SMITHSONIAN YEAR 1967

Smithsonian Year 1967

ANNUAL REPORT OF THE
SMITHSONIAN INSTITUTION FOR THE YEAR
ENDED JUNE 30, 1967, INCLUDING THE
FINANCIAL REPORT OF THE EXECUTIVE
COMMITTEE OF THE BOARD OF REGENTS

SMITHSONIAN INSTITUTION
Washington 1967

The Smithsonian Institution

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."

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June 30, 1967

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A listing of the professional staff of the Smithsonian Institution, its bureaus, and its offices, appears in Appendix 7.

The annual report of the Secretary of the Smithsonian Institution appears under the general title *Smithsonian Year.*

It contains the reports of the bureaus and branches of the Institution, including that of the United States National Museum. This report on the activities of its component Museums of Natural History and of History and Technology, was last issued as a separate publication for fiscal year 1964, appearing in 1965. Issuance of the annual report of the Secretary is no longer followed by appearance of a greenbound volume containing a General Appendix of articles in the sciences and the arts. The last of the old series is that for 1964.

Reprints of each of the bureau reports are available. To some of them are appended tabulated, statistical, and other information of primary interest to those concerned with the particular field covered, and which for reasons of space can no longer be carried in this volume.

SMITHSONIAN PUBLICATION 4729

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Statement by the Secretary

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S. Dillon Ripley

Some years ago, in conversation, the late Robert Oppenheimer remarked to me that he felt that men in the future would find the single area of greatest discovery in biology. Oppenheimer was of course thinking primarily of the then exciting discoveries in molecular biology, the end effects of which, while perhaps inevitably upon us, will not be revealed for many years.

As a biologist, one might now question whether there is not another area where discoveries rather than refinements await us. To me it seems that the single area which needs the greatest amount of attention from discoverers is that uncharted and almost unknown field which might be called social biology. The field is unknown and uncharted because it is not a specialty, and today most scientists are trained for narrow specialties. Biologists are concerned primarily with laboratory or field studies of animal and plant species. Sociologists are concerned primarily with the study of the origins and history and constitution of human society. In universities the departments of the two disciplines are usually in separate buildings, and in libraries the books they use tend to come from different parts of the stacks.

In fact, sociologists labor under the disadvantage of being somewhat luxated; are they scientists or are they humanists? It is a symbol of the age that they should feel thus dislocated. It is of course unnecessary. Similarly, some thoughtful biologists tend today to feel slightly uncomfortable about being scientists. Science in the public mind has come to be associated almost exclusively with the physical sciences or with medicine. Scientists are white-coated men, either possessed of a Batman-like syndrome, about to fly off into space, or else all-knowing, wise versions of Dr. Kildare. In any case, biologists who have to do

with physico-chemical processes involving the components of a single cell, or those who are involved with medical science, can perhaps feel closer to the physical scientists and to medicine.

But biologists associated with natural phenomena in gross, external terms, with population biology and the dynamics of large systems, and with much of what is today called ecology (a badly misused word in most cases) as well as paleobiologists and evolutionists—many of these sorts of biologists find themselves somewhat dislocated. Perhaps they are in danger of becoming humanists? Perhaps indeed the scientific sociologists and the humanist biologists are approaching each other, figures on a darkened and uncharted stage.

When one says that there is an area here which perhaps contains the single, greatest problem that man faces today, one is referring to problems of human survival and of morality. Here it must be said that many scientists are greatly troubled about the responsibilities and the integrity of science. Scientists and sociologists alike work in disciplines where study brings them a knowledge of the social consequences of the discovery of new technologies and of new principles about behavior. By training, however, most scientists tend to be cautious about ascribing broad implications to the results of narrowly defined and controlled experiments. Science-minded sociologists tend to have kindred feelings, and often prefer to remain aloof from the dangerous area where theoretical results are correlated with non-controlled situations.

And yet there is a responsibility to speak out. As the conditions of the environment deteriorate, as the social disorders of the age deepen, the special relationship between the scientist's social responsibilities and his general duties of citizenship grows critical. As Commoner says, "If the scientist, directly or by inferences from his actions, lays claim to a special responsibility for the resolution of the policy issues which relate to technology, he may, in effect, prevent others from performing their own political duties. If the scientist fails in his duty to inform citizens, they are precluded from the gravest acts of citizenship and lose their right of conscience."*

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*Barry Commoner. *Science and Survival*. New York, 1966, p. 130.

