday of the Dominion Observatory, Ottawa, on three Perseid meteor spectra obtained at the Springhill Meteor Observatory at Springhill, Ontario, in 1957. Dr. Cook has also worked on the physics of meteors to generate a criterion for the mode of ablation, i.e., to determine whether vaporization does or does not occur and then to seek observational evidence for the action of this criterion.

During its long life the earth's surface has been hit many times by large meteorites, which have produced craters. Only a limited number of these have been recognized and studied. It is clear that appropriate effort can extend this number significantly, and the Observatory has been involved in occasional studies of craters or possible craters. Dr. Paul W. Hodge visited the Henbury Meteorite Craters and the Boxhole Crater in Australia to study the meteoritic debris in the soil surrounding them.

A field party⁵ made up of Ursula B. Marvin, T. C. Marvin, and Walter A. Munn spent 16 days in August 1963 mapping and collecting samples at the site of an unusual craterlike formation in the San Luis Valley, Colo., to test the possibility that it could have resulted from the impact of a small meteorite or comet. The plane-table map shows that the "crater" is not a bowl-shaped depression in the landscape, but that the rim is a positive feature surrounding a floor that is concordant with the slope of the alluvial fan on which it lies. The search through the samples for meteorite strippings, nickel-iron spherules, or such impact products as glass or shock-produced silica minerals has not been completed, but results to date are negative.

⁵ See footnotes, p. 177.

The tentative conclusions are that the feature is probably not an impact site but an uncommon type of sand-dune formation.

Tektites, their distribution, and possible associated impactites and earth craters pose interesting questions. Are tektites terrestrial or extraterrestrial in origin? If they are terrestrial, are there associated impact craters? Dr. Whipple has suggested that a large crater, on the order of 15 miles in diameter, may exist in the Far East area of tektite-strewn fields. Therefore Don W. Farnsworth has begun a map search for such an impact structure. He has so far examined nearly 1,000 topographic maps of Sumatra, Java, Borneo, and nearby islands. Maps showing depth to ocean bottom have been examined and contoured. Search for an impact crater continues as maps become available.

Very small particles striking the high atmosphere are stopped by atmospheric drag before they are destroyed. Larger bodies may fragment or ablate on striking the atmosphere, generating many smaller particles. Hence a rain of small particles from outside the earth is constantly falling through the atmosphere to the surface. The identification and analysis of these particles is a challenging problem.

The use of radio isotope techniques offers one means to identify material as extraterrestrial. For this purpose Dr. Edward L. Fireman, working with Chester C. Langway of the Army Cold Regions Research Laboratories, has collected and analyzed dust from melted snow deep within the Greenland ice sheet. Results from this study indicate that the exposure age of silicates in dust is less than 10,000 years.⁹

Mrs. Ursula B. Marvin has made comparative studies of the mineralogy, chemical composition, and physical properties of black spherules from the Greenland ice cap and industrial black spherules produced by welding operations.¹⁰ Results showed that weld spatter sometimes duplicates a type of black spherule, consisting of iron oxide (magnetite) with less than 1 percent of manganese, that is found in the Greenland ice and has been reported from many other environments where researchers have sought extraterrestrial dust. The most common weld spatter, however, is metallic iron or nickel-iron that can be distinguished from cosmic dust by a high content of chromium. This work was done in collaboration with Mr. Langway.

Collections of small particles have also been made on Observatory collectors flown on a U-2 at high altitudes by the U.S. Air Force, and on a B-52 by the NASA Flight Research Center, both at Edwards Air Force Base, California. These collections have been analyzed by Dr. Frances Wright and Dr. Hodge. They have also examined

⁹ See footnotes, p. 177.

material from polar ice cores in search for extraterrestrial particles and have collected particles on the slopes of the Arizona Meteorite Crater for analysis and comparison with other matter that now seems to be extraterrestrial.

A particular problem has been the isolation of volcanic particles, which may be confused with extraterrestrial material. To better characterize volcanic particles, Dr. Wright is examining collections made by personnel from the Baker-Nunn Stations: samples from Kilauea Iki 1959 eruption, collected by D. V. Mechau; samples from Irazu 1963 eruption, collected by Ron La Count; and samples from Ubinas 1954 eruption, collected by A. Oakes.

Drs. Wright and Hodge have sampled these volcanic dust deposits to search for and analyze microscopic spherules that might possibly be similar to the supposed meteoritic spherules found in polar ice sediments. In the size range of 10 to 100μ , approximately 2×10^{-5} of volcanic particles are perfect or nearly perfect spherules, and 2×10^{-3} are rough magnetic spheroids. In composition they are similar to only a few of the polar glacier particles the two have analyzed. They have concluded that since the numerical ratio of spherules to irregular particles for the volcanic dust is so much different from that for the ice sediments, a volcanic origin for the latter seems impossible. Therefore a meteoroidal origin for the arctic and antarctic spherules is the most reasonable hypothesis.

Another place where cosmic dust might be expected to accumulate is the sediment on the ocean floor. Dr. Craig M. Merrihue is exploring this possibility. A mass-spectrometric search for extraterrestrial material in a magnetic separate from a modern Pacific red clay revealed the presence of He^3 and an argon isotope anomaly, suggesting the presence of cosmic dust. The cosmic gases are not cosmogenic because the isotope pattern does not resemble that expected from cosmic-ray-induced reactions. It appears that the most abundant magnetic component of cosmic dust is saturated with gases picked up from the solar wind. A computer program has been assembled to solve the diffusion equation for gases from spheres, assuming an arbitrary nonuniform initial gas profile. This program will permit accurate determinations of diffusion constants and activation energies for meteoritic minerals.

The Observatory's interest in dust goes beyond the earth's atmosphere. The joint research of Drs. Giuseppe Colombo and Don A. Lautman, with Irving Shapiro of the M.I.T. Lincoln Laboratory, concerning the concentration of cosmic dust around the earth has established that the density of dust in the vicinity of the earth can be enhanced by a factor of nearly 10^4 over that in the zodiacal cloud,

provided that the initial velocities with respect to the earth are small (about 1.5 km sec^{-1}). The trapping mechanism consists of an initial encounter with the earth's atmosphere followed by conversion to a long-lifetime orbit by radiation pressure. Drs. Colombo and Lautman have found that long-lifetime orbits of particles ejected from the moon cannot contribute significantly to the cloud, nor can particle breakup, since the drag pressure at the relatively high capture altitudes is not high enough to break the particles.

The particles responsible for the zodiacal light are concentrated near the plane of the ecliptic. Dr. Southworth has performed a calculation combining the space-density distribution of the zodiacal dust particles (as observed in the zodiacal light, and as theoretically predicted from the Poynting-Robertson effect) with the observed reddening of the Fraunhofer corona (which is sunlight diffracted by the particles), showing that the mean radius of the observed particles exceeds 15 microns. Some invisible submicron particles may also be present, but their total mass will be negligible compared to that of the larger particles.

Dr. Charles Whitney has obtained laboratory evidence confirming the suggestion that interstellar bands are produced by resonant absorption in small grains. Experimental work confirms the presence of the band for Na grains, and theory shows that such grains, when coated with ordinary ice, will produce an absorption just at the astronomically observed wavelength.

Meteorites, solid bodies from space that survive the plunge through the earth's atmosphere, warrant careful attention, since they are the only samples yet available of extraterrestrial material. It is fruitful to study their mineralogy, crystal structure, metallurgy, chemical composition, isotope distribution, and other physical properties.

In her continuing mineralogical studies Mrs. Marvin has established zircon as a meteoritic mineral by its positive identification in the Vaca Muerta mesosiderite and the Toluca iron meteorite.¹⁰ Zircon, because it concentrates uranium, thorium, hafnium, and rare earths, is a mineral of choice for age determinations and measurements of Zr/Hf ratios and rare-earth distribution in meteorites. The character and mode of occurrence of zircon in Vaca Muerta and Toluca were studied in detail in collaboration with Cornelis Klein, of the Harvard University Department of Geological Sciences, who determined chemical compositions by means of electron-probe microanalyses.

During the past year Dr. Joseph I. Goldstein completed a metallurgical study of Widmanstätten patterns in metallic meteorites. The object of the project was to establish the roles of pressure, tempera-

¹⁰ See footnotes, p. 177.

ture, and time in the formation of these patterns. A method of analysis using the method of finite differences was developed for the diffusion-controlled growth of the Widmanstätten patterns. As necessary inputs to the growth analysis, the interdiffusion coefficients for the Fe-Ni system, as a function of pressure, temperature, and composition, were measured, as were the diffusion coefficients in both the α and γ phases. The Fe-Ni phase diagram was also redetermined at temperatures above 500° C. Dr. Goldstein proposes two alternative models for the origin of meteorites in which the Widmanstätten pattern formed at low pressures.

Dr. Matthias F. Comerford has initiated a program to investigate defect structures in meteorites and micrometeorites. An attempt is being made to relate the substructure observed in extraterrestrial objects to the thermomechanical procedures required to produce similar structures in laboratory alloys. The environmental effects of both pressure and temperature upon the kinetics of nucleation and growth of these defect structures can be examined in some detail. Preliminary results indicate that both effects are present and may act in opposing ways.

Dr. Fireman and his associates conduct a broad program of research to measure cosmic-ray-produced radioactive and stable isotopes in meteorites, in recovered satellites, in dust collections from the polar regions, and in deep-sea sediments. In this program one must constantly improve and maintain low-level counting equipment and other types of analytical apparatus. The group has determined the time various meteorites were exposed to cosmic rays. The youngest is the Farmington meteorite, which was exposed for only 10,000 years; the oldest stony meteorite is Norton County, exposed for about 400,000,000 years. Results on recovered satellites indicate that in addition to cosmic rays there are isotope effects produced by Van Allen particles and solar flares. These effects are quite different from cosmic-ray effects.

An important advance was made during the past year when James C. DeFelice and Dr. Fireman obtained sufficient material to measure the short-lived argon-37 in the whole-rock, magnetic, and nonmagnetic phases of the recently fallen chondrite Peace River. Although the radioactive contents are similar to those of other newly fallen chondrites, the ratio of argon-37 to argon-39 is somewhat lower than they have previously observed. Also, its carbon-14 is lower. In another analysis, the cosmic-ray exposure age of the Pribram meteorite was found to be identical to the value of the exposure age obtained for the Bruderheim fall, which is typical for chondrites. The tritium, argon-

39, and carbon-14 contents are similar to those obtained for other stony meteoroids.

Earlier measurements of tritium in satellite fragments have been extended by Dr. David Tilles and Mr. DeFelice, who have obtained upper limits for the tritium content of *Discoverer 14* and for the amount of tritium in a trapped state in August 1960. These measurements, combined with measurements previously reported in other satellites, have given evidence for an increase of at least an order of magnitude in trapped tritium flux in less than 4 months and a decrease of at least an order of magnitude in less than 7 months. Such time variations are believed to have been caused by direct injection of solar-flare tritons into the Van Allen belts in November 1960.

Dr. Merrihue's analysis of data on xenon and krypton from minerals and chondrules from the Bruderheim meteorite indicates that chondrules, enriched in Xe^{129} yet depleted in xenon, are the most primitive material yet studied and reflect an early high-temperature origin. Based on a Xe^{129} -xenon correlation, the minerals appear to be an equilibrium aggregation. The difference between meteoritic and terrestrial xenon can be attributed to a fast proton irradiation of meteoritic material and the accumulation in meteorites of fission xenon, possibly from Pu^{244} spontaneous fission.

Dr. Merrihue has devised a method of trace-element determinations by mass spectrometry of neutron-irradiated samples. Preliminary results, based on data collected at Berkeley, were obtained for U^{235} , Se, Te, I, Br, and Cl, and also for the $\text{Br}^{79}/\text{Br}^{81}$ ratio, which appears to be anomalous in meteorites. Also, a new method of potassium-argon dating, applicable to minute samples, has been established, based on $\text{A}^{40}/\text{A}^{39}$ ratios in neutron-irradiated samples in which A^{39} is produced by the $\text{K}^{39}(\text{n},\text{p})$ reaction. Thus both potassium and radiogenic argon are determined in the same sample, and a correction for air contamination can be applied using the measured A^{39} . This represents a considerable improvement over conventional methods.

The rare-gas mass spectrometer has been completed by Dr. Tilles and his associates.⁷ As a first application of the instrument, the group plans searches of deep-sea sediment for evidence of material of extraterrestrial origin. Similar searches are planned in particulate matter from Greenland ice, collected by Dr. Fireman and Mr. Langway. The major research emphasis with this spectrometer will be on studies of meteoritic samples—isotopic composition and amounts of all noble gases in separated phases of meteorites.

From the theoretical aspect, Dr. Henri E. Mitler is studying the effects of cosmic-ray bombardment on meteorites. Quantitative analysis of radionuclides produced can lead to estimates of the preatmos-

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pheric size of the meteorite and of the proton flux to which it has been subjected.

Cometary science.—Comets and their associated phenomena are intimately related to other aspects of the solar system, such as zodiacal dust, micrometeorites, and evolution of the planets. Cometary investigations hence constitute a vital link in the Observatory's overall research program.

A study by Dr. Whipple of the secular variation in the absolute brightnesses of comets leads to the possibility that several of the known periodic comets may disappear within the coming decade. The observational rediscoveries of the periodic comets suggest that these calculations are more pessimistic with regard to the lifetimes of comets than is justified; nevertheless, the predictions should serve a useful purpose in stimulating search for the rediscovery of old comets and in clarifying the question concerning the actual decay processes whereby comets do, indeed, cease to be visible.

Dr. Whipple, in the study mentioned earlier, has also discussed the evidence that a thin belt of comets probably remains in a plane not far from the mean plane of the planets, but outside the orbit of Neptune. Such a belt of comets can account for disturbances of Neptune's motion.

The utilization of the Baker-Nunn cameras for comet observations has been expanded.^{12, 1} Using photographs thus obtained, the Observatory is pursuing three objectives: determination and understanding of the motion of comet tails; photometry of comets; and time-lapse motion pictures to document the changes in a comet and its tail with time.

The research on tail motions is guided by Daniel Malaise,¹³ who has previously observed that the direction of the tail of a comet may oscillate significantly about the line directed through the comet away from the sun. The explanation of this phenomenon is not clear, but it may be related to some characteristic of the solar wind. Baker-Nunn photographs are an excellent source of the observational data required to pursue this topic. Data obtained during the past year are being analyzed.

The photometric investigations are the responsibility of Dr. Southworth. For this purpose, defocusing lenses have been sent to a number of the stations. An unresolved question in cometary astronomy is whether comet magnitudes do indeed change in correlation with solar activity, as some investigators have reported. A study of this question is one of several investigations based on the photometric data.

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In conjunction with the icy-conglomerate model of a comet, Dr. Whitney reexamined the theory of heat transfer within glaciers. He showed that radioactive transfer can be appreciable and can significantly influence measured temperatures in glaciers. Dr. Whitney, Dr. Charles A. Lundquist, and Douglas Pitman have initiated laboratory work to elucidate the transfer of heat and mass within porous, subliming matrices such as snow or frosty sand. Preliminary experiments confirm that this work will be highly valuable for insight into comet phenomena.

Solar observations.—Information about solar phenomena may be acquired by relatively direct or by indirect observational techniques. Heating of the earth's atmosphere or oscillations in the direction of a comet's tail are examples of indirect means of gleaning solar data. The Observatory is also involved in more direct measurements.

Dr. Leo Goldberg directs a broad program of solar-oriented research, mostly under the auspices of Harvard College Observatory, but partly within the research program of the Astrophysical Observatory. An important part of Dr. Goldberg's program concerns the preparation of solar spectrometers for rocket and satellite flights.¹⁴

A model of the Harvard spectrometer for Orbiting Solar Observatory B was flown in an Aerobee high rocket from White Sands, New Mexico, on September 6, 1963. Three full scans and part of a fourth were obtained of the solar spectrum between 1350 and 500 Å. Good records were obtained of the emission lines and of the Lyman continuum. Dr. Robert W. Noyes of the Astrophysical Observatory assisted in the reduction of the data from this experiment.

The flight model for the OSO-B spectrometer was integrated into the spacecraft at Ball Brothers Research Corporation in Colorado and subsequently delivered to Cape Kennedy for final testing and preparation for flight. A disastrous accident during spin-balance testing, in which the third stage of the rocket to which the satellite was attached ignited, caused the destruction of the entire payload. A spare instrument now being calibrated will be integrated into a new spacecraft during the next fiscal year. Dr. Noyes supervised the setting up of a "Quick Look" Data System, by which data from experiments aboard the Orbiting Solar Observatories will be acquired by Harvard-SAO in decoded, legible form within a short time of the satellite's pass over a ground station, thus permitting near-real-time control of the experiment.

Designs are currently being prepared¹⁵ for an improved version of the spectrometer capable of one arc minute resolution on the disk, which will probably be flown about 1966.

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Observations made at the Kitt Peak National Observatory concerning magnetic fields in the solar photosphere have been analyzed by Dr. Noyes. These observations yielded a definite correlation between photospheric velocities and magnetic fields, in the sense that the highest magnetic fields (about 50–75 gauss) found in quiet regions tend to occur in regions where material is moving downward (with velocities of about 0.2 km sec^{-1}). This has been interpreted as a result of convective sweeping of magnetic fields toward the downward-descending periphery of the large convective cells (supergranulation) which cover the surface of the quiet sun.

Dr. Giovanni Fazio has reduced gamma-ray detector data from 1,000 orbits of Orbiting Solar Observatory I.¹⁶ These reductions have shown no evidence of gamma rays with energy greater than 50 million ev from the sun, even during solar flares, with an upper limit of the order of 10^{-3} photons/cm² sec. Likewise, no evidence was found for celestial sources of primary gamma rays. The sensitivity of the detector was limited by background radiation.

The possibility of detecting neutrinos from the sun is a lively topic of discussion in astrophysical circles. Some authors suggest that this can be accomplished by using the reaction in which a solar ν_e combines with a Cl^{37} nucleus to give Ar^{37} and an electron. The radioactive gas Ar^{37} may be detected by counting techniques. The Observatory has laboratories equipped to do this counting, as Ar^{37} is one of the radioactive isotopes analyzed in meteorites. Since the ν_e reaction cross section with Ar^{37} is extremely low, vast quantities of Cl^{37} must be used. Since Ar^{37} can also be generated by cosmic-ray-induced reactions, the experiment must be performed under conditions of extreme radiation shielding—say deep in the earth. Dr. Lundquist has suggested that commercially pumped brine wells might meet these requirements, if the Ar^{37} from the chlorine-rich brine could be measured. Dr. Mitler has made a study of the relative amounts of Ar^{37} generated by the solar neutrino reaction and by other undesired reactions. The practical implementation of the experiment is being studied.

Stellar observations.—A feature of current astrophysics is the rapid expansion of observational possibilities into previously inaccessible parts of the electromagnetic spectrum and to radiation other than electromagnetic. This has been accomplished in part by carrying instruments above the absorption of the atmosphere. New technology has also contributed to the enlarged observational capabilities. Comparison and correlation of data from widely spaced frequencies have also proved to be powerful procedures.

An example of correlated observations at quite different frequencies is the study of flare stars.¹ During preagreed time intervals, the

¹ See footnotes, p. 177.

Observatory employs its network of Baker-Nunn cameras to photograph a flare star repeatedly. The probability of successful observation is good since several of the cameras can be used simultaneously. During the same interval, one of several radio telescopes cooperating in the program continuously observes the same flare star. The resulting records are searched for nearly simultaneous optical flares and sudden increases in radio signal. During the past year about 180 hours of combined observations have been made. Correlations previously found to exist between faint optical flares and radio events were confirmed by several major events.

The continuing cooperative effort with Sir Bernard Lovell of the Jodrell Bank Experimental Station, England, and Dr. Whipple and Leonard H. Solomon of the Astrophysical Observatory has led to further new evidence concerning optical flares and radio flares on peculiar dwarf stars, such as UV Ceti. A distinction between two types of event has been made, with at least one analogy to solar phenomena being drawn. Further, the coincidence in time between optical and radio flares shows that the velocity of light is constant to better than one part in 2×10^6 over a range in wavelength exceeding a factor of 2×10^6 . Similar joint programs are being pursued with the Division of Radiophysics, Commonwealth Scientific and Industrial Research Organization, Sydney, Australia, and the Arecibo Ionospheric Observatory of Cornell University.

Project Telescope,¹⁷ the satellite project to use television techniques to survey the ultraviolet magnitude of stars, has finished its developmental phase with completion of the prototype instrument. The project next enters the critical phase during which the prototype undergoes extensive environmental testing, and the instrument for flight on an Orbiting Astronomical Observatory is fabricated to the proven prototype design. Overall aspects of this challenging undertaking have engaged the attention of Dr. Whipple, Dr. Lundquist, and Project Scientist Dr. Robert Davis. The procedures for absolute calibration of the four ultraviolet television photometers have been established by Dr. Davis and Mr. Malaise. Preparations for automated data reduction and analysis are coordinated by Dr. Owen Gingerich.

At wavelengths still shorter than ultraviolet light, projects are underway at the Observatory to measure X-rays and γ -rays from astronomical sources. The most exciting experiment now in progress is an attempt by Dr. Fazio and Dr. Henry Helmken of the Observatory and Dr. D. Hill of M.I.T. to detect γ -rays with energy greater than 10^{12} ev from the radio galaxy Cygnus A and from the quasi-stellar radio sources. A large (28 ft. square) fixed parabolic mirror in conjunction with a steerable plane mirror (40 ft. square) is being used to detect the

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Čerenkov light resulting from charged-particle showers in the atmosphere. One possible origin of these showers is extraterrestrial gamma radiation. In the experiment an increase in the number of showers as a source transits the sensitive cone of the mirror would indicate the emission of gamma radiation by the source. In preliminary trials Čerenkov light was detected, and results indicate that this device should provide the most sensitive detector thus far in the search for gamma radiation. The mirror system is part of the solar furnace at the U.S. Army Laboratories, Natick, Mass. The Army has provided use of the instrument and technicians during these experiments.

The feasibility of using a spark chamber in conjunction with a television recording system to detect primary gamma rays was exhibited in the laboratory, and a high-altitude balloon experiment using this detector is in preparation. A series of spark chambers was constructed and evaluated, and a final design was chosen. A television camera (vidicon) was used to observe spark patterns of cosmic-ray particles in the chambers. The vidicon picture was recorded on 16 mm film by a kinescope recorder and also transmitted by radio and recorded. In its ultimate form, this instrumentation can be adapted for satellite use to measure the flux of primary gamma rays and to determine their arrival direction and energy.

Dr. Comerford and Dr. Fazio are using laboratory X-ray apparatus to evaluate techniques such as reflection and scattering for the collection and detection of radiation from distant sources and to aid in the design and construction of devices to implement these techniques. Currently, the aim is not to map the sky, but to look carefully at discrete sources in the hope of resolving some of the uncertainties about their nature.

Returning to the less exotic but ever-important visible portion of the spectrum, Drs. Wright and Hodge have completed the Atlas of the Large Magellanic Cloud. Heretofore it has been the custom for scientists who have identified and studied certain objects in the Large Magellanic Clouds to publish identifications in the form of coordinates on one of three different coordinate systems. The experience of most scientists with this method of identification has been very unsatisfactory, as the coordinates are inadequate, especially for stellar objects. Ambiguity arises because of the crowded nature of the star fields and the difficulty of establishing the coordinate systems on different plates with different scales and distortions. A further hindrance to progress in the study of the Magellanic Clouds is the lack of any central source of information on objects that have been identified and studied. There have been much confusion and duplication in identification of variable stars, star clusters, and emission regions.

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Hence this Atlas presents a photographic bibliography of past discoveries so that identification can be made quickly and accurately. The photographic plates taken expressly for the Atlas have now been completed. They were taken with the Schmidt telescopes at the Boyden and Mt. Stromlo Observatories. Two sets of plates were taken, one with a yellow filter and one with a blue filter. From these, 160 charts size 11 by 11 inches have been made. The charts made from plates taken with a blue filter have identified on them all published verifiable variable stars, over 2,000 in number, while the other charts have identified on them all of the NGC objects, all star clusters, and all emission objects for which positions have been published. In the process of identifying past discoveries, 500 new star clusters were identified.

The SAO Star Catalog, initially reduced in the FK-3 system, has been converted to the FK-4. All the preparatory work for publication in book form has been completed.¹ Dr. Veis and Mrs. Katherine Haramundanis have begun the groundwork for a possible future enlargement by compiling a bibliography of star catalogs and references pertaining to them; determining approximate orientation angles for 1,231 galaxies; and compiling a catalog of about 2,500 discrete radio sources.

Stellar theory.—The Astrophysical Observatory has become a recognized leader in the application of modern electronic computers to stellar models. In January 1964 the Observatory was host to an informal 3-day international Conference on Model Stellar Atmospheres, which provided an opportunity for workers in this field to discuss their current researches. The conference was convened by Dr. Whitney and his associates.

Extensive calculations of model stellar atmospheres are being continued by Drs. Eugene H. Avrett and Stephen E. Strom.¹¹ The grid of models calculated during the past year has been very successful in establishing an improved effective temperature scale for early-type stars. The effects of individual lines and of line blanketing are now being incorporated into the computer program. The first phase of investigation of line formation under conditions of noncoherent scattering has been completed. Solutions were obtained for the frequency-independent line source function for a two-level atom. Of greater importance, the necessary mathematical techniques have been developed for the solution of a wide variety of line-transfer problems.

Dr. Strom has investigated the validity of model stellar atmospheres by means of comparing predicted continuous fluxes and spectral lines with the corresponding observed quantities. He obtained

See footnotes, p. 177.

many of the observations at Harvard's Agassiz Station. The continuous flux and H δ , H γ , and H β profiles for Vega were predicted remarkably well by a model atmosphere that included opacities caused by the blended wings of the higher Balmer and Lyman lines. The effective temperature of the model that best reproduced the observations matched that derived from recent measurements of this star's radius.

Dr. Gingerich has investigated the role of opacities from metals in stellar atmospheres,¹¹ finding good agreement between a predicted model and the solar rocket ultraviolet observations, and also showing that such opacities must be considered even in much hotter stars, such as Sirius, which probably has anomalously high metal abundances. In the work with S. S. Kumar on cool stars, with effective temperatures from 2,500 to 4,500°, he found unusually sharp maxima in the infrared spectrum near 16,500 Å, which have been partially confirmed by the Princeton Stratoscope balloon observations. Electron and Rayleigh scattering has been incorporated into a stellar atmosphere computer program, both for the cool stars and for hotter stars. With this program David Latham has been able to show that the introduction of convection into a consistent nongray solar model has little effect on the overlying temperature structure, and no effect on the visible spectrum.

Dr. Wolfgang Kalkofen is developing a model whose aim is to predict the radiation from variable stars.¹¹ This involves the calculation of the radiation field emerging from a medium that departs from local thermodynamic equilibrium, and that is in motion, with a velocity dependent upon position in the medium.

Drs. Colombo and Whitney are studying a nonlinear autonomous system with two or three degrees of freedom. This system is chosen to simulate the mechanics of a pulsating star.

Dr. Mitler has made theoretical study of the isotope abundances of the light elements. He shows that the observed abundances of Li, Be, and B can be explained by their spallation in small, prototerrestrial bodies. He considers spheres of arbitrary composition and radius irradiated by protons and finds that the present-day proton flux is too soft to give the desired results reasonably, and that a mean proton energy of 300 mev is necessary to get the observed isotopic ratios. The results are not sensitive to the composition, and he can obtain the measured Li, Be, and B abundances by taking dry silicate spheres of about 14 m radius for the prototerrestrial bodies, 140 m for the protoasteroidal bodies.

See footnotes, p. 177.

PUBLICATIONS

The following papers by staff members of the Astrophysical Observatory appeared in various journals:

- AVRETT, E. H., AND STROM, S. E. Calculation of early-type model stellar atmospheres (abstract). *Astron. Journ.*, vol. 69, p. 150, 1964.
- BAKER, K. Additional data on the velocity of faint meteors. *Harvard Radio Meteor Project Research Report No. 4*, December, 1963.
- . Influx of Gemini meteors relative to the sporadic background at magnitudes +4 and +8. *Harvard Radio Meteor Project Research Report No. 6*, June, 1964.
- CARLETON, N. P., AND MEGILL, L. R. Excitation by local electric fields in the aurora and airglow. *Journ. Geophys. Res.*, vol. 69, pp. 101-122, 1964.
- COLOMBO, G., AND FIOCCO, G. Optical radar results and meteoric fragmentation. *Journ. Geophys. Res.*, vol. 69, pp. 1795-1803, 1964.
- COOK, A. F., AND FRANKLIN, F. A. Rediscussion of Maxwell's Adams prize essay on the stability of Saturn's rings. *Astron. Journ.*, vol. 69, pp. 173-200, 1964.
- DEBUS, K. H.; JOHNSON, W. G.; HEMBREE, R. V.; AND LUNDQUIST, C. A. A preliminary review of the upper atmosphere observations made during the Saturn high water experiment. *Proc. 13th Int. Astronaut. Congress*, pp. 182-196, Springer-Verlag, 1964.
- DEFELICE, J.; FAZIO, G. G.; AND FIREMAN, E. L. Cosmic-ray exposure age of the Farmington meteorite from radioactive isotopes. *Science*, vol. 142, pp. 673-674, 1963.
- . *See also* Fireman and DeFelice; Tilles and DeFelice; Tilles, DeFelice, and Fireman.
- DEFELICE, J.; FIREMAN, E. L.; AND TILLES, D. Tritium, argon-37 and manganese-54 radioactivities in a fragment of *Sputnik 4*. *Journ. Geophys. Res.*, vol. 68, pp. 5289-5296, 1963.

¹ Supported by grant NsG 87/60 from the National Aeronautics and Space Administration.

² Supported by contract AF 19(628)-3248 with the U.S. Air Force.

³ Supported by contracts AF 19(628)-2949 (now completed) and AF 19(628)-4203 with the U.S. Air Force.

⁴ Supported by grants G 20135 and GP 388 from the National Science Foundation to Harvard University and by contract NASr-158 between the National Aeronautics and Space Administration and Harvard University.

⁵ Supported by grant NsG 291-62 from the National Aeronautics and Space Administration.

⁶ Supported by research grant NsG 536 from the National Aeronautics and Space Administration.

⁷ Supported by grant NsF 16067 from the National Science Foundation.

⁸ Supported by contract AF 19(604)-5196 between the U.S. Air Force and Harvard University.

⁹ Supported in part by grant NsF 16067 from the National Science Foundation.

¹⁰ Supported in part by grant NsG 282-63 from the National Aeronautics and Space Administration to Dr. Clifford Frondel of Harvard University.

¹¹ Supported by grant GP 940 from the National Science Foundation.

¹² Supported by grant GP 2999 from the National Science Foundation.

¹³ Research sponsored by fellowships from NASA, Fonds National de la Recherche Scientifique, Belgium, and European Preparatory Commission for Space Research.

¹⁴ Supported by contract NASw 184 between the National Aeronautics and Space Administration and Harvard University.

¹⁵ Supported by grant NsG 438 from the National Aeronautics and Space Administration to Harvard University.

¹⁶ Supported by grant NAS5-3255 from the National Aeronautics and Space Administration.

¹⁷ Supported by contract NAS5-1535 with the National Aeronautics and Space Administration.

- DUGAN, C. H. Experimental studies of metastable atoms and molecules. Dissertation, Harvard University, 1963.
- FAZIO, G. G. See DeFelice, Fazio, and Fireman; Pollack and Fazio.
- FIREMAN, E. L. Radioactivities in meteorites and in recovered satellites. Proc. Int. Conf. on Cosmic Rays (Jaipur), vol. 1, 1963.
- FIREMAN, E. L., AND DEFELICE, J. Tritium and argon-39 in the Pribram meteorite. Bull. Astron. Inst. Czechoslovakia, vol. 15, p. 113, 1964.
- . Radioactive nuclides in the Peace River meteorite. Trans. Amer. Geophys. Union, vol. 25, pp. 89-90, 1964.
- . See also DeFelice, Fireman, and Tilles; DeFelice, Fazio, and Fireman; Tilles, DeFelice, and Fireman.
- FRANKLIN, F. A. See Cook and Franklin.
- GINGERICH, O. Studies in nongray stellar atmospheres. I. Computer procedures and iteration techniques. Astrophys. Journ., vol. 138, pp. 576-586, 1963.
- . Investigations of a model solar atmosphere (abstract). Astron. Journ., vol. 69, p. 139, 1964.
- . Laboratory exercises in astronomy—the moon's orbit. Sky and Tel., vol. 27, p. 220, 1964.
- . The computer versus Kepler. Amer. Scientist, vol. 52, pp. 218-226, 1964.
- . Introduction to the astrophysics of stars. Translation, J. Dufay, Dover Press, 1964.
- GINGERICH, O., AND KUMAR, S. S. Calculations of low-temperature model stellar atmospheres (abstract). Astron. Journ., vol. 69, p. 139, 1964.
- GOLDBERG, L. Solar spectroscopy. Journ. Quant. Spectrosc. Radiat. Transfer, vol. 3, pp. 519-528, 1963.
- GOLDBERG, L.; DUPREE, A. K.; AND KOPP, R. A. Abundance of iron derived from faint Fraunhofer lines (abstract). Astron. Journ., vol. 69, p. 139, 1963.
- GOLDBERG, L.; PARKINSON, W. H.; REEVES, E. M.; AND NOYES, R. W. Preliminary results of a rocket flight of the Harvard OSO-B spectrometer (abstract). Astron. Journ., vol. 69, p. 140, 1963.
- GOLDSTEIN, J. I. The growth of the Widmanstätten pattern in metallic meteorites. Dissertation, Massachusetts Institute of Technology, 1964.
- GOLDSTEIN, J. I., AND OGILVIE, R. E. Electron microanalysis of metallic meteorites. Geochim. et Cosmochim. Acta, vol. 27, pp. 623-637, 1963.
- GROSSI, M. D. A technique for wind measurements in the lower ionosphere by collection and processing of doppler information contained in VHF radar returns from meteor trails. Proc. Conf. on Aeronomic Measurements in the Lower Ionosphere, pp. 82-88, University of Illinois, 1963.
- . Aeronomic measurements in the lower ionosphere. Report to USAF on Contract AF 19(628)-3248, Smithsonian Astrophys. Obs., September, 1963.
- HAWKINS, G. S. The meteor population. Harvard Radio Meteor Project Research Report No. 3, August, 1963.
- . Stonehenge decoded. Nature, vol. 200, pp. 306-308, 1963.
- . Stonehenge: a neolithic computer. Nature, vol. 202, pp. 1258-1261, 1964.
- HAWKINS, G. S.; MEUNIER, P.; AND ROSENTHAL, S. The plume over a meteorite crater. Geochim. et Cosmochim. Acta., vol. 28, pp. 1011-1014, 1964.
- HAWKINS, G. S., AND SOUTHWORTH, R. B. The physical characteristics of meteoroids. Harvard Radio Meteor Project Research Report No. 2, July, 1963.
- . See also Verniani and Hawkins.
- HELMKEN, H. F. Galactic gamma radiation. Dissertation, Massachusetts Institute of Technology, 1964.

- HODGE, P. W. Distribution of stars in Leo I dwarf galaxy. *Astron. Journ.*, vol. 68, pp. 470-474, 1963.
- HODGE, P. W., AND WRIGHT, F. W. Studies of particles for extraterrestrial origin. 2. A comparison of microscopic spherules of meteoritic and volcanic origin. *Journ. Geophys. Res.*, vol. 69, pp. 2449-2454, 1964.
- . See also Wright, Hodge, and Langway.
- IRVINE, W. M. Formation of absorption bands in a scattering atmosphere (abstract). *Astron. Journ.*, vol. 68, p. 538, 1963.
- . The asymmetry of the scattering diagram of a spherical particle. *Bull. Astron. Inst. Netherlands*, vol. 17, pp. 176-184, 1963.
- . The shadowing effect in diffuse reflection (abstract). *Trans. Amer. Geophys. Union*, vol. 44, p. 873, 1963.
- . The formation of absorption bands and the distribution of photon optical paths in a scattering atmosphere. *Bull. Astron. Inst. Netherlands*, vol. 17, pp. 266-279, 1964.
- . Electrodynamics in a rotating system of reference. *Physica*, vol. 30, pp. 1160-1170, 1964.
- IZSAK, I. G. A note on perturbation theory. *Astron. Journ.*, vol. 68, pp. 59-61, 1963.
- . Tesseral harmonics in the geopotential. *Nature*, vol. 199, pp. 137-139, 1963.
- . Tesseral harmonics of the geopotential and corrections to station coordinates. *Journ. Geophys. Res.*, vol. 69 pp. 2621-2630, 1964.
- JACCHIA, L. G. Variations in the earth's upper atmosphere as revealed by satellite drag. *Rev. Mod. Phys.*, vol. 35, pp. 973-991, 1963.
- . Influence of solar activity on the earth's upper atmosphere. *Planet. Space Sci.*, vol. 12, pp. 355-378, 1964.
- JACCHIA, L. G., AND SLOWEY, J. Atmospheric heating in the auroral zones from the drag analysis of the *Injun III* satellite. *Astron. Journ.*, vol. 68, pp. 538-539, 1963.
- . An analysis of the atmospheric drag of the *Explorer IX* satellite from precisely reduced photographic observations. In P. Muller, ed., *Space Research IV*, pp. 257-270, North-Holland Publ., Amsterdam, 1964.
- . Atmospheric heating in the auroral zones: A preliminary analysis of the drag of the *Injun III* satellite. *Journ. Geophys. Res.*, vol. 69, 905-910, 1964.
- LAUTMAN, D. A. On the distribution of the perihelia of the asteroids (abstract). *Astron. Journ.*, vol. 68, p. 539, 1963.
- LOVELL, B.; WHIPPLE, F. L.; AND SOLOMON, L.H. Observation of a solar type radio burst from a flare star. *Nature*, vol. 201, pp. 1013-1014, 1964.
- . Relative velocity of light and radio waves in space. *Nature*, vol. 202, p. 377, 1964.
- LUNDQUIST, C. A. See Debus, Johnson, Hembree, and Lundquist.
- MALASE, D. Photographic observations of the tail activity of comet *Burnham 1960 II*. *Astron. Journ.*, vol. 68, pp. 561-565, 1963.
- MARVIN, U. B. Mineralogy of the oxidation products of the *Sputnik 4* fragment and of iron meteorites. *Journ. Geophys. Res.*, vol. 68, pp. 5059-5068, 1963.
- MARVIN, U. B., AND KLEIN, C. Meteoritic zircon (abstract). *Trans. Amer. Geophys. Union*, vol. 45, p. 86, 1964.
- MERRIHUE, C. M. On the origin of I^{239} in meteorites (abstract). *Trans. Amer. Geophys. Union*, vol. 45, p. 90, 1964.
- MITLER, H. E. He^3 in planetesimals. *Journ. Geophys. Res.*, vol. 68, pp. 4587-4594, 1963.