In 1847 Joseph Henry, meditating upon the course of the Smithsonian Institution, wrote: "To effect the greatest amount of good, the organization should be such as to enable the Institution to produce results in the way of increasing and diffusing knowledge, which cannot be produced by the existing institutions in our country." What is there that we in the Smithsonian can think upon which would illumine the basic problems confronting social biology?

There are certainly three paths along which we might travel toward illumination: one leads to the study of terrestrial environment, another to the study of our social environment, and the third to the study of man as an evolving species.

The disorder of our age is graphically illustrated by the slow degrading of man's terrestrial environment. There is something inherently wrong with man's relations with his environment. Nature suffers continually in an undeclared war. Man, animated by hunger for profit or for spectacular action, continually erodes our landscape. Many feel indeed that this is appropriate, that man and nature can never live in harmony. Thomas Hardy said, "nature and man can never be friends." Must we then kill off our enemy and in so doing kill off ourselves?

Biologists have a social duty to alert citizens to the inescapable results of such mass suicide. In this Institution we have in particular one great scientific resource to bring to bear upon this problem. Our sorts of biologists are concerned with the quality of the environment, for they are concerned with systematics, with setting into categories organisms that are inescapably a part of the particular environments within which they, as species, live. The assembled data about species in relation to their environments assumes an historic and important relevance to the environment as it is today. That is, the recordings of systematists become a series of benchmarks against which modern environments can be gauged. To put it in crude terms we know for example that the American mountain lion was exterminated from all the eastern seaboard States by the late 1800s, except for the fastnesses of Florida and parts of West Virginia and Vermont. Today the principal population of mountain lions survives precariously only in parts of the Sierra Nevada and the high mountains of the West. We also know why. We know the food habits, the predator-prey food chain, the range requirements,

the amount of "leaving alone" which a mountain lion requires in order to live and reproduce its kind. In a similar way we know the requirements of a whole series of animal and plant species, and what happened to them when these requirements were not met.

All these situations are similar in that a certain formula is involved. A proportion of one or another sets of conditions is required, without which a certain species will not occur. The declining ratio of natural to man-made conditions over the continent creates multiple effects which can be measured or simulated through models. The results, when arrayed against the resources of the planet, surely could tell us much of the ability of various species to survive. The results also tell us something of man's plasticity and tolerance, and of his ability to survive the changes he is introducing into the environment.

One of the keys to American success in foreign aid and indeed in foreign relations will be the degree to which American planners pay attention to the knowledge of environmental problems already possessed by American scientists. At present there is little if any indication that aid planners or foreign policy planners have ever heard of ecology or would know how to talk to a systematic biologist if they met one. And yet in areas of the tropical world today ecologists and systematists are far more capable of predicting the effects of change in the environment than are engineers and dam builders or agriculturists. The proposed International Biological Program—unknown to most planners or policy makers—has within it the capacity of mobilizing field biologists into a concerted effort to understand the present state of our terrestrial environment all over the world. The resulting information could be utilized in a way which might provide vital criteria, real benchmarks against which to set our standards for survival for the future. Our traditional economic and political aims, keyed to commercial development and the promotion of consumer consciousness, have blinded us to our own survival.

Another disorder of this age is graphically illustrated by the decline of social and moral values in our cities. The problems of deteriorating environment and of social disorder are related. As the landscape suffers, man becomes less humane. As Hoffer, speaking of our increased command over nature, says, "In many

parts of the world the taming of nature by rapid industrialization gave rise to degrees of social barbarization."* If man cannot live in cities as a humane individual, then he cannot survive. Thus social biologists have a duty to alert citizens to the inescapable results of urbanization.

In this Institution, a world center for anthropology, there should be a whole series of benchmarks which, interpreted by social anthropologists, could produce models of stress, crowding phenomena, aggression and hostility. Our view derived from these data could be of great use, indeed ensynoptic.