- NOYES, R. W., *See* Goldberg, Parkinson, Reeves, and Noyes.
- NOYES, R. W., AND LEIGHTON, R. Velocity fields in the solar atmosphere. II. The oscillatory field. *Astrophys. Journ.*, vol. 138, pp. 631-647, 1963.
- PACKER, E.; SCHER, S.; AND SAGAN, C. Biological contamination of Mars. II. Cold and aridity as constraints on the survival of terrestrial microorganisms in simulated Martian environments. *Icarus*, vol. 2, pp. 293-316, 1963.
- POLLACK, J. B., AND FAZIO, G. G. Production of π -mesons and gamma radiation in the galaxy by cosmic rays. *Phys. Rev.*, vol. 131, pp. 2684-2691, 1963.
- ROSENTHAL, S. *See* Hawkins, Meunier, and Rosenthal.
- SAGAN, C. Microwave properties of the atmosphere and cloud layer of Venus. *In* E. C. Jordan, ed., *Electromagnetic Theory and Antennas*, vol. 2, p. 771, Pergamon Press, 1963.
- . Biological exploration of Mars. *Adv. Astronaut. Sci.*, vol. 15, p. 571-581, 1963.
- . Interstellar communication (book review). *Planet. Space Sci.*, vol. 12, p. 259, 1964.
- . Exobiology: a critical review. *In* M. Florin and A. Dollfus, eds., *Life Sciences and Space Research II*, North-Holland Publ., Amsterdam, 1964.
- . *See also* Packer, Scher, and Sagan; Scher, Packer, and Sagan.
- SAGAN, C., AND KELLOGG, W. W. The terrestrial planets. *Ann. Rev. Astron. and Astrophys.*, vol. 1, p. 235-266, 1963.
- SCHER, S.; PACKER, E.; AND SAGAN, C. Biological contamination of Mars: I. Survival of terrestrial microorganisms in simulated martian environments. *In* M. Florin and A. Dollfus, eds., *Life Sciences and Space Research II*, pp. 352-356. North-Holland Publ., Amsterdam, 1964.
- SKALAFURIS, A. J. *See* Whitney and Skalafuris.
- SLEE, O. B.; SOLOMON, L. H.; AND PATSTON, G. E. Radio emission from flare star V371 Orionis. *Nature*, vol. 199, pp. 991-993, 1964.
- SLOWEY, J. *See* Jacchia and Slowey.
- SOLOMON, L. H. *See* Lovell, Whipple, and Solomon; Slee, Solomon, and Patston.
- SOUTHWORTH, R. B. *See* Hawkins and Southworth.
- STROM, S. E. Comparison between model atmospheres and observations of early-type stars. Dissertation, Harvard University, 1964.
- . *See also* Avrett and Strom.
- TILLES, D. Tritium retention in iron meteorites. *Nature*, vol. 200, p. 563, 1963.
- . Meteoritic tritium and diffusion in α - and γ -iron. *Nature*, vol. 201, p. 808, 1964.
- . Stable silicon isotope ratios in tektites. *Geochim. et Cosmochim. Acta*, vol. 28, pp. 1015-1017, 1964.
- . *See also* DeFelice, Fireman, and Tilles.
- TILLES, D., AND DEFELICE, J. Time variations of abundance of geomagnetically trapped tritium. *Trans. Amer. Geophys. Union*, vol. 45, p. 351, 1964.
- TILLES, D.; DEFELICE, J.; AND FIREMAN, E. L. Measurements of tritium in satellite and rocket material, 1960-1961. *Icarus*, vol. 2, pp. 258-279, 1963.
- VEIS, G. Optical tracking of artificial satellites. *Space Sci. Rev.*, vol. II, pp. 250-296, 1963.
- VERNIANI, F., AND HAWKINS, G. S. On the ionizing efficiency of meteors. Harvard Radio Meteor Project Research Report No. 5, February, 1964.
- WANG, C. Y. On the correlation between the fluctuations of heat flow and gravitational potential of the earth (abstract). *Trans. Amer. Geophys. Union*, vol. 45, p. 36, 1964.
- WANG, C. Y. Figure of the earth as obtained from satellite data and its geophysical implications. Dissertation, Harvard University, 1964.

- WHIPPLE, F. L. Earth, moon, and planets. 2d ed., 278 pp. Harvard University Press, 1963.
- . On meteoroids and penetration. *Journ. Geophys. Res.*, vol. 68, pp. 4929-4939, 1963.
- . The history of the solar system. *Space Sci.*, XIII, vol. 5, pp. 2-6, 1964.
- . Disintegrating comets. *Sky and Tel.*, vol. 3, pp. 148-149, 1964.
- . Brightness changes in periodic comets (abstract). *Astron. Journ.*, vol. 69, p. 152, 1964.
- . Evidence of a comet belt beyond Neptune. *Proc. Nat. Acad. Sci.*, vol. 51, pp. 711-718, 1964.
- . See also Lovell, Whipple, and Solomon.
- WHITNEY, C. A. Thermal response of the solar atmosphere. *Astrophys. Journ.*, vol. 138, pp. 537-551, 1963.
- WHITNEY, C. A., AND SKALAFURIS, A. J. The structure of shock fronts in atomic hydrogen. I. The effect of precursor radiation in the Lyman continuum. *Astrophys. Journ.*, vol. 138, pp. 200-215, 1963.
- WOOD, J. A. On the origin of chondrules and chondrites. *Icarus*, vol. 2, pp. 337-401, 1963.
- WRIGHT, F. W. See Hodge and Wright.
- WRIGHT, F. W.; HODGE, P. W.; AND LANGWAY, C. C., JR. Studies of particles for extraterrestrial origin. I. Chemical analyses of 118 particles. *Journ. Geophys. Res.*, vol. 68, pp. 5575-5587, 1963.

The Special Reports of the Astrophysical Observatory distribute catalogs of satellite observations, orbital data, and preliminary results of data analysis prior to journal publication. Numbers 127 through 156, issued during the year, contain the following material:

No. 127, July 8, 1963

Attitude determination from specular and diffuse reflection by cylindrical artificial satellites, by R. H. Giese.

No. 128, July 10, 1963

Ultraviolet synthesis of adenosine triphosphate under possible primitive earth conditions, by C. Ponnampertuma, C. Sagan, and R. Mariner.

No. 129, July 15, 1963

Laplace coefficients and their Newcomb derivatives, by I. G. Izsak.

No. 130, July 17, 1963

Catalogue of satellite observations: Satellites 1958 α (*Explorer 1*), 1959 $\alpha 1$ (*Vanguard 2*), 1959 η (*Vanguard 3*), and 1959 $\iota 1$ (*Explorer 7*), for July 1-Dec. 31, 1962; Satellite 1958 $\beta 2$ (*Vanguard 1*) for Sept. 22-Oct. 18, 1962; and Satellite 1960 $\gamma 2$ (*Transit 1B*) for Sept. 29-Oct. 24, 1962, prepared by B. Miller.

No. 131, July 18, 1963

Catalogue of satellite observations: Satellites 1960 $\iota 1$ (*Echo 1*), 1960 $\iota 2$ (*Echo 1 rocket*), and 1960 $\xi 1$ (*Explorer 8*) for July 1-Dec. 31, 1962, prepared by B. Miller.

No. 132, July 19, 1963

Catalogue of satellite observations: Satellites 1961 $\delta 1$ (*Explorer 9*), 1961 $\alpha 1$ (*Transit 4A*), and 1961 $\alpha 2$ (*Injun Solar Radiation 3*) for July 1-Dec. 31, 1962; Satellite 1962 $\alpha 1$ (*Telstar 1*) for July 10-Dec. 31, 1962; Satellite 1962 $\beta \lambda 1$ (*Explorer 15*) for Nov. 2-Dec. 20, 1962; Satellite 1962 $\beta \mu 1$ (*Anna 1B*) for Nov. 1-Dec. 31, 1962; Satellite 1962 $\beta \nu 1$ (*Relay 1*) for Dec. 15-31, 1962; and Satellite 1962 $\beta \chi 1$ (*Explorer 16*) for Dec. 16-21, 1962, prepared by B. Miller.

No. 133, August 16, 1963

The determination of absolute directions in space with artificial satellites, by G. Veis.

No. 134, September 12, 1963

On the distribution of surface heat flows and the second order variations in the external gravitational field, by C. Y. Wang.

No. 135, September 16, 1963

Formulae and tables for the computation of lifetimes of artificial satellites, by L. G. Jacchia and J. Slowey.

No. 136, September 17, 1963

Atmospheric heating in the auroral zones: A preliminary analysis of the atmospheric drag of the *Injun III* satellite, by L. G. Jacchia and J. Slowey.

No. 137, September 30, 1963

Catalog of precisely reduced observations: Satellite 1960 $\gamma 2$ (*Transit 1B*) for May 7-19, 1960; Satellite 1960 $\alpha 1$ (*Echo 1*) for Aug. 12-31, 1960; and Satellite 1961 $\delta 1$ (*Explorer 9*) for July 1-Dec. 31, 1961, prepared by P. Stern.

No. 138, October 1, 1963

Catalog of precisely reduced observations: Satellites 1959 $\alpha 1$ (*Vanguard 2*), 1959 η (*Vanguard 3*), 1960 $\alpha 2$ (*Echo 1* rocket), and 1961 $\delta 1$ (*Explorer 9*) for Jan. 1-June 30, 1962, prepared by P. Stern.

No. 139, October 15, 1963

Optical radar results and meteoric fragmentation, by G. Colombo and G. Flocco.

No. 140, January 24, 1964

Construction of Newcomb operators on a digital computer, by I. G. Izsak, J. M. Gerard, R. Efimba, and M. P. Barnett.

No. 141, January 30, 1964

Satellite orbital data: Satellites 1959 $\alpha 1$ (*Vanguard 2*), 1959 η (*Vanguard 3*), 1960 $\alpha 2$ (*Echo 1* rocket), and 1961 $\delta 1$ (*Explorer 9*) for Jan. 1-June 30, 1962; Satellite 1960 $\beta 1$ (*Tiros 1* rocket) for Apr. 12-May 26, 1960; Satellite 1960 $\beta 2$ (*Tiros 1*) for Apr. 12-Sept. 15, 1960; Satellite 1960 $\alpha 1$ (*Echo 1*) for Aug. 14-30, 1960; Satellite 1961 $\alpha 1$ (*Transit 1A*) for Aug. 11, 1961-June 25, 1962; and Satellite 1961 $\alpha 2$ (*Injun 3*), for Aug. 11, 1961-June 29, 1962, prepared by I. G. Izsak.

No. 142, January 31, 1964

Satellite orbital data: Satellites 1958 α (*Explorer 1*), 1959 $\alpha 1$ (*Vanguard 2*), 1959 η (*Vanguard 3*), 1959 $\alpha 1$ (*Explorer 7*), 1960 $\alpha 1$ (*Echo 1*), 1960 $\xi 1$ (*Explorer 8*), and 1961 $\delta 1$ (*Explorer 9*) for Jan. 1-Apr. 1, 1963, prepared by I. G. Izsak.

No. 143, February 3, 1964

Inhomogeneous distribution of the radioactive heat sources. I. Theory, by C. Y. Wang.

No. 144, February 10, 1964

Geodesics on an equipotential surface of revolution, by W. Kühnlein.

No. 145, February 17, 1964

On the luminous efficiency of meteors, by F. Verniani.

No. 146, February 24, 1964

On the visual tracking of two bright satellites from C-130-type aircraft, by R. C. Vanderburgh.

No. 147, February 27, 1964

Catalog of precisely reduced observations: Satellite 1960 $\beta 1$ (*Tiros 1* rocket) for Apr. 5-June 1, 1960; Satellite 1960 $\beta 2$ (*Tiros 1*) for Apr. 5-Sept. 21, 1960;

- and Satellites 1961 o1 (*Transit 4A*) and 1961 o2 (*Injun Solar Radiation 3*) for Aug. 5, 1961–Dec. 31, 1962, prepared by P. Stern.
- No. 148, February 28, 1964
Catalog of precisely reduced observations: Satellites 1959 α 1 (*Vanguard 2*), 1959 η (*Vanguard 3*), 1960 ϵ 2 (*Echo 1* rocket), and 1961 δ 1 (*Explorer 9*) for July 1–Dec. 31, 1962; Satellite 1961 δ 1 (*Midas 4*) for Mar. 9–Dec. 31, 1962; and Satellite 1962 $\alpha\epsilon$ 1 (*Telstar 1*) for July 13–Dec. 31, 1962, prepared by P. Stern.
- No. 149, April 15, 1964
Long-period effects in nearly commensurable cases of the restricted three-body problem, by J. Schubart.
- No. 150, April 22, 1964
The temperature above the thermopause, by L. G. Jacchia.
- No. 151, May 5, 1964
A catalog of positions and proper motions of 258,997 stars for the epoch and equinox of 1950.0, by the Staff of the Smithsonian Astrophysical Observatory.
- No. 152, June 15, 1964
Temperature variations in the upper atmosphere during geomagnetically quiet intervals, by L. G. Jacchia and J. Slowey.
- No. 153, June 16, 1964
Catalogue of satellite observations: Satellites 1958 α 1 (*Explorer 1*), 1959 α 1 (*Vanguard 2*), 1959 η 1 (*Vanguard 3*), and 1959 ϵ 1 (*Explorer 7*) for Jan. 1–June 30, 1963, prepared by B. Miller.
- No. 154, June 17, 1964
Catalogue of satellite observations: Satellites 1960 ϵ 1 (*Echo 1*), 1960 ϵ 2 (*Echo 1* rocket), 1960 ζ 1 (*Explorer 8*), and 1961 δ 1 (*Explorer 9*) for Jan. 1–June 30, 1963, prepared by P. Stern.
- No. 155, June 18, 1964
Catalogue of satellite observations: Satellites 1961 o1 (*Transit 4A*), 1961 o2 (*Injun Solar Radiation 3*), 1962 $\alpha\epsilon$ 1 (*Telstar 1*), and 1962 $\beta\mu$ 1 (*Anna 1B*) for Jan. 1–June 30, 1963; Satellite 1962 ν 1 (*Cosmos 5*) for Mar. 11–Apr. 30, 1963; Satellite 1962 $\beta+2$ (*Injun 3*) for Jan. 16–June 30, 1963; Satellite 1962 $\beta\nu$ 1 (*Relay 1*) for Jan. 4–June 30, 1963; Satellite 1963 9A (*Explorer 17*) for Apr. 6–June 24, 1963; and Satellite 1963 13A (*Telstar 2*) for May 11–June 30, 1963, prepared by B. Miller.
- No. 156, June 25, 1964
Baker-Nunn photography of the *Syncom II* fourth-stage ignition, by R. Citron and L. H. Solomon; and Tracking of Centaur (*AC-2*), by L. H. Solomon.

STAFF CHANGES

Scientists who joined the Observatory staff during the year are Dr. Henry F. Helmken, Dr. Craig Merrihue, and Dr. William G. Elford, physicists; Dr. Richard R. Haefner, supervisor of computations operations; Douglas T. Pitman, chemist; Leendert Aardoom, geodesist; Carlton G. Lehr and Yasushi Nozawa, electronic engineers; and Dr. P. L. Bhatnagar, astrophysicist.

Resignations during the year included those of Dr. Morton J. Davies, Dr. Wolfgang Kalkofen, and Dr. Max Krook, physicists; Dr. Joachim Schubart, celestial mechanic; Richard C. Bruck, chief

of station operations; and Col. Olcott M. Brown (now serving as consultant), station coordinator of Moonwatch.

Consultants at the Observatory during the year were Dr. Pol Swings, Dr. John A. Wood, Sir A. C. B. Lovell, Mr. Thomas C. Marvin, Dr. George Murray, and Dr. Om P. Rustgi.

On June 30, 1964, the Observatory employed 404 persons.

DIVISION OF RADIATION AND ORGANISMS

Prepared by W. H. KLEIN, *Chief of the Division*

Research of the Division of Radiation and Organisms is directed toward those areas of investigation in which radiation affects or controls, directly and indirectly, the functions of living organisms. Specific areas which have been investigated intensively by the division include the control of regulatory mechanisms by nonionizing radiation such as photomorphogenesis, phototropism, the induction of photosynthetic activity and the interaction of ionizing radiation with synthetic and morphological systems, such as the effects of X-rays and gamma rays at the cellular and subcellular levels. Research has continued on the storage of energy in and synthesis of macromolecules in such diverse systems as higher plants and marine algae. The service activity of the carbon-dating laboratory has been expanded, and the division also conducts basic research in developing and extending dating techniques.

Investigation of the mechanism by which chloramphenicol, an antibiotic protein inhibitor, inhibits light-dependent development of photosynthetic activity of bean leaves has been continued. The chloramphenicol prevents formation of a normal chloroplast structure, the absence of which is correlated with a larger percentage of water-soluble plastid protein. Investigations by serological techniques of differences between water-soluble proteins of plastids from treated and untreated leaves are in progress. The results indicate that there are different proteins in the soluble fractions from the two sources. The plastids from treated and untreated leaves differ in ability to generate antibodies, indicating differences in arrangement of proteins in the two types of plastids.

Although diatoms grown in the dark synthesize photosynthetic pigments, less chlorophyll is produced than in the light. Some evidence indicating a difference in the ratio of chlorophylls to carotenoids in light- and dark-grown cells has been obtained. Changes in the absorption spectrum of diatom cells brought about by heating also occur on treatment with chemicals known to bring about changes in the configuration of protein molecules. Studies on the changes of the absorption spectra of the diatom cells that occur on heating

suggest a different molecular environment for carotenoids and chlorophylls.

In the area of phosphorus metabolism the structure and physiology of ribonucleic acid-polyphosphates in algae have been studied. Extracts have been obtained from synchronous algal cultures, and polymers have been hydrolyzed by various means; the low molecular-weight products have been investigated to ascertain the linkage group which connects the ribonucleic acid to polyphosphates. In December 1963 through February 1964, an extensive Antarctic collecting trip aboard the U.S.S. *Eltanin* was made. Algal and diatom collections were made in the Humboldt current off the coast of Chile and in a great circle arc from Valparaíso to Peter I Island. From these plankton, sample determinations were made on total phosphorus and organic nitrogen. The distribution of phosphorus within certain compounds and relative rates of radioactive phosphate incorporation into various fractions were determined. Concurrently, sea-water samples were obtained at the same sites at which organisms were collected to determine the major nutrients to which the plankton were exposed.

A glycopeptide was isolated, purified, and characterized from the green alga *Chlorella pyrenoidosa*. This glycopeptide contains sialic acid, a sugar derivative which has not previously been reported in any photosynthetic organisms. Sialic acid confers antigenic specificity upon such macromolecules as blood-group substances and bacterial cell-wall sheaths.

The continued investigation of intracellular, phytochrome-mediated responses in corn-leaf sections has demonstrated a light catalyzed utilization of carbohydrates more closely associated with the radiant-energy stimulus than any other phytochrome-mediated biochemical response reported heretofore. Increase in utilization occurs well before any growth response is detectable. Total sugar loss is the first change observable, preceding starch disappearance. Specific sugar changes occurring during the first hours immediately following the light pretreatment reveal major changes in both nonreducing and reducing sugars.

Continuation of the studies on the correlation between measured *in vivo* changes in phytochrome pigment concentrations and observed physiological responses induced by red or far-red irradiation show that the logarithmic change in pigment concentration correlates exactly with the physiological dose-response curve for initial light treatments. The time rate of bean hypocotyl hook opening has been measured by time-lapse photography. The rate of hook opening is directly proportional to the initial dose of red light. The onset of opening occurs after about 5 hours and is the same for all exposures.

The fact that the opening rate remains linear for as long as 20 hours suggests that the magnitude of the final opening is directly proportional to the amount of phytochrome produced by the initial red-light exposure. However, any subsequent light treatments after the initial ones show no correlation between the physiological system and the measured *in vivo* pigment changes. Possible explanations for these results are that only a small amount of the phytochrome is active, that there is another form of the pigment as yet undetected, or that the amount of phytochrome required to initiate the physiological response cannot be detected by available instrumentation. At present, our experimental data indicate that current theories are deficient and need revision or modification.

The action spectra for growth and tropic responses in *Phycomyces blakesleeanus* have been extended into the near ultraviolet. The spectra in this range indicate that either a second pigment system is involved or that bleaching of the photoreceptor occurs.

Experiments measuring the activity of extracts of sporangiophores in the luciferin-luciferase assay system indicated that a 50-percent change of activity occurs within 30 seconds after a blue-light stimulus. There is no correlation between luciferin-luciferase activity and the level of adaptation of sporangiophores. The activity is constant for all levels of adaptation. Comparison between growing and nongrowing samples indicated that all of the luciferin-luciferase activity changes occur in the growing zones. These experiments show that one of the early metabolic systems affected by blue-light stimuli involves high-energy phosphate compounds such as adenosine triphosphate which are active in the luciferin-luciferase assay.

The blue fluorescing unknown which was reported previously to be present in large amounts in light-sensitive stages of sporangiophore development has been isolated in large enough amounts to be identified. This material is a derivative of gallic acid and can be prepared directly from gallic acid in the laboratory. Gallic acid is known to occur at near-saturation concentrations in the sporangiophore, and it is surprising that a material which correlates with the light-sensitivity of sporangiophores is derived from material present in such large amounts.

To date, 80 samples of archeological, geological, and hydrological interest have been analyzed by the carbon-dating laboratory, most of them having been submitted in connection with research at the Smithsonian.

Carbon-14 determinations on the dissolved bicarbonate in ground water have permitted estimates to be made on the flow rates in certain mountain areas in Arizona. Such high-resolution age determination is possible in certain situations owing to the rapid rise in atmospheric

carbon-14 produced by thermonuclear devices. It is assumed that the carbon dioxide in the water as it entered the ground-water system was in isotopic equilibrium with the atmosphere, and that the carbon dioxide the water picked up as it percolated into the ground-water system was from recently decayed organic material. Thus, the recharge water would have a carbon-14 age of less than two years. Measurement of the carbon-14 content of water near the recharge area bears out this assumption. It is further assumed that exchange of carbon dioxide with older carbonate in the system is insignificant. The resultant data for water from a particular locality will be the average travel time of the water from the recharge areas to the sample locality. In the cases studied, water requires less than 10 years to get from the top of the mountain as rain to the main ground-water system at the base of the mountain.

The simultaneous measurement of spectral quality regions of sun and sky radiation as perceived by a horizontal flat receiver is progressing. Technical difficulties encountered in automating the recording system have been largely overcome or corrected by modification and adaptation. We expect to achieve a continuous operation by early fall.

Preliminary experimental data from plant material have been obtained, primarily to test the operation of the growth rooms and greenhouse. These results indicate that, within specified limits, the growing rooms and greenhouse area can be controlled and made uniform with each other in respect to light intensity, temperature, carbon-dioxide content, and day length. The photosynthetic rates of the plant material in the three areas, as measured by dry-weight production, are uniform, indicating that the physical control system operates effectively.

PUBLICATIONS

- KLEIN, WILLIAM H.; PRICE, L.; AND MITRAKOS K. Light stimulated starch degradation in plastids and leaf morphogenesis. *Photochemistry and Photobiology*, vol. 2, pp. 233-240, 1963.
- MITRAKOS, K. Chlorophyll metabolism and its relationship to photoperiodism, endogenous daily rhythm and red, far-red reaction system. *Photochemistry and Photobiology*, vol. 2, pp. 223-231, 1963.
- PRICE, LEONARD; MITRAKOS, K.; AND KLEIN, W. H. Photomorphogenesis and carbohydrate changes in etiolated leaf tissue. *Quart. Rev. Biol.*, vol. 39, pp. 11-18, 1964.
- SIGALOVE, JOEL J., AND LONG, A. Smithsonian Institution radiocarbon measurements I. *Radiocarbon*, vol. 6, pp. 182-188, 1964.

OTHER ACTIVITIES

The division was represented during the year at a number of scientific meetings. In attendance at the American Institute of Biological Sciences meeting in August at the University of Massachusetts, Amherst, Mass., were J. L. Edwards, R. H. Gettens, Dr. W. H. Klein,

Dr. R. L. Latterell, Dr. M. M. Margulies, Dr. K. Mitrakos, L. Price, and Dr. W. A. Shropshire. Papers presented at the meetings included "Light-induced Biochemical Changes in *Phycomyces* Sporangio-phores," by Miss Gettens and Dr. Shropshire; "Red, Far-red System and Phytochrome," by Mr. Edwards and Dr. Klein; "Chloroplasts from Chloramphenicol Treated leaves," by Dr. Margulies; and "Phytochrome Mediated Carbohydrate Responses in Etiolated Corn Leaf Sections," by Dr. Mitrakos, Mr. Price, and Dr. Klein. Dr. Klein attended the executive committee sessions of the American Society of Plant Physiologists and was chairman of a session.

J. H. Harrison attended the Intermediate Seminar for Scientific Glass Blowers held in July at the State University of New York, Alfred, N.Y.

Joel J. Sigalove traveled to Tucson, Ariz., in September to collect water samples to determine flow rates of ground water in certain mountain areas of Arizona. In October Dr. Margulies was a participant in a symposium on "Photosynthetic Mechanisms of Green Plants" sponsored by the Photobiology Committees of the National Academy of Science—National Research Council at Warrenton, Va.

Mr. Sigalove and Austin Long attended the Geological Society of America meeting held in New York City in November.

Mr. Goldberg and Mr. Harrison attended a 2-week training course in programing computers given by the Control Data Corporation in Rockville, Md.

In December Dr. D. L. Correll participated in a 3-month Antarctic collecting trip aboard the National Science Foundation vessel, the U.S.S. *Eltanin*. The party sailed from Valparaiso, Chile, on December 17 and spent 2 months collecting in the Antarctic Ocean.

Dr. Shropshire attended the annual meetings of the Biophysical Society in Chicago in February. Dr. Klein spent a week in March in San Juan and Mayaguez, Puerto Rico, consulting with staff scientists of the U.S. Atomic Energy Commission installations. Dr. Correll attended the regional meetings of the American Chemical Society in April at the University of Maryland, College Park. In May Dr. Klein was a visiting lecturer at the University of Texas in Austin. Dr. Correll attended meetings of the American Society of Limnology and Oceanography in Miami, Fla., June 14–20, and presented his paper "Pelagic Phosphorus Metabolism in the Antarctic."

Dr. Margulies presented a lecture at the Research Institute of Advanced Studies in Baltimore on June 10. Dr. Shropshire traveled in June to Cold Spring Harbor, N.Y. to confer with Dr. John Cairns at the biological laboratory.

STAFF CHANGES

Scientists who joined the staff during the year are Austin Long, geochemist in the carbon-14 laboratory, and Dr. Adolf Steiner, visiting plant physiologist from the University of Freiburg, Germany. Dr. Peter A. J. deLint, visiting plant physiologist, returned to Wageningen, Holland. Resignations: Dr. R. L. Latterell, cytogeneticist, and J. Sigalove, geochemist.

On June 30, 1964, the Division staff numbered 32 members.

Respectfully submitted.

FRED L. WHIPPLE, *Director.*

S. DILLON RIPLEY,
Secretary, Smithsonian Institution.

Report on the National Collection of Fine Arts

SIR: I have the honor to submit the following report on the activities of the National Collection of Fine Arts for the fiscal year ended June 30, 1963:

SMITHSONIAN ART COMMISSION

The 41st annual meeting of the Smithsonian Art Commission was held in Washington on Tuesday, December 3, 1963. Members present were Paul Manship, chairman; Leonard Carmichael, secretary; Gilmore D. Clarke, David E. Finley, Lloyd Goodrich, Walker Hancock, Bartlett H. Hayes, Jr., Henry P. McIlhenny, Paul Mellon, Ogden M. Pleissner, Edgar P. Richardson, Charles H. Sawyer, and Andrew Wyeth. Also present were James C. Bradley, Assistant Secretary; Theodore W. Taylor, Assistant to the Secretary of the Smithsonian Institution; Thomas M. Beggs, Director, National Collection of Fine Arts, and David W. Scott, Assistant Director.

The Commission recommended the appointment of Page Cross to fill the vacancy caused by the resignation of Douglas Orr.

Recommendations were made for the reappointment of Lloyd Goodrich, Bartlett H. Hayes, Jr., and Walker Hancock for the usual 4-year period.

Dr. Leonard Carmichael, who was to retire as Secretary of the Smithsonian Institution on January 31, 1964, was elected Member Emeritus of the Commission.

The following officers were elected for the ensuing year: Paul Manship, chairman; Gilmore D. Clarke, vice chairman; and Leonard Carmichael, secretary (to be succeeded by S. Dillon Ripley upon his assumption of duties as Secretary of the Smithsonian Institution).

The following were elected members of the executive committee for the ensuing year: David E. Finley, chairman; Gilmore D. Clarke; Ogden M. Pleissner; Edgar P. Richardson; with Paul Manship and Leonard Carmichael, *ex officio* (to be succeeded by S. Dillon Ripley upon his assumption of duties as Secretary of the Smithsonian Institution).

Dr. Carmichael reviewed the purpose of the National Collection of Fine Arts for the Commission and indicated the current status of the development on the proposed new gallery in the Old Patent Office

Building. He noted the passage of the fiscal year 1964 appropriation bill providing \$5,465,000 for renovation of this building.

The Commission recommended acceptance of the following for the National Collection of Fine Arts:

Oil, *Group Portrait of Anna Maria Mabie, John Henry Mabie, and George Winfield Mabie*, by Undetermined Artist. Offered by Mr. and Mrs. William A. Sturm, Bladensburg, Md.

Fifty-eight pen-and-ink drawings by E. C. Peixotto (1869-1940). Offered by Fortunato Porotto, Washington, D.C.

Two miniatures, watercolor on ivory, *Emilia Field Brewer*, possibly by John Henry Brown (1818-1891), and *Portrait of a Child*, by Undetermined Artist. Offered by Mrs. David Karrick, Washington, D.C.

A miniature, watercolor on ivory, *Unknown Gentleman*, by Undetermined Artist. Offered by Mrs. C. H. Roper, Austin, Tex.

The Commission recommended that the following be added to the Study Collection:

Pastel, *The New Moon*, by George Randolph Barse, Jr. (1861-). Offered by Eugene W. Bolling, Upper Montclair, N.J.

Miniature, oil on porcelain, *Two Girls in a Garden*, by Undetermined Artist. Offered by Mrs. David Karrick, Washington, D.C.

The Commission recommended that the following be held for submission to the National Portrait Gallery Commission:

Two sculptures, bronze, *William Howard Taft* (1857-1930), and terracotta, *Cordell Hull* (1871-1955), by Bryant Baker (1881-). Offered by the sculptor, New York City.

Oil, *General John J. Pershing* (1860-1948), by Leopold Seyffert (1887-1956). Offered by Mr. and Mrs. Dudley Cooper, Norfolk, Va.

The Commission recommended that the following be added to the Lending Collection:

Oil, *3:00 a.m.*, by Adelaide Morris Gardner. Offered by Mrs. Fred Gardner, Sarasota, Fla.

THE CATHERINE WALDEN MYER FUND

The following miniatures, watercolor on ivory, were acquired from the fund established through the bequest of Catherine Walden Myer:

No. 150. *Barnabus Bates*, attributed to Thomas Sully (1783-1872). Acquired from Mrs. Eva W. Chadbourne, Washington, D.C.

No. 151. *Betsy Goodrich*, by Sarah Goodridge (1788-1858).

No. 152. *R. M. Copeland*, by Thomas Edwards (ac. 1822-1856, Boston).

No. 153. *Child*, attributed to Edward Greene Malbone (1777-1802).

No. 154. *James Morris*, by Henry Colton Shumway (1807-1884).

No. 155. *Mrs. James Morris*, by Henry Colton Shumway (1807-1884).

No. 156. *Lewis Gaylord Clark*, attributed to Charles Loring Elliot (1842-1868).

No. 157. *Gentleman*, by Undetermined Artist (resembling the style of Copley).

No. 158. *Lady*, by Bernard Lens (1682-1740).

Nos. 151-158 acquired from Edwin C. Buxbaum, Wilmington, Del.

STUDY COLLECTION

The Director and curatorial staff accepted the following for the Study Collection:

Four silhouettes and a miniature, by Undetermined Artist. Offered by the Misses Gatchell, Washington, D.C.

One miniature, by Undetermined Artist, and other related material. Offered by Miss Mary Schaff, Washington, D.C.

Watercolor, *Williamburg Post Office*, by Dwight Williams. Offered by Felix Stapleton, Washington, D.C.

WORKS OF ART LENT AND RETURNED, PERMANENT COLLECTION

<i>Institutions</i>	<i>Loans</i>	<i>Loans returned</i>
American Federation of Arts.....	2	--
Bowdoin College.....	1	--
Bureau of the Budget.....	27	--
General Services Administration.....	3	1
Indian Claims Commission.....	--	1
Interior, Department of the.....	1	--
International Business Machines Corporation.....	3	3
Interstate Commerce Commission.....	3	--
Joslyn Art Museum.....	--	1
Justice, Department of.....	2	--
Museum of Fine Arts, Boston.....	1	1
Portland Museum, Maine.....	1	1
State, Department of.....	1	--
University of Arizona Art Gallery.....	1	1
U.S. Antarctic Projects.....	1	--
U.S. District Court for the District of Columbia.....	2	--
U.S. District Court, Richmond, Va.....	12	--
U.S. Information Agency.....	1	1
U.S. Senate.....	1	--
Washington County Museum of Fine Arts.....	14	14
The White House.....	3	2
The White House (Plans for Progress Office).....	10	--
The White House (Office of Special Representative for Trade Negotiations).....	9	--
Whitney Museum of American Art.....	1	1
	100	27

WORKS OF ART LENT AND RETURNED, LENDING COLLECTION

<i>Institutions</i>	<i>Loans</i>	<i>Loans returned</i>
Barney Neighborhood House.....	12	2
Bureau of the Budget.....	16	--
Foxcroft School.....	1	1
Health, Education, and Welfare, Department of.....	2	--
Howard University.....	19	16
Mount Pleasant Library.....	2	--
President's Advisory Committee on Science.....	6	--
Tuskegee Institute.....	--	1
U.S. District Court for the District of Columbia.....	5	--
The White House.....	2	2
The White House (Office of Special Representative for Trade Negotiations).....	8	--
	73	22

ALICE PIKE BARNEY MEMORIAL FUND

Additions to the principal during the year amounting to \$2,088.06 increased the total invested sums in the Alice Pike Barney Memorial Fund to \$47,512.55.

THE HENRY WARD RANGER FUND

According to a provision of the Henry Ward Ranger bequest, that paintings purchased by the Council of the National Academy of Design from the fund provided by the bequest and assigned to American art institutions may be claimed during the 5-year period beginning 10 years after the death of the artist represented, the following paintings were recalled for action of the Smithsonian Art Commission at its meeting December 3, 1963:

No. 140. *Tide Water Creek, Oregon* (watercolor), by Theodore Kautzky (1896-1953), was accepted to become a permanent accession.

No. 179. *The Eviction* (pastel), by Everett Shinn (1876-1953), was accepted to become a permanent accession.

The following paintings, purchased by the Council of the National Academy of Design since the last report, have been assigned as follows:

<i>Title and artist</i>	<i>Assignment</i>
278. <i>Milestone</i> (oil), by Philip B. White (1935-).	Assignment pending.
279. <i>Interior with Figure</i> (oil), by Sarah Blakes- lee (1912-).	Hackley Art Gallery, Mus- kegon, Mich.
280. <i>The Beach</i> (oil), by Hughie Lee-Smith, (1915-).	Assignment pending.
281. <i>From my Window</i> (oil), by Jacques Hniz- dovsky (1915-).	University of Delaware, Newark, Del.
282. <i>Portrait of Susan B. Stewart</i> (oil), by Wal- ter Stuempfig (1914-).	Birmingham Museum of Art, Birmingham, Ala.
283. <i>Connemara</i> (oil), by Colleen Browning (1925-).	Assignment pending.
284. <i>The New Tent</i> (oil), by Sperry Andrews (1917-).	Pomona College, Clare- mont, Calif.
285. <i>The Wait</i> (watercolor), by Doris White (1924-).	Assignment pending.
286. <i>Reunion</i> (oil), by Richard Wynn (1928-).	Assignment pending.
287. <i>The High City</i> (watercolor), by Betty Bowes (1911-).	University of Southern California, Los Angeles, Calif.
288. <i>Landscape</i> (watercolor), by Douglas Gors- line (1913-).	Rollins College, Winter Park, Fla.
289. <i>Mountain Glen</i> (watercolor), by Henry C. Pitz (1895-).	Fine Arts Gallery, Uni- versity of Colorado, Boulder, Colo.
290. <i>Expressway Site</i> (watercolor), by Charles Taylor (1910-).	Assignment pending.
291. <i>Roof Tops, Ste. Agnes</i> (watercolor), by Stuart Garrett (1922-).	Assignment pending.
292. <i>Ludlow Snow</i> (watercolor), by David M. Checkley (1917-).	The University Guild, Northwestern Univer- sity, Evanston, Ill.
293. <i>Embankment, III</i> (watercolor), by Glenn R. Bradshaw (1922-).	Fine Arts Gallery of San Diego, San Diego, Calif.
294. <i>North of Truro</i> (watercolor), by Saraga P. Saffer (1927-).	Museum of New Mexico, Santa Fe, N. Mex.
295. <i>Studio Interior</i> (watercolor), by Wick Knaus (1928-).	Assignment pending.
296. <i>Beach at Quoque</i> (watercolor), by Joseph W. Arcier (1909-).	Sioux City Art Center, Sioux City, Iowa.
297. <i>Gathering Storm</i> (watercolor), by Forrest Orr (1895-).	Assignment pending.
298. <i>Viaduct</i> (watercolor), by Fred B. Marshall (1904-)	Assignment pending.

SMITHSONIAN TRAVELING EXHIBITION SERVICE

Mrs. Dorothy T. Van Arsdale was appointed Acting Chief to replace Mrs. Annemarie Pope, who was named Special Assistant to the Secretary for Traveling Exhibition Study in May of this year.

In addition to 99 exhibits held over from previous years as indicated below, 37 new shows were introduced. The total of 139 shows was circulated to 297 museums in the United States. Two exhibitions were delivered to the U.S. Information Service for circulation abroad.

EXHIBITS CONTINUED FROM PRIOR YEARS

- 1956-57: Japan II by Werner Bischof.
- 1957-58: The American City in the 19th Century; Theatrical Posters of the Gay Nineties; Japanese Dolls.
- 1958-59: Advertising in 19th Century America; Religious Subjects in Modern Graphic Arts; Our Town; Shaker Craftsmanship.
- 1959-60: American Prints Today; Brazilian Printmakers; Arts and Cultural Centers; Photographs by Robert Capa II; Prints and Drawings by Jacques Villon; Portraits of Greatness by Yousuf Karsh; Paintings by Young Africans; Japan I.
- 1960-61: The Technique of Fresco Painting; The America of Currier and Ives; Drawings by Sculptors; Eskimo Graphic Art; American Art Nouveau Posters; Japan by Werner Bischof; The Spirit of the Japanese Print; Americans—A view from the East; Contemporary Swedish Architecture; Mies van der Rohe; Irish Architecture of the Georgian Period; Brasilia—A New Capital; Design in Germany Today; Designed for Silver; American Textiles; The Seasons, color photographs by Eliot Porter; The World of Werner Bischof; The Image of Physics; Charles Darwin: The Evolution of an Evolutionist; The Beginning of Flight; The Magnificent Enterprise—Education Opens the Door; The New Theatre in Germany; Tropical Africa I; Tropical Africa II; Symphony in Color; Paintings and Pastels by Children of Tokyo; Children's Art from Italy; Hawaiian Children's Art; Designs by Children of Ceylon.
- 1961-62: Tutankhamun's Treasures: Fourteen Americans in France; George Catlin, Paintings and Prints; Physics and Painting; UNESCO Watercolor Reproductions; Belgian Drawings; The Lithographs of Childe Hassam; Contemporary Italian Drawings; John Baptist Jackson; Contemporary Swedish Prints; Japanese Posters; The Face of Viet Nam; Architectural Photography (New Editions); Le Corbusier—Chapel at Ronchamp; The Family, The Neighborhood, the City; One Hundred Books from the Grabhorn Press; Wisconsin Designer-Craftsmen; Caribbean Journey; The Swedish Film; The Story of a Winery; This is the American Earth; The Hidden World of Crystals; Hummingbirds; Brazilian Children's Art; Children Look at UNESCO; My Friends.
- 1962-63: The Daniells in India; Eskimo Carvings; Holland: The New Generation; John Sloan; Contemporary Japanese Sumi Paintings; American Prints Today, 1962; Contemporary American Drawings; Work by Ernst Barlach; Old Master Drawings from Chatsworth; English Watercolors and Drawings; Eskimo Graphic Art II; Pakistan Stone Rubbings; Contemporary Canadian Architecture; Twelve Churches; Pre-Hispanic Mexico;

Today's American Wall-Coverings; Craftmen of the City; The Tradition of French Fabrics; A Child's World of Nature; West German Students' Art; Historic Annapolis; The Old Navy, 1776-1860.

EXHIBITIONS INITIATED IN 1964

Archeology

7000 Years of Iranian Art ----- Iranian Government; Archaeological Museum in Tehran; Madam Foroughi.

Paintings and Sculpture

The Bird That Never Was ----- Musée National d'Art Moderne in Paris; Artist.
 Indian Miniatures ----- India Library, London, Mrs. Mildred Archer; P & O Lines.
 Religious Themes by Old Masters ----- Inter Nationes, Bonn; German Embassy.
 Turner Watercolors ----- British Museum, Mr. E. Croft-Murray.

Drawings and Prints

Fifty Years of American Prints ----- Pennell Fund Collection, Library of Congress, Washington, D.C.
 Antonio Frasconi 1952-1963 ----- The Artist.
 Prints by Mary Cassatt ----- The National Gallery of Art, Washington, D.C.
 Graphics '63 ----- Mr. Richard Freeman, University of Kentucky.
 Treasures from the Plantin-Moretus Museum ----- Plantin-Moretus Museum, Antwerp.
 Eighteenth Century Venetian Drawings ----- Correr Museum, Venice, Dr. Terisio Pignatti.

Design and Crafts

Albers: Interaction of Color ----- Yale University Press.
 American Costumes ----- Index of American Design, National Gallery of Art, Washington, D.C.
 Eugene Berman—New Stage Designs ----- Artist; M. Knoedler & Company, New York City.
 Craftsmen of the Eastern States ----- Museum of Contemporary Crafts, New York City, Mr. Paul Smith.
 Eskimo Carvings ----- Eskimo Art, Inc., Ann Arbor, Mich., Mr. Eugene Powell.
 Finnish Rugs and Tapestries by Oili Maki ----- Artist.
 Masters of Ballet Design ----- Spreckels Collection, California Palace of the Legion of Honor, San Francisco, Calif.
 Swedish Design Today ----- Svensk Form-Design Center, Stockholm, Ake Hultd, Managing Director.

- Swedish Folk Art..... Nordiska Museet, Stockholm; Dr. Eskerod, Swedish Embassy.
 Swiss Posters..... Pro Helvetia, Zurich; Embassy of Switzerland.

Architecture

- Alvar Aalto..... Traveling Exhibition Service, Mr. E. Kidder-Smith, Photographer.
 Contemporary American Landscape Architecture..... Hubbard Educational Trust; American Society of Landscape Architects.
 Recent American Synagogue Architecture..... Mr. Richard Meier, Architect; Jewish Museum in New York.
 Eero Saarinen..... Public Relations Department, TWA, New York; Ezra Stoller, Photographer.
 Historic Annapolis..... Historic Annapolis, Inc.

History

- The American Flag..... Library of Congress, Washington, D.C.
 Hearts and Flowers..... Hallmark Historical Collection, Hallmark Cards, Inc., Kansas City, Mo.
 World Fairs..... Prints and Photographs Division, Library of Congress, Washington, D.C.

Children's Art

- American Kindergarten Art..... National Kindergarten Association.
 Paintings by Young Balinese..... Collection of Mrs. Gordon Wiles, Encino, Calif.
 Washington—My City..... District Art Department, Washington, D.C.

Natural History and Science

- Birds of Asia..... Loke Wan Thos, Chinese Photographer.

Photography

- Africa, Antarctica, The Amazon..... IBM Gallery, New York City.
 African Folkways of Angola and Mozambique..... National Geographic Society; Museum of Primitive Art, New York City.
 The Eloquent Light—Ansel Adams..... Mrs. Nancy Newhall, George Eastman House, Rochester, N.Y.
 The Nile..... Elliot Elisofon, Photographer.

LIBRARY

During the year the library accessioned 784 publications, 416 of which were obtained through exchange or gift. In all, 178 books and 36 subscriptions to periodicals were purchased.

The slide collection was greatly augmented. A checklist of slides was instituted; 2,537 slides were accessioned. The Carnegie Corporation aided in the purchase of the *Carnegie Survey, Arts of the United States*.

STAFF ACTIVITIES

Thomas M. Beggs, Director of the National Collection of Fine Arts for 17 years, was appointed Special Assistant to the Secretary for Fine Arts. David W. Scott was appointed Assistant Director, and subsequently, Acting Director.

During the past year the following were added to the staff: Val Lewton, museum technician; Robin Bolton-Smith, research assistant; Judith Chance, clerk-typist.

The office handled approximately 1,800 personal inquiries, in addition to about 22,000 requests for information by mail and telephone; 437 works of art were examined by the curatorial staff and the director.

The reserve, permanent, and the lending collections were installed in a new screen storage area, and the foyer gallery was refurbished.

Physical inventory of paintings, sculpture, prints, and miniatures in the collection has been completed and an inventory of the decorative arts collection was begun by staff members. Two preliminary catalog listings, one of paintings, drawings, and sculpture, the other of graphic arts, were completed by Robin Bolton-Smith, Donald McClelland, and David W. Scott. A survey of W.P.A. paintings at the Department of Labor was carried on by Val Lewton.

Thomas M. Beggs wrote the catalog introductions to the Washington County Museum exhibition *Old Masters* and the Department of State exhibition *American Indian and Eskimo Arts and Crafts*. An article on Ralph Earl was published in *Antiques Journal* by Rowland Lyon. Staff members served as jurors for local art exhibitions and lectured on the collection.

A survey concerning the development of the collection was completed by John Kerr. Special services with reference to cataloging were performed by Keyes Porter. Delight Hall prepared a text on the Alice Pike Barney Memorial Collection and began an inventory of the paintings. The inventory was completed by Jean Lawton. A survey of art in Government buildings was undertaken by Miss Hall, but was interrupted by the unfortunate accident which caused her death.

Henri G. Courtais restored and repaired the following paintings:

John Gellatly, by Irving R. Wiles (1861-1948); *Lord Mulgrave*, by Thomas Gainsborough (1727-1788); *Mary Hopkinson*, by Benjamin West (1738-1820); *Edinburgh—A Painting of Sunlight and Air*, by Joseph M. W. Turner (1775-1851); *Water Carriers, Venice*, by Frank Duveneck (1848-1919); *Joseph Head*, by Gilbert Stuart (1755-1828); *Madonna and Child with St. John and an Angel*,

by Sebastiano Mainardi (1466-1513); *At Nature's Mirror*, by Ralph Albert Blakelock (1847-1919); *Moonrise*, by Ralph Albert Blakelock (1847-1919); *Man with a Large Hat*, by Rembrandt van Rijn (1606-1669); *The Prince of Wales*, by Sir John Watson Gordon (1790-1864); *The Great Western*, by William Marsh (fl. 1844-1858); *Pomona*, by Childe Hassam (1859-1935); *Young Girl in a Green Bonnet*, by Mary Cassatt (1845-1926).

Harold F. Cross restored and repaired the following paintings:

Natalie with a Violin, by Alice Pike Barney (1857-1931); *Sundown*, by George Inness (1825-1894); *The Brass Kettle*, by Alice Pike Barney (1857-1931); *Hippolyte Dreyfus*, by Alice Pike Barney (1857-1931); *Lord Abercorn*, by Sir Thomas Lawrence (1769-1830); *The Mystic Marriage of St. Catherine of Alexandria*, by Giacomo Francia (1486-1557); *View in Rome with the Church of Ara Coeli*, by School of Canaletto; *L'Automne*, by Pierre Puvis de Chavannes (1824-1898); *Foldama*, by George Fuller (1822-1884); *Westward the Course of Empire Takes its Way*, by Emanuel Leutze (1816-1868); *Gentleman*, by Sir Godfrey Kneller (1646-1723); *The Doctor's Visit*, by Jan Steen (1626-1679); *Dutch Landscape with Figures*, by Jacobus van Strij (1756-1815).

Repairs and regilding were done to 88 frames for paintings, prints, and watercolors by Val Lewton, Linwood Lucas, and Istvan Pfeiffer.

SPECIAL EXHIBITIONS AND EVENTS

July 3-August 1, 1963. Tenth Interservice Photography Contest, sponsored by the Department of Defense.

August 10-September 2, 1963. Sixteenth International Congress of Zoology, sponsored by the United States National Museum.

September 8-29, 1963. Pakistan Stone Rubbings, circulated by the Smithsonian Institution Traveling Exhibition, together with Pakistan textiles and jewelry lent by Mrs. E. J. W. Bunting, and miscellaneous objects from the Division of Ethnology, USNM. A catalogue was privately printed.

September 8-October 10, 1963. Ninth International Exhibition of Ceramic Art, sponsored by the Kiln Club of Washington, D.C. An illustrated catalogue was privately printed.

October 5-24, 1963. Seventieth Annual Exhibition of the Society of Washington Artists. A catalogue was privately printed.

November 3-24, 1963. American Artists Professional League under the auspices of the New Jersey Chapter. Memorial to Frederick Ballard Williams. A catalogue and brochure were privately printed.

December 8-January 2, 1964. Twenty-sixth Anniversary of the Metropolitan Art Exhibition, sponsored by the American Art League. A brochure was printed privately.

December 8, 1963-January 2, 1964. Hearts and Flowers, a history of the greeting card from the 18th century to 1910, circulated by the Smithsonian Institution Traveling Exhibition Service, from Hallmark Historical Collection, Kansas City, Mo.

January 11-February 2, 1964. Ninth Annual Painting of the Year Exhibition, sponsored by the Mead Corporation. A special catalogue was privately printed.

January 12-30, 1964. African Folkways in Angola and Mozambique, photographs by Volkmar Wentzel, under the auspices of the National Geographic Society and the Museum of Primitive Art.

January 20, 1964. Images of Hawaii—from Captain Cook to Contemporary Crossroads—a lecture on the development of Hawaiian art by Ben Norris, profes-

sor of art at the University of Hawaii, sponsored by the Hawaii State Society of Washington, D.C.

February 8-March 1, 1964. Twenty-fifth National Exhibition of the Society of Washington Printmakers. A catalogue was privately printed.

February 8-March 1, 1964. Prints by Antonio Frasconi, 1952-1963, circulated by the Smithsonian Institution Traveling Exhibition Service. A special brochure was privately printed.

February 10-March 8, 1964. An oil painting, "The Range Burial," by Harry Jackson, together with related sculptures and studies, sponsored by the Honorable Milward Lee Simpson, Senator from Wyoming, the Wyoming State Society of Washington, D.C., and the Coe Foundation. An illustrated catalogue was privately printed.

March 7-29, 1964. Craftsmen of the Eastern States, an exhibit of textiles, ceramics, jewelry, metalwork, and furniture, circulated by the Smithsonian Institution Traveling Exhibition Service. A special catalogue was privately printed.

April 5-23, 1964. The twenty-second Biennial Art Exhibition, sponsored by the National League of American Pen Women. A catalogue was privately printed.

April 4-26, 1964. Graphics '63, sponsored by the University of Kentucky and circulated by the Smithsonian Institution Traveling Exhibition Service. A catalogue was privately printed.

May 3-21, 1964. Sixty-seventh Annual National Exhibition of the Washington Watercolor Association.

May 3-21, 1964. Thirty-first Annual Exhibition of the Miniature Painters, Sculptors, and Gravers Society of Washington, D.C.. A special catalogue was privately printed.

May 2-24, 1964. The Nile, photographs by Elliot Elisofon, circulated by the Smithsonian Institution Traveling Exhibition Service. A special book was printed.

May 11-June 14, 1964. Sculpture and Drawings by Juan de Avalos, sponsored by the Ambassador of Spain. A catalogue was privately printed.

June 27-July 19, 1964. Tuscany in the 19th Century, an exhibition of paintings, sponsored by the American Federation of Art and the Ambassador of Italy.

Respectfully submitted.

DAVID W. SCOTT, *Acting Director.*

S. DILLON RIPLEY.

Secretary, Smithsonian Institution.

Report on the Freer Gallery of Art

SIR: I have the honor to submit the 44th annual report on the Freer Gallery of Art, for the year ended June 30, 1964.

THE COLLECTIONS

Twenty-two objects were added to the collections by purchase as follows:

METALWORK

- 63.15. Persian, Achaemenid, 6th/5th century B.C. Wild goat, rearing, with front legs bent double. Gold, hollow; a band of fine gold wire over center of body. Originally one of two handles of an amphora-shaped vase. Cf. 64.6. Three small holes. Height: 0.196; weight: 5 oz. (Illustrated.)
- 64.3. Persian, Sasanian, 6th/7th century A.D. Vase, silver, partially gilded; triangular notched design repeated three times; tri-lobed leaf molding around neck. Height: 0.175; diameter (at rim): 0.057; weight: 1 lb. 6½ oz.
- 64.6. Persian, Achaemenid, 6th/5th century B.C. Wild goat, rearing, with front legs bent double, standing on a tube-like support with chevron pattern and a central rib in relief. Gold, hollow; a band of fine gold wire over center of body. Originally one of two handles of an amphora-shaped vase. Cf. 63.15. Cracks in front of neck and ears. Length: 0.226; weight: 4½ oz. (Illustrated.)

PAINTING

- 64.2. Chinese, Ming, by Liu Chüeh (1410-72). Landscape, with bamboo grove. Five inscriptions and 10 seals on the painting; 1 seal on the mounting preceding the painting; colophon with 1 seal following the painting. Label on outside mount. Height: 0.336; width: 0.578. (Illustrated.)
- 64.5. Chinese, Ch'ing, Yang-chou school, by Lo P'ing (1733-99). Album of 12 leaves: landscapes and figures; dated 1774. Painted in ink and colors on paper. Title on outside mount; artist's inscription and seal on each leaf; collector's inscription and two seals on mounting beside last leaf. Height: 0.241; width: 0.305.
- 63.4. Indian, Mughal, ca. 1588 (996 H.), attributed to 'Abd al-Šamad Shīrīn Qalam. Leaf from the Jahāngīr album: Verso: Jamshīd writing on a rock, retainers in landscape; border of gold flowers and colored birds. Recto: calligraphy (*nasta'liq* by Mir 'Ali); marginal design with small human figures in gold landscape. Small areas of pigments chipped off. Height: 0.420; width: 0.265.
- 63.2. Japanese, Ashikaga, Muromachi Suiboku school, by Oguri Sōritsu (16th century). Willows and birds; *sumi* on paper. Kakemono: height: 1.105; width: 0.520.

- 63.3. Japanese, Edo, Individualist school, by Mori Sosen (1747-1821). Monkeys and waterfall; *sumi* and slight color on paper. Kakemono: height: 0.885; width: 0.310.
- 63.5. Japanese, Ashikaga, early 15th century, Muromachi Suiboku school, attributed to Shūbun. Landscape; ink on paper. Kakemono: height: 0.905; width: 0.350.
- 63.6. Japanese, Heian period, 12th century, Buddhist school. The Bodhisattva Fugen. Ink, color, gold and silver on silk. Kakemono height: 1.556; width: 0.831. (Illustrated.)
- 63.11. Japanese, Edo, 19th century, Individualist school, by Shibata Zeshin (1807-91). Carp. Lacquer on paper. Height: 0.346; width: 0.472.
- 63.12-13. Japanese, Momoyama period, Kanō school, by Kanō Eitoku (1543-90). A pair of six-fold screens depicting "The Four Accomplishments." Ink on paper. Each screen: height: 1.540; width: 3.540.
- 63.14. Japanese, Kamakura, Buddhist school. The Bodhisattva Fugen and attendants. Ink, color and gold on silk. Kakemono: height: 1.404; width: 0.730.

POTTERY

- 63.16. Chinese, Sung, *ting* ware. Shallow bowl with wide, flaring rim bound with copper; small foot. Clay: fine off-white stoneware. Glaze: transparent, slightly bubbly, some "teardrops" on outside. Decoration: two ducks swimming among water plants incised in the paste under the glaze. Height: 0.048; diameter: 0.210.
- 63.8. Japanese, Edo period, *kakemono* ware, early 18th century. Deep bowl, octagonal in section, with slightly flaring rim and upright lip. Clay: white porcelain. Glaze: transparent. Decoration: flowers, tree trunks, rocks, and scrolling vines in underglaze blue and overglaze enamel colors; brown rim; single circle in underglaze blue on base. Height: 0.102; diameter: 0.212.
- 63.9. Japanese, Edo period, *nabeshima ware*. Dish on high foot. Footrim repaired. Clay: fine white porcelain. Glaze: transparent. Decoration: in underglaze blue and overglaze enamel colors; outside, flowers on cavetto and typical "comb pattern on foot"; inside auspicious objects and "kotobuki" reserved in white. Height: 0.058; diameter: 0.203.
- 63.10. Japanese, Momoyama period, *oribe* ware. Small dish with flattened, foliate rim. Clay: buff stoneware with areas of iron red near the glaze. Glaze: deep green with uneven flow. Decoration: incised, floral motifs and grasses in cavetto; a donkey carrying a grain sack in center. Height: 0.036; diameter: 0.115.
- 64.1. Japanese, Edo period, 17th century, Ninsei. Rectangular vase with rounded profile, short neck and small out-turning lip. Signature incised on rough unglazed base. Clay: gray stoneware, fired reddish buff. Glaze: uneven reddish brown with black areas. Height: 0.248; width: 0.273 (maximum). (Illustrated.)
- 64.4. Japanese, Momoyama, *shino-oribe* ware. Bottle, gourd-shaped. Clay: rough stoneware. Glaze: transparent. Decoration: grapes and trellis design. Height: 0.215; diameter: 0.105.
- 64.7. Japanese, Edo, *nabeshima* ware. Plate, footed. Clay: porcelain. Glaze: partial celadon. Decoration: design in underglaze blue and incised iron. Height: 0.057; diameter: 0.203.

- 63.7. Turkish, Ottoman period, mid-16th century, *isnik* ware. Plate with a design of zinnias, pomegranates, and hyacinths in light blue, purple, and white on dark blue ground, on the inside; and of two tulips alternating with a zinnia in light and dark blue on white ground on outside wall. Small area along the upper right edge lost and replaced by painted plaster, nicks along edge; two holes in ring-foot for suspension. Height: 0.058; diameter: 0.312.

REPAIRS TO THE COLLECTION

Twenty-four Chinese and Japanese paintings and screens were restored, repaired, or remounted by T. Sugiura, Oriental picture mounter. F. A. Haentschke, illustrator, remounted 34 Persian paintings. Repairs and regilding of six frames for American paintings were done outside the Gallery.

CHANGES IN EXHIBITIONS

Changes in exhibitions amounted to 373, which were as follows:

American art:		Japanese art:	
Paintings -----	11	Paintings -----	79
Chinese art:		Pottery -----	27
Bronzes -----	4	Lacquer -----	12
Christian art:		Wood -----	3
Manuscripts -----	20	Near Eastern art:	
Stone sculpture -----	1	Metalwork -----	44
Indian art:		Manuscripts -----	32
Paintings -----	28	Paintings -----	79
		Pottery -----	33

LIBRARY

The library has been coming into full use with the recent introduction of courses in Oriental Art in the local colleges and universities. The graduate and undergraduate students, many of whom have used our collection for research, as well as the three students on fellowships studying at the Gallery this past year, have given an impetus to the "diffusion of knowledge."

During the year, 472 items (books, pamphlets, periodical parts) were acquired by the library; 258 of these were by purchase and 214 by exchange and gift. Nineteen microfilms augmented the collection, and the study file increased by 1,069 photographs.

The year's cataloging projects included a total of 900 entries; 596 analytics were made and 199 new titles of books, pamphlets, and microfilms were cataloged. Additions to the sets of books numbered 115, and 3,151 cards were added to the card catalog. Only 11 percent of these were available as printed cards; nearly 90 percent of the cataloging is original work.

Since many instructors at the university Oriental Art courses depend on the library for supplementary material and visual aids, the importance of the slide collection has markedly increased. The library acquired 1,412 new slides, and 2,778 were bound, labeled, classified, or repaired. Slide loans totaled 2,962, of which 487, or 17.5 percent, were for the use of the Gallery staff in their lectures.

There were 434 requests for bibliographic information by telephone and letter. Visitors were frequent: 686 scholars and students who were not members of the Freer staff used the library resources, 5 saw and studied the Washington Manuscripts, and 6 came to see the library equipment and facilities.

After years of searching, two copies of *Shih-chu-chai shu-hua p'u* (*Painting manual from the Ten Bamboo Studio*) were acquired. The larger copy is undated, and has 181 colored illustrations on 45 canon folds, while the second copy has the illustrated text in eight *pên*, published in Shanghai and dated 1879.

Another rare and valuable book, acquired for the documentation of Moronobu's works, is *Byobu kakemono edzukushi* (*Designs for screens and kakemono*), Tokyo, 1701 (first edition published in 1682). This work clearly establishes that Moronobu was familiar with, and followed, other techniques and schools of art besides Ukiyoe.

The following gifts deserve special mention because of their outstanding quality. *Kokuhō henshū-iin* (*National treasures of Japan*), Tokyo, Mainichi Shimbun-sha, 1963—, is a folio set eventually to be complete in six volumes; it is made available to us through the Weedon gift. Another set, *Nikuhitsu Ukiyoe* (*Ukiyoe painting*), Tokyo, Kodansha, 1962-63, two folio volumes, is the gift of Mr. and Mrs. Felix Juda. The staff continues to be generous with their writings and the literature sent to them.

Holdings of Whistler correspondence, 630 leaves in all, were laminated by the Archival Restoration Associates, Inc.

Mrs. Bertha M. Usilton, librarian since 1944, retired on June 30; Mrs. Constance B. Olsen will take charge of the library with the beginning of the new fiscal year.

PUBLICATIONS

Two publications were issued by the Gallery as follows:

- Ars Orientalis*, Vol. V. 19 articles in English, French, or German, 18 book reviews, 1 bibliography, 2 notes, 3 memorials. 354 pp., 206 plates, text illustrations. (Smithsonian Institution Publication 4540.)
- Oriental Studies*, No. 6: Armenian Manuscripts in the Freer Gallery of Art, by Sirarpie Der Nersessian, 145 pp., 108 plates. (Smithsonian Institution Publication 4516.)

Publications of staff members were as follows:

- CAHILL, JAMES F. Yüan Chiang and his school. Part I. *Ars Orientalis*, vol. 5 (1963), pp. 259-272, 20 pls.
- . Review of "The birth of Landscape Painting in China," by Michael Sullivan. *Burlington Magazine*, vol. 105 (Oct. 1963), p. 452.
- . Translation of "Concerning the I-p'in Style of Painting, Part III," by S. Shimada. *Oriental Art*, n.s. vol. 10 (1964), pp. 19-26, illus.
- ETTINGHAUSEN, RICHARD. Iran under Islam. *7000 Years of Iranian Art, circulated by the Smithsonian Institution . . . 1964-65* (1964), pp. 33-46.
- . Art of the Islamic period, bibliography. *7000 Years of Iranian Art, circulated by the Smithsonian Institution . . . 1964-65* (1964), pp. 50-51.
- . Chinese representations of Central Asian Turks. *Beiträge zur Kunstgeschichte Asiens; in memoriam Ernst Diez*. Istanbul (1963), pp. 208-222, 16 figs.
- . Historical subjects, The East: Islam. *Encyclopedia of World Art*, vol. VII, cols. 495-497.
- . Masterpieces of Iranian rugs and textiles. [An exhibition at the Textile Museum, Washington, D.C., June 9-September 12, 1964.] 12 pp., 9 illus. on 7 pls.
- . New pictorial evidence of Catholic missionary activity in Mughal India (early XVIIth century). *Perennities . . . P. Thomas Michels . . . zum 70. Geburtstag*. Münster, Verlag Aschendorff (1963), pp. 385-396, 11 pls.
- . Oreeicria (Goldsmithing); L'Islam. *Enciclopedia Universale dell'Arte*, vol. 10, cols. 141-142.
- . Pre-Mughal painting in India. *Trudy dvadstat' pyatogo mezhdunarodnogo kongressa vostokovedov, Moskva 1960*. (Proceedings of the 25th International Congress of Orientalists, Moscow, 1960), vol. 4, section 14, pp. 191-192.
- . Some Deccani miniatures in the United States. *Marg*, vol. 16 (March 1963), pp. 14-16, 32-33, 5 illus. (Published as two articles under titles "Bijapur" and "Portfolio [Deccani painting]").
- . Yemenite Bible manuscripts of the XVth century. Jerusalem, Israel exploration society, 1963. *Eretz-Israel*, vol. 7, L. A. Mayer memorial volume, pp. 32-39, 13 pls.
- . Youssef Sida: paintings, drawings, ceramics. An Introduction. [An exhibition at Middle East House, March 17-April 12, 1964, Washington, D.C.] 5 pp.
- . Review of "Introduction à l'histoire de l'Orient Musulman," by Jean Sauvaget. *Der Islam*, bd. 39 (Feb. 1964).
- . Review of "Natural History Drawings in the Indian Office Library," by Mildred Archer. *Journal of Asian Studies*, vol. 22 (Feb. 1963), pp. 250-252.
- GETTENS, R. J. Conservators in Russia. *Museum News*, vol. 42 (May 1964), pp. 11-17, 13 illus.
- . Review of "Archaeology and the Microscope; the Scientific Examination of Archaeological Evidence," by Leo Biek. *Science*, vol. 143 (June 3, 1963), p. 36.

- POPE, JOHN A. Archibald Gibson Wenley; an appreciation. *Ars Orientalis*, vol. 5 (1963), pp. 1-5, port.
- . Stockholm: The Museum of Far Eastern Antiquities. *Apollo*, vol. 78 (July 1963), pp. 29-33, 8 illus.
- . Review of "Chinese Trade Porcelain," by Michel Beurdeley. *Journal of the American Oriental Society*, vol. 82 (Oct.-Dec. 1962), pp. 601-605.
- . Review of "The Golden Peaches of Samarkand; a Study of Tang Exotics," by Edward H. Schafer. *Journal of Asian Studies*, vol. 23 (1964), pp. 296-297.
- . Review of "La route de la soie," by Luce Boulnois. *Journal of Asian Studies*, vol. 23 (1964), p. 313.
- STERN, HAROLD P. In memoriam, James Marshall Plumer. *Ars Orientalis*, vol. 5 (1963), pp. 329-331, port.
- . Introduction to: Japanese drawings. *Great drawings of all time*, New York, Shorewood press, vol. IV, 2 pp., plates 907-926.
- . Introduction to: A hundred pots by Shoji Hamada. [A loan exhibition at the Phillips Collection, Washington, D.C., Oct. 13-Nov. 18, 1963.]
- TROUSDALE, WILLIAM B. Chinese jade at Philadelphia. *Oriental Art*, vol. 10 (Summer 1964), pp. 107-114, illus.
- . Review of "Archaeology in China, vol. 2, Shang China," by Cheng Te-k' un. *Ars Orientalis*, vol. 5 (1963), pp. 303-306.
- . Review of "Archaeology in China," by William Watson. *Ars Orientalis*, vol. 5 (1963), p. 306.
- . Review of "Chinese Jade Throughout the Ages; a Review of Its Characteristics, Decoration, Folklore and Symbolism," by Stanley Charles Nott. *Burlington Magazine*, vol. 105 (Oct. 1963), pp. 452-453.
- USILTON, BERTHA M. Bibliography and writings of James Marshall Plumer. *Ars Orientalis*, vol. 5 (1963), pp. 331-337.
- . The museum library. *Museum News*, vol. 42 (Oct. 1963), pp. 11-14, illus.

PHOTOGRAPHIC LABORATORY AND SALES DESK

The photographic laboratory made 10,403 items during the year as follows: 5,649 prints, 971 negatives, 3,451 color slides, 297 black-and-white slides, and 35 color sheet films. At the sales desk 67,589 items were sold, comprising 5,273 publications, and 62,316 reproductions (including postcards, slides, photographs, reproductions in the round, etc.). Chief photographer Raymond A. Schwartz spent 7 months in Japan and Taiwan on the Taiwan Photographic Project, and thus the production of the photographic laboratory was proportionately decreased; however, the figures for the sales desk indicate an increase of approximately 20 percent over the sales of the preceding year.

BUILDING AND GROUNDS

The exterior of the building appears to be sound and in good condition. The exterior masonry, including the walls of the courtyard has been cleaned. Blisters have appeared on the roof, but no serious damage has occurred; however, this condition will bear continuous watching.

In the interior, the structural steel in the attic remains in need of painting. An experimental system to be used in relamping consisting of a metal superstructure was installed over Galleries VIII, IX, and X, and has proved to be unsatisfactory. All steam pipes in the attic were removed and heating units installed in the existing ducts. This commendable measure made many areas more accessible for storage and general use.

Galleries I through VIII and XIII through XIX, including the east and west corridors, have been redecorated with vinyl resin-coated fabric to match Galleries IX, X, and XI. All baseboards, grills, and belt courses were painted as work progressed. The galleries now appear much improved and in good condition.

The exposed ceiling of the American painting storage was reinstalled and the area painted. Safety latches were designed and installed on each of the picture racks. Repair and refinishing of the panel storage cases has begun; work on the cases on the north and south sides of the room has been completed. Nine sets of doors remain to be refinished.

The wall, trim, doors, and window frames of the auditorium have been painted, and a new Altec No. 342B Amplifier-Preamplifier was installed and connected into the existing sound system. The north wall and ceiling at the back of the auditorium have been repaired.

The cabinet shop made and repaired furniture and equipment as the need arose.

Seasonal plantings in the courtyard were made and have flourished, and the entire courtyard was bird-proofed.

ATTENDANCE

The Gallery was open to the public from 9:00 to 4:30 every day except Christmas Day. The total number of visitors to come in the main entrance was 168,625. The highest monthly attendance was in July—22,329.

There were 3,224 visitors who came to the Gallery office for such varied purposes as to seek general information, to submit objects for examination, to consult staff members, to take photographs or sketch in the galleries, to use the library, to examine objects in storage, etc.

AUDITORIUM

The series of illustrated lectures was continued as follows:

1963

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|------------------|--|
| October 8..... | William G. Archer, Esq., Victoria and Albert Museum, London, England, "Rajput Painting." Attendance, 17. |
| November 12..... | Donald H. Rochlen, Esq., United States Information Agency, "Thailand, an Archeological Treasure House." Attendance, 270. |

1964

- January 14----- Dr. Harold P. Stern, Freer Gallery of Art, "Life in 14th Century Japan." Attendance, 132.
- February 11----- Dr. Aschwin Lippe, Metropolitan Museum of Art, "Early Chalukya Sculpture of India (Sixth and Seventh Centuries)." Attendance, 46.
- March 10----- Michael Gough, Esq., British Institute of Archaeology, Ankara, Turkey, "Christian Archaeology in Asia Minor; the Last Ten Years." Attendance, 218.
- April 14----- Fujio Koyama, Esq., Ceramics Historian, Tokyo, Japan, "Three-color Pottery in the Shōsōin." Attendance, 91.

The Smithsonian Institution used the auditorium as follows:

1963

- September 27----- National Air Museum—lecture by Elmer A. Sperry, Jr., "Early Airplane Instruments." Attendance, 112.

The auditorium was used by seven outside organizations for 39 meetings as follows:

1963

United States Department of Agriculture:

- United Givers Fund----- September 19; attendance, 50.
- 4-H Club Group----- October 24; attendance, 111.
- National Outlook Conference. November 20; attendance, 230.
- November 21; attendance, 83.
- Annual Farmers' Cooperative Workshop. December 9; attendance, 120.

United States Department of Health, Education, and Welfare:

- Food and Drug Administration, Bureau of Biological and Physical Sciences. November 13; attendance, 138.
- E.D.A./F.P.B. ----- December 10; attendance, 81.
- Women's Committee, National Symphony Orchestra. October 2; attendance, 95.
- Washington Chapter, National Women's Committee, Brandeis University. October 2; attendance, 91.

1964

United States Department of Agriculture:

- Federal Extension Service--- January 8; attendance, 92.
- January 9; attendance, 85.
- January 10; attendance, 97.
- February 5; attendance, 63.
- Forest Service----- January 22; attendance, 64.
- March 2; attendance, 189.
- Rural Electrification Administration. February 4; attendance, 71.
- Public hearing----- April 9; attendance, 225.
- April 10; attendance, 81.