The Institution contains within it the national archives for anthropology. It is the greatest actual repository of data on American Indians. It should be the home for urgent anthropology activities throughout the world, the salvage of ethnographic and linguistic records before they become extinct. We are answering Professor Levi-Strauss' challenge to us at our Bicentennial Seminars in 1965. Already the Wenner-Gren Foundation for Anthropological Research has responded with a grant to the Institution for commencing these studies. Within these materials lie the seeds of invaluable comparative research on man's ability to survive the disorders of this age.

It may be germane here to refer to the fact that the Smithsonian's Office of Anthropology is emerging as a center of international anthropology through its organization of imaginative new programs. In the past two years the consolidation of the former Department of Anthropology and the Bureau of American Ethnology has been accomplished. A survey, in consultation with a distinguished panel of anthropologists, has helped us establish urgent tasks and set guidelines for the future. With the help of Professor Sol Tax, special advisor for anthropology, the chairman of the Office—Richard Woodbury until early this year, now Saul Riesenberg—and the curators have been planning three basic programs. One of the most fundamental of these programs is that already mentioned, in urgent anthropology. A second is a new, badly needed, cooperative project, the revised Handbook of North American Indians, which will require perhaps ten years to complete and may run to fifteen volumes. A third and unique program is in ancient technologies.

*Eric Hoffer. *The Temper of Our Time*. New York, 1967.

Using modern scientific techniques in the study of such crafts as metal working, textile manufacture, and pottery making, and working in conjunction with laboratories such as the Battelle Memorial Institute as well as our own Conservation-Analytical Laboratory, we hope for great increases in our ability to learn from archeological finds.

As an archive for anthropological science, the Smithsonian must mobilize every resource to support anthropological information exchange, cooperative teaching, and the coordination of our basic understanding of man's place in the world. In this connection we should review the possibility, raised over the years by our leading anthropologists, of creating a modern Museum of Man. The emergence of new nations, as Professor Tax has pointed out, signals the end of the era when there was "civilized man" who ruled another kind of man called "natural man," and often displayed him in a museum along with precious jewels, rocks, and dinosaurs. All cultures and all humans should be accorded equal dignity and respect, and for this they deserve a museum of their own.

Man has not changed genetically in fifty thousand years. Man is, however, extraordinarily plastic and tolerant in his individual response to life itself. The key to much of this occurs in the experience of the maturing individual. Here again this Institution has an enormous untapped resource, our visitors, who each year devotedly come in their millions, bringing their children. None of us has successfully discerned the way toward asking the questions of our visitors which might teach us of their inherent or innate interests. Here lie seeds for a fertile study which we intend to pursue. From it perhaps we may learn something of the processes of conceptualization and synthesis that lie at the very heart of the problem of the use of knowledge.

Ultimately, if we are to increase knowledge, it must be diffused. This year marks the renaissance of the Smithsonian Institution Press as an earnest of our intent to adhere to first principles. As Professor Henry envisaged, the Institution should publish treatises consisting "of valuable memoirs translated from foreign languages, or of articles prepared under the direction of the Institution, or procured by offering premiums for the best exposition of a given subject." The state of knowledge of social

biology will be enhanced this year, we hope, through the publication of the second Smithsonian Annual, the results of the February 1967 conference on "The Quality of Man's Environment," partially supported by grants from the Ford Foundation and the Taconic Foundation. The first catalog of publications of the Smithsonian Institution Press has just been issued.

Last summer, in August 1966, under the innovative leadership of Charles Blitzer, Director of the Smithsonian programs in education and training, a conference, supported by a grant from the U.S. Office of Education, was held by the Institution on the subject of museums and education. The results, edited by Professor Eric Larrabee, will be published shortly by the Smithsonian's Press. Meanwhile, a suggestion emanating from discussions at that conference is about to be put into effect. One's concern with museums is partly directed toward the problem of who goes to see them. Most people go to museums because they are already won over to the proposition that a visit is worthwhile. Many go in classes. Still others go because it is a social duty or, like taking a vitamin pill, a nostrum for culture. But many people who could be greatly benefited by going to museums—who could have latent interests aroused or who would be ripe for open education, undidactic, unstressed—never get to museums. Some live in poor neighborhoods out of which they do not travel. Some are inherently hostile toward marble palaces. The suggestion is, then, that we help a local committee in some urban area plan a neighborhood museum.