- Office of the Inspector General. April 28; attendance, 43.
 April 29; attendance, 70.
 April 30; attendance, 83.
 May 1; attendance, 63.
 May 5; attendance, 75.
 May 6; attendance, 84.
 May 7; attendance, 95.
 May 8; attendance, 59.
- United States Department of Health, Education, and Welfare:
 Food and Drug Administration, Bureau of Biological and Physical Sciences. January 15; attendance, 93.
 February 19; attendance, 137.
 Division of Pharmacology----- January 24; attendance, 81.
 General meeting----- April 15; attendance, 76.
- Washington Fashion Group:
 Ninth Fashion Career Course:
 "Fashion Showmanship"--- February 17; attendance, 242.
 "Accessories to Fashion"--- February 24; attendance, 256.
 "Fashion in the Home"----- March 2; attendance, 235.
 "Fashion Communication"--- March 9; attendance, 234.
 "Fashion Careers Unlimited." March 16; attendance, 234.
 "Fashion Designing"----- March 23; attendance, 237.
- Archaeological Institute of America:
 Lecture by Professor D. P. Hansen, New York University, "Sculpture from Nippur." April 16; attendance, 35.
- National Academy of Sciences:
 Committee on Vision----- April 23; attendance, 122.
 April 24; attendance, 160.

STAFF ACTIVITIES

The work of the staff members has been devoted to the study of new accessions, of objects contemplated for purchase, and of objects submitted for examination, as well as to individual research projects in the fields represented by the collection of Chinese, Japanese, Persian, Arabic, and Indian materials. In all, 17,894 objects and 1,298 photographs were examined, and 1,093 Oriental language inscriptions were translated for outside individuals and institutions. By request, 32 groups totaling 859 persons met in the exhibition galleries for docent service by the staff members. Ten groups totaling 98 persons were given docent service by staff members in the storage rooms.

Among the visitors were 132 distinguished foreign scholars or persons holding official positions in their own countries who came here under the auspices of the Department of State to study museum administration and practices in this country.

TECHNICAL LABORATORY

A total of 218 objects was examined by various methods, including microscopic and microchemical examination, and examination in ultraviolet light. Of the 85 Freer objects examined, 47 were bronze objects analysed by wet chemical methods, and 28 were objects of stone, bronze, silver, and other metalwork and pottery which were cleaned and/or repaired. Forty-two objects being considered for purchase were examined. Ninety-one objects were examined for other divisions of the Smithsonian, other museums, and private owners. Two of these were repaired, and 10 written reports were made. Forty-seven of these objects were coins belonging to the Dumbarton Oaks Research Library and Collection, of which the specific gravity was determined. In addition, 22 bronze standards were analyzed by wet methods; and 75 identifications were made by X-ray diffraction. Twenty inquiries were answered by letter, and numerous inquiries by telephone.

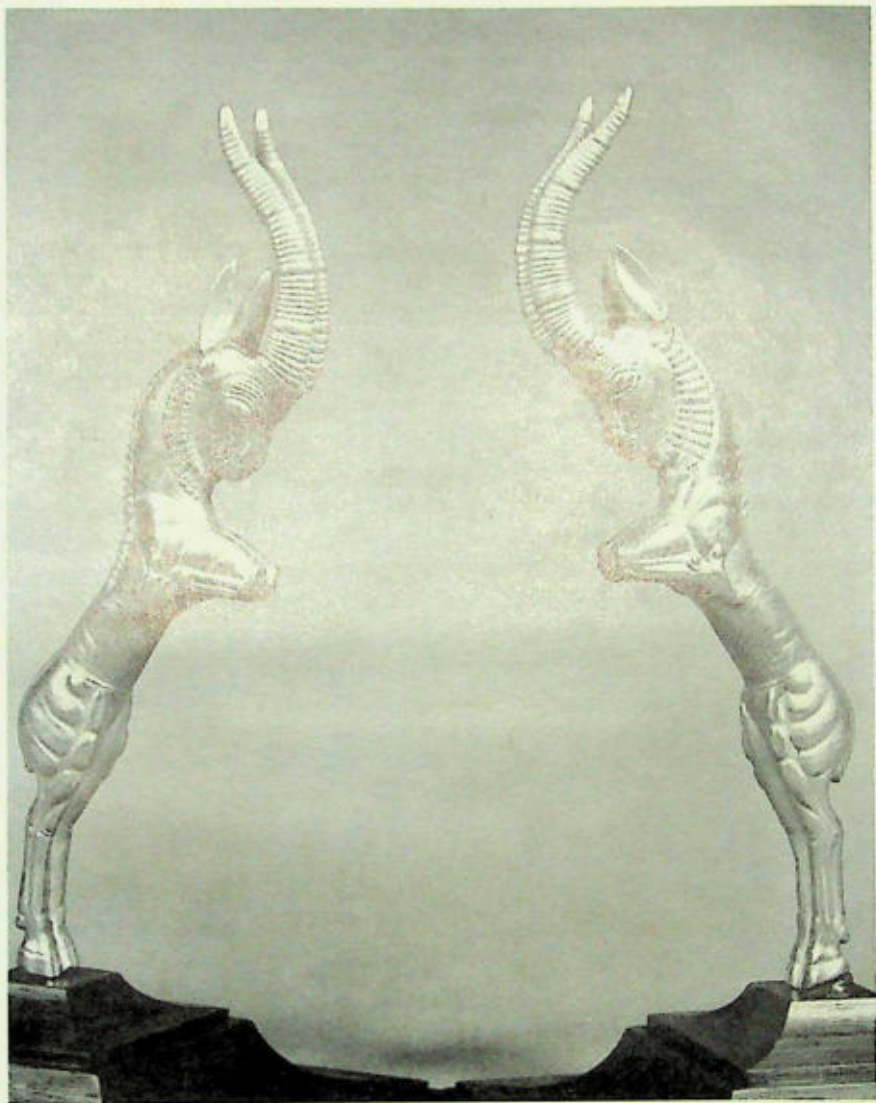
Analysis by wet chemical methods of Chinese bronzes in the Freer collection was continued. Further systematic collection of data on the technology of ancient copper and bronze in the Far East was undertaken. Much of the information gained will be presented in a forthcoming catalog on *Ancient Chinese Bronze Ceremonial Vessels in the Freer Gallery of Art*. Continued studies on the corrosion products of ancient metal objects were made. The editing of *IIC Abstracts*, published by the International Institute of Conservation of Historic and Artistic Works, London, continued to be carried on in the Technical Laboratory.

LECTURES BY STAFF MEMBERS

By invitation, the following lectures were given outside the Gallery by staff members (illustrated unless otherwise noted) :

1963

- June 25-August 25--- W. B. Trousdale gave a series of 16 lectures on Chinese Art History, for the Second Summer Institute in Chinese Civilization, under the auspices of the United States Education Foundation in China, Taichung, Taiwan. Average attendance, 29; total attendance, 464.
- July 12----- Mr. Trousdale, at the China Society, Taichung Branch, Tunghai University, Taiwan, "Archaic Chinese Jade." Attendance, 50.
- July 22----- Dr. Richard Ettinghausen, at Georgetown University (Peace Corps Training Program), Washington, D.C., "Turkish Art." Attendance, 100.
- July 22----- R. J. Gettens, at the meeting of the ICOM Committee for Scientific Museum Laboratories held in Leningrad, U.S.S.R., read a paper on "Mineral Alteration Products on Ancient Metal Objects." Attendance, 75.



Wild Goats. Persian metalwork, Achaemenid period, 6th/5th century B.C. 63.15 and 64.6, Freer Gallery of Art.



The Bodhisattva Fugen. Japanese painting, Heian period, 12th century, Buddhist school. 63.6, Freer Gallery of Art.



Vase, by Ninsai Nonomura. Japanese pottery, Edo period, 17th century. 64.1, Freer Gallery of Art.



Landscape, by Liu Chüeh (1410-1472). Chinese painting. Ming dynasty. 64.2, Freer Gallery of Art.

1963

- October 7..... Dr. John A. Pope, at the Society for Asian Art, Berkeley, Calif., "Japanese Porcelain and the Dutch Trade." Attendance, 75.
- October 8..... Dr. Pope, at Stanford University, Stanford, Calif., "The Monuments of Angkor." Attendance, 750.
- October 9..... Dr. Pope, at the University of California, Berkeley, Japanese Porcelain and the Dutch Trade." Attendance, 200.
- October 13..... Dr. Ettinghausen, at the Alburz Foundation, Teheran, Iran, "The Meaning of Art and Archaeology" (not illustrated). Attendance, 65.
- October 14..... Dr. Pope, at the Santa Barbara Museum of Art, Santa Barbara, Calif., "The Monuments of Angkor." Attendance, 150.
- October 14..... Dr. Ettinghausen, at the Iran-American Society, Teheran, Iran, "The Interest of the United States in Iranian Art and Culture." Attendance, 165.
- October 16..... Dr. Pope, at the Collectors Group, Los Angeles County Museum, Los Angeles, Calif., "The Collectors and Collections of Chinese Art." Attendance, 40.
- October 16..... Dr. Ettinghausen, at the Faculty of Fine Arts of the University of Teheran, "Masterworks of Iranian Art in Washington." Attendance, 250.
- October 17..... Dr. Pope, at the University of California in Los Angeles, "The Early Trade in Chinese Porcelain." Attendance, 150.
- October 17..... Dr. Pope, at the Japan-America Society of Southern California, Los Angeles, "Japanese Porcelain and the Dutch Trade." Attendance, 250.
- October 17..... Dr. Ettinghausen, at the Literary College of the University of Teheran, "Persian Miniature Painting." Attendance, 135.
- October 18..... Dr. Pope, at the San Diego Fine Arts Gallery, San Diego, Calif., "The Early Trade in Chinese Porcelain." Attendance, 125.
- October 19..... Dr. Pope, at the Art Center in La Jolla, Calif., "Collectors and Collections of Chinese Art." Attendance, 150.
- October 21..... Dr. Pope, at the University of Arizona, Tucson, "The Monuments of Angkor." Attendance, 150.
- October 31..... Dr. Pope, at Cornell University, Ithaca, N.Y., "Note on the Early Trade in Chinese Porcelain." Attendance, 175.
- November 4..... Dr. Ettinghausen, at the Turkish-American Association, The Art Lovers' Club, Ankara, Turkey, "American Interest in Turkish Art" (not illustrated). Attendance, 150.
- November 7..... Dr. Ettinghausen, at Ankara University, Literary College, "Persian Miniatures" (in German). Attendance, 100.

1963

- November 14..... Dr. H. P. Stern, at the Royal Ontario Museum, Toronto, Canada, "Popular Painting of Tokugawa Japan." Attendance, 175.
- December 5..... Dr. Ettinghausen, at the Oriental Seminar of the University of Frankfurt, Germany, "The Development of Persian Miniature Painting" (in German). Attendance, 25.
- December 12..... Dr. Pope, at Princeton University, Princeton, N.J., "Some Aspects of the Pre-Eighteenth Century World Trade in Chinese Porcelain." Attendance, 175.

1964

- January 30..... Dr. Pope, at the Williamsburg Antiques Forum, Williamsburg, Va., "The Far East and Early America; Especially Porcelain." Attendance, 350.
- March 13..... Mr. Gettens, at a symposium on "Aims and Essential Information for Reports on Technical Studies of Archaeological Objects," at Columbia University, New York City, "Requirements for Published Data on Chemical Analysis of Archaeological Objects." Attendance, 30.
- March 13..... Dr. Pope, at a symposium on "Chinese Export Porcelain," at Winterthur, Del., "Shapes and Decoration Common to Porcelain Made for Export to the Middle East, Portugal, Holland, and England to 1750." Attendance, 100.
- April 7..... Dr. Stern, at the Musée Guimet, Paris, France, "Japanese Art." Attendance, 10. (Staff members only.)
- April 17..... Dr. Stern, at the Rijksmuseum, Amsterdam, The Netherlands, "Hokusai." Attendance, 125.
- April 20..... Dr. J. F. Cahill, at the Norton Gallery of Art, West Palm Beach, Fla., "Chinese Painting and Contemporary Art." Attendance, 70.
- April 22..... Dr. Cahill, at the "Coffee Hour Talk," Princeton University, Princeton, N.J., "Photographing in Taiwan." Attendance, 30.
- April 23..... Mr. Gettens, at the 1964 National Junior Science and Humanities Symposium, Industrial College of the Armed Forces, Fort McNair, "Prying into Chinese Ceremonial Bronzes, the Documents of an Ancient Culture." Attendance, 35.
- May 1-2..... Dr. Cahill, at the University of Chattanooga Faculty Seminar, Chattanooga, Tenn., "Chinese and Japanese Art: Concurrences and Divergences," and "Chinese and Japanese Paintings." Attendance, respectively, 150 and 14.
- May 4..... Dr. Stern, at the Nationalmuseet, Copenhagen, Denmark, "Life in 14th Century Japan." Attendance, 150.
- May 6..... Dr. Stern, at the Museum of Decorative Art, Copenhagen, "Hokusai." Attendance, 150.
- May 12..... Dr. Stern, at Oxford University, England, "Hokusai." Attendance, 75.
- May 13..... Dr. Stern, at Oxford University, "Life in 14th Century Japan." Attendance, 80.
- May 14..... Dr. Stern, at the Japan Society of England, London, "Hokusai." Attendance, 65.

1964

- June 14----- Dr. Ettinghausen, at the National Gallery of Art, "The Last Flowering of Iranian Art." Attendance, 375.
- June 20----- Dr. Cahill, at the Conference on the China for Presidents, Deans and Senior Faculty Members of New York State Colleges, Pinebrook, Saranac Lake, N.Y., "Chinese Art and Its Background in Thought." Attendance, 35.

Members of the staff traveled outside Washington on official business as follows:

1963

- May 8-July 9----- Dr. J. A. Pope, in Europe, attended the opening of the new Museum of Far Eastern Antiquities, in Stockholm, Sweden. He also saw other collections in Sweden, Denmark, The Netherlands, Austria, Switzerland, France, and England: in numerous museums, private collections, and dealers.
- June 14-July 15----- Miss E. H. West, in Europe, visited numerous museums in Italy, France, and England; she also attended a symposium on art conservation sponsored by the Conservation Center of the Institute of Fine Arts, New York University, held at the Institut Royal du Patrimoine Artistique, in Brussels, Belgium.
- June 17-November 22. W. B. Trousdale, in the Orient and Europe, examined objects in museums and private collections, and visited archeological sites, in Japan, Taiwan, India, Afghanistan, Iran, Lebanon, Turkey, Switzerland, Sweden, and England.
- June 29-July 1----- Dr. J. P. Cahill, in New York City, attended the exhibition, "Evolution of the Buddha Image," at Asia House Gallery; and examined objects for numerous dealers.
- July 15-19----- Mrs. B. M. Usilton, in Chicago, Ill., attended the annual meetings of the American Library Association.
- August 10----- Dr. Pope, in Williamsburg, Va., examined pottery for Colonial Williamsburg.
- August 20----- Dr. H. P. Stern, in New York City, examined miscellaneous objects for a dealer.
- August 21-22----- Dr. Stern, in Philadelphia, examined miscellaneous objects at the Museum of Art and at the University Museum; the latter included the collection of Edmund Zalinski.
- August 29-November 22. T. Sugiura, in Japan, met with other restorers, ordered special silks and other supplies unobtainable in the United States, and saw numerous objects in museums, private collections, and dealers.
- September 1-October 16. Mr. Gettens, in Europe, attended meetings of the ICOM Committee for Scientific Museum Laboratories held in Leningrad and Moscow. He also visited museums and laboratories in these two cities, and in Vienna, München, Zürich, Stuttgart, Brussels, Paris, London, and Dublin, examining objects at the British Museum in London, the Musée Cernuschi in Paris, and the Institut Royal du Patrimoine Artistique in Brussels.

1963

- September 2-March 30. Dr. Cahill, in Japan, Formosa (Taiwan), and Hong Kong, attended a number of exhibitions, including "Art of the Ming and Ch'ing Dynasties" and "Indian Art" at the Tokyo National Museum; saw numerous objects in museums and private collections; and participated in the Taiwan Photographic Project to aid in the establishment of two archives of photographic negatives of objects in the National Palace and Central Museums, one archive to be kept in Taiwan, and the other to be deposited with an institution in the United States; this project was financed by the Rockefeller, Bollingen, and Henry Luce Foundations, with the Freer Gallery of Art administering the funds.
- September 2-April 24. R. A. Schwartz, in Japan and Formosa (Taiwan), attended a number of exhibitions and saw numerous objects in museums and private collections; photographed Chinese paintings in the exhibition, "Art of the Ming and Ch'ing Dynasties" at the Tokyo National Museum; and participated in the Taiwan Photographic Project, doing the actual photographic work; photographed numerous kiln sites and outstanding examples of old palace architecture; approximately 7,000 color and 9,000 black-and-white negatives, a total of 16,000, were made on the Taiwan project.
- September 7-9----- Dr. Pope, in New York City, examined miscellaneous Chinese and Japanese objects at the Metropolitan Museum of Art and at one dealer's.
- September 9-20----- Dr. Stern, in Ann Arbor, Mich., taught a 2-week seminar on Ukiyoe painting, at the University of Michigan.
- September 18-December 16. Dr. Ettinghausen, in Venice, Italy, attended the Second International Congress of Turkish Art; helped plan two traveling exhibitions, "7,000 Years of Iranian Art" and "Art Treasures from Turkish Museums," to be shown in the United States; saw collections in museums in Iran, Turkey, Italy, Switzerland, Germany, France, and England, and examined objects for numerous private collectors and dealers.
- October 7-24----- Dr. Pope, in California, visited the collections and examined objects in the Brundage Collection of the M. H. DeYoung Memorial Museum, the Stanford University Museum, the Santa Barbara Museum of Art, and the San Diego Museum of Art; also examined objects at numerous dealers and in private collectors, including one in Tucson, Ariz.
- October 16-19----- Mrs. Usilton, in Atlantic City, N.J., attended meetings of the Middle Atlantic Regional Library Conference.
- October 18-19----- Dr. Stern, in New York City, examined objects at several dealers.
- October 31----- Dr. Pope, in Ithaca, N.Y., examined Chinese pottery at the Andrew Dixon White Museum of Art, Cornell University.
- November 1-2----- Dr. Pope, in New York City, examined objects at several dealers.

1963

- November 4-8..... Dr. Stern, in Ann Arbor, taught a one-week seminar on Japanese painting, at the University of Michigan.
- November 13-15..... Dr. Stern, in Toronto, Canada, examined numerous Chinese and Japanese objects at the Royal Ontario Museum.
- November 18..... Dr. Pope, in Greenville, Del., examined objects in a private collection and at the Winterthur Museum.
- November 29-
December 2..... Dr. Pope, in Kansas City, Mo., examined objects at the William Rockhill Nelson Gallery of Art and in a private collection; and in Chicago examined objects at the Art Institute and at a dealer.

1964

- January 2..... Mrs. E. West FitzHugh, in Baltimore, Md., visited the Walters Art Gallery, regarding the conservation of Armenian manuscripts, and the new laboratory at the Baltimore Museum of Art.
- January 18-22..... Dr. Pope, in Cambridge, Mass., attended a meeting of the *ad hoc* Committee on Tenure Appointments, Harvard University; and in New York City examined objects at several dealers.
- January 28-30..... Dr. Pope, in Williamsburg, attended the Antiques Forum, during which time he examined objects for the Department of Archaeology, Colonial Williamsburg.
- January 30-31..... Dr. Ettinghausen, in Philadelphia, attended the annual meeting of the College Art Association and examined objects at the Free Library of Philadelphia and in a private collection.
- February 7-8..... Dr. Ettinghausen, in New York City, attended the exhibition of Mughal painting at Asia House; met with Prof. Edith Porada, Columbia University, regarding the catalog of the exhibition, "7,000 Years of Iranian Art"; and examined objects at several dealers.
- February 15-16..... Dr. Pope, in New York City, attended meetings of the American Council of Learned Societies S.S.R.C. Committee for Grants on Asian Studies.
- March 3..... Dr. Pope, in Buffalo, N.Y., examined objects in the von der Heydt Collection at the Museum of Science.
- March 13..... Dr. Pope, at Winterthur, Del., examined objects for the Winterthur Museum and in a private collection.
- March 13..... Mr. Gettens, in New York City, attended a symposium at Columbia University.
- March 23-25..... Dr. Pope, in New York City, examined objects at several dealers and in a private collection.
- March 26-June 16... Dr. Stern, in Europe, saw collections in Lisbon, Portugal; Paris, France; Amsterdam, The Netherlands; Copenhagen, Denmark; and London, England: in numerous museums and private collections and at dealers.
- April 8-9..... Dr. Pope, in New York City, attended meetings of the American Oriental Society and reported in his capacity as chairman of the Louise Wallace Hackney Scholarship Committee; examined objects at the Metropolitan Museum of Art and at one dealer and a private collection.

1964

- April 19-21----- Dr. Cahill, in West Palm Beach, Fla., examined objects at the Norton Gallery of Art and in a private collection.
- April 22----- Dr. Cahill, in Princeton, N.J., examined objects in a private collection.
- April 24-25----- Dr. Pope, in Philadelphia, recorded two taped programs for "What in the World" at WCAU-TV broadcasting station; and in New York City attended the board meeting of the College Art Association.
- May 7-8----- Mr. Trousdale, in New York City, did preliminary work on a film narration for the Asia Society; and examined a large private collection of jade.
- May 17-June 30----- R. C. Mielke saw building installations at the Dayton Art Institute, Cincinnati Art Museum, John Herron Art Institute, City Art Museum of St. Louis, William Rockhill Nelson Gallery of Art, Art Institute of Chicago, Detroit Institute of Arts, Cleveland Museum of Art, and Toledo Museum of Art.
- May 21-22----- Dr. Cahill, in New York City, attended a meeting of the American Council of Learned Societies, Committee on Studies of Chinese Civilization; saw the exhibition "Art of Nepal" at Asia House; and examined objects at several dealers.
- May 25-26----- Mrs. E. West FitzHugh, in St. Louis, Mo., attended the annual meeting of the International Institute for the Conservation of Museum Objects, American Group.
- May 25-27----- Mrs. L. O. West and Mrs. M. H. Quail, in Chicago, Ill., attended meetings of the Museums Sales Association.
- May 25-29----- Mr. Gettens, in St. Louis, Mo., attended meetings of the I.I.C., American Group, and the American Association of Museums; he also examined objects at the City Art Museum of St. Louis and the Allen Art Museum, Oberlin College, Oberlin, Ohio.
- June 8----- Dr. Pope left for Europe to visit museums and collections in England and France.
- June 19----- Mrs. FitzHugh, in Baltimore, Md., visited the Walters Art Gallery where she worked in the conservation laboratory on the chemical microscopy of pigments.
- June 29----- Dr. Ettinghausen, in New York City, examined objects at several dealers.

As in former years, members of the staff undertook a wide variety of peripheral duties outside the Gallery, served on committees, held honorary posts, and received recognitions.

Respectfully submitted.

JOHN A. POPE, *Director.*

S. DILLON RIPLEY,
Secretary, Smithsonian Institution.

Report on the National Gallery of Art

SIR: I have the honor to submit, on behalf of the Board of Trustees, the 27th annual report of the National Gallery of Art, for the fiscal year ended June 30, 1964. This report is made pursuant to the provisions of section 5(d) of Public Resolution No. 14, 75th Congress, 1st session, approved March 24, 1937 (50 Stat. 51).

ORGANIZATION

The statutory members of the Board of Trustees of the National Gallery of Art are the Chief Justice of the United States, the Secretary of State, the Secretary of the Treasury, and the Secretary of the Smithsonian Institution, ex officio. On January 9, 1964, Lessing J. Rosenwald and Dr. Franklin D. Murphy were elected general trustees of the National Gallery of Art. The three other general trustees continuing in office during the fiscal year ended June 30, 1964, were Paul Mellon, John Hay Whitney, and John N. Irwin II. On May 7, 1964, Paul Mellon was reelected by the Board of Trustees to serve as president of the Gallery, and John Hay Whitney was reelected vice president. On January 9, 1964, J. Carter Brown was elected assistant director.

The executive officers of the Gallery as of June 30, 1964, were as follows:

Chief Justice of the United States, Earl Warren, Chairman.	John Walker, Director.
Paul Mellon, President.	Ernest R. Feidler, Administrator.
John Hay Whitney, Vice President.	Huntington Cairns, General Counsel.
Huntington Cairns, Secretary- Treasurer.	Perry B. Cott, Chief Curator.
	J. Carter Brown, Assistant Director.

The three standing committees of the Board, as constituted at the annual meeting on May 7, 1964, were as follows:

EXECUTIVE COMMITTEE

Chief Justice of the United States, Earl Warren, Chairman.	Secretary of the Smithsonian Institution, S. Dillon Ripley.
Paul Mellon, Vice Chairman.	John Hay Whitney.
	Dr. Franklin D. Murphy.

FINANCE COMMITTEE

Secretary of the Treasury, C. Douglas
Dillon, Chairman.
Paul Mellon.

Secretary of the Smithsonian
Institution, S. Dillon Ripley.
John Hay Whitney.
John N. Irwin II.

ACQUISITIONS COMMITTEE

Paul Mellon, Chairman.
John Hay Whitney.
John N. Irwin II.

Lessing J. Rosenwald.
John Walker.

PERSONNEL

At the close of fiscal year 1964, full-time Government employees on the permanent staff of the National Gallery of Art numbered 305. The U.S. Civil Service regulations govern the appointment of employees paid from appropriated funds.

Continued emphasis was given to the training of employees under the Government Employees Training Act, and it was possible to give training to seven employees under that Act.

APPROPRIATIONS

For the fiscal year ended June 30, 1964, the Congress of the United States, in the regular annual appropriation, and a supplemental appropriation required for pay increases for wage-board employees, provided \$2,176,000 to be used for salaries and expenses in the operation and upkeep of the National Gallery of Art, the protection and care of works of art acquired by the Board of Trustees, and all administrative expenses incident thereto, as authorized by the basic statute establishing the National Gallery of Art.

The following obligations were incurred:

Personnel compensation and benefits.....	\$1, 831, 443. 17
All other items.....	315, 774. 41
	<hr/>
Total obligations.....	2, 147, 217. 58

Because the low bid for the contract to renovate the skylights over the east wing of the Gallery was considerably below the amount included in the appropriation for that purpose, it was possible to return \$28,782 to the Treasury as an unobligated balance.

ATTENDANCE

There were 1,236,155 visitors to the Gallery during fiscal year 1964. The attendance for the previous fiscal year was higher by 557,345 visitors. This resulted from the large number of people who came to see the *Mona Lisa* by Leonardo da Vinci when it was on exhibition at the National Gallery of Art for 27 days in fiscal year 1963. The daily average number of visitors during the past fiscal year was 3,415. This is the largest average in the past 10 years, except those years in which occurred the unusually popular exhibitions of the *Mona Lisa* and the Tutankhamen Treasures.

ACCESSIONS

There were 5,002 accessions by the National Gallery of Art as gifts, loans, or deposits during the fiscal year, an increase of 3,796 over the previous year.

GIFTS

During the year the following gifts or bequests were accepted by the Board of Trustees:

PAINTINGS

<i>Donor</i>	<i>Artist</i>	<i>Title</i>
Avalon Foundation, New York, N.Y.	Cropsey.....	Autumn on the Hudson River.
Do.....	Doughty.....	Fanciful Landscape.
John W. Beatty, Jr., Pittsburgh, Pa.	Homer.....	Marshy Scene with Man in Boat.
National Gallery of Art, Ailsa Mellon Bruce Fund.	Poussin.....	The Assumption of the Virgin.
Paul Mellon, Upperville, Va.	Canaletto.....	Landscape Capriccio with Column.
Do.....	do.....	Landscape Capriccio with Palace.
Do.....	Devis.....	Conversation Piece, Ashdon House.
Do.....	do.....	Lord Brand of Hurndall Park.
National Gallery of Art, Andrew Mellon Fund.	Rubens.....	Tiberius and Agrippina.
National Gallery of Art, Adolph Caspar Miller Fund.	Copley.....	Watson and the Shark.

GRAPHIC ARTS

<i>Donor</i>	<i>Artist</i>	<i>Title</i>
Mrs. George Matthew Adams, New York, N.Y.	Legros.....	Cardinal Manning.
Do.....	do.....	Hand of His Daughter.
Mrs. George Matthew Adams, New York, N.Y.	Legros.....	Nude.
John W. Beatty, Jr., Pitts- burgh, Pa.	Various.....	Nineteen prints and drawings.
Mr. and Mrs. Frank Eyerly, Des Moines, Iowa.	Miro.....	Ink and pastel drawing.
Do.....	Feininger.....	Spire of Gelmeroda.
Mrs. Beatrice Beck Fahne- stock, Washington, D.C.	Watteau.....	A Mezzetin.
Samuel H. Kress Foundation, New York, N.Y.	Various.....	Thirty-four French and Italian drawings and water colors.
Mrs. Laura T. Magnuson, Washington, D.C.	Renoir.....	Red-chalk drawing of a child.
Print Council of America, New York, N.Y.	Various.....	Set of 55 prints in the exhibi- tion "American Prints To- day—1962."
Lessing J. Rosenwald, Jen- kintown, Pa.	do.....	2,574 prints, drawings, illus- trated books, and reference works. Among the prints are important works by Aldegrever, Baldung Grien, Dürer, Bruegel, Bosch, Rem- brandt, Goya, Daumier, and Degas.
David E. Rust, Washington, D.C.	Gentileschi, Orazio.	A Young Girl Playing a Lute.

EXCHANGE OF WORKS OF ART

In exchange for a print by Daumier entitled "Un plaideur peu satisfait" in the Rosenwald Collection, Mr. Rosenwald gave a woodcut by Christoffel Jegher, after Rubens, entitled "The Rest on the Flight into Egypt."

OTHER GIFTS

In the fiscal year 1964 gifts of money were made by Avalon Foundation, Mrs. Cordelia S. May, Old Dominion Foundation, Calouste Gulbenkian Foundation, J. I. Foundation, Inc., The Frelinghuysen Foundation, Samuel H. Kress Foundation, 16th International Congress of Zoology, and Mrs. Landon C. Bell.

Mrs. Mellon Bruce contributed additional funds for the purchase of works of art for the National Gallery of Art and for educational purposes related to works of art.

The Gallery received a bequest of funds by the late Chester Dale to provide fellowships for painters, sculptors, and historians and critics of the fine arts.

WORKS OF ART ON LOAN

The following works of art were received on loan by the Gallery:

<i>From</i>	<i>Artist</i>	<i>Title</i>
Mr. and Mrs. David Lloyd Kreeger, Washington, D.C.	Bonnard.....	Le Jardin de Bosquet.
Do.....	Cézanne.....	La Route Tournaante.
Do.....	Van Gogh.....	Vase of Flowers.
Do.....	Maillol.....	Pomona (sculpture).
Do.....	Picasso.....	Café de la Rotonde.
Do.....	Renoir.....	Bather.
Do.....	do.....	View of Venice.
Mrs. Eugene E. Meyer, Washington, D.C.	Dufresne.....	Still Life.
Do.....	Renoir.....	Man Lying on Sofa.
Do.....	do.....	Nude.
The Honorable Claiborne Pell, Washington, D.C.	Bingham.....	The Jolly Flatboatman.
S. Dillon Ripley, Washington, D.C.	Audubon.....	Washington Sea Eagle.

WORKS OF ART ON LOAN RETURNED

The following works of art on loan were returned during the fiscal year:

<i>To</i>	<i>Artist</i>	<i>Title</i>
Col. and Mrs. Edgar W. Garbisch, New York, N.Y.	Senior.....	The Sportman's Dream.
Mr. and Mrs. David Lloyd Kreeger, Washington, D.C.	Bonnard.....	Le Jardin de Bosquet.
Do.....	Cézanne.....	La Route Tournante.
Do.....	Van Gogh.....	Vase of Flowers.
Do.....	Picasso.....	Café de la Rotonde.
Do.....	Renoir.....	Bather.
Do.....	do.....	View of Venice.
Mrs. Eugene E. Meyer, Washington, D.C.	Dufresne.....	Still Life.
Do.....	Renoir.....	Man Lying on Sofa.
Do.....	do.....	Nude.

WORKS OF ART LENT

The American Federation of Arts, New York, N.Y., circulated the following works of art during the fiscal year to the Rochester Memorial Art Gallery, Rochester, N.Y.; Milwaukee Art Center, Milwaukee, Wis.; Isaac Delgado Museum of Art, New Orleans, La.; Baltimore

Museum of Art, Baltimore, Md.; Philadelphia Museum of Art, Philadelphia, Pa.; Museum of Fine Arts, Boston, Mass.; and Detroit Art Institute, Detroit, Mich.:

<i>To</i>	<i>Artist</i>	<i>Title</i>
American Federation of Arts, New York, N.Y.	Joseph Badger	Mrs. Isaac Foster.
Do.....	John Bradley	Little Girl in Lavender.
Do.....	Bundy	Vermont Lawyer.
Do.....	Earl	Family Portrait.
Do.....	Hofmann	Berks County Almshouse.
Do.....	Linton Park	Flax Scutching Bee.
Do.....	Susanne Walters	Memorial to Nicholas M. S. Catlin.
Do.....	Unknown	Jonathan Benham.
Do.....	do	The Start of the Hunt.
Do.....	do	The End of the Hunt.
Do.....	do	The Sargent Family.
Do.....	do	Alice Slade.
Do.....	do	Joseph Slade.
Do.....	do	General Washington on White Charger.
Do.....	do	Blue Eyes.
Do.....	do	The Hobby Horse.
Do.....	do	Mahantango Valley Farm.
Do.....	do	Civil War Battle Scene.

The following loans also were made during the fiscal year:

American Embassy, London, England.	Canaletto	Landscape Capriccio with Column.
Do.....	do	Landscape Capriccio with Palace.
Do.....	Devis	Conversation Piece, Ashdon House.
Do.....	do	Lord Brand of Hurndall Park
Cleveland Museum of Art, Cleveland, Ohio.	Stuart	The Skater.
Museum of Fine Arts, Boston, Mass.	Homer	Right and Left.
Do.....	Unknown	Burning of Old South Church, Bath, Maine.
Columbia Museum of Art, Columbia, S.C.	Healy	Franklin Pierce.
Do.....	do	Daniel Webster.
Do.....	Lambdin	John Marshall.
Do.....	Stuart	Horace Binney.
Do.....	Sully	John Quincy Adams.
Do.....	Unknown	President John Tyler.
Corcoran Gallery of Art, Washington, D.C.	Sargent	Repose.
Do.....	do	Street in Venice.

To	Artist	Title
Detroit Institute of Arts, Detroit, Mich.	British School..	Pocahontas.
Museum of Early American Folk Arts, New York, N.Y.	L. Sachs.....	The Herbert Children.
Do.....	Unknown.....	Baby in Blue Cradle.
Do.....	do.....	Child with Rocking Horse.
The Minneapolis Institute of Arts, Minneapolis, Minn.	Copley.....	Epes Sargent.
Do.....	West.....	The Battle of La Hogue.
Portland Museum of Art, Portland, Maine.	Unknown.....	Burning of Old South Church, Bath, Maine.
City Art Museum of St. Louis, St. Louis, Mo.	Stuart.....	Mrs. Yates.
Smithsonian Institution, Mu- seum of History and Tech- nology.	British School..	Pocahontas.
Do.....	Peale.....	William Moultric.
Do.....	Pine.....	General Smallwood.
Do.....	Polk.....	Washington at Princeton.
Smithsonian Institution, Mu- seum of History and Tech- nology, Presidential Recep- tion Room.	Sully.....	Major Thomas Biddle.
Do.....	Jarvis.....	Commodore Rodgers.
Do.....	Healy.....	Daniel Webster.
Do.....	Peale.....	Robert Coleman.
Virginia Museum of Fine Arts, Richmond, Va.	British School.	Pocahontas.
Washington County Museum of Fine Arts, Hagerstown, Md.	Peale.....	John Philip de Haas.
Do.....	do.....	General William Moultric.
Do.....	do.....	Benjamin Harrison, Jr.
The White House, Washing- ton, D.C.	Sully.....	Andrew Jackson.
Do.....	Healy.....	Henry Clay.
Do.....	Stuart.....	George Washington.
Whitney Museum of Ameri- can Art, New York, N.Y.	Homer.....	Right and Left.

EXHIBITIONS

The following exhibitions were held at the National Gallery of Art during the fiscal year 1964:

Prints and Drawings by Mary Cassatt. Continued from the preceding fiscal year through September 12, 1963.

Landscape Prints. From the Rosenwald Collection. Continued from the preceding fiscal year through October 14, 1963.

Exhibition of Modern Prints and Illustrated Books from the Rosenwald Collection. July 13 through September 2, 1963.

Water Colors by J. M. W. Turner from the collection of the British Museum. September 15 through October 13, 1963.

- Exhibition of Etchings and Mezzotints from J. M. W. Turner's "Liber Studiorum."* September 15 through October 13, 1963.
- Eighteenth-Century Venetian Drawings from the Correr Museum.* October 27 through November 24, 1963.
- Eighteenth-Century Venetian Etchings from the National Gallery of Art Collection.* October 27 through November 24, 1963.
- National Gallery of Art 1963 Christmas Card Subjects from the Graphic Arts.* November 20 through December 10, and from December 17, 1963, through January 7, 1964.
- Prints by Käthe Kollwitz from the Rosenwald Collection in Commemoration of Human Rights week.* December 10 through December 18, 1963.
- Paintings from The Museum of Modern Art, New York.* December 17, 1963, through March 22, 1964.
- Expressionist Prints from the Rosenwald Collection.* December 17, 1963, through March 22, 1964.
- Thomas Rowlandson Prints from the Rosenwald Collection.* January 7 through April 17, 1964.
- Drawings from the National Gallery of Art Collection.* April 17, 1964, to continue into the next fiscal year.
- 7000 Years of Iranian Art.* June 7, 1964, to continue into the next fiscal year.
- Portrait of the Artist's Mother: Arrangement in Gray and Black, No. 1* by James Abbott McNeill Whistler. Lent by the Musée du Louvre. June 10 through June 30, 1964.
- Whistler Prints from the National Gallery of Art Collection.* June 10, 1964, to continue into the next fiscal year.
- Exhibitions of recent accessions:* "Joris W. Vezeler" and "Margaretha Bogbe, Wife of Joris W. Vezeler" by Joos van Cleve. Continued from the preceding fiscal year through July 11, 1963; "The Bookseller's Wife" by Goya, August 30, through October 30, 1963; "The Assumption of the Virgin" by Poussin, November 17, 1963, through January 10, 1964.

TRAVELING EXHIBITIONS

Special exhibitions of graphic arts from the National Gallery of Art collections were circulated during the fiscal year to 50 museums, universities, schools, and art centers in the United States and abroad.

Index of American Design. Fifty-eight exhibitions (2,344 plates) of material from the Index were circulated to 18 States and the District of Columbia.

CURATORIAL ACTIVITIES

Under the direction of Perry B. Cott, chief curator, the curatorial department accessioned 2,700 gifts to the Gallery during the fiscal year 1964. Advice was given with respect to 1,918 works of art brought to the Gallery for expert opinion, and 20 visits to collections were made by members of the staff in connection with offers of gifts. About 6,691 inquiries, many of them requiring research, were answered verbally and by letter.

William P. Campbell, assistant chief curator, served as a member of the Special Fine Arts Committee of the Department of State.

Hereward Lester Cooke, curator of painting, continued as consultant to National Aeronautics and Space Administration with duties of organizing and supervising commissions to artists for paintings of themes relating to the space program. He also acted as judge for the Tri-State Exhibition, Evansville, Ind., and the Savannah Art Association exhibition during the fiscal year.

The Richter Archives received and cataloged 84 photographs on exchange from museums here and abroad; 2,289 photographs were purchased, and about 1,000 reproductions have been added to the archives.

RESTORATION

Francis Sullivan, resident restorer of the Gallery, made regular and systematic inspection of all works of art in the Gallery and on loan to Government buildings in Washington, and periodically removed dust and bloom as required. He relined, cleaned, and restored 18 paintings and gave special treatment to 37. Thirty-four paintings were X-rayed as an aid in research. He continued experiments with synthetic materials as suggested by the National Gallery of Art Research Project at the Mellon Institute, Pittsburgh, Pa. Technical advice was given in response to 237 telephone inquiries. Special treatment was given to works of art belonging to Government agencies, including the U.S. Capitol and the Treasury Department. In other instances advice was furnished to various agencies concerning the care and conservation of paintings.

PUBLICATIONS

A new book by John Walker, director, on the history and collections of the Gallery entitled *National Gallery of Art, Washington, D.C.* appeared during the year.

Mr. Cooke wrote an article for *Art in America*, October 1963 issue, entitled "Count-Down at Canaveral." He also wrote the text for 16 National Gallery leaflets.

Miss Katharine Shepard, assistant curator of graphic arts, wrote a book review for the *American Journal of Archaeology*, April 1964 issue.

PUBLICATIONS FUND

During the fiscal year 1964, the Publications Fund placed on sale six new publications including two books: *National Gallery of Art, Washington, D.C.* by John Walker and *The Eternal Present: The Beginnings of Architecture* by S. Giedion, the latter being the second volume of the 1957 A. W. Mellon Lectures in the Fine Arts. Four exhibition catalogs were placed on sale: *Turner Water Colors: Eighteenth-Century Venetian Drawings from the Correr Museum*;

Paintings from the Museum of Modern Art, New York; and 7000 Years of Iranian Art. The number of 11- by 14-inch color reproductions published by the Gallery was increased to 238 with the addition of 37 new subjects, and 44 new postcards were published to make a total of 196 subjects now available. Two new slide sets of paintings by Rembrandt and by Renoir were placed on sale. The 1963 Christmas card selection included 14 new color subjects. With Gallery cooperation, six new collotype reproductions were produced: Botticelli—*Madonna and Child with Angels*, Canaletto—*The Portello and the Brenta Canal at Padua*, Van Cleve—*Joris W. Vezeler and Margaretha Boghe, Wife of Joris W. Vezeler*, Gentileschi—*The Lute Player*, and Redon—*Wildflowers*. Five small sculpture reproductions were added to the items available to the public.

EDUCATIONAL PROGRAM

The program of the educational department was carried out under the direction of Raymond S. Stites and his staff. Lectures and conducted tours on works of art in the Gallery's collections were given.

Attendance for the general tours, tours of the week, and picture-of-the-week talks amounted to 40,801. The attendance at the Sunday afternoon lectures in the auditorium totaled 13,450.

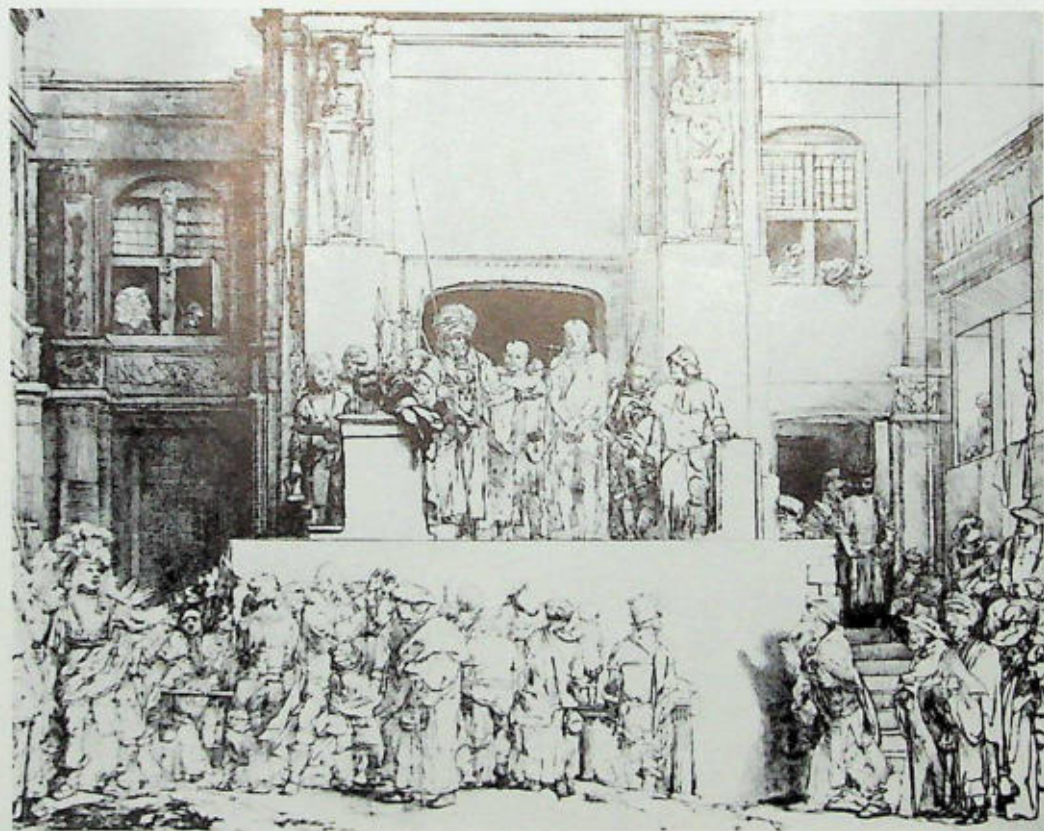
Special tours, lectures, and conferences were arranged for a total of 17,371 persons. These special appointments were made for Government agency groups, and at the request of congressional offices, for educators, foreign students, club and study groups, religious organizations, conventions, museum officials, and groups from hospitals, as well as school groups from various parts of the country.

The program of training volunteer docents continued, and special instruction was given to approximately 130 volunteers from the Junior League of Washington and the American Association of University Women. By special arrangement with the public and parochial schools of the District of Columbia and surrounding counties of Maryland and Virginia, these organizations conducted tours for 68,836 children, representing an increase over last year of 2,308. They also guided 750 Safety Patrol girls from Atlanta, Ga., on tours of the Gallery.

Fifty-two lectures were given in the auditorium on Sunday afternoons. Of these, 34 were delivered by guest lecturers, 10 by members of the staff, and two were full-length film presentations. Jakob Rosenberg delivered the 13th annual series of the A. W. Mellon Lectures in the Fine Arts on seven consecutive Sundays beginning on March 8 on the general subject: "*On Quality in Art: Criteria of Excellence in the Past and Present.*"



The Virgin and Child with a Rose. An etching by Jacques Bellange (1594-1638). Rosenwald Collection. National Gallery of Art.



Christ Presented to the People. An etching, early state—1655—by Rembrandt van Ryn (1606–1669).
Rosenwald Collection. National Gallery of Art.



Lord Brand of Hurndall Park, by Arthur Devis (1711-1787). Gift of Paul Mellon. National Gallery of Art.



Conversation Piece, Ashdon House, by Arthur Devis (1711-1787). Gift of Paul Mellon. National Gallery of Art.



Landscape Capriccio with Palace, by Canaletto (1697-1768). Gift of Paul Mellon. National Gallery of Art.



Landscape Capriccio with Column, by Canaletto (1697-1768). Gift of Paul Mellon. National Gallery of Art.



Autumn on the Hudson River, by Jasper Francis Cropsey (1823-1900). Gift of the Avalon Foundation. National Gallery of Art.



Fanciful Landscape, by Thomas Doughty (1793-1856). Gift of the Avalon Foundation. National Gallery of Art.



Tiberius and Agrippina, by Rubens. Andrew Mellon Purchase Fund.
National Gallery of Art.



The Assumption of the Virgin, by Nicolas Poussin. Gift of Mrs.
Mellon Bruce. National Gallery of Art.

The slide library of the educational department has a total of 47,624 slides in its permanent and lending collections. During the year 1,942 slides were added to the collections. Altogether, 458 persons borrowed a total of 11,494 slides from the collections. It is estimated that these slides were seen by 21,420 viewers.

Members of the staff participated in outside activities delivering lectures, teaching courses in local schools at night, and attending College Art Association meetings. Staff members prepared and recorded scripts for Lectour recordings and radio talks, and prepared the material for the school tour program and the slide lending program.

A printed calendar of events was prepared and distributed monthly to a mailing list of more than 7,900 names.

EXTENSION SERVICES

The office of extension services, under the direction of the curator of the Index of American Design, Grose Evans, circulated to the public traveling exhibitions, films, slide lectures, and filmstrip sets of works of art in the National Gallery of Art's collections. There are 44 traveling exhibits in circulation, lent free of charge except for shipping expenses. These were circulated in 399 bookings and were seen by an estimated 199,500 viewers. Eleven special exhibits, lent to a church organization for circulation in 96 bookings, were seen by 37,552 viewers. Thirteen copies each of exhibits were lent to 13 New York State schools, having a total of 13,768 students—estimated viewers, 55,072. Two films on the National Gallery were circulated in 171 bookings and were seen by an estimated 51,300 viewers. A total of 1,174 slide lecture sets were circulated in 3,435 bookings and were seen by an estimated 206,100 viewers. The extension service reached approximately 549,524 persons during the year; this is an increase of 164,964 over the number of persons served last year.

The curator of the Index prepared the texts for the slide lectures and new circulating exhibits; also he attended conferences to demonstrate the extension services and to keep abreast of new developments in the audiovisual field.

LIBRARY

During the year the library, under the supervision of Ruth E. Carlson, accessioned 3,724 publications, of which 3,548 were obtained through exchange, by gift, or purchased from private funds. Government funds were used to purchase 23 books and 26 subscriptions to periodicals, and for the binding of 127 volumes of periodicals. A total of 2,373 photographs were added to library stock and to the archives and were acquired by exchange or purchased from private funds.

During the year 1,944 publications were cataloged and classified; 7,100 cards were filed in the main catalog and the shelf-list. Library of Congress cards were used for 508 titles; original cataloging was done for 454 titles. There were 3,169 periodicals recorded, 11,187 periodicals circulated, and 5,291 books charged out to the staff. There were 6,193 books shelved in normal routine. The Gallery borrowed 1,512 books on interlibrary loan. The exchange program was continued during the year, and 1,689 National Gallery publications were distributed. The Gallery received 2,454 publications of various types under this program.

The library is the depository for black-and-white photographs of works of art in the Gallery's collections. These are maintained for use in research by the staff, for exchange with other institutions, for reproduction in approved publications, and for sale to the public. Approximately 6,000 photographs were added to the stock in the library during the year, and 1,420 orders for 6,018 photographs were filled. There were 411 permits for reproduction of 1,058 subjects processed in the library.

INDEX OF AMERICAN DESIGN

The Index of American Design, under the supervision of Grose Evans, circulated, in addition to the traveling exhibits referred to above, 140 sets of color slides (7,073) throughout the United States, and 518 photographs of Index materials were used for exhibits, study, and publication. The photographic file has been increased by 110 negatives and 116 prints; 22 permits to reproduce 73 subjects from the Index were issued. Special exhibits of Index material were prepared at the request of various groups involving a total of 178 water colors. The material of the Index was studied during the year by 319 persons conducting research, collecting material for publication and design, and for illustration. The curator of the Index held conferences with important scholars, attended meetings, conducted a television course in conjunction with George Washington University, and lectured to a variety of groups, including USIA personnel.

MAINTENANCE OF THE BUILDING AND GROUNDS

The Gallery building, mechanical equipment, and grounds have been maintained throughout the year at the established standards.

The Gallery entered into contracts for the renovation of the skylight on the east wing of the building and to construct six new galleries for the exhibition of the Chester Dale Collection of paintings. Work under these contracts will be completed during the next fiscal year.

The Gallery staff made special preparations in the ground floor galleries and the central gallery for the exhibition of paintings from

the Museum of Modern Art and the exhibition entitled *7000 Years of Iranian Art*.

The Gallery greenhouse continued to produce flowering and foliage plants in quantities sufficient for all decorative needs of special openings and day-to-day requirements of the Garden Courts.

The program of increased security protection for the Gallery and its works of art was furthered during the fiscal year by the acquisition of a guard dog. This dog and his handler, a Gallery employee, were graduated from the regular training school of the District of Columbia Metropolitan Police K-9 Corps and are now on duty at the Gallery building.

LECTOUR

During the fiscal year 1964 Lectour, the Gallery's electronic guide system, was used by 59,472 visitors.

OTHER ACTIVITIES

Forty Sunday evening concerts were given during the fiscal year in the East Garden Court. These concerts were sponsored by the Calouste Gulbenkian Foundation, the J. I. Foundation, Inc., and the Andrew Mellon Endowment Fund of the National Gallery of Art. The National Gallery Orchestra, conducted by Richard Bales, played nine concerts at the Gallery during the season. One of these was made possible in part by a grant from the Music Performance Trust Fund of the American Recording Industry. The National Gallery Strings, conducted by Mr. Bales, furnished music during two exhibition openings. The concert on Sunday, October 20, 1963, was dedicated to United Nations Day. Six Sunday evenings, in May and June, were devoted to the Gallery's 21st American Music Festival. All concerts were broadcast in their entirety by radio station WGMS-AM and FM. Washington music critics continued their regular coverage of the concerts. During the intermission periods of the Sunday evening broadcasts, talks were delivered by members of the staff of the educational department on various art topics, and by Mr. Bales on the musical programs. Seven 1-hour TV concerts of the National Gallery Orchestra, with Mr. Bales conducting, were taped at the National Gallery and telecast on WTOP-TV. Mr. Bales and the National Gallery Orchestra received an award from the American Association of University Women for the outstanding cultural and educational contribution to the community through the television programs; and the Washington Chapter of the Academy of Television Arts and Sciences presented an award to WTOP-TV for the presentation of the National Gallery Orchestra's program of Italian Music and Art, citing it as the best cultural program of the year. The Baltimore Symphony Orchestra played Mr. Bales's arrangement of

"The Battle of Trenton"; and "The Blue and Gray Quadrille" by Mr. Bales was published in April 1964. Another of Mr. Bales's arrangements was published by the Gregorian Institute in a memorial edition to President Kennedy. The Institute also commissioned a hymn by Mr. Bales.

In response to requests, 18,261 copies of "An Invitation to the National Gallery of Art" and 712 information booklets were distributed to Congressmen and various organizations in the area.

Henry Beville, head of the photographic laboratory, and his assistants processed 24,314 items including negatives, prints, slides, color transparencies, and color separations.

A total of 153 permits were issued to copy works of art in the National Gallery, and 72 permits to photograph were issued.

AUDIT OF PRIVATE FUNDS OF THE GALLERY

An audit of the private funds of the Gallery will be made for the fiscal year ended June 30, 1964, by Price Waterhouse & Co., public accountants. A report of the audit will be forwarded to the Gallery.

Respectfully submitted.

HUNTINGTON CAIRNS, *Secretary.*

S. DILLON RIPLEY,
Secretary, Smithsonian Institution.

Report on the Canal Zone Biological Area

SIR: I have the honor to submit the following report on the operations of the Canal Zone Biological Area for the fiscal year ended June 30, 1964:

The Canal Zone Biological Area is responsible for maintaining Barro Colorado Island in Gatun Lake, Canal Zone, as a biological preserve. The area of the island is approximately 3,600 acres. It is almost completely covered by "tropical monsoon forest" (see tables 1 and 2 for the annual rainfall) and contains a rich fauna. It is one of the few places in the American tropics close to large centers of human population yet largely unaffected by recent human activities. Thus, it is particularly suitable and convenient for research on many aspects of tropical biology and the tropical environment.

TABLE 1.—*Annual rainfall, Barro Colorado Island, Canal Zone, 1925-63*

Year	Total inches	Station average	Year	Total inches	Station average
1925	104.37		1945	120.42	109.84
1926	118.22	113.56	1946	87.38	108.81
1927	116.36	114.68	1947	77.92	107.49
1928	101.52	111.35	1948	83.16	106.43
1929	87.84	106.56	1949	114.86	106.76
1930	76.57	101.51	1950	114.51	107.07
1931	123.30	104.69	1951	112.72	107.28
1932	113.52	105.76	1952	97.68	106.94
1933	101.73	105.32	1953	104.97	106.87
1934	122.42	107.04	1954	105.68	106.82
1935	143.42	110.35	1955	114.42	107.09
1936	93.88	108.98	1956	114.05	107.30
1937	124.13	110.12	1957	97.97	106.98
1938	117.09	110.62	1958	100.20	106.70
1939	115.47	110.94	1959	94.88	106.48
1940	86.51	109.43	1960	140.07	107.41
1941	91.82	108.41	1961	100.21	106.95
1942	111.10	108.55	1962	100.52	107.07
1943	120.29	109.20	1963	108.94	107.10
1944	111.96	109.30			

The Canal Zone Biological Area also has authority to use a small amount of land on the adjacent mainland, near Gamboa, Canal Zone. This mainland territory is covered by various types of second-growth vegetation and patches of forest which are more humid than the forest on Barro Colorado Island.

The bureau maintains a small but well-equipped laboratory on Barro Colorado Island, with attached library and living quarters, available for use by scientists and students from all over the world.

The scientific staff of the bureau conducts research on several groups of animals and plants on Barro Colorado itself, in adjacent regions of the Canal Zone and the Republic of Panama, and in other parts of Central and South America.

TABLE 2.—Comparison of 1962 and 1963 rainfall, Barro Colorado Island

[In inches]

Month	Total		Station average	Years of record	1963 excess or deficiency	Accumulated excess or deficiency
	1962	1963				
January.....	1. 86	7. 94	2. 29	38	+5. 65	+5. 65
February.....	. 67	3. 14	1. 36	38	+1. 78	+7. 43
March.....	. 08	1. 65	1. 22	38	+. 43	+7. 86
April.....	1. 84	6. 38	3. 52	39	+2. 86	+10. 72
May.....	12. 84	9. 08	10. 90	39	-1. 82	+8. 90
June.....	10. 13	5. 96	10. 69	39	-4. 73	+4. 17
July.....	13. 26	12. 83	11. 57	39	+1. 26	+5. 43
August.....	13. 21	18. 87	12. 60	39	+6. 27	+11. 70
September.....	13. 57	8. 06	10. 29	39	-2. 23	+9. 47
October.....	8. 43	10. 19	13. 89	39	-3. 70	+5. 77
November.....	13. 82	21. 60	17. 95	39	+3. 65	+9. 42
December.....	10. 81	3. 24	10. 82	39	-7. 58	+1. 84
Year.....	100. 52	108. 94	107. 10	+1. 84
Dry season.....	4. 45	19. 11	8. 39	+10. 72
Wet season.....	96. 07	89. 73	98. 71	-8. 88

RESEARCH ACTIVITIES

Ninety scientists and students visited Barro Colorado Island for at least several days and/or made use of bureau research facilities on the mainland last year. This represents a slight increase over the preceding year. The increase would have been larger had it not been for the reports of local civil disturbances which caused an appreciable number of scientists to cancel their proposed visits. Fortunately, the disturbances did not actually impede the day-to-day operations of the bureau.

Two scientists were added to the permanent staff last year: Dr. Robert L. Dressler and Dr. Neal G. Smith.

Dr. Dressler continued the studies of Orchidaceae which he has been pursuing for some years, supported by a National Science Foundation grant. In connection with this project, he made short field trips to Costa Rica and the Cayman Islands and studied specimens in the collection of the Missouri Botanical Garden. He also visited Miami to observe various species of orchids in cultivation there and to consult with Dr. C. H. Dodson, with whom he is collaborating in a study of pollination.

Dr. Smith began field work on the behavior and ecology of several groups of birds. He also visited Virginia Polytechnic Institute to secure information on histological and laparotomy techniques, studied collections of plant materials in the Gray Herbarium and the U.S. National Museum, studied the zoological collection of the U.S. National Museum, and visited the New York Zoological Society to obtain information on keeping and raising certain species of birds in captivity.

Dr. Moynihan continued studies of the signal patterns of platyrrhine monkeys and New World "nine-primaried" songbirds, and began a long-term investigation of geographical variation in social behavior among Andean birds, supported by a grant from the National Science Foundation. This last project necessitated field trips to Peru and Bolivia. Dr. Moynihan also attended the Eighth International Ethological Conference at The Hague in September 1963, studied collections in the U.S. National Museum and the American Museum of Natural History, and visited Harvard University for discussion of bioacoustical problems and techniques.

The following papers by current and former staff members of the Canal Zone Biological Area appeared in various publications:

BENNETT, C. F., Jr. A phytophysiognomic reconnaissance of Barro Colorado Island, Canal Zone. *Smithsonian Misc. Coll.*, vol. 145, No. 7, pp. 1-8, 1963.

DRESSLER, R. L. Index of orchid names-1962. *Ann. Missouri Bot. Gard.*, vol. 50, pp. 53-54, 1963.

———. Another natural hybrid in *Epidendrum*. *Amer. Orchid Soc. Bull.*, vol. 33, pp. 289-291, 1963.

KAUFMANN, J. H., and KAUFMANN, A. Some comments on the relationship between field and laboratory studies of behaviour, with special reference to Coatis. *Animal Behaviour*, vol. 11, pp. 464-469, 1963.

MOYNIHAN, M. Inter-specific relations between some Andean birds. *Ibis*, vol. 105, pp. 327-339, 1963.

BUILDINGS AND EQUIPMENT

Maintenance activities on Barro Colorado Island continued as usual.

Installation of the electric cable from the mainland to the island was delayed by various factors, but it is hoped that the work will be com-

pleted within the next few months. Remodeling of the laboratory, in anticipation of the air conditioning that will be installed after the cable is completed, has begun.

New cages for animals and a shade house for plants were constructed.

Five vehicles were obtained from U.S. Army surplus. They will be used for field research on the mainland. They are being reconditioned and remodeled for use as mobile field laboratories.

Expansion of the library has continued. In all probability, it is now the largest and best general biological library in the American tropics. It is frequently used by members of other scientific and educational organizations in the Canal Zone and the Republic of Panama, in addition to the scientists and students conducting research on Barro Colorado itself.

FINANCES

Trust funds for the maintenance of the island and its living facilities are obtained by collections from visitors and scientists, table subscriptions, and donations.

The following institutions continued their support of the laboratory through the payment of table subscriptions: Eastman Kodak Co., New York Zoological Society, and the Smithsonian Institution. Donations are also gratefully acknowledged from Dr. Eugene Eisenmann and C. M. Goethe.

PLANS

Discussions with the Organization of American States have been initiated in the hope of setting up a joint Smithsonian-OAS program of fellowships and assistantships, or grants-in-aid, to provide support for scientists and students, especially Latin Americans who do not have access to many other sources of support. It is hoped to continue expansion of the scientific staff and research activities of the bureau and to attract larger numbers of visiting scientists and students.

ACKNOWLEDGMENTS

The Canal Zone Biological Area can operate only with the excellent cooperation of the Canal Zone Government and the Panama Canal Company. Thanks are due especially to the Customs and Immigration officials; the Police Division; and the Division of Sanitation. Also deeply appreciated are the advice and assistance provided by the Gorgas Memorial Laboratory, the Inter-American Geodetic Survey, Dr. Nathan B. Gale of the Division of Veterinary Medicine, Dr.

W. John Smith of Harvard University, Dr. C. C. Soper of the Eastman Kodak Co., and R. A. Botzenmayer, Chief Engineer, Southern Command Network.

Respectfully submitted.

MARTIN H. MOYNIHAN, *Director.*

S. DILLON RIPLEY,
Secretary, Smithsonian Institution.

Report on the National Air Museum

SIR: I have the honor to submit the following report on the activities of the National Air Museum for the fiscal year ended June 30, 1964:

In July 1963 a Congressional appropriation of \$511,000 was approved for the first year's planning funds for the new National Air Museum Building. The firm of Hellmuth, Obata & Kassabaum of St. Louis was employed as architects for the new building, with Mills, Petticord & Mills of Washington, D.C., as associate architects. During fiscal year 1964 the architects submitted a preliminary concept for the new building which received the approval of the National Air Museum staff and Advisory Board, members of the Smithsonian Board of Regents, the General Services Administration, the National Capital Planning Commission, and the National Commission of Fine Arts.

Legislation was introduced in Congress to change the name of the National Air Museum to the National Air and Space Museum, to increase the membership on the Advisory Board, and to authorize construction of the new building.

A generous gift to the Smithsonian Institution for the use of the National Air Museum was announced during the year—a grant from the Daniel and Florence Guggenheim Foundation of \$250,000 over a 10-year period. The income from the grant is to be used for an annual lecture, a commemorative exhibit in the new building, and the employment of graduate students of history for research in the Museum's Historical Flight Research Center.

The beginning of a new exhibits department was established during the year in anticipation of the new building. James A. Mahoney was employed to head the unit.

A number of historically significant accessions were received by the Museum during the year. Among them were a Fleet Model 7 aircraft, from the Fleet Foundation; a Mark XV Norden Bombsight from John Wible; Helioplane No. 1, from the Helio Aircraft Corp.; a replica of *Oscar I*, world's first amateur satellite, from Project Oscar, Inc.; an RAF 1A aircraft engine of 1914, from United Aircraft Corp.; a Napier "Nomad" E, diesel compounded with turbojet aeronautical engine, from Napier Aero Engines, Ltd.; a DeHavilland 98

"Mosquito" light bomber of World War II vintage, from the Royal Air Force; the McDonnell XV-1 Convertiplane, from the McDonnell Aircraft Corp.; Inertial Guidance System from a Thor Launch Vehicle, from the U.S. Air Force; a collection of 419 medals and awards, all aviation related, from the American Institute of Aeronautics and Astronautics formerly the Institute of the Aeronautical Sciences; memorabilia of Lowell H. Smith, Commanding Officer of the First Round-the-World Flight, from Mrs. Lowell H. Smith; a Lincoln Standard J-1 aircraft of 1920, from the Kerr-McGee Oil Industries, Inc.; the first supercharged aircraft engines, from Vera C. Murray; oil portraits of Wilbur and Orville Wright, from the Flight Safety Foundation; a 1912 parachute used by "Tiny" Broadwick, from Mrs. G. T. Brown (Tiny Broadwick); Wiley Post's first pressure helmet, from the B. F. Goodrich Co.; oil portraits of Jacqueline Cochran and Charles E. Yeager by artist Chet Engle, from the Lockheed Aircraft Corp.; and memorabilia of Admiral Moffett from Rear Admiral Moffett, Jr.

An ever-growing information service to authors, researchers, historians, schools, Government agencies, students, and the public was an active function of the Museum during the year.

ADVISORY BOARD

The National Air Museum Advisory Board met in Washington on April 1, 1964, with all members present. Secretary S. Dillon Ripley was elected chairman. The Board approved the new building concept presented by the architects.

SPECIAL EVENTS

The first annual Edwin A. Link Lecture was presented on February 19, 1964, by Astronaut Alan B. Shepard, Jr. The annual Lester D. Gardner Lecture was presented on September 27, 1963, by Elmer A. Sperry, Jr. The Langley Medal was presented to Astronaut Alan B. Shepard, Jr., on May 5, 1964. Many distinguished visitors came to the Museum during the year to see the exhibit or to participate in special presentation and commemorative ceremonies.

The director attended several meetings of aviation, aerospace, and educational organizations and societies. He also visited a number of Air Force and Navy bases, National Aeronautics and Space Administration space centers, and contractors of these agencies in the aerospace flight program. He spoke frequently on these visits.

Paul E. Garber, head curator and historian, Louis S. Casey and Kenneth E. Newland, curators, and Walter Male, superintendent, represented the Museum at a number of aviation and aerospace meetings

during the year and spoke on the work of the Museum. Mr. Garber delivered 46 lectures.

IMPROVEMENT IN EXHIBITS

Continued experiments with display techniques in the Air and Space Building provided valuable experience in planning the exhibit for the new building.

REPAIR, PRESERVATION, AND RESTORATION

Storage, restoration, preservation, and the preparation of specimens for display in the new building were active and continuing functions at the Silver Hill, Md., activity.

ASSISTANCE TO GOVERNMENT DEPARTMENTS

Varied services, including information and counseling, were extended to the Federal Aviation Agency, National Aeronautics and Space Administration, the Department of Justice, the U.S. Navy, and the U.S. Air Force, during the year.

REFERENCE MATERIAL AND ACKNOWLEDGMENTS

The Museum's Historical Flight Research Center was greatly enriched during the year with valuable research materials. As space permits, these are being integrated into the files for the use of the Museum staff and other researchers.

The cooperation of the following persons and organizations in providing this material is sincerely appreciated and acknowledged:

AIR FORCE ASSOCIATION, EARL SOUTHEE, Athens, Pa.: Two pages from a scrapbook—Bert Acosta and Emile Burgin and their airplane; Viola Gentry and Jack Ashcroft and the airplane *The Answer*.

AIR FORCE ASSOCIATION, RICHARD SKINNER, Washington, D.C.: Books, *Speaking of Space* by Richard M. Skinner and William Leavitt; and *The Wild Blue* by John F. Loosbrock and Richard M. Skinner.

AIR FORCE MUSEUM, Wright-Patterson AFB, Ohio: 8 boxes of documents—books, files, photos, and other data.

ALL-WOMEN TRANSCONTINENTAL AIR RACE, INC., MRS. KAY A. BRICK, Teterboro, N.J.: 2 copies "Official Program" 1961 race; 2 copies of the 1961 results; 5 photos, 1 of 1961 race winner, 2 of 1962 race winner, 2 of 1963 race winners.

AMERICAN ANTIQUARIAN SOCIETY, MARCUS A. MCCORISON, Worcester, Mass.: Scrapbook, "Ballooning in Springfield, Mass., 1908 and On" by Harlan T. Pierpont.

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, New York, N.Y.: Books, magazines, drawings, photos, and printed matter.

ARMY, DEPARTMENT OF THE, PAUL J. BURNETTE, Washington, D.C.: Microfilm *Pegasus*, 1943-1957 (on 15 reels).

AUTONETICS (THROUGH JAMES CAREY), Anaheim, Calif.: Photographs (175) of the XN-1/XN-2.

- BEARD, ROBERT L., Winfield, Kans.: 1 photo of the NC-4 at Ponta Del Gada, Azores; 1 photo of the NC-3 at Ponta Del Gada, Azores; 1 photo of the story of the NC transatlantic flight printed on a piece of Wong linen from the NC-3; 1 photo of the USS *Melville*, dated 8/22/18; 1 photo of Mr. Beard.
- BELKNAPP, HUGH S., North Hollywood, Calif.: 3-view assembly drawing of the Ryan NYP.
- BERLINER, HENRY A., ENGINEERING AND RESEARCH CENTER, Riverdale, Md.: 19 pamphlets; 15 books; 59 8- by 10-inch negatives; 3 4- by 5-inch glass negatives; 33 photographs—miscellaneous; report on the Probable Performance of the Berliner Helicopter in Climb; letters from MIT to Berliner.
- BOBBETT, LT. COL. ROBERT L., USAF, Washington, D.C.: "The Evolution of Military Flight Pay," by Lt. Col. Robert L. Bobbett, USAF. 2 bound copies of typed papers, reproduced by a copy process, including illustrations, some furnished by the National Air Museum, and so acknowledged.
- BRAZELTON, DAVID H., Bartonville, Ill.: Drawing of Curtis BT-1 aircraft.
- BRISTOL SIDDELEY ENGINE, LTD., J. M. TOOGOOD, Leavesden, Hertfordshire, England: 1 copy of a 16 mm. color sound film showing Sir Geoffrey de Havilland with replica of his first engine; 1 12- by 17-inch color photograph; 1 11- by 14-inch matte finish black and white photograph; 1 8- by 10-inch glossy finish black and white photograph showing the de Havilland engine showroom at Leavesden.
- CAPRONI DI TALIENDO, COUNTESS, Milan, Italy: 7 books and a set of postcards. Postcards—Senra Cozzar Dirocco: Books, *Let Us Kill the War*; *Senra Cozzar Dirocco*; *Sandriano Con I Caproni in Guerra*; *Alli Tricolori in Africa*; *La Centuria di Ferro* (3).
- CASEY, L. S., Washington, D.C.: Book, *The Incomparable Sabreliner* by North American Aviation, Inc.
- CATHCART, DONALD G., Hermosa Beach, Calif.: Photos; album; magazines; books; personal records; and papers.
- CHAMBERLAIN, RALPH, Lincoln Park, Mich.: Book, *Dedication of the Wright Brothers' Home and Shop in Greenfield Village* by the Edison Institute.
- CLARK, HENRY AUSTIN JR., Glen Cove, Long Island, N.Y.: Photographs; reports; newspaper clippings; magazines; books; records and personal papers of John J. Ide.
- COAST GUARD, UNITED STATES, Elizabeth City, N.C.: 80 reels of microfilm on HSS/HUS helicopters.
- CONTINENTAL AIRLINES, GEORGE R. COFFEY, Los Angeles, Calif.: 11 photographs; 11 "The Conair News"; 17 "The Golden Jet"; 3 "The Continental Eagle"; 1 "Everything's 'Go' on Continental"; Annual Report 1962; "Golden Jet Boeing 720B"; "Continental Airlines" a story of growth by Robert F. Six; timetable October 27, 1963; reprint from *Business Week*; "Airline Thrives of Split Personality"; two news releases.
- EXPERIMENTAL AIRCRAFT ASSOCIATION AIR MUSEUM FOUNDATION, INC., Hales Corners, Wis.: Book, paper cover, *The Golden Age of Air Racing Pre 1940* by EAA; 13 EAA publications.
- FEDERAL AVIATION AGENCY, W. H. WEEKS, Washington, D.C.: Reports on the President's Airport Commission, 1952; booklet, *A History of Propeller Manufacturers* by FAA.
- FILIPPI, BERNARD P., Baltimore, Md.: 26 books on Lindbergh.
- FISCHER, HAROLD A., Tonawanda, N.Y.: Drawings of the Fokker T-2 (3 plates); drawings of the Spandau machinegun (contract); drawing of the fuel, oil, and cooling systems—Fokker T-2.