With the stimulating aid of grants from the Carnegie Corporation of New York, the Meyer Foundation of Washington, and the Richardson Fund of Connecticut, we are helping a neighborhood council to create the Anacostia Neighborhood Museum in southeast Washington. Already plans for exhibits and participation programs have been advanced by the Neighborhood Museum Committee and the Director, John Kinard. These seem full of promise and interest, and the Museum is opening officially September 15, 1967.

Another important experiment in education is that of an exhibit for the blind, or, as the term is, sightless persons. With the aid of a planning grant from the Vocational Rehabilitation Administration, Mr. Blitzer has been working with Dr. Brian

O'Doherty in planning an exhibit which will be stimulating not only to sightless but also to sighted persons.

As Professor Derek Price has recently stated, in the field of the history of science the Institution is preeminent for its resources in objects and in skilled research staff. Among its greatest treasures is a notable collection of letters and manuscripts of Joseph Henry, who was selected by the National Historical Publications Commission of the National Archives as the first scientist whose papers should be published under national auspices. It is appropriate, therefore, that the Smithsonian, in happy conjunction with the American Philosophical Society and the National Academy of Sciences, should have determined to publish the papers of Joseph Henry. Aided by a vital grant from the National Science Foundation, this project has now commenced under the editorship of Dr. Nathan Reingold. A guiding committee of associated specialists has been formed. In this connection, it has also been heartening to observe the progress made by the Institution's talented archivist Samuel T. Suratt in developing our manuscript collections for use by historical scholars.

Members of the staff of the Museum of History and Technology themselves continue to produce important work, such as Robert Multhauf's *The Origins of Chemistry* (Oldbourne, 1966). In addition, work at the forefront of modern technology continues with a comprehensive study aimed at documenting the development of the art of the computer through interviews with scientists and inventors, as well as through collecting printed and manuscript material relating to the subject.

Additional monographs of our historians include Walter Cannon's *Social History of Science in Victorian England* (to be published by Routledge and Kegan Paul); Bernard Finn's *Sources of Thermoelectricity* (to be published by Johnson); and Sami K. Hamarneh's *Catalogue of Arabic Pharmaceutical Manuscripts in the British Museum;* as well as Monte Calvert's *The Mechanical Engineer in America, 1830–1910* (The Johns Hopkins Press).

The Smithsonian Institution has been asked on numerous occasions this year to join in planning for the bicentennial observances of the American Revolution in 1976. The Secretary is a member of the Federal Council on the Arts and Humanities,

Photo Courtesy W. H. Watkins

Secretary of Transportation Alan S. Boyd (below, left) and Mrs. George H. Mahon, wife of the Smithsonian Regent, and acting Secretary James Bradley (fourth left) chat with Bill Suitor of Bell Aerosystems Company, who demonstrated (above) a rocket belt on the Mall, April 1, 1967, during the Pageant marking the establishment of the new Department of Transportation.

Photo Courtesy W. H. Watkins

At the Pageant of Transportation, Don Piccard ascended in a 50-foot hot-air balloon as Suitor demonstrated the rocket belt, and (below) the Porter Family Puppeteers entertained young people.

The Smithsonian's 1880 hotel omnibus (below) and the autos of the National Capital Region Antique Automobile Association represented stages in the progress of transportation.

The U.S. Air Force Bagpipe Band marched, and (below) the Bell Aerosystems Company air cushion vehicle Hydroskimmer was demonstrated at the Pageant of Transportation.

charged by the Congress to plan for national celebrations of an historic nature. In addition the Secretary is a member ex officio of the President's "American Revolution Bicentennial Commission." In its April 21, 1967, report, the House Appropriations Committee reiterated its desire and intent that the Smithsonian Institution shall take an active part in the celebration of the bicentennial of the American Revolution.