- FLIEDNER, C. S., Chevy Chase, Md.: Album received from the estate of Carlisle Fliedner, August 14, 1961, De Havilland H. 1 engine; contains 25 photographs and 12 transparencies.
- FORSTER, MCGUIRE & CO. LTD., R. D. FORSTER, Montreal, Canada: Book, *The Magic of a Name* by Harold Nockolds.
- FRANTZ, HARRY W., Washington, D.C.: Book, *De Palos Al Plata* by Comandante Franco and Capitan Ruiz de Alda.
- GENERAL DYNAMICS, PAYNE B. JOHNSON, San Diego, Calif.: Copy of black and white film taken at the presentation of the Mercury Control Center model.
- GILL, MABEL E., Baltimore, Md.: 3 aviation scrapbooks; 3 auto scrapbooks; 14 auto photos; newspaper clippings; 2 membership cards—Baltimore Athletic Club 1907 and the Automobile Club of America; New Jersey automobile driver's license No. 27001.
- GLEICK JOSEPH T., Highland Park, Ill.: Curtiss Robertson Airplane Mfg. Co. organization chart; 12 negatives of Curtiss "Robin."
- GREENE, FRANK L., Glasonbury, Conn.: Booklet, "History of the Grumman F4F 'Wildcat'" by Frank L. Greene.
- HARDIN, GEORGE W., Greeneville, Tenn.: Patents; photo and artist drawing of airship with 4-engine transport; photo of George W. Hardin; newspaper page; bill of authorization; report on hearings before the Committee on Military Affairs June 26, 1935 and March 20, 1936.
- HILD, FRED C., Miami, Fla.: 1 scrapbook of newspaper clippings; 1 scrapbook of photographs; 1 ledger of the American Aeroplane Supply House; and biographical history.
- HILDES-SEIM, ERICK, Fairfield, Conn.: Pamphlet, "The Air Arm of the Confederacy" by Joseph Jenkins Cornish III.
- HOOVER, FREDERICK A., La Jolla, Calif.: Newspaper clippings, the Chirp, June 1936; 30 photos, some on post cards; Aeromarine Airways leaflet "Ninety Minutes in Heaven," 1922; souvenir catalogue, Aeronautical Exposition, March 1-15, 1919; newspaper clippings (3)—"Museum Adds Prewar Biplane," *San Diego Union*, October 25, 1963; "Rep. Bob Wilson," *San Diego Union*, September-October 1963; "A Man With an Urge to Fly Like the Birds," Donald H. Gordon, *San Diego Union*, May 3, 1964.
- HOPKINS, PHILIP S., Washington, D.C.: 7 booklets; 3 books; and "Class Outline for Instructors," by P. S. Hopkins.
- INFORMATION AGENCY, UNITED STATES, Washington, D.C.: Tapes—Age of Flight, Nos. 1-4; Charles A. Macready, Parts I and II; B. Foulis Interview, Parts I and II; N. Halaby; Grover Loening—Pioneer Aviator; Conely Interview with Igor Sikorsky, Aviation Pioneer.
- ISTEL, JACQUES ANDRE, Orange, Mass.: 1 8- by 10-inch photograph of Jacques Istel, Lewis Sanborn, Nathan Pond, and William Jolly; 2 homologation documents dated April 17, 1962.
- JABLONSKI, EDWARD, New York, N.Y.: AERONCA 1937 brochure: SOHIO road-map guide to the 1939 National Air Race; Eastern Air Lines timetable May 17, 1937; United Air Lines timetable March 1, 1937; "Learning to Fly"; Symbols and Notes for Department of Commerce Sectional Airways Maps; the Fairchild "24."
- JAHN, MRS. E., White Plains, N.Y.: 1 scrapbook compiled by James V. Martin; 140 photographs of various J. V. Martin aeroplanes, stabilizers, wheels, and retractable chassis.
- KEGEL, HENRY J., Los Angeles, Calif.: Book, *Modern Aircraft* by Page.
- KERLEY, ROBERT V., ETHEL CORPORATION, Detroit, Mich.: Air Corps technical report "American and Foreign Military and Commercial Aircraft"; Booklet,

- "A New Wasp, Series 'H'"; 3 photos with captions of Boeing 314 "Clipper"; 1 photo Boeing 307 "Substratosphere" with caption and fact sheet; 24 cover sheets "Technical Data Digest" by U.S. Army Air Corps; 1 booklet titled "Origin of A-N Performance Number System"; 1 handbook titled "Research on Aviation Spark Plug Problems"; 1 pamphlet titled "The 17.6 Engine, Its Design, Development and Applications" by A. E. Felt and Robert V. Kerley.
- LANCASTER, MRS. HUGH K., Mill Valley, Calif.: 2 sets of 11 photos each of Martin 130 "China Clipper."
- LECH, ANDREW F., Glendora, Calif.: Drawing of "Ryan NYP Spirit of St. Louis" (3 plates).
- MACAULAY, MRS. T. C., Severna Park, Md.: Album, photos, and letters of T. C. Macaulay.
- MEANS, JAMES H., Boston, Mass.: Original patents awarded and held by James Means. Patent drawings and reports; correspondence; photographs; newspaper clippings; and biographical material.
- MEYER, OTTO, Augsburg, West Germany: Pamphlet, "On the History of Air Transportation."
- MILLING, MARGARET, Washington, D.C.: 16 military certificates and statements; 375 photographs of various sizes of Milling, other aviators and planes; 1 14-by 11-inch photo of General Milling in uniform; 4 8-by 10-inch negatives; approximately 35 to 40 pieces of news articles; four pieces of correspondence.
- MOLLER, JOSEPH A., Tucson, Ariz.: Book, *The Story of the 390th Bombardment Group (H)*.
- MYLES, MRS. EUGENIE LOUISE, Edmonton, Alberta, Canada: Book, *Airborne from Edmonton* by Eugenie Louise Myles.
- NASH, MISS CAROLYN, Washington, D.C.: 1 Norwegian pamphlet on the Amundsen-Ellsworth Expedition, 1925; 1 post card showing the memorial stone in Ny-Aalesund of the Amundsen-Ellsworth Expedition, 1925; 1 fragment of balloon cloth or parachute cloth.
- NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, PAUL HANEY, Houston, Tex.: 30 reels of motion-picture films.
- NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, JAMES J. MODARELLI, Cleveland, Ohio: Aircraft engine overhaul instructions handbooks for J35-A-17D, J35-A-27A, J35-A-29A USAF, U35-A-29A USN, and for J-33-A-33, J-33-A-33A USAF; photographs, 8 by 10, black and white of the four pilots who were honored as recipients of the Robert J. Collier Trophy for the year 1961—Joseph A. Walker, CDR Forrest S. Petersen, Major Robert M. White, and A. Scott Crossfield.
- NAVY, DEPARTMENT OF THE, AVIATION SAFETY CENTER, Norfolk, Va.: "Approach," bound Vol. 8, July 1962-June 1963.
- NEWLAND, KENNETH E., Alexandria, Va.: Book, *Squadrons of the Royal Air Force* by Maj. F. A. de V. Robertson, Lt. Comdr. C. N. Colson, and Flying Officer W. A. Cook; book, *The Incomparable Sabreliner* by North American Aviation, Inc.
- NYE, WILLIS L., Hayward, Calif.: Drawing of Curtiss S-3.
- OLMSTEAD, GERHART, Little Rock, Ark.: 364 photos and negatives; 10 10-by 13-inch brown envelopes containing papers and reports; C.M.O. notebook; certificate from Patent Office; notebook-laws and minutes of C.M.O. Physical Laboratory, Inc.; scrapbook-calculations; scrapbook, Flying Test of Olmsted Propellers.

- PAGE, GEORGE A. JR., Reynoldsburg, Ohio: 2 photograph albums, Volume I containing 234 prints of the CW-20, H 75B, P-40-171, XP-46, O-52, XP-60, XP-62; Volume II containing 128 prints of the HF5-6, P-40-100, XP60-16, P-47-4, B-24-1, G-205-1.
- PARSONS, REAR ADMIRAL E. C., Osprey, Fla.: Book, *I Flew with the Lafayette Escadrille* by E. C. Parsons.
- PRATT, JOHN BROOKS, Charlotte Amalie, Virgin Islands: 8- by 10-inch photographs and negatives of the "Round the World Cruisers" being serviced (wheels for pontoons) on the Hoogly River on June 27, 1924.
- RUSSELL, FRANK F., New York, N.Y.: Colored aviation prints of 14 aviation scenes; 4 French aviator portraits of World War I by H. Farre.
- SAMPSON, PHILLIP SQUIRE, Arlington, Va.: Newspaper clippings, 1 full page of Lindbergh (head and shoulders); 2 full pages of some of the items sent to the Missouri Historical Society, St. Louis; 6 pertaining to Harry W. Lyon, navigator of the transpacific airplane *Southern Cross*.
- SHAMBURGER, MISS PAGE, Aberdeen, N.C.: Book, 1st ed., *Tracks Across the Sky* by Page Shamburger.
- SOARING SOCIETY OF AMERICA, Los Angeles, Calif.: 49 back issues of *Soaring Magazine*.
- SOLOMON, SAMUEL J., Silver Spring, Md.: Two booklets, "Survival" by Airlines War Training Institute; and "Pilgrim's Process" by Air Transport Command, U.S. Army Air Forces.
- STONE, VICTOR L., Reseda, Calif.: Parts catalog of Robertson Aircraft Co. and "Catalog A" 1928 parts list of Curtiss OX5-OXX6 and Hispano-Suiza.
- STRATTON, SAMUEL WESLEY, FAMILY OF (through WESLEY S. HOBBS), Tulsa, Okla.: 2 photograph scrapbooks, 1 on the "Langley," a Handley Page bomber built by the Standard Aircraft Corporation, 1918; 1 titled "Sezione Fotografica di Aviazione per la R. Marine" (Italian aviation photographs of World War I).
- TETZLAFF, DELAVAN, Wis.: Magnetic recording tape, 7-inch size, of interview with Jesse C. Bradazon, an Early Bird.
- TRACY, DANIEL, Lakewood, Ohio: 2-view drawing of Wright "J" long-hulled flying boat, 1915, 3 sheets.
- TUSCARAWAS COUNTY AVIATION, INC., New Philadelphia, Ohio: John H. Glenn's original primary flight file.
- WATERMAN, EDWARD C., Miami, Fla.: 25 8- by 10-inch prints of early personages of the 1914-1918 period at North Island.
- WATERTOWN DAILY TIMES, JOHN B. JOHNSON, Watertown, N.Y.: 2 photos, article on the Pepin airship; photo of airship *Inocrain*.
- WEATHER BUREAU, UNITED STATES, Washington, D.C.: Project Tiros data, 12 black and white 8- by 10-inch photos; 1 map of world showing route of Tiros, 12 by 30; 1 color 8- by 10-inch print; 3 mosaics.
- WEIMAN, KEN, South Miami, Fla.: 9 aviation photographs including 4 Douglas World Cruisers, 1 Boeing SP-12A, and 1 Douglas BT-2B.
- WHITTIER, ROBERT J., South Duxbury, Mass.: Drawings from Curtiss Engineering Corporation, eighth size, Curtiss Oriole.
- WILBER, PAUL F., Rochester, N.Y.: 16 4½- by 6-inch photographs of Curtiss copy type airplane, Curtiss flying boat, Benoist airplanes, Maximotor engines, and Tony Jannus with Benoist; 4 pages of xerox copy of newspaper articles of Paul Wilber; 1 3-view blueprint of a standard Curtiss Type Biplane 28'4"; 1 blueprint of wood details for 28'4" Curtiss Type Biplane.

- WILLIAMSON, MRS. MARGARET S., Cleveland, Tenn.: Single issue of *Aerial Age*, February 2, 1920.
- YAGER, MR. & MRS. FRANK R., Anaheim, Calif.: *Saga of the U.S. Air Mail Service* by the Air Mail Pioneers, Inc.; poem, "The Westbound Mail" by Phil Braniff; *A Brief History of the Air Mail Service of the U.S. Post Office Department (May 15, 1918-August 31, 1927)* by Edward A. Keogh.

ACCESSIONS

Additions to the National Aeronautical and Space Collections, received and recorded during the fiscal year 1964, totaled 559 specimens in 71 separate accessions, as listed below. Those from Government departments are entered as transfers, unless otherwise indicated; others were received as gifts or loans.

- AIR FORCE, DEPARTMENT OF THE, ANDREWS AFB, Md.: Holley automatic cutaway variable Venturi carburetor (ca. 1941) (N.A.M. 1451); VANDENBURG AFB, Calif.: Inertial guidance system from a THOR launch vehicle (N.A.M. 1442); CAMERON STATION, Va.: Redstone rocket engine recovered after the June 11, 1958, ballistic missile trajectory flight from Canaveral (N.A.M. 1473).
- B. F. GOODRICH Co., Akron, Ohio: Pressure helmet used by Wiley Post with his first two experimental space suits (N.A.M. 1467).
- BARCAS, VICTOR, Washington, D.C.: Autographed original menu for luncheon given for C. A. Lindbergh in Paris, autographed by Lindbergh, Glenn, Carpenter, Gargarin, and Titov (N.A.M. 1448).
- BELL AIRCRAFT Co., Buffalo, N.Y.: Bell model 47D-1 single 2-blade rotor helicopter with directional rotor at aft end of machine (N.A.M. 1430).
- BROWN, MRS. G. T., Henderson, N.C.: Very early back-pack parachute used by "Tiny" Broadwick for exhibition jumps from airplanes in 1912 (N.A.M. 1466).
- CROM, CURTISS G., Springfield, Va.: Unusual dress uniforms and officer's saber which belonged to donor's late father, colonel in USAF (N.A.M. 1462).
- DIENES, NICHOLAS S., Fort Belvoir, Va.: Fragment, airship *Hindenburg* girder (N.A.M. 1458).
- DOOLITTLE, JAMES H., SPACE TECHNOLOGY LABORATORIES, Redondo Beach, Calif.: Medal of the Ordre Souveraine de Chypre (No. PA 400) given to the donor (N.A.M. 1480).
- DOUGLAS AIRCRAFT Co., Washington, D.C.: Model THOR IRBM space launch vehicle, 1:22 size (N.A.M. 1469).
- EASTERN AIR LINES, INC., New York, N.Y.: 2 framed study sketches by Dean Cornell made for murals in EAL building (N.A.M. 1441).
- EMERSON, EARL A., Arlington, Va.: World War II USAF winter flying suit, worn on antisubmarine patrol by Lt. James D. Emerson, son of the donor (N.A.M. 1468).
- FLEET FOUNDATION, San Diego, Calif.: Fleet model 7 aircraft powered by 160 hp. Kinner R-56 engine (N.A.M. 1417).
- FLIGHT SAFETY FOUNDATION, New York, N.Y.: 2 oil portraits of the Wright Brothers, painted by Efrem Melik (N.A.M. 1465).
- GARBER, PAUL E., Washington, D.C.: La Crociera Atlantica Gold Medal (N.A.M. 1446).
- GENERAL DYNAMICS, San Diego, Calif.: 4-foot square scale model of Mercury Control Center at Cape Canaveral (N.A.M. 1431).

- GILL, MRS. MABEL E., Baltimore, Md.: Silver tray-trophy awarded to H. W. Gill (N.A.M. 1484).
- GODDARD, MRS. ROBERT H., Worcester, Mass.: 2 bronze reproductions of gold medal awarded to Dr. Goddard by Congress in 1959 (N.A.M. 1427).
- GRAYSON, LT. COMDR. K. B., Forest Hills, N.Y.: Mark 1A bombsight of World War I period (N.A.M. 1419).
- HARTWICK, HERBERT D., Cayucos, Calif.: Model of Fokker D-VII, 1:16 size (N.A.M. 1482).
- HELIO AIRCRAFT CORPORATION, Norwood, Mass.: Helioplane No. 1, first of a series of controllable STOL aircraft (N.A.M. 1425).
- HOLLOWOOD, CHARLES L., Pittsburgh, Pa.: Model of Stinson, Jr., aircraft (N.A.M. 1436).
- AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, New York, N.Y.: 4 personal watches of the Wright Brothers (N.A.M. 1450); collection of 419 medals and awards, all related to aviation (N.A.M. 1452).
- JONES, MRS. LOUIS C., Cooperstown, N.Y.: Flag and barometer used by Charles F. Durant (N.A.M. 1479).
- KERLEY, ROBERT V., ETHYL CORPORATION, Detroit, Mich.: Engine components and awards and medals belonging to S. D. Heron, engine and fuel expert (N.A.M. 1471); slide rule and drafting set belonging to S. D. Heron (N.A.M. 1432).
- KERR-McGEE OIL INDUSTRIES, INC., Oklahoma City, Okla.: Aircraft, Lincoln Standard J-1, Reg. No. 1375, Ser. No. 177, 1920, powered by Hispano-Suiza Model A-3, Ser. No. 5407 (N.A.M. 1455).
- KIRKHAM, CHARLES B., Montgomery, N.Y.: Kirkham air-cooled engine built in 1929, 6-cylinder, horizontally opposed (N.A.M. 1416).
- LEITE, RONALD F., Alexandria, Va.: Lang propeller (English) designed for the 400-hp. Liberty engine, 1918 (N.A.M. 1478).
- LOCKHEED AIRCRAFT CORPORATION, Burbank, Calif.: Model of Lockheed F-104, 1:48 size (N.A.M. 1457); oil portraits of "Jackie" Cochran and "Chuck" Yeager (N.A.M. 1472); Model of Lockheed TF-104G (N.A.M. 1459).
- MARTIN AIRCRAFT Co., Baltimore, Md.: Model of Martin B-10 bomber (N.A.M. 1439).
- MCDONNELL AIRCRAFT CORPORATION, St. Louis, Mo.: McDonnell XV-1 Convertiplane (N.A.M. 1435).
- MIKESH, MAJOR ROBERT C., San Francisco, Calif.: Model of Douglas DST (first of DC-3 series) in American Airlines livery, Neg. No. NC 14988 on rudder and wings (N.A.M. 1456); series of 8 B-17 models depicting the development of the B-17 series (N.A.M. 1440).
- MILLING, MRS. T. DEWITT, Washington, D.C.: Military aviator wings awarded to 2nd Lt. T. D. Milling, October 6, 1913 (N.A.M. 1449).
- MOFFETT, REAR ADM., JR., Virginia Beach, Va.: Memorabilia of Admiral Moffett—Adm. Moffett's magnetic compass; plaster bust of Adm. Moffett; rear admiral flag; rivet press and gold rivet used on *Shenandoah* (N.A.M. 1483).
- MURRAY, MISS VERA C., Washington, D.C.: 2 Murray engines, 70-hp., 2-cycle, 6-cylinder; 30-hp., 2-cycle, 6-cylinder rotary engine; tools (N.A.M. 1464).
- NAPIER AERO ENGINES, LTD., London, England: Napier "Nomad" E, diesel compounded with turbojet aeronautical engine (N.A.M. 1429).
- NATIONAL AERONAUTIC ASSOCIATION, Washington, D.C.: Plaque of William Thaw and 4 Gordon Bennett Trophy plaques (N.A.M. 1474).
- NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, Washington, D.C.: Duplicate of NASA Distinguished Service Medal awarded to Alan B. Shepard, Jr.

- (N.A.M. 1444); LANGLEY RESEARCH CENTER, Langley Field, Va.: 3 scale models—Ryan Flex-Wing; Supersonic Furlled Flex-Wing; and wind tunnel item—Flex-Wing (N.A.M. 1476).
- NAVY, DEPARTMENT OF THE, Williamsburg, Va.: Hispano-Suiza engine model E (N.A.M. 1486); NAVAL ACADEMY, Annapolis, Md.: Models of Douglas TBD-1, Grumman J2F-1, Vought SB2U-1 scout bomber (N.A.M. 1460); MARINE CORPS, Quantico, Va.: Japanese double-barreled aircraft machinegun and Spandau German aircraft machinegun (N.A.M. 1453); MARINE CORPS SCHOOL, Quantico, Va.: 9 aircraft machineguns and cannons with spare barrel assembly (N.A.M. 1470).
- PAN AMERICAN WORLD AIRWAYS, New York, N.Y.: Model of Douglas DC-7F showing cargo handling equipment (N.A.M. 1461).
- PROJECT OSCAR, INC., Sunnyvale, Calif.: Full-size replica of *OSCAR I*, world's first amateur satellite, plus two separate components of the radio signalling device (N.A.M. 1426).
- PYLE, JAMES T., Washington, D.C.: Early flying suit, 1930's (N.A.M. 1463).
- RAY, DR. E. L., through BURKE M. RAY, Washington, D.C.: 2 silver spoons commemorating 1935 flight of Thor Solberg from Norway to United States (N.A.M. 1424).
- REPUBLIC AVIATION CORPORATION, Farmingdale, Long Island, N.Y.: Model of Republic FH-105 USAF fighter (N.A.M. 1445).
- ROYAL AIR FORCE, United Kingdom: DeHavilland 98 *Mosquito* light bomber of World War II vintage (N.A.M. 1434).
- SMILEY, DR. C. H., Providence, R.I.: Cent carried by donor on flight to photograph eclipse of 7/20/63 (N.A.M. 1423).
- SMITH, J. C., Massillon, Ohio: Scale model of Verville CA-3 aircraft (N.A.M. 1443).
- SMITH, MRS. LOWELL H., Tucson, Ariz.: Memorabilia including personal items, awards, scrapbooks, photographs, etc., belonging to Lowell H. Smith, the commanding officer of the first Round-the-World Flight (N.A.M. 1454).
- SMITHSONIAN INSTITUTION, EXHIBITS DIVISION, Washington, D.C.: Model of Boeing B-17G World War II bomber (N.A.M. 1422); model of Wright Brothers 1899 kite (N.A.M. 1438).
- SPACE TECHNOLOGY LABORATORIES, Redondo Beach, Calif.: 3 full-scale models of research satellites, *Pioneer I*, *Pioneer V*, and *Explorer VI* (N.A.M. 1475).
- SPENCER, PERCIVAL H., Hawthorne, Calif.: Working model of *Motorized Bird*, an ornithopter (N.A.M. 1437).
- STANLEY AVIATION CORPORATION, Denver, Colo.: B-58 supersonic ejection seat and capsule (N.A.M. 1433).
- SWAIN, JOHN, Arlington, Va.: Pilot's leather helmet, late 20's (N.A.M. 1420).
- THIOKOL CHEMICAL CORPORATION, Ogden, Utah: Cutaway of M-58 Falcon rocket motor (N.A.M. 1421); REACTION MOTORS DIVISION, Danville, N.J.: Rocket jump-belt by Thiokol (N.A.M. 1485).
- TRACY, DANIEL E., Cleveland, Ohio: Scale model of Macchi-39 Schneider trophy-winning seaplane, 1929 (N.A.M. 1447).
- UNITED AIRCRAFT CORPORATION, Hartford, Conn.: RAF 1A aircraft engine of 1914 (N.A.M. 1428).
- WIBLE, JOHN, Andrews AFB, Md.: Mark XV Norden bombsight (N.A.M. 1418).
- WILBURN, GENE N., Chevy Chase, Md.: Unidentified wind tunnel test model (N.A.M. 1477).
- ZIEMER, MAJOR H. A., Pine Bluff, Ark.: Collection of 225 civilian and military buttons (N.A.M. 1481).

Philip S. Hopkins, director of the National Air Museum since 1958, announced his retirement as of August 1, 1964. S. Paul Johnston has been selected as the new director. He will take office on September 1, 1964.

Respectfully submitted.

PHILIP S. HOPKINS, *Director.*

S. DILLON RIPLEY,
Secretary, Smithsonian Institution.

Report on the John F. Kennedy Center for the Performing Arts

SIR: I have the honor to submit, on behalf of the Board of Trustees, a status and financial report on the John F. Kennedy Center for the Performing Arts (formerly the National Cultural Center) for the period July 1, 1963, through June 30, 1964.

ORGANIZATION

Public Law 85-874, September 2, 1958, established the National Cultural Center as a bureau of the Smithsonian Institution. The initial legislation was amended by Public Law 86-297, September 21, 1959. Public Law 88-100 was enacted on August 19, 1963. This amended the original law by extending the term for fund-raising from 5 to 8 years and increased the maximum number of public members of the Board of Trustees from 15 to 30.

With the tragic death of President Kennedy, a spontaneous reaction spread throughout the country to dedicate the National Cultural Center as his sole memorial in the Nation's Capital. In December 1963 President Lyndon Johnson sent the proposal to Congress, and hearings were subsequently held before a joint session of the House and Senate Public Works Committee. I had the honor of testifying before these hearings. The Bill passed the House and the Senate with full bipartisan support, and on January 23, 1964, President Johnson signed it into law.

Provisions of the legislation.—The National Cultural Center was renamed the John F. Kennedy Center for the Performing Arts. Under the provisions of this Act, authorization was given for the appropriation of \$15.5 million to match funds raised by the public. In addition, the Center's trustees were empowered to issue revenue bonds to the Treasury payable from revenues accruing to the Board, up to a sum of \$15.4 million to cover the cost of a 3-level parking facility for approximately 1,600 cars. This unit will also form the substructure of the building. (The National Capital Planning Commission was granted a further appropriation of \$2.175 million for the purchase of land within and without the designated site and for relocation payments.)

The Center's testimony was given before the House and Senate Appropriations Committees, and final action was taken when both houses of Congress agreed to the amended Appropriations Bill on June 29. (It was signed by President Johnson on July 7.) Under the terms of this legislation (P.L. 88-356) Congress provided "such amounts which in the aggregate will equal gifts, bequests, and devises of money, securities, and other property, received by the Board for the benefit of the John F. Kennedy Center for the Performing Arts prior to July 1, 1965, and available or used for expenditures directly incident to the planning, contracting, and construction of the Center: Provided, That the total amount appropriated by this paragraph shall not exceed \$15,500,000."

The John F. Kennedy Center Act made no change in the composition of the Board of Trustees, the officers, the Advisory Committee on the Arts, or the concept and charter of the Center.

Mrs. Lyndon B. Johnson agreed to serve as honorary cochairman with Mrs. John F. Kennedy and Mrs. Dwight D. Eisenhower.

At the present time the Board of Trustees and elected officers of the Center are as follows:

Trustees:

Howard F. Ahmanson
 Floyd D. Akers
 Lucius D. Battle
 K. LeMoyne Billings
 Ralph E. Becker
 Ernest R. Breech
 Edgar M. Bronfman
 Ralph J. Bunche
 Anthony J. Celebrezze
 Joseph S. Clark
 J. William Fulbright
 Mrs. George A. Garrett
 George B. Hartzog
 Francis Keppel
 Mrs. Albert D. Lasker

George Meany
 L. Quincy Mumford
 Mrs. Charlotte T. Reid
 Richard S. Reynolds, Jr.
 Frank H. Ricketson, Jr.
 S. Dillon Ripley, II
 Leverett Saltonstall
 Mrs. Jouett Shouse
 L. Corrin Strong
 Frank Thompson
 Walter N. Tobriner
 William Walton
 William H. Waters, Jr.
 James C. Wright, Jr.

Chairman, Roger L. Stevens
Vice Chairman, L. Corrin Strong
Treasurer, Daniel W. Bell
General Counsel, Ralph E. Becker
Secretary, K. LeMoyne Billings
Senior Assistant Secretary, Philip J. Mullin

PROGRESS DURING 1963-1964

All the Center's fund-raising committees continued, on an increased scale, the activities initiated in the previous year:

(1) *President's Business Committee.*—Ernest R. Breech, formerly chairman, Ford Motor Co., maintained his effective leadership of this

committee which has, to date, raised more than \$2.7 million. In October 1963 President Kennedy was host at a luncheon in the White House to members of the Committee, as well as other top business leaders from all parts of the country. (As a direct result of this occasion, industrial contributions amounting to approximately \$1 million were received within a short period of time thereafter.)

(2) *Service band recordings*.—During the year a second royalty payment was received from RCA Victor Records covering the sale of the four military service band albums issued by RCA on behalf of the Center, for a further 6-month period, September 1963 through February 1964. This royalty payment amounted to \$60,197.81, bringing the total proceeds from the sale of the records to \$120,039.02.

(3) "*Creative America*," published by Ridge Press, went on nationwide sale in February 1963. A percentage of the proceeds from the sale of the book is being paid to the Center. The book traces the full circle of artistic creation and contains a foreword by President Kennedy, original articles by General Eisenhower, President Truman, James Baldwin, Mark Van Doren, John Ciardi, among others, as well as more than 90 pages of color pictures by the staff of Magnum, one of the world's outstanding associations of photographers.

(4) *Gifts of foreign governments*.—During the year the Center received substantial gifts from two foreign governments. In July 1963 President Kennedy announced that the Italian Government through President Segni had offered a contribution of all the marble required in the building of the Center. In October the Prime Minister of Ireland, Mr. Sean Lemass, offered the gift of a Waterford chandelier to hang in the Center's symphony hall. Several other foreign governments have also shown an interest in making donations to the Center.

(5) In October 1963 the Rockefeller Foundation made an unconditional grant to the Center of \$1 million, and in December a gift of \$500,000 came from the Old Dominion Foundation.

(6) *Special Gifts Committee*.—Plans have been completed for the formation of a national Special Gifts Committee to seek substantial contributions to the Center from sources other than business and industry. A contract has been negotiated with the firm of Bowen & Gurin, New York City, to coordinate the fund-raising efforts of this committee.

(7) *Mrs. Kennedy's Christmas cards*.—During the summer of 1963 Mrs. Kennedy graciously offered to design two Christmas cards to be sold for the benefit of the Center. The cards were published and distributed by Hallmark Cards and enjoyed a very considerable sale.

Publicity relating to the cards was nationwide and the Center received approximately \$26,000 from their sale.

(8) *Announcement of Center's programs.*—During the course of the year, two programs were announced in which the Center was a joint sponsor.

- a. In October, President Kennedy announced the formation of a national company of the Metropolitan, to be presented by the Metropolitan Opera and the Center. The purpose of this company, which will begin its first tour of some 35–37 cities in the fall of 1965, is to provide training and experience for young American singers, and to bring the best in live opera to cities throughout the country where little or none has previously existed.
- b. Plans were also announced for a National University Theatre Festival to be held in Washington, D.C., during a 3-week period in the spring of 1965. Jointly sponsored by the Center, the American Educational Theatre Association, and the American National Theatre and Academy, the Festival is inviting the participation of the many college and university theatre groups in the country. Organized at the outset on a regional basis, it is expected that some 10 or 12 college groups will be selected to present their outstanding productions to audiences in the Capital.

ADMINISTRATIVE CHANGES

With the pending eligibility for Government funds, both through our borrowing authority and from Congressional appropriations, the Center has been in close consultation with the offices of the Secretary of the Treasury, the Comptroller General, the Bureau of the Budget, and the Smithsonian Institution. Upon their recommendation and with the unanimous approval of the Board of Trustees, an Administrative Officer, Philip J. Mullin, was appointed who will be responsible for the administrative and fiscal management of the Center.

GENERAL SERVICES ADMINISTRATION

Arrangements were made whereby the Public Buildings Service of the General Services Administration will serve as the Center's agent for design and construction, and a contract to this effect is about to be signed. Standard GSA procedures will be followed, including the award of contracts on the basis of competitive bids.

MEMORIAL COMMITTEE

In accordance with the provisions of the John F. Kennedy Center Act, a Memorial Committee under the chairmanship of K. LeMoyne Billings has been appointed. This committee will originate, assemble, and review proposals, and make recommendations, for a suitable memorial to President Kennedy to be placed within the Center itself. The trustees will then make their recommendation to the Congress and to the Regents of the Smithsonian as the law provides. Members of this committee are:

Senator William Fulbright
Senator Leverett Saltonstall
Congressman Torbert H. Macdonald
Mrs. Stephen Smith, President Kennedy's sister
Mrs. Albert D. Lasker, a Trustee
Edward Durell Stone, the Center's architect
S. Dillon Ripley, Secretary of the Smithsonian Institution
Theodore C. Sorensen, who served as Special Counsel to President Kennedy
(Roger L. Stevens will serve as an *ex officio* member)

FINE ARTS ACCESSIONS COMMITTEE

Because of an increasing number of objects of art that are being offered to the Center, it has been found necessary to appoint a Trustees' Fine Arts Accessions Committee to determine acceptance or refusal of such gifts. The Committee will, in turn, appoint a subcommittee containing representatives of the architect, the General Services Administration, the National Collection of Fine Arts, the National Gallery of Art, and of two leading non-Federal galleries in Washington. Members of the Accessions Committee are:

S. Dillon Ripley, Secretary of the Smithsonian Institution, *Chairman*
Mrs. Albert D. Lasker, Mrs. Jouett F. Shouse, and Senator J. William Fulbright

ARCHITECTURAL PLANNING

Following some controversy in the press on the size and site of the Center, all questions relating to these matters were finally and satisfactorily resolved on June 4 when the National Capital Planning Commission, the central planning agency for the Federal and District of Columbia Governments, voted approval of the site, access points, height, bulk, and profile of the building, as well as of the dimensions of the three halls. This action left the way clear for final planning of the construction of the Center.

Preliminary architectural plans have now been completed and the architect and his staff are starting on the working drawings. Site borings have been completed. It is hoped that construction on the substructure of the building will begin in the summer of 1965, with completion of the Center within 30 months. A ground-breaking ceremony is now being planned.

FUTURE PROSPECTS

The events of the past fiscal year have put us well within sight of our objective to create in the Nation's Capital a national center for the performing arts, as well as an appropriate and living memorial to President Kennedy.

To comply technically with the matching provisions of the Appropriations Act \$2 million more is needed before June 30, 1965. In addition, it is the intention to raise \$3 million to provide working capital and a reserve against increased building costs.

Respectfully submitted.

ROGER L. STEVENS,
Chairman.

S. DILLON RIPLEY,
Secretary, Smithsonian Institution.

The Center's Financial Report for the period July 1, 1963, through June 30, 1964, follows:

AUDIT

July 25, 1964
Washington, D.C.

TO THE BOARD OF TRUSTEES OF THE
JOHN F. KENNEDY CENTER FOR THE PERFORMING ARTS
Washington, D.C.

Gentlemen:

We have examined the books and records of the JOHN F. KENNEDY CENTER FOR THE PERFORMING ARTS for the period July 1, 1963, through June 30, 1964, and submit our report herewith as follows:

Exhibit A—Balance Sheet as of June 30, 1964.

Exhibit B—Statement of Income, Expenses and Fund Balance for the Year July 1, 1963, through June 30, 1964.

Exhibit B-1 Statement of Expenses for the Year July 1, 1963, through June 30, 1964.

Schedule 1—Schedule of Time Deposits, Savings Account and Treasury Bills.

Our examination was made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion the accompanying report presents fairly the financial position of the JOHN F. KENNEDY CENTER FOR THE PERFORMING ARTS at June 30, 1964, and the results of its operation for the period then ended in conformity with generally accepted accounting principles.

Respectfully submitted.

(S) JOHN J. ADDABBO,
Certified Public Accountant.

EXHIBIT A
BALANCE SHEET
June 30, 1964

ASSETS		
Current assets:		
Cash in banks:		
General account.....	\$269,151.29	
Reserve account.....	50,428.49	
Time deposits and savings accounts	2,584,753.97	
	\$2,904,333.75	
Treasury bills.....	1,160,887.00	
Stock and property received.....	12,500.00	
Petty cash.....	400.00	
Deposit with airlines.....	425.00	
	\$4,078,545.75	
Pledges receivable:		
National General Account.....	5,091,627.98	
National Tangible Property.....	1,168,000.00	
National Seat Reserve Account.....	67,444.00	
President's Business Committee.....	822,134.67	
Washington Area Building Fund—General...	294,228.46	
Washington Area Building Fund—Reserve...	346,400.00	
Washington Area Seat Reserve Account.....	103,638.48	
Washington Area Federal Employee Drive...	3,286.50	
Washington Area Federal Employee Drive— Seat Endowment.....	1,660.00	
Washington Area Tangible Property.....	35,000.00	
School Children's Reserve Fund.....	185.00	
J. F. Kennedy Memorial Fund.....	1,000.00	
Israeli Benefit.....	20,190.00	
	7,954,795.09	
Fixed assets:		
Cost of land—advanced to National Capital Planning Commission.....		
	146,000.00	
Construction costs—architect and design costs...	507,498.25	
Furniture and equipment—book value.....	5,962.62	
	659,460.87	
Other assets:		
Deferred charges—Creative America.....	56,425.00	
Total assets	\$12,749,226.71	
LIABILITIES AND NET WORTH		
Liabilities:		
Payroll taxes withheld.....		\$1,177.54
Net worth:		
Pledges receivable.....	\$7,954,795.09	
Fund balance—June 30, 1964.....	4,793,254.08	
	12,748,049.17	
Total liabilities and net worth	\$12,749,226.71	

NOTE: Pledges receivable; national general account includes Ford Foundation grant of \$5,000,000.00 on a two-to-one matching basis of nongovernmental funds.

EXHIBIT B

STATEMENT OF INCOME, EXPENSES, AND FUND BALANCE

Year ended June 30, 1964

Contributions and pledges paid in:

General accounts:

National General Account.....	\$1,757,966.84
President's Business Committee.....	1,292,577.28
Fine Arts Gifts Committee.....	5,000.00
Closed Circuit Telecast.....	7,281.82
Washington Area Building Fund.....	261,823.98
Washington Area Federal Employee Drive...	118,035.50
Austrian Embassy Benefit.....	13,322.53
Peter Pan Benefit.....	13,845.73
Israeli Benefit.....	26,942.22
Interest Income.....	28,932.98

Total general accounts.....	\$3,525,728.88
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Reserve accounts:

National Reserve Account.....	-----
National Seat Reserve Account.....	\$105,325.00
Washington Area Building Fund.....	207,983.54
Washington Area Seat Reserve Account.....	133,673.57
Washington Area Endowment Fund.....	-----
Washington Area Federal Employee Drive— Seat Endowment.....	23,149.43
School Children's Reserve Fund.....	20,497.86
John F. Kennedy Memorial Fund.....	15,235.51

Total reserve accounts.....	505,864.91
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Total income.....	4,031,593.79
Deduct expenses—exhibit B-1.....	557,576.47

Excess of receipts over expenses.....	3,474,017.32
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Fund balance—beginning of year.....	1,319,236.76
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Fund balance—June 30, 1964.....	\$4,793,254.08
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EXHIBIT B-1
STATEMENT OF EXPENSES
Year ended June 30, 1964

Salaries—major.....	\$63,671.48
Salaries—D.C.....	22,735.48
Salaries—Fine Arts.....	-----
Extra help.....	8,869.89
Depreciation—furniture and equipment.....	716.51
Equipment—rental and repairs.....	1,162.32
Meetings.....	747.18
Office supplies and postage.....	7,918.15
D.C. area expenses—general.....	5,950.47
Fine Arts Gifts Committee.....	-----
Seat endowment.....	580.43
Printing and publicity.....	3,382.82
Promotion.....	35,188.33
Publications.....	2,370.25
Telephone and telegraph.....	12,820.70
Travel and maintenance.....	17,029.96
Taxes—payroll and civil service.....	2,792.95
Unclassified.....	1,388.39
Accounting.....	4,005.00
Insurance.....	3,624.93
Interest.....	-----
Fund-raising fees.....	50,750.00
Legal fees.....	21,900.00
Miscellaneous fees.....	-----
President's Business Committee.....	113,898.98
Federal Employee Drive.....	2,012.50
Closed Circuit Telecast.....	152,561.80
Peter Pan Benefit.....	5,125.82
Austrian Embassy Benefit.....	2,062.89
Israeli Benefit.....	1,197.37
College Drama Festival.....	5,000.00
Band Recording.....	1,053.30
Sousa Memorial Fund.....	1,914.08
N.Y. World's Fair Inaugural Ball.....	5,142.49

Total expenses.....	\$557,576.47

NOTE: Expenses include capitalized expenditures charged off in the amount of \$150,000.00.

SCHEDULE 1

SCHEDULE OF TIME DEPOSITS, SAVINGS ACCOUNT, AND TREASURY BILLS
June 30, 1964

Depository	Date deposited	Maturity date	Interest rate per annum	Amount deposited
American Security & Trust Co. Washington, D.C.	2/17/64	8/17/64	3¼%	\$18,000.00
	2/17/64	8/17/64	3¼%	225,000.00
	2/21/64	8/21/64	3¼%	40,000.00
	3/ 2/64	9/ 2/64	3¼%	100,000.00
Perpetual Bldg. Assoc.----- Washington, D.C.	11/15/63	11/15/64	4%	200,000.00
Manufacturers Hanover Trust Co., New York, N.Y.	11/18/63	11/18/64	3⅞%	200,000.00
Irving Trust Co.----- New York, N.Y.	11/18/63	11/18/64	3¼%	200,000.00
National Bank of Detroit.----- Detroit, Mich.	11/18/63	11/18/64	4%	200,000.00
	3/25/64	3/25/65	4%	150,000.00
Morgan Guaranty Trust Co.----- New York, N.Y.	11/18/63	11/18/64	3¼%	200,000.00
Manufacturers Nat'l Bank of Detroit, Detroit, Mich.	11/18/63	11/18/64	3⅞%	200,000.00
Home Savings & Loan Assn.---- Beverly Hills, Calif. <i>Savings Account</i>	11/18/63	11/18/64	4.85%	300,000.00
Interest credited Jan. 1964.	-----	-----	-----	1,753.97
Chase Manhattan Bank.----- New York, N.Y.	12/31/63	1/ 4/65	3⅞%	100,000.00
	1/10/64	1/11/65	4%	150,000.00
Schroder Trust Co.----- New York, N.Y.	2/18/64	8/18/64	3⅞%	100,000.00
Chemical Bank N.Y. Trust Co.-- New York, N.Y.	2/26/64	8/26/64	3¼%	100,000.00
	2/28/64	8/28/64	3⅞%	100,000.00
Treasury bills.-----	#1446905	11/30/64	-----	963,300.00
	#5706009	9/ 3/64	-----	99,121.00
	#5706108	11/19/64	-----	98,466.00
Total.-----	-----	-----	-----	3,745,640.97

Report on the National Portrait Gallery

SIR: I have the honor to submit the following report on the activities of the National Portrait Gallery for the fiscal year ended June 30, 1964:

The Act of April 27, 1962 (Public Law 87-443) provided for the establishment of the National Portrait Gallery as a bureau of the Smithsonian Institution. As described in the act, the purpose of the Gallery is to "function as a free public museum for the exhibition and study of portraiture and statuary depicting men and women who have made significant contributions to the history, development, and culture of the people of the United States and of the artists who created such portraiture and statuary."

The Smithsonian Board of Regents at its January 1963 meeting took two important actions:

(I) *Approved the functions of the National Portrait Gallery Commission:*

The National Portrait Gallery Commission shall have the primary functions of promoting the administration, development, and utilization of the National Portrait Gallery, including the acquisition of material of high quality representing men and women who have made significant contributions to the history, development, and culture of the people of the United States and of the artists who created such portraiture and statuary.

In this connection, the Commission shall:

- (1) Advise the Secretary on the appointment and compensation of the Director of the National Portrait Gallery, with the consent of the Board of Regents.
- (2) With the assistance of the Director of the National Portrait Gallery, prepare recommended criteria for the acquisition of portraits, statuary, or other items authorized under the Act of April 27, 1962, for presentation to the Board of Regents for adoption.
- (3) Develop proposed rules and regulations for the operation of the National Portrait Gallery.
- (4) Act as a "board of recommendation" for items presented to the National Portrait Gallery, or items proposed to be purchased for the National Portrait Gallery, subject to final approval by the Board of Regents.
- (5) Adopt an official seal which shall be officially noticed.
- (6) Be responsible for reviewing the proposed program for the development of the National Portrait Gallery, developed by the Director of that Gallery.
- (7) As a group and as individual members, be responsible for encouraging gifts, within the criteria approved by the Board of Regents, of funds, portraits, statuary, and other items which would enhance the value and significance of this important Gallery to the people of the United States in commemorating the men

and women who have made significant contributions to the history, development, and culture of the United States.

(8) Submit to the Board of Regents an annual report of the operations of the Gallery.

(II) *Determined the number and tenure of members of the National Portrait Gallery Commission:*

The National Portrait Gallery Commission, created by Public Law 87-443, April 27, 1962, shall be composed of the Chief Justice of the United States, the Secretary of the Smithsonian Institution, and the Director of the National Gallery of Art, as members *ex-officio*; and eight appointive members, chosen as provided in this section, who shall be citizens of the United States.

The appointive members of the Commission first taking office shall be chosen by the Board and shall have terms expiring two each on July 1 of 1965, 1966, 1967, and 1968, as designated by the Board. Successors shall be chosen by the Board from nominees presented by the Commission and the Secretary of the Smithsonian Institution, and shall have a term expiring six years from the date of the expiration of the term for which the predecessor was chosen, except that a successor chosen to fill a vacancy occurring prior to the expiration of such term shall be chosen only for the remainder of such term. Notwithstanding the expiration of the term of office provided by this section for any member of the Commission, such member shall continue to serve as such until his successor has been appointed and has qualified.

The Commission may function notwithstanding vacancies, and six members shall constitute a quorum for the transaction of business.

The Chancellor of the Board of Regents, the Honorable Earl Warren, announced the membership of the National Portrait Gallery Commission on June 21, 1963. (The members are listed in the 1963 report.)

The significant first meeting of the National Portrait Gallery Commission was held on October 21, 1963. Dr. John Nicholas Brown, Regent of the Smithsonian Institution, was elected chairman. The basic functions of the National Portrait Gallery were discussed and a subcommittee was appointed to develop criteria for admission to the National Portrait Gallery.

A discussion of the qualifications for Director and Associate Director resulted in an agreement that the two types of skills needed at the top of the organization were:

- (1) A highly capable museum or art gallery director who is a good administrator, and
- (2) A historian who knows American history and could be a leading research man.

Dr. Brown designated the following terms of Commission members:

	<i>Term ending July 1 of year indicated below</i>
Mrs. Bowen and Dr. Boyd.....	1965
Dr. Brown and Dr. Deschler.....	1966
Mr. Finley and Dr. Lewis.....	1967
Dr. Shryock and Colonel Todd.....	1968

At the second meeting of the Commission on December 20, 1963, it was reported that bids for the remodeling of the F Street Building were 35 percent higher than the funds available. Therefore, the bids had to be rejected, with the understanding that the Smithsonian would work with the architect and the General Services Administration to reduce the scope of the remodeling to bring the cost within the funds available.

At this meeting the twofold objectives of the National Portrait Gallery were reaffirmed: (1) exhibition of portraits and statuary of men and women who have made contributions to the history, development, and culture of the United States, and (2) the provision of necessary bibliographical, biographical, and historical materials for a study center.

The chairman announced that he had appointed the following subcommittee on criteria: Mr. Lewis (chairman), Mrs. Bowen, and Mr. Boyd. The Commission recommended and the Regents approved the appointment of Charles Nagel to be Director of the National Portrait Gallery, and this was announced on March 3, 1964. Mr. Nagel will enter on duty July 1, 1964. Mr. Nagel has been director of the City Art Museum of St. Louis, Mo., and prior to that he was director of the Brooklyn Museum.

At the third meeting of the Commission on February 26, there was a detailed discussion of the proposed rules for selection to the permanent collections to the National Portrait Gallery. A subcommittee was appointed to make recommendations on the proposed library, research, and publication program. The members were Dr. Shryock, Mr. Lewis, and Dr. Boyd.

At the fourth meeting of the Commission on May 1, 1964, the proposed library, research, and publication program were discussed. The rules for selection to the permanent collection were approved for submission to the Board of Regents.

In their May 1964 meeting, the Regents approved the rules for selection to the permanent collection, as follows:

The purpose of the National Portrait Gallery is to collect and exhibit portraits and sculpture of persons who have made significant contributions to the history, development, and culture of the United States of America from its earliest period of discovery to the present and, as integral to this purpose, to establish a research center in American iconography and biography.

I. The Gallery hopes to acquire the best likenesses available, originals from life if possible, replicas or copies if necessary. The initial selection shall be made by the National Portrait Gallery Commission acting upon the recommendations of the Director and the Committee on acquisitions. The recommendations shall be circulated to the Commission before the meeting at which the selections are to be made. Approval of such recommendations shall be by a majority of two-thirds of the Commission. Proxy votes shall be admissible for this purpose.

II. No likeness of any person who has been dead less than ten years shall be exhibited in the permanent collection with the exception of the President of the United States and his wife.

III. Temporary exhibitions dealing with specific fields of interest may be held from time to time. Special provision shall be made in the Gallery for the display of the likenesses of the President of the United States and his wife, the Vice President, the Speaker of the House of Representatives, the Chief Justice of the United States, the Secretary of State, the Associate Justices of the Supreme Court, the President's Cabinet, and Members of the Congress.

IV. The Research Center shall include archival material necessary for iconographical, biographical, and historical study.

Respectfully submitted.

THEODORE W. TAYLOR, *Assistant to the Secretary.*

S. DILLON RIPLEY,
Secretary, Smithsonian Institution.

Report on the Library

SIR: I have the honor to submit the following report on the activities of the Smithsonian library for the fiscal year ended June 30, 1964:

ACQUISITIONS

The acquisitions section received 120,008 publications during the year. This included 4,498 purchased items and 1,284 journal subscriptions. The rest were received by exchange or as gifts. Arrangements were made with 81 new organizations for the exchange of new publications.

Some of the outstanding gifts presented to the library by interested donors are:

- Brasher, Rex. *Birds and trees of North America*. 4 vols. New York, 1961-1962, from Rowman and Littlefield, Inc., New York, N.Y.
- A collection of 19th century travel literature (479 brochures, maps, folders, guides), from Mr. and Mrs. E. P. Morris, Southampton, Pa.
- Griffiths, John Willis. *Treatise on marine and naval architecture*. 1849, from Mrs. Myrtie Hall, Landers, Calif.
- Kienbusch, Carl Otto von. The Kretzschmar von Kienbusch collection of armor and arms. Princeton, 1963, from C. O. von Kienbusch, New York, N.Y.
- Leupold, Jacob. *Theatrum pontificale* . . . 1726, and 11 additional volumes on architecture, art and geography, published between 1738 and 1871, from Mrs. Carolyn Edwards, Glen Echo, Md.
- Marconi's wireless telegraphic code, 1907, and four additional volumes on electricity and communications, from Laurence E. Whittemore, Short Hills, N.J.
- Mearns, Louis de Zerega. *Mammals and birds; a collection of biological publications* . . . 1897-1903, from Mrs. C. L. Coleman, Troy, N.Y.
- Piranesi, Giovanni Battista, 1720-1778. *Antiquariorum Regiae Societatis Londinensis Campus Martius Antiquae Urbis*. 1762 (Opere . . . v. 10), and a volume of engravings, from Mrs. C. E. Bullowa, Philadelphia, Pa.
- 22 books on the physical sciences published 1891-1935, from the Estate of William W. Coblentz, Brightwood, Va.
- 55 volumes, including works on art and on science, from the Embassy of the Federal Republic of Germany, Washington, D.C.
- 400 volumes of historical materials on science and technology, including a set of *Allgemeine Deutsche Biographie*, 1875-1912, from the U.S. Naval Observatory Library.

A total of 71,094 pieces of duplicate and extraneous materials were forwarded to other libraries. The Library of Congress received 60,977 items; the National Library of Medicine, 2,245; and the

National Agricultural Library, 1,406 pieces. A combined total of 191,102 pieces of material was handled by the section.

CATALOGING AND BINDING

The catalog section cataloged 10,574 volumes, recataloged 205 items, transferred 750 publications, discarded 138 volumes, recorded 35,042 serials in the Serial Record, and filed 34,718 cards into the card catalogs. In addition, 478 trade catalogs were added to the collection.

The binding unit prepared 5,175 books and journals for binding by a commercial binder. The hand-binding staff preserved 1,859 publications which were fragile or too valuable to be sent outside the Institution for repair.

REFERENCE AND CIRCULATION

The reference librarians answered 38,453 requests for specific types of information, replied to 3,459 pieces of correspondence, circulated 40,409 books and journals, and cleared the loan records on 30,277 volumes. No record is kept of the circulation and use of the publications assigned to the divisional libraries where they circulate freely within the division. Publications borrowed from other libraries, chiefly the Library of Congress, numbered 4,777, and 1,309 volumes were lent. Xerox copies of many articles were supplied in lieu of loaning the old, fragile, or heavily used publications. The reading and reference facilities were used by 29,146 persons.

BRANCH LIBRARIES

The branch library for the Museum of History and Technology answered 12,496 reference questions, circulated 13,588 books and journals, and added 478 trade catalogs to the collection. Persons using the reading and reference areas numbered 5,149. This library was moved from the Arts and Industries Building to the new Museum of History and Technology Building in February.

The Bureau of American Ethnology branch library answered 697 reference questions, circulated 924 books and journals, and provided assistance to 774 patrons. Mrs. Carol Jopling, librarian, resigned in October.

The branch library for the Smithsonian Astrophysical Observatory, Cambridge, Mass., answered 3,135 reference requests, circulated 2,045 books and journals, and provided library services for 7,577 users.

The department of entomology branch library answered 996 reference requests, circulated 985 books and journals, and 1,571 patrons used the library facilities.

PROGRAMS AND FACILITIES

Features that contribute to the usefulness of the new library for the Museum of History and Technology are its central location, reading and browsing areas, new furniture and equipment, workspace for the staff, and good natural and artificial lighting.

Funds were allotted by the library to the different departments and bureaus for the selection of library materials. Keysort record cards are in process for use in ordering periodical subscriptions and continuations.

Through participation in the National Science Foundation Public Law 480 program for translation of Russian text materials, the Smithsonian Institution received English translations of 36 scientific monographs pertinent to Smithsonian interests. Copies of these translations have been distributed to American libraries.

STAFF ACTIVITIES

The staff continued to attend special courses and seminars for growth and development. Participation was active in professional organizations and in attendance at the annual conferences for the Special Libraries Association and American Library Association. Jack Goodwin was elected chairman of the museum division of the Special Libraries Association.

Mrs. Parepa Jackson, exchange librarian, in the acquisitions section, retired in March. Mrs. Frances Jones visited the libraries for the Smithsonian Astrophysical Observatory and Harvard University, Cambridge, Mass., and the libraries for the Vermont State Historical Society, Montpelier, and the Boston Museum of Fine Arts.

SUMMARIZED STATISTICS

TABLE 1.—*Accessions to the Library in fiscal year 1964*

Library	Volumes	Total recorded volumes, 1964
Smithsonian central library including the Museum of Natural History.....	4, 544	361, 848
Museum of History and Technology.....	3, 530	
Astrophysical Observatory (SI).....	1	13, 408
Smithsonian Astrophysical Observatory, Cambridge, Mass.....	561	2, 903
Radiation and Organisms.....	77	2, 244
Bureau of American Ethnology.....	257	40, 151
National Air Museum.....	184	1, 327
National Collection of Fine Arts.....	179	14, 698
National Zoological Park.....	31	4, 333
National Portrait Gallery.....	73	73
Total.....	9, 437	440, 985
Trade catalogs.....	478	4, 154

Unbound volumes of periodicals and reprints and separates from serial publications, of which there are many thousands, have not been included in the above totals.

Exchanges:

New exchanges arranged.....	81
Specially requested publications received.....	1, 064

Cataloging:

Volumes cataloged.....	11, 489
Catalog cards filed.....	34, 718

Serials: Number of serials recorded..... 35, 042

Circulation: Loans of books and periodicals..... 40, 409

Binding and repair:

Volumes sent to the bindery.....	5, 175
Volumes repaired in the library.....	1, 859

Respectfully submitted.

RUTH E. BLANCHARD, *Librarian.*

S. DILLON RIPLEY,

Secretary, Smithsonian Institution.

Report on Publications and Information

SIR: I have the honor to submit the following report on the publications of the Smithsonian Institution and its branches and on other informational activities for the year ended June 30, 1964:

The editorial and publications division, the publishing arm of the Institution, maintains a four-part program. One includes the editing, designing, and publishing of books and reports on explorations and research by staff members and collaborators of the Institution in the fields of science, history, and art, and the production of publications of a more popular nature, such as museum guidebooks, informational leaflets, and art catalogs. The second is the control and distribution of these publications. The third deals with the day-to-day dissemination of information concerning the Smithsonian to the press and the inquiring public; the chief of the division serves as public-relations officer of the Institution. And the fourth covers the printing of materials of a current and emergency nature, such as museum labels and invitations and announcements of Smithsonian events, in a branch of the Government Printing Office which is housed at the Institution for that purpose.

PUBLICATIONS PROGRAM

Ninety-five publications appeared under the Smithsonian imprint during the past year in its various series, as listed below. These publications are issued partly from federally appropriated funds (Smithsonian Reports and publications of the National Museum, the Bureau of American Ethnology, the National Air Museum, and the Astrophysical Observatory) and partly from private endowment funds (Smithsonian Miscellaneous Collections, publications of the Freer Gallery of Art, and some special publications). The Institution also publishes under the auspices of the Freer Gallery of Art the series *Ars Orientalis*, which appears under the joint imprint of the University of Michigan and the Smithsonian Institution. In addition, the Smithsonian publishes for sale to visitors guidebooks, information pamphlets, postcards, folders, and popular publications on scientific and historical subjects related to its important exhibits and collections.

SMITHSONIAN MISCELLANEOUS COLLECTIONS

In this series, under the immediate editorship of Mrs. Nancy Link Powars, the following papers were issued:

Volume 145

- No. 5. Tertiary echinoids from the Caloosahatchee and Tamiami formations of Florida, by Porter M. Kier. 64 pp. 18 pls. (Publ. 4543.) August 2, 1963. (\$2.)
- No. 6 Additions to records of birds known from the Republic of Panama, by Alexander Wetmore. 11 pp. (Publ. 4523.) December 16, 1963. (50 cents.)
- No. 7. A phytophysiognomic reconnaissance of Barro Colorado Island, Canal Zone, by Charles F. Bennett, Jr. 8 pp. 1 map. (Publ. 4527.) December 20, 1963. (50 cents.)

Volume 146

- No. 2. A contribution toward an encyclopedia of insect anatomy, by Robert E. Snodgrass. 48 pp. (Publ. 4544.) July 12, 1963. (\$1.)
- No. 3. Solar variation and weather, by C. G. Abbot. 68 pp. 4 pls. (Publ. 4545.) October 18, 1963. (\$1.)

Volume 147

- No. 1. The architecture of Pueblo Bonito, by Neil M. Judd. 349 pp. 81 pls. (Publ. 4524.) June 30, 1964. (\$6.)

SMITHSONIAN ANNUAL REPORTS

REPORT FOR 1962

The complete volume of the Annual Report of the Board of Regents for 1962 was received from the printer on September 26, 1963.

Annual Report of the Board of Regents of the Smithsonian Institution showing the operations, expenditures, and condition of the Institution for the year ended June 30, 1962. x + 610 pp., illustr. (Publ. 4518.)

The general appendix contained the following papers (Publ. 4546-4566) :

- Aircraft propulsion: A review of the evolution of aircraft powerplants, by C. Fayette Taylor.
- Rocket propulsion, by Ralph S. Cooper.
- The early history of radar, by R. M. Page.
- Modern glass, by S. Donald Stookey.
- The great earthquakes of May 1960 in Chile, by Pierre Saint-Armand.
- The rim of the reef, by E. Yale Dawson.
- What's happening to water? By Charles J. Robinove.
- The opening of the Arctic Ocean, by James T. Strong.
- The place of genetics in modern biology, by George W. Beadle.
- The shark that hibernates, by L. Harrison Matthews.
- Man in a world of insects, by Dwight M. DeLong.
- Tropical fruit-fly menace, by L. D. Christenson.
- The soil as a habitat for life, by Sir John Russell.
- The evolution of the echinoderms, by E. Barraclough Fell.
- Mangroves: Trees that make land, by William M. Stephens.
- The history and relationships of the world's cottons, by Sir Joseph Hutchinson.
- Some mysteries of life and existence, by R. E. Snodgrass.
- Civilization and the landscape, by Sylvia Crowe.
- How many people have ever lived on earth? By Annabelle Desmond.
- Bows and arrows: A chapter in the evolution of archery in America, by Paul E. Klopsteg.

Scientific methods in the examination and conservation of antiquities, by A. E. A. Werner.

REPORT FOR 1963

The report of the Secretary, which will form part of the 1963 Annual Report of the Board of Regents, was issued January 23, 1964.

Report of the Secretary and financial report of the Executive Committee of the Board of Regents for the year ended June 30, 1963. xii + 275 pp. 15 pls. (Publ. 4525.)

SPECIAL PUBLICATIONS

Preliminary field guide to the mackerel- and tuna-like fishes of the Indian Ocean (Scombridae), by Bruce B. Collette and Robert H. Gibbs, Jr. 48 pp. 10 pls. (Publ. 4567.) August 9, 1963.

The gown of Mrs. John F. Kennedy. [Supplement to "The Dresses of the First Ladies of the White House," by Margaret W. Brown, published by the Smithsonian Institution in 1952. (Publ. 4060.)] November 26, 1963. (50 cents.)

The Star-Spangled Banner. 16 pp. + postcard. (Publ. 4529.) January 1964. (15 cents.)

Brief guide to the museums in the Washington area. 39 pp. illus. (Publ. 4588.) March 6, 1964. (25 cents.)

Dedication of the Museum of History and Technology of the Smithsonian Institution. 26 pp. (Publ. 4531.) March 24, 1964. (50 cents.)

The exhibits speak, by Sophy Burnham. (With a section on "Birds of the World," by Linda S. Gordon.) 49 pp. (Publ. 4536.) June 5, 1964. (50 cents.)

REPRINTS

Smithsonian meteorological tables. Prepared by Robert J. List. Sixth revised edition. Second reprint. (Publ. 4014.) July 19, 1963. (\$5.)

The First Ladies Hall. 8 pp. (Publ. 4212.) (Two runs: July 31, 1963; April 27, 1964.) (25 cents.)

The Smithsonian Institution. 50 pp. (Publ. 4145.) August 1, 1963. (50 cents.)

The fishes of North and Middle America, by David Starr Jordan and Barton Warren Evermann. (Bulletin 47 of the United States National Museum.) 4 vols. ix+3,313 pp. illustr. (Reprinted for the Smithsonian Institution by T.F.H. Publications.) May 18, 1964. (\$25.)

First book of grasses: the structure of grasses explained for the beginner, by Agnes Chase. 127 pp. (Publ. 4351.) Third edition. June 3, 1964. (\$3.)

UNITED STATES NATIONAL MUSEUM PUBLICATIONS

The editorial work of the National Museum continued during the year under the immediate direction of John S. Lea, assistant chief of the division. The following publications were issued:

REPORT

The United States National Museum annual report for the year ended June 30, 1963. Pp. vii+226, illustr., January 23, 1964.

BULLETINS

226. Checklist of the birds of Thailand, by Herbert G. Deignan. Pp. x+263, 1 fig. December 31, 1963.

227. Part 1. Marine polychaete worms of the New England region: 1. Families Aphroditidae through Trochochaetidae, by Marian H. Pettibone. Pp. v+356, 83 figs., November 5, 1963.
234. Cephalopods of the Philippine Islands, by Gilbert L. Voss. Pp. v+180, 4 pls., 36 figs., August 27, 1963.
236. Free-living Copepoda from Ifaluk Atoll in the Caroline Islands with notes on related species, Willem Vervoort. Pp. ix+431, 151 figs., June 30, 1964.
244. Bagworm moths of the Western Hemisphere (Lepidoptera: Psychidae), by Donald R. Davis. Pp. v+233, 12 maps, 385 figs., June 1, 1964.

CONTRIBUTIONS FROM THE NATIONAL HERBARIUM

Volume 32

- Part 4. The genus *Dussia* (Leguminosae), by Velva E. Rudd. Pp. iii+247-277, 11 figs., November 4, 1963.

Volume 34

- Part 2. The woods and flora of the Florida Keys: Capparaceae, by William L. Stern. George K. Brizicky, and Francisco N. Tamolang. Pp. 25-43, 7 pls., November 4, 1963.

Volume 36

- Part 3. The lichen family Graphidaceae in Mexico, by Michael Wirth and Mason E. Hale, Jr. Pp. 63-119, 82 figs., December 6, 1963.

Volume 38

- Part 1. A revision of *Trichantha* (Gesneriaceae), by Conrad V. Morton. Pp. 1-27, October 9, 1963.

PROCEEDINGS

Volume 115

- No. 3476. Additional information on the morphology of an embryo whale shark, by J. A. F. Garrick. Pp. 1-7, 4 pls., February 28, 1964.
- No. 3477. Notes on new and old species of Alticinae (Coleoptera) from the West Indies, by Doris H. Blake. Pp. 9-29, 25 figs., February 28, 1964.
- No. 3478. Asteroidea of the *Blue Dolphin* expeditions to Labrador, by E. H. Grainger. Pp. 31-46, 4 figs., February 28, 1964.
- No. 3479. Moths of the genus *Rhabdatomis* Dyar (Arctiidae: Lithosiinae), by William D. Field. Pp. 47-60, 6 pls. (33 figs.), February 28, 1964.
- No. 3480. Neotropical Microlepidoptera, III. Restriction of *Gonionota melobaphes* Walsingham with descriptions of new species (Lepidoptera: Oecophoridae), by J. F. Gates Clarke. Pp. 61-83, 3 pls. (1 color), 7 figs., March 17, 1964.
- No. 3481. Chironomid midges of California. II. Tanypodinae, Podonominae, and Diamesinae, by James E. Sublette. Pp. 85-135, 7 figs., February 28, 1964.
- No. 3482. Caligoid copepods (Crustacea) of the Hawaiian Islands: parasitic on fishes of the family Acanthuridae, by Alan G. Lewis. Pp. 137-244, 24 figs., February 28, 1964.
- No. 3483. Notes on Aradidae in the U.S. National Museum. III. Subfamily Mezirinae (Hemiptera), by Nicholas A. Kormilev. Pp. 245-258, 7 figs., February 28, 1964.
- No. 3484. A generic revision of the leafhopper subfamily Neocoelidiinae (Homoptera: Cicadellidae), by James P. Kramer. Pp. 259-287, 114 figs., March 17, 1964.

- No. 3485. A review of the North American moths of the family Walshidae (Lepidoptera: Gelechioidea), by Ronald W. Hodges. Pp. 289-329, 66 figs., March 17, 1964.
- No. 3486. American species of the lacebug genus *Acalypta* (Hemiptera: Tingidae), by Carl J. Drake and John D. Lattin. Pp. 331-345, 15 pls., December 31, 1963.
- No. 3487. The caligid copepod genus *Dentigryps* (Crustacea: Caligoida), by Alan G. Lewis. Pp. 347-380, 13 figs., March 17, 1964.
- No. 3488. A new Brazilian moth of the genus *Gonioterma* with notes on related species (Lepidoptera: Stenomidae), by W. Donald Duckworth. Pp. 381-389, 3 figs., March 17, 1964.
- No. 3489. Seven new amphipods from the west coast of North America with notes on some unusual species, by Clarence R. Shoemaker. Pp. 391-429, 15 figs., March 17, 1964.
- No. 3490. Shrimps of the genus *Betaeus* on the Pacific coast of North America with descriptions of three new species, by Josephine F. L. Hart. Pp. 431-466, 2 pls., 80 figs., February 28, 1964.
- No. 3491. Notes on some nearctic Psychomyiidae with special reference to their larvae (Trichoptera), by Oliver S. Flint, Jr. Pp. 467-481, 5 figs., February 28, 1964.

BUREAU OF AMERICAN ETHNOLOGY PUBLICATIONS

The editorial work of the Bureau continued under the immediate direction of Mrs. Eloise B. Edelen. The following publications were issued during the year:

REPORT

Eightieth Annual Report of the Bureau of American Ethnology, 1962-1963, ii+34 pp., 2 pls. 1964.

BULLETINS

- Bulletin 178. Index to Bulletins 1-100 of the Bureau of American Ethnology, with index to Contributions to North American Ethnology, Introductions, and Miscellaneous Publications, by Biren Bonnerjea. vi+726 pp. 1963.
- Bulletin 186. Anthropological Papers, Nos. 63-67. iv+310 pp., 60 pls., 35 figs., 2 maps. 1963.
- No. 63. Tarqui, an early site in Manabí Province, Ecuador, by Matthew W. and Marion Stirling.
- No. 64. Blackfoot Indian pipes and pipemaking, by John C. Ewers.
- No. 65. The Warihio Indians of Sonora-Chihuahua: An ethnographic survey, by Howard Scott Gentry.
- No. 66. The Yaqui deer dance: A study in cultural change, by Carleton Stafford Wilder.
- No. 67. Chippewa mat-weaving techniques, by Karen Daniels Petersen.
- Bulletin 187. Iroquois music and dance: Ceremonial arts of two Seneca Longhouses, by Gertrude P. Kurath. xvi+268 pp., 3 pls., 164 figs. 1964.
- Bulletin 189. River Basin Surveys Papers, Nos. 33-38, Frank H. H. Roberts, Jr., editor. xiv+406 pp., 58 pls., 66 figs., 13 maps. 1964.
- No. 33. The Paul Brave site (32S14), Oahe Reservoir area, North Dakota, by W. Raymond Wood and Alan R. Woolworth.
- No. 34. The Demery site (39CO1), Oahe Reservoir area, South Dakota, by Alan R. Woolworth and W. Raymond Wood.
- No. 35. Archeological investigations at the Hosterman site (39PO7), Oahe Reservoir area, Potter County, South Dakota, 1956, by Carl F. Miller.

No. 36. Archeological investigations at the Hickey Brothers site (39LM4), Big Bend Reservoir, Lyman County, South Dakota, by Warren W. Caldwell, Lee G. Madison, and Bernard Golden.

No. 37. The Good Soldier site (39LM238), Big Bend Reservoir, Lyman County, South Dakota, by Robert W. Neuman.

No. 38. Archeological investigations in the Toronto Reservoir area, Kansas, by James H. Howard.

Bulletin 190. An ethnography of the Huron Indians, 1615-1649, by Elisabeth Tooker. iv+184 pp. 1964.

ASTROPHYSICAL OBSERVATORY PUBLICATIONS

The year's publications in the series Smithsonian Contributions to Astrophysics are as follows:

Volume 4

No. 5. A criterion for the mode of ablation in stone meteors, by Allan F. Cook. Pp. ii + 131-136. July 3, 1963.

No. 6. The microscopic properties of meteorites, by Gustav Tschermak. Pp. ix + 137-239. June 4, 1964.

Volume 6

Research in space science, by Fred L. Whipple, et al. 242 pp. August 30, 1963.

Volume 8

No. 1. Accurate drag determinations for eight artificial satellites; atmospheric densities and temperatures, by Luigi G. Jacchia and Jack Slowey. Pp. 1-99. September 12, 1963.

No. 2. The relative positions of sunspots and flares, by John G. Wolbach. Pp. 101-118. July 12, 1963.

No. 3. Type IV solar radio bursts, geomagnetic storms, and polar cap absorption (PCA) events. Pp. 119-131. October 3, 1963.

NATIONAL COLLECTION OF FINE ARTS PUBLICATIONS

The following catalogs were issued by the Smithsonian Institution Traveling Exhibition Service during the year:

Turner watercolors. 23 pp. +80 illus. (Publ. 4519.) 1963.

Indian miniatures. 67 pp. (Publ. 4520.) 1963.

Eighteenth-century Venetian drawings. 58 pp. + 118 illus. 1963.

7000 years of Iranian art. 184 pp. +157 illus. (Publ. 4535.) 1964.

FREER GALLERY OF ART PUBLICATIONS

Ars Orientalis, vol. V. (Publ. 4540.) 354 pp. illus. December 30, 1963. (\$31.)

Oriental Studies No. 6. Armenian illustrated manuscripts in the Freer Gallery of Art, by Sirarpie Der Nersessian. (Publ. 4516.) 145 pp. + 108 pls. December 30, 1963. (\$10.)

AMERICAN HISTORICAL ASSOCIATION REPORTS

The annual reports of the American Historical Association are transmitted by the Association to the Secretary of the Smithsonian Institution and are by him communicated to Congress, as provided in the act of incorporation of the Association. The following reports were issued during the year:

Annual report of the American Historical Association for 1962. Vol. 1. Proceedings. November 1963.

Writings in American history, 1955. Vol. 2 of Annual Report of the American Historical Association for 1957. September 25, 1963.

Writings in American history, 1956. Vol. 2 of Annual Report of the American Historical Association for 1958. May 28, 1964.

REPORT OF THE NATIONAL SOCIETY, DAUGHTERS OF THE AMERICAN REVOLUTION

In accordance with law, the manuscript of the 66th annual report of the National Society, Daughters of the American Revolution, was transmitted to Congress on February 11, 1964.¹

DISTRIBUTION PROGRAM

Requests for publications and information concerning them continued to increase during the year. The publications distribution section, under the immediate supervision of Mrs. Eileen M. McCarthy, received 39,017 requests for publications from foreign and domestic libraries, universities, research institutions, educational establishments, and individuals throughout the world. Visitors to the office and replies to inquiries numbered 33,027.

A total of 656,330 copies of publications and miscellaneous items were distributed: 10 Contributions to Knowledge; 16,751 Smithsonian Miscellaneous Collections; 7,912 Annual Report Volumes and 22,686 pamphlet copies of Report separates; 181,568 special publications; 111 reports of the Harriman Alaska Expedition; 62,658 publications of the National Museum; 35,314 publications of the Bureau of American Ethnology; 49,002 catalogs and leaflets of the National Collection of Fine Arts; 148 publications of the Freer Gallery of Art; ² 7 Annals of the Astrophysical Observatory; 12,965 Smithsonian Contributions to Astrophysics; 678 War Background Studies; 4,987 reports of the American Historical Association; and 53,937 publications not issued by the Smithsonian Institution. Miscellaneous items: 12 sets of North American Wild Flowers and 181 North American Wild Flower prints; 3 Pitcher Plant volumes; 207,400 information leaflets.

The following titles were issued and distributed to libraries as a result of the Institution's participation in the National Science Foundation translation program:

Fauna of U.S.S.R., Fishes, vol. 2, No. 1, Clupeidae, by A. N. Svetovidov; *Fauna of U.S.S.R., Crustacea, vol. 3, No. 3, Freshwater Cyclopoida*, by V. M. Rylov; *Fauna of Russia and Adjacent Countries, Reptiles, vol. 1, Chelonia and Sauria*, by A. M. Nikol'skii; *Genus Woodsia R. Br. in Yugoslavia (Genus Woodsia R. Br. V.*

¹ D.A.R. reports are published as Senate documents and are not available from the Smithsonian Institution.

² In addition to those distributed by the Gallery itself.

Jugoslaviji), by E. Mayer; *Morphology, Biology and Zoogeography of European Temnocephala and their Systematic Position*, by J. Matjasic; *Morphological Taxonomical and Typological Problems Concerning Echinocystis Lobata (Michaux) Torrey and Gray*, by V. Petkovsek; *Mammals of U.S.S.R. and Adjacent Countries, vol. 6, Rodents*, by S. I. Ognev; *Fauna and Flora of the Rivers, Lakes and Reservoirs of the U.S.S.R.*, by V. I. Zhadin and S. V. Gerd; *Preparatory Works for the Flora of Slovenia. II., III. II. Odontites Hall, III. Euphrasia L.*, by E. Mayer; *A Contribution to the Knowledge of the Flora of the Western Julian Alps*, by E. Mayer; *Mammals of U.S.S.R. and Adjacent Countries, vol. 7, Rodents*, by S. I. Ognev; *Fauna of U.S.S.R., Crustacea, vol. 7, No. 5*, by Ya. A. Birstein; *Fishes of the Northern Seas of the U.S.S.R.*, by A. P. Andriyashev; *Locusts and Grasshoppers of the U.S.S.R. and Adjacent Countries, part I*, by K. Ya. Bei-Bienko and L. L. Mishchenko; *Locusts and Grasshoppers of the U.S.S.R. and Adjacent Countries, part II*, by G. Ya. Bei-Bienko and L. L. Mishchenko.

INFORMATION PROGRAM

Information activities for the past year included the issuance of 88 news releases on noteworthy events and researches of the Smithsonian. These were utilized extensively by press and other communications media throughout the country. Over 500 written inquiries and more than 1,000 telephone calls for specific information were answered. Approximately 260 visitors, many of them writers and newsmen, sought knowledge concerning the work, facilities, history, and resources of the Institution. Definite plans were made to improve information services in the coming year to meet the needs of a growing population, and to increase the effectiveness of this link between the Institution and the public.

PRINTING PROGRAM

The Smithsonian print shop, a branch of the Government Printing Office, under the immediate supervision of Murray C. Ballard operated at maximum capacity during the past year, completing 552 individual printing jobs. These assignments included labels, forms, invitations, programs, leaflets, flyers, announcements, and other printing of a current and emergency nature.

OTHER ACTIVITIES

The chief of the division continued to represent the Smithsonian Institution on the board of trustees of the Greater Washington Educational Television Association, Inc., of which the Institution is a member. He and the assistant chief of the division represented the

Institution at the annual meeting of the Association of American University Presses held the latter part of May and the first part of June at Chicago, Ill.

The Smithsonian Institution and T.F.H. Publications, Inc., of Jersey City, N.J., in May 1963 entered into an agreement to establish a restricted fund to be known as the "T.F.H. fund for the increase and diffusion of knowledge concerning fishes suitable for home aquaria." T.F.H. will donate to the Smithsonian Institution reprinted books to be sold by the Institution at not less than cost. The money derived from such sales will be earmarked for research, collection or purchase of fish specimens, explorations, and publication of scientific reports related to aquarium fishes. The first reprint under this agreement was published May 18, 1964; it is the four-volume work *The Fishes of North and Middle America*, by David Starr Jordan and Barton Warren Evermann, Bulletin 47 of the U.S. National Museum, originally issued in 1896.

STAFF CHANGES

Three new editors were added to the staff of the division during the past year: Miss Louise J. Heskett on September 30, 1963; Mrs. Nancy Link Powars on December 2, 1963; and Thomas C. Wither- spoon on April 14, 1964.

On May 18, 1964, Mrs. Jewell S. Baker was appointed administrative assistant in the division and Miss Sue D. Wallace was appointed clerk-stenographer, following the resignation of Mrs. Margaret L. Poling.

Mrs. Phyllis W. Prescott, who had assisted in editing many of the Bureau of American Ethnology publications, died on June 12, 1964, after a brief illness. She had been associated with the Smithsonian since 1942.

Respectfully submitted.

PAUL H. OEHSER,
Chief, Editorial and Publications Division.

S. DILLON RIPLEY,
Secretary, Smithsonian Institution.

Report of the Executive Committee of the Board of Regents of the Smithsonian Institution

For the Year Ended June 30, 1964

To the Board of Regents of the Smithsonian Institution:

Your executive committee respectfully submits the following report in relation to the funds of the Smithsonian Institution, together with a statement of the appropriations by Congress for the Government bureaus in the administrative charge of the Institution.

SMITHSONIAN INSTITUTION

PARENT FUND

The original bequest of James Smithson was £104,960 8s 6d—\$508,318.46. Refunds of money expended in prosecution of the claim, freight, insurance, and other incidental expenses, together with payment into the fund of the sum of £5,015, which had been withheld during the lifetime of Madame de la Batut, brought the fund to the amount of \$550,000.

The gift of James Smithson was "lent to the United States Treasury, at 6 per centum per annum interest" (20 USC. 54) and by the Act of March 12, 1894 (20 USC. 55) the Secretary of the Treasury was "authorized to receive into the Treasury, on the same terms as the original bequest of James Smithson, such sums as the Regents may, from time to time see fit to deposit, not exceeding, with the original bequest the sum of \$1,000,000."

The maximum of \$1,000,000 which the Smithsonian Institution was authorized to deposit in the Treasury of the United States was reached on January 11, 1917, by the deposit of \$2,000.

Under the above authority the amounts shown below are deposited in the United States Treasury and draw 6 percent interest:

	<i>Unrestricted Funds</i>	<i>Income 1964</i>
James Smithson.....	\$727, 640	\$43, 658. 40
Avery.....	14, 000	840. 00
Habel.....	500	30. 00
Hamilton.....	2, 500	150. 00
Hodgkins (General).....	116, 000	6, 960. 00
Poore.....	26, 670	1, 600. 20
Rhees.....	590	35. 40
Sanford.....	1, 100	66. 00
	<hr/>	<hr/>
Total.....	\$889, 000	\$53, 340. 00

	<i>Restricted Funds</i>	<i>Income 1964</i>
Hodgkins (Specific).....	\$100,000	\$6,000.00
Reid.....	11,000	660.00
Total.....	\$111,000	6,660.00
Grand total.....	\$1,000,000	\$60,000.00

In addition to the \$1,000,000 deposited in the Treasury of the United States there has been accumulated from income and bequests the sum of \$7,233,033.28 which has been invested. Of this sum, \$6,278,181.67 is carried on the books of the Institution as the Consolidated Fund, a policy approved by the Regents at their meeting on December 14, 1916. The balance is made up of several small funds.

CONSOLIDATED FUND
(Income for the unrestricted use of the Institution)

Fund	Investment 1964	Income 1964
Abbott, W. L., Special.....	\$24,177.94	\$1,082.49
*Avery, Robert S., and Lydia.....	64,101.76	2,870.00
Forrest, Robert Lee, Bequest.....	1,753,815.43	65,850.57
Gifts, royalties, gain on sale of securities.....	448,086.13	20,062.27
Hachenberg, George P. and Caroline.....	6,526.73	292.20
*Hamilton, James.....	655.07	29.32
Hart, Gustavus E.....	790.43	35.37
Henry, Caroline.....	1,962.71	87.86
Henry, Joseph and Harriet A.....	79,553.39	3,561.78
*Hodgkins, Thomas C. (General).....	49,160.26	2,201.04
Morrow, Dwight W.....	125,493.59	5,618.63
Olmsted, Helen A.....	1,301.09	58.27
*Poore, Lucy T. and George W.....	264,125.96	11,825.56
Porter, Henry Kirke.....	464,776.51	20,809.16
*Rhees, William Jones.....	767.77	34.36
*Sanford, George H.....	1,444.61	64.69
*Smithson, James.....	1,981.23	88.73
Taggart, Gansen.....	580.42	25.97
Higbee, Harry, Memorial Fund.....	19,019.89	851.59
Witherspoon, Thomas A.....	209,430.31	9,376.68
Total.....	\$3,517,751.23	\$144,826.54

*In addition to funds deposited in the United States Treasury.

CONSOLIDATED FUND—Continued
(Income restricted to specific use)

Fund	Investment 1964	Income 1964
Abbott, William L., for investigations in biology.	\$169, 186. 94	\$7, 574. 92
Armstrong, Edwin James, for use of Department of Invertebrate Paleontology when principal amounts to \$5,000.....	2, 237. 37	95. 89
Arthur, James, for investigations and study of the sun and annual lecture on same.....	64, 903. 62	2, 905. 87
Bacon, Virginia Purdy, for traveling scholarship to investigate fauna of countries other than the United States.....	81, 306. 56	3, 640. 28
Baird, Spencer Fullerton, for expenses in whole or in part of a scientific exploration and biological research or for the purchase of specimens of natural objects or archeological specimens.....	59, 500. 00	2, 663. 95
Barney, Alice Pike, for collection of paintings and pastels and for encouragement of American artistic endeavor.....	46, 546. 23	2, 083. 96
Barstow, Frederick D., for purchase of animals for Zoological Park.....	1, 622. 40	72. 62
Brow, Roland W., endowment fund—study, care, and improvement of the Smithsonian paleobotanical collections.....	52, 861. 91	2, 366. 75
Canfield collection, for increase and care of the Canfield collection of minerals.....	62, 069. 64	2, 779. 01
Casey, Thomas I., for maintenance of the Casey collection and promotion of researches relating to Coleoptera.....	20, 341. 68	910. 72
Chamberlain, Francis Lea, for increase and promotion of Isaac Lea Collection of gems and mollusks.....	45, 700. 54	2, 046. 11
Dykes, Charles, for support in financial research.	69, 869. 81	3, 128. 24
Eickemeyer, Florence Brevoort, for preservation and exhibition of the photographic collection of Rudolph Eickemeyer, Jr.....	17, 639. 63	789. 79
Guggenheim, Daniel and Florence Foundation for a commemorative Guggenheim Exhibit, an annual Daniel Guggenheim Lecture, and annual Guggenheim Fellowships for graduate students for research at the National Air Museum.....	25, 000. 00	0
Hanson, Martin Gustav and Caroline Runice, for some scientific work of the Institution, preferably in chemistry or medicine.....	14, 427. 04	645. 92
Higbee, Harry, income for general use of the Smithsonian Institution after June 11, 1967..	689. 63	78. 59
Hillyer Virgil, for increase and care of Virgil Hillyer collection of lighting objects.....	10, 665. 69	477. 54

CONSOLIDATED FUND—Continued
(Income restricted to specific use)—Continued

Fund	Investment 1964	Income 1964
Hitchcock, Albert S., for care of the Hitchcock Agrostological Library.....	\$2,560.76	\$114.65
Hrdlička, Aleš and Marie, to further researches in physical anthropology and publication in connection therewith.....	89,665.38	3,842.51
Hughes, Bruce, to found Hughes alcove.....	31,063.71	1,390.79
Johnson, E. R. Fenimore, research in underwater Photography.....	12,428.22	819.28
Loeb, Morris, for furtherance of knowledge in the exact sciences.....	141,436.88	6,332.49
Long, Annette and Edith C., for upkeep and preservation of Long collection of embroideries, laces, and textiles.....	881.16	39.46
Maxwell, Mary E., for care and exhibition of Maxwell collection.....	31,831.06	1,425.15
Myer, Catherine Walden, for purchase of first-class works of art for use and benefit of the National Collection of Fine Arts.....	32,780.17	1,467.64
Nelson, Edward W., for support of biological studies.....	38,626.19	1,682.71
Noyes, Frank B., for use in connection with the collection of dolls placed in the U.S. National Museum through the interest of Mr. and Mrs. Noyes.....	1,559.12	69.83
Pell, Cornelia Livingston, for maintenance of Alfred Duane Pell collection.....	12,029.31	538.56
Petrocelli, Joseph, for the care of the Petrocelli collection of photographic prints and for the enlargement and development of the section of photography of the U.S. National Museum.....	12,030.75	538.65
Rathbun, Richard, for use of division of U.S. National Museum containing Crustacea.....	17,260.69	772.81
*Reid, Addison T., for founding chair in biology, in memory of Asher Tunis.....	28,866.03	1,292.38
Roebling Collection, for care, improvement, and increase of Roebling collection of minerals.....	195,860.04	8,769.12
Roebling Solar Research.....	40,695.49	1,822.04
Rollins, Miriam and William, for investigations in physics and chemistry.....	242,033.39	10,599.15
Smithsonian employees' retirement.....	37,423.68	1,691.20
Springer, Frank, for care and increase of the Springer collection and library.....	29,102.46	1,302.98
Strong, Julia D., for benefit of the National Collection of Fine Arts.....	16,226.11	726.48
Walcott, Charles D. and Mary Vaux, for development of geological and paleontological studies and publishing results of same.....	778,915.07	34,842.24

CONSOLIDATED FUND—Continued
(Income restricted to specific use)—Continued

Fund	Investment 1964	Income 1964
Walcott, Mary Vaux, for publication in botany	\$93,939.64	\$4,205.91
Younger, Helen Walcott, held in trust	127,107.05	6,500.71
Zerbee, Francis Brinckle, for endowment of aquaria	1,539.39	68.91
Total	\$2,760,430.44	\$121,416.45

FREER GALLERY OF ART FUND

Early in 1906, by deed of gift, Charles L. Freer, of Detroit, gave to the Institution his collection of Chinese and other Oriental subjects of art, as well as paintings, etchings, and other works of art by Whistler, Thayer, Dewing, and other artists. Later he also gave funds for construction of a building to house the collection, and finally in his will, probated November 6, 1919, he provided stocks and securities to the estimated value of \$1,958,591.42, as an endowment fund for the operation of the Gallery. The fund now amounts to \$10,987,835.54.

SUMMARY OF ENDOWMENTS

Invested endowment for general purposes	\$5,243,151.23
Invested endowment for specific purposes other than Freer endowment	2,989,882.05
Total invested endowment other than Freer	8,233,033.28
Freer invested endowment for specific purposes	10,987,835.34
Total invested endowment for all purposes	\$19,220,868.62

CLASSIFICATION OF INVESTMENTS

Deposited in the U.S. Treasury at 6 percent per annum, as authorized in the U.S. Revised Statutes, sec. 5591	\$1,000,000.00
Investments other than Freer endowment (cost or market value at date acquired):	
Bonds	\$2,641,924.90
Stocks	3,601,024.68
Real estate and mortgages	951,406.00
Uninvested capital	38,677.70
Total investments other than Freer endowment	8,233,033.28
Investments of Freer endowment (cost or market value at date acquired):	
Bonds	\$6,032,418.24
Stocks	4,954,472.28
Uninvested capital	944.82
Total investments	\$19,220,868.62

EXHIBIT A

BALANCE SHEET OF PRIVATE FUNDS

June 30, 1964

ASSETS

Current funds:

General:

Cash:

United States Treasury current account.....	\$76,965.48
In banks and on hand.....	155,713.17

232,678.65

Investments—stocks and bonds (quoted market value \$2,020,111.00 ¹).....	2,030,531.30
Travel and other advances.....	13,983.65

2,277,193.60

Total general funds.....

Restricted:

Cash—United States Treasury current account.....	\$1,731,447.28
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Investments—stocks and bonds (quoted market value \$496,064.00) (note).....	498,641.63
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2,230,088.91

Total restricted funds.....

Total current funds.....

4,507,282.51

Endowment funds and funds functioning as
endowment:

Investments:

Freer Gallery of Art:

Cash.....	944.82
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Stocks and bonds (quoted market value \$17,404,618.00) (note).....	10,986,890.52
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10,987,835.34

Consolidated:

Cash.....	\$27,875.21
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Stocks and bonds (quoted market value \$7,924,- 024.00) (note).....	6,113,080.63
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6,140,955.84

Loan to United States

Treasury.....	1,000,000.00
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Other stocks and bonds (quoted market value \$182,068.00) (note).....	129,868.95
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Cash.....	10,802.49
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Real estate.....	951,406.00	8,233,033.28
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Total endowment funds and funds functioning as
endowment.....

\$19,220,868.62

Total.....

\$23,728,151.13

¹ Investments are stated at cost or appraisal value at date of gift.

FUND BALANCES

Current funds:		
General:		
Unexpended funds—unrestricted.....		\$2,277,193.60
Total general funds.....		<u>2,277,193.60</u>
Restricted:		
Unexpended income from endowment.....	\$1,292,324.13	
Funds for special purposes:		
Gifts.....	514,631.55	
Grants.....	1,216,815.73	
Contracts.....	(793,682.50)	
Total restricted funds.....		<u>2,230,088.91</u>
Total current funds.....		<u>4,507,282.51</u>
Endowment funds and funds functioning as endowment:		
Freer Gallery of Art.....	10,987,835.34	
Other:		
Restricted.....	\$2,989,882.05	
General.....	5,243,151.23	
		<u>8,233,033.28</u>
Total endowment funds and funds functioning as endowment.....		<u>19,220,868.62</u>
Total.....		<u>\$23,728,151.13</u>

EXHIBIT B

PRIVATE FUNDS

STATEMENT OF CURRENT GENERAL FUND RECEIPTS AND DISBURSEMENTS AND CHANGES IN CURRENT GENERAL FUND BALANCE

Year ended June 30, 1964

	Operations	Gifts	Grants	Contracts	Total
Current receipts:					
Endowment income:					
Freer Gallery of Art.....	\$648,817.36				\$648,817.36
Other restricted funds.....	139,314.31				139,314.31
Unrestricted.....	145,336.67				145,336.67
Investment income.....	111,611.32				111,611.32
Gifts and grants.....	1,426,338.48	\$901,560.79	\$5,628,739.80	\$2,533,123.31	10,489,762.38
Publications and photographs.....	169,274.93				169,274.93
Miscellaneous.....	6,801.44				6,801.44
Total current receipts.....	2,647,494.51	901,560.79	5,628,739.80	2,533,123.31	11,710,918.41
Current disbursements:					
Salaries:					
Administrative.....	694,227.39			10,474.03	704,701.42
Research.....	87,979.40	14,768.89	2,832,351.22	261,985.98	3,197,085.49
Other.....	13,123.71	56,605.24	17,546.03	9,459.87	96,734.85
Employee benefits.....	26,466.56		111,227.74	8,223.62	145,897.92
Total salaries.....	821,777.06	71,374.13	2,961,124.99	290,143.50	4,144,419.68
Purchase for collection.....	276,700.91	500,000.00	35,000.00		811,700.91

EXHIBIT B—Continued
PRIVATE FUNDS—Continued

	Operations	Gifts	Grants	Contracts	Total
Current disbursements—Continued					
Researches and exploration and related administrative expenses:					
Travel.....	\$44,046.92	\$91,819.56	\$429,785.12	\$165,459.74	\$731,111.34
Equipment and supply.....	42,578.83	5,919.46	170,515.75	67,546.67	286,560.71
Other.....	51,521.02				51,521.02
Publication and photographs.....	162,406.54	3,771.74			166,178.28
Buildings, equipment and grounds:					
Buildings and installations.....	15,685.22		3,296.92		18,982.14
Court and grounds maintenance.....	2,243.89				2,243.89
Technical laboratory.....	4,049.80				4,049.80
Rents and utilities.....			440,636.65	33,440.04	474,076.69
Contractual services:					
Computer.....			578,080.49	7,327.21	585,407.70
Subcontracts.....			13,375.00	1,606,486.61	1,619,861.61
Other services.....	155,227.33	145,830.92	605,556.22	305,350.27	1,211,964.74
Supplies and expenses:					
Meetings, special exhibits.....	20,182.57				20,182.57
Lectures.....	2,968.55				2,968.55
Photographs and reproductions.....	2,726.09	72,168.57	3,711.59		78,606.25
Library.....	4,179.27				4,179.27
Sales desk.....	12,311.96				12,311.96
Stationery and office supplies.....	14,757.97	7,338.03	249,506.31	45,970.62	317,572.93
Postage, telephone and telegraph.....	5,935.54	3,338.38	138,150.76	11,398.65	158,823.33

Employees' withholding payments, net..	(6, 753. 67)				(6, 753. 67)
Total current disbursements.....	1, 632, 545. 80	901, 560. 79	5, 628, 739. 80	2, 533, 123. 31	10, 695, 969. 70
Excess of current receipts over current disbursements, carried forward.....	\$1, 014, 948. 71				1, 014, 948. 71
Excess of current receipts over current disbursements, brought forward.....	\$1, 014, 948. 71				1, 014, 948. 71
Transfer to restricted fund.....	(10, 000. 00)				(10, 000. 00)
Transfer to endowments.....	(1, 370, 264. 44)				(1, 370, 264. 44)
Transfer from gifts and grants.....	1, 168, 314. 86				1, 168, 314. 86
	802, 999. 13				802, 999. 13
Balance at beginning of year.....	1, 474, 194. 47				1, 474, 194. 47
Balance at end of year.....	\$2, 277, 193. 60				2, 277, 193. 60

EXHIBIT C
PRIVATE FUNDS
STATEMENT OF CHANGES IN CURRENT RESTRICTED FUND BALANCE
Year ended June 30, 1964

	Unexpended income	Funds for special purposes			Total
		Gifts	Grants	Contracts	
Balance at beginning of year.....	\$1, 384, 769. 95	\$388, 800. 64	\$3, 389, 774. 30	(\$188, 644. 30)	\$4, 974, 700. 59
Add:					
Income from endowment:					
Freer Gallery of Art.....	516, 683. 51	-----	-----	-----	516, 683. 51
Other restricted funds.....	132, 605. 79	-----	-----	-----	132, 605. 79
Unrestricted funds.....	144, 826. 54	-----	-----	-----	144, 826. 54
	794, 115. 84	-----	-----	-----	794, 115. 84
Less administrative costs.....	43, 816. 77	-----	-----	-----	43, 816. 77
	750, 299. 07	-----	-----	-----	750, 299. 07
Net income from endowment.....	750, 299. 07	-----	-----	-----	750, 299. 07
Sale of publications.....	29, 741. 47	1, 446. 22	-----	-----	31, 187. 69
Gifts and grants.....	-----	822, 219. 83	4, 957, 333. 60	2, 231, 779. 47	8, 011, 332. 90

Traveling exhibition.....		225,799.13			225,799.13
Other.....	4,907.99	949.82	360.83		6,218.64
	784,948.53	1,050,415.00	4,957,694.43	2,231,779.47	9,024,837.43
	2,169,718.48	1,439,215.64	8,347,468.73	2,043,135.17	13,999,538.02
Deduct:					
Transfer to current income, net of administrative costs:					
Freer Gallery of Art.....	607,650.00				607,650.00
Other restricted funds.....	136,664.90	901,560.79	5,628,739.80	2,533,123.31	9,200,088.80
Unrestricted funds.....	145,336.67				145,336.67
	889,651.57	901,560.79	5,628,739.80	2,533,123.31	9,953,075.47
Refund of prior years' unexpended funds.....			647,816.00		647,816.00
Transfer.....	(10,349.82)	10,523.30	854,097.20	303,694.36	1,157,965.04
Income added to principal, net.....	10,592.60				10,592.60
Transfer to (from) gifts.....	(12,500.00)	12,500.00			
	877,394.35	924,584.09	7,130,653.00	2,836,817.67	11,769,449.11
Balance at end of year.....	\$1,292,324.13	514,631.55	1,216,815.73	(793,682.50)	2,230,088.91

EXHIBIT D

PRIVATE FUNDS

STATEMENT OF CHANGES IN PRINCIPAL OF ENDOWMENT FUNDS AND FUNDS
FUNCTIONING AS ENDOWMENT

Year ended June 30, 1964

Balance at beginning of year.....	\$16,086,025.07
Add:	
Gifts and bequests.....	1,211,648.50
Income added to principal as prescribed by donor.....	10,596.00
Transfer from current fund for investment.....	1,370,621.19
Net gain on investments.....	542,684.43
	<hr/>
	19,221,575.19
Less:	
Transfer to cover deficit in employees' retirement fund.....	\$349.82
Income paid to income beneficiary as prescribed by donor.....	356.75
	<hr/>
	706.57
Balance at end of year.....	<hr/> <hr/> \$19,220,868.62
Balance at end of year consisting of:	
Freer Gallery of Art.....	10,987,835.34
Other:	
Restricted.....	2,989,882.05
General.....	5,243,151.23
	<hr/>
	\$19,220,868.62

The practice of maintaining savings accounts in several of the Washington banks and trust companies has been continued during the past year, and interest on these deposits amounted to \$7,817.98.

Deposits are made in banks for convenience in collection of checks, and later such funds are withdrawn and deposited in the United States Treasury. Disbursement of funds is made by check signed by the Secretary of the Institution and drawn on the United States Treasury.

The Institution gratefully acknowledges gifts and grants from the following:

Anonymous, a gift for special purposes.

Atomic Energy Commission, a grant for research entitled "A Study of the Biochemical Effects of Ionizing and Nonionizing Radiation on Plant Metabolism during Development."

Boston University, a grant to defray travel expenses to the West Coast to study research materials.

Bredin Foundation, a grant for the support of research entitled "Biological Survey of Dominica Project."

A grant for the support of research entitled "Ocean Food Chain Cycle."

David K. E. Bruce, a gift for special purposes.

Mary Grace Bruce, a gift for special purposes.

Mrs. J. Campbell, a gift to the Zoo Animal Fund.

Department of the Air Force: Additional grant for the support of research entitled "Study of Atomic and Electronic Collision Processes which occur in the Atmosphere at Auroral Heights."

A grant for studies directed toward the development of a technique for measuring wind speed and direction at heights using ionized paths generated by meteors.

A grant for the exploration of computer techniques in the preparation of indexes.

A grant to prepare and conduct a course in operation maintenance and calibration training for seven government personnel on the Baker-Nunn Camera System.

A grant to perform numerical analysis of observational data to determine the rate of satellite period.

A grant for time standard calibrating training and consulting in support for the "Field and Precision Reduction of Baker-Nunn Film."

Department of the Army: Additional grant for the support of basic research entitled "Potential Vectors and Reservoirs of Disease in Strategic Overseas Area."

Additional grant for the support of research entitled "Mammals and their Ectoparasites from Iran."

Additional grant for support of research on the analysis of bird migration in the Pacific Area and the study of the ecology of birds and mammals on one or more Pacific Islands.

A grant for research entitled "Bio-Ecological Classification for Military Environments."

Ethyl Corporation, a gift for the S. D. Heron Memorial Fund.

Robert Lee Forrest Bequest for unrestricted use of Smithsonian Institution.

Esther Goddard, a gift to the Goddard Memorial Fund.

Robert H. Grob, a gift for the purchase of Egyptian Bronze Situla.

Guggenheim, Daniel and Florence, Foundation for a commemorative Guggenheim Exhibit, an annual Daniel Guggenheim Lecture, and annual Guggenheim Fellowships for graduate students for research at the National Air Museum.

Felix and Helen Juda, a gift to the Freer Gallery of Art, for the purchase of collections.

Joseph H. Kler, a gift for the Delaware Log House Exhibit Fund.

Landegger Foundation Inc., a gift for research entitled "The Landegger Underwater Exploration."

Link Foundation, a grant for the publication of the pamphlet "Opportunities in Oceanography."

James H. Means, a gift for the James Means and the Problem of Manflight Fund.

Paul Mellon, a contribution for the Traveling Exhibition Service.

Vera C. Murray, a gift for the purchase of two historic aircraft engines.

National Aeronautics and Space Administration: Additional grant for the support of research entitled "Optical Satellite Tracking Program."

Additional grant for the scientific and engineering study for instrumenting and orbiting telescope.

A grant for research entitled "Optical and Radar Investigation of Simulated and Natural Meteors."

A grant for research entitled "Computation of Data Reduction of S-16 High Energy Gamma-Ray Experiment."

A grant for research studies in the recovery and analysis of space fragments.

A grant for an investigation and collection of meteorites, tektites, and related materials.

National Geographic Society: Additional grant for research entitled "Link Prolonged and Deep Submergence Study Program."

A grant for research expedition to Australia.

A grant for publication entitled "Archeology of Pueblo Bonito."

National Institutes of Health: Additional grant for research entitled "Studies of Asian Biting Flies."

Additional grant for the support of research entitled "Generic Classification of the Proctotrupeoidea."

A grant for the support of research entitled "Chronic Disease in Relation to Social Efficiency."

National Science Foundation: Additional grant for the support of research entitled "Early Tertiary Mammals of North America."

Additional grant for the support of research entitled "Earth Albedo Observations."

Additional grant for the support of research entitled "Revisionary Study of Blattoidea."

Additional grant for the support of research entitled "Rare Gases in Meteorites."

Additional grant for the support of research entitled "Morphology and Paleocology of Permian Brachiopods of the Glass Mountain, Texas."

Additional grant for the support of research entitled "Tertiary Forests of the Tonasi-Santiago Basin of Panama."

- Additional grant for the support of research entitled "South Asian Microlepidoptera, particularly the Philippine Series."
- Additional grant for the support of research entitled "The Mammals of Panama."
- Additional grant for the support of research entitled "Ecology and Behavior of *Suncus murinus*."
- Additional grant for the support of research entitled "Photoresponse and Optical Properties of Phycomyces Sporangiohores."
- Additional grant for the support of research entitled "Taxonomy of Bamboos."
- Additional grant for the support of research entitled "Lower Cretaceous Ostracoda of Israel."
- Additional grant for the support of research entitled "Marine Mollusks of Polynesia."
- Additional grant for the support of research entitled "Tertiary Echinoids of the Eastern United States and the Caribbean."
- Additional grant for the support of research entitled "Monographic Revision of Carcharinid Sharks of the Tropical Indo-Pacific Oceans."
- Additional grant for the support of research entitled "Zoogeography of Southern Ocean Scleractinian Coral Faunas."
- Additional grant for the support of research entitled "The American Commensal Crabs of the Family Pinnotheridae."
- Additional grant for the support of research entitled "Prehistory of Southwest, Virginia."
- Additional grant for the support of research entitled "Indo-Australian Vespidae sens. lat. and Specidae."
- Additional grant for the support of research entitled "Support of Publication of an English Translation of Flora of Japan, by Jisaburo Ohwi."
- Additional grant for the support of research entitled "Revision of Genera of Paleozoic Bryozoa."
- Additional grant for the support of research entitled "Research of Stellar Atmosphere."
- Additional grant for the support of research entitled "Monographic Studies of the Tingidae of the World."
- Additional grant for the support of research entitled "Ethnoscience Analysis of American Ethnology."
- Additional grant for the support of research entitled "Pelagic Phosphorus Metabolism: Phosphorus-containing Compounds in Plankton."
- Additional grant for the support of research entitled "Study of Type Specimens of Ferns in European Herbaria."
- Additional grant for the support of research entitled "Polychaetous Annelids of New England."
- Additional grant for the support of research entitled "The Phanerogams of Colombia."
- Additional grant for the support of research entitled "Monograph of Parmelia Subgenus *Xanthoparmelia*."
- Additional grant for the support of research entitled "Revision of Scarab Beetles of the Genus *Ataenius*."
- Additional grant for the support of research entitled "Systemic Studies of the Archidaceae, Subtribe Epidendrinae."
- Additional grant for the support of research entitled "A Monograph of the Stomatopod Crustaceans of the Western Atlantic."

- Additional grant for the support of research entitled "Recording of Data for Specimens Collected during the U.S. Antarctic Program."
- Additional grant for the support of research entitled "Mammals of Southeastern United States."
- Additional grant for the support of research entitled "Exploration in Southern Brazil."
- Additional grant for the support of research entitled "Distribution of North America Calanoid and Harpacticoid Copepoda."
- Additional grant for the support of research entitled "Megalithic Structures of *Panope*."
- Additional grant for the support of research entitled "Collection of Meteorites and Tektites in Australia."
- Additional grant for the support of research entitled "Installation of Power Line to Barro Colorado from Mainland."
- Additional grant for the support of research entitled "European Tertiary Dicotyledon Floras."
- Additional grant for the support of research entitled "Science Information Exchange."
- Additional grant for the support of research entitled "Geographic Variation in the Inter-specific Relations among Certain Andean Passeriformes."
- Additional grant for the support of research entitled "Upper Cretaceous Inoceraminae in North America and Western Europe."
- Additional grant for the support of research entitled "Environment of Permian-Triassic Reptiles of the Order Therapsida in South Africa."
- Additional grant for the support of research entitled "Taxonomic and Biological Studies of Neotropical Water Beetles."
- Additional grant for the support of research entitled "Evolution and Distribution of *Parmelia* in Eastern Asia and Pacific."
- Additional grant for the support of research entitled "Sorting of U.S. Antarctic Research Program Biological Collections."
- Additional grant for the support of research entitled "Taxonomic Studies of the Family Stenomidae in Neotropical Region."
- Additional grant for the support of research entitled "Pre-Industrial System of Water Management in Arid Region."
- Additional grant for the support of research entitled "Effects of Displacement."
- Additional grant for the support of research entitled "Revisionary Studies in the Chilopoda."
- Additional grant for the support of research entitled "Photographic Investigation of Comets."
- Additional grant for the support of research entitled "Purchase of the Hood Collection of Thrips."
- Additional grant for the support of research entitled "Archaeological Survey of Southwestern Kansas."
- Additional grant for the support of research entitled "Taxonomic and Biological Studies on Central American Caddisflies."

Neinken Foundation, a gift for philately research.

Office of Naval Research: Additional grant to perform aeronautical research studies.

Additional grant to provide expert consultants to advise the Navy Advisory Committee.

Additional grant to perform psychological research studies.

Additional grant for the support of research entitled "Information of Shark Distribution and Distribution of Shark Attack All Over the World."

Additional grant for studies concerning the development of a proposal for an institute for laboratory of human performance standards.

A grant for research entitled "Microlepidoptera of the Island of Rapa."

A grant to conduct research on the Medusae and related organisms from the Indian Ocean Collection.

O'Neill Brothers Foundation, a gift for the purchase of rare Alaskan notes for numismatic collection.

Charles Pfizer and Company, a gift for purchase of objects for exhibits on the history of pharmacy.

Rockefeller Foundation, a grant for research entitled "Bird Virus Diseases in the Region of Belem, Brazil."

Mr. and Mrs. R. Tom Sawyer, a gift for the Tom Sawyer—Model of the first Gas Turbine Locomotive Fund.

Frank R. Schwengel, a gift toward the study of mollusks of Polynesia.

For the support of the Science Information Exchange:

Atomic Energy Commission
Department of Defense
National Institutes of Health
National Science Foundation

Jerome A. Straka, a gift for the purchase of the antique Feregham carpet.

For the support of the Taiwan Photographic Project:

Bollingen Foundation
Henry Luce Foundation
Rockefeller Foundation

Ellen Bayard Weedon Foundation, a gift to the Freer Gallery of Art for the Library Fund.

Wenner Gren Foundation, a gift for anthropological research entitled "To Aid Study of Rapid Change and Adjustment under Conditions of Shock and Territorial Displacement among Canela of Brazil."

Westinghouse Corporation, a contribution toward the dismantling and transportation of one of the original generators at the Niagara Falls Power Company.

Woods Hole Marine Biological Laboratory, a gift for marine biological research (Buzas).

Woods Hole Oceanographic Institution, a gift to provide funds to permit the participation in the International Indian Ocean Expedition.

Charles Mortiz Wormser, a gift for the Mortiz Wormser Memorial Fund.

The following appropriations were made by Congress for the Government bureaus under the administrative charge of the Smithsonian Institution for the fiscal year 1964:

Salaries and expenses.....	\$13,191,000.00
National Zoological Park.....	\$1,597,356.00
The appropriation made to the National Gallery of Art (which is a bureau of the Smithsonian Institution) was.....	\$2,138,000.00

In addition, funds were transferred from other Government agencies for expenditure under the direction of the Smithsonian Institution as follows:

Working funds, transferred from the National Park Service, Interior Department, for archeological investigations in river basins throughout the United States.....	\$254,500.00
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The Institution also administers a trust fund for partial support of the Canal Zone Biological Area, located on Barro Colorado Island in the Canal Zone.

ROBERT LEE FORREST BEQUEST

The final settlement was made during the year by the Mercantile Safe Deposit and Trust Company of Baltimore, Md., as executors of the will of Robert Lee Forrest, who died on October 30, 1962. The Smithsonian Institution was named in the will as the residuary legatee.

The distribution resulted in the following being received by and for the unrestricted use of the Smithsonian Institution:

Cash received.....	\$1,370,621.19
5,498 shares of The Borden Company, fair market value..	347,748.50

In addition to the above there was received three parcels of real property consisting of a farm known as "Java Farm," located in Anne Arundel County, Md., of approximately 360 acres; one lot and improvements located at 7-11 Chesapeake Street, Towson, Md., one unimproved lot located at 700 N. Kresson Street, Baltimore, Md. There also was received some odd lots of stock of "no value" which included 22 shares, preferred, of The Municipal Asphalt Company, 30 shares, Common, of the Municipal Asphalt Company, 100 shares of The Fast Bearing Company, and 100 shares of Medical Chemicals, Incorporated.

AUDIT

The report of the audit of the Smithsonian Private Funds follows:

THE BOARD OF REGENTS
Smithsonian Institution
Washington, D.C., 20560

We have examined the balance sheet of private funds of Smithsonian Institution as of June 30, 1964 and the related statement of current general private funds receipts and disbursements and the several statements of changes in

funds for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

Except for certain real estate acquired by gift or purchased from proceeds of gifts which are valued at cost or appraised value at date of gift, land, buildings, furniture, equipment, works of art, living and other specimens and certain sundry property are not included in the accounts of the Institution; likewise, the accompanying statements do not include the National Gallery of Art, the John F. Kennedy Center for the Performing Arts and other departments, bureaus and operations administered by the Institution under Federal appropriations. The accounts of the Institution are maintained on the basis of cash receipts and disbursements, with the result that the accompanying statements do not reflect income earned but not collected or expenses incurred but not paid.

In our opinion, subject to the matters referred to in the preceding paragraph, the accompanying statement of private funds presents fairly the assets and funds principal of Smithsonian Institution at June 30, 1964; further, the accompanying statement of current general private funds receipts and disbursements and several statements of changes in funds, which have been prepared on a bases consistent with that of the preceding year, present fairly the cash transactions of the private funds for the year then ended.

(S) PEAT, MARWICH, MITCHELL & Co.

WASHINGTON, D.C.

October 16, 1964

Respectfully submitted:

(S) ROBERT V. FLEMING,
(S) CARYL P. HASKINS,
(S) CLINTON P. ANDERSON,
Executive Committee.

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