There are two central physical frames of reference for the Institution's participation, one the new Museum of History and Technology on the Mall, the other the authorized but still unconstructed Armed Forces Museum and Park. In the first, a series of exhibits and commemorative publications over the next eight years will gradually document the coming of the Revolution. Already, two years ago, a first exhibit was held commemorating the Stamp Act, and this year an exhibit on George Mason and the Bill of Rights was prepared. Next year an exhibit covering the Townshend Acts of 1767 and the arrival of the British Customs Commissioners will be shown. In this way, a gradual procession of special exhibits relating to the development of the Revolution will be constructed. In addition it is hoped that Congress will authorize the construction of two small special pavilions to encompass additional historic exhibits of the greatest importance for the Bicentennial year.

The National Armed Forces Museum and Park could in itself be a valuable adjunct to the visitor's traversing of the eastern seaboard from Boston to Williamsburg for the commemoration of the events of 1776. On the road from Washington via the Woodrow Wilson Bridge to Mount Vernon and on to Williamsburg, the Park, to be situated near Fort Foote, would be a valuable intermediate point. It is hoped that a series of important discussions on the causes of war and peace can be held during the next year which might help to set the themes of this Congressionally authorized museum.

In the coming year two events of artistic and historic importance will occur in Washington. The first, in the spring of 1968, will be the reopening in new quarters in the old Patent Office building of the National Collection of Fine Arts. This should be a momentous event. Moving operations, commenced in early 1967, will have consumed a year. Meanwhile, because of

the energetic work of Director David W. Scott and his staff, and because of enhanced public understanding of the role of this important art gallery, substantial augmentations to the collection have been made, most notably the S. C. Johnson Wax Company collection of contemporary American artists' works, valued at approximately a million dollars, and the Paul Manship collection, as well as many individual gifts. The National Collection of Fine Arts, now to be finally in a home of its own, will create a major new artistic influence in the life of the capital.

In the latter part of 1968 an event of historic importance will be the opening of the United States' first National Portrait Gallery. This is still an organization in its infancy, but given handsome and stylish quarters and its nucleus of important paintings and sculptural likenesses, it is the earnest hope of the National Portrait Gallery Commission, endorsed by the Regents, that the Gallery will attract gifts as well as Congressional interest appropriate to its nascent stature and central importance as a repository for historical and biographical iconography.

The work of the U.S. National Museum under its Director, Frank Taylor, is central to some of the critical problems of our age. Never before have museums enjoyed such a wealth of opportunities or faced such trials as those contained in the worldwide crisis in education and the bewildering search for life values and standards. Educators are beginning to recognize that museums provide much of the reality—lacking in classroom and books—needed to stimulate curiosity and the will to learn. Museums provide opportunities for people of all ages and conditions to continue to grow with the inspiration of the works of great artists, scholars, and patriots, the products of past and present civilizations, and the physical evidence of the wonders of nature.

On June 20, 1967, President Johnson wrote to the Secretary—in his capacity as Chairman of the Federal Council on the Arts and Humanities—requesting the Council to study the status of American museums and to recommend ways to support and strengthen them. The President's letter, which showed his awareness of both the problems and the potentialities of museums, presents us with an immensely exciting challenge:

> America's five thousand museums are among our most precious cultural and educational resources. Their collections, their trained

staffs, and their facilities contribute immeasurably to the enrichment of the nation's life and to educational advancement at every level.

Not only do imaginative museum exhibits excite the curiosity of millions; many scholars—in science, in the arts and the humanities—rely upon museum collections for their raw material.

Attendance at U.S. museums has already passed 300,000,000 visits a year. In many places, inadequate museum budgets and facilities are under severe strain. In the future, the nation's museums will be expected to reach and serve additional millions. Accelerated research programs will cause more and more scholars to seek access to museum collections.

Our museums have shown their willingness to join with other institutions to promote the "increase and diffusion of knowledge among men." Certainly they should have the wherewithal to do that great work effectively.

We are eager to respond to this challenge.

For 125 years the Smithsonian has shared its experience and resources with museums of the United States and abroad. In the past year an entirely new volume and quality of museum assistance was reached. A start was made to investigate the fundamentals of the interaction between the museum visitor and exhibited objects, and to reach, through neighborhood museums and traveling exhibits, those people who do not visit museums. Evaluation of the museum experience, experimentation with communication through senses other than sight, and a study of museum audiences and their needs, were undertaken.

The National Museum Act of 1966, passed by the Congress and approved by the President in October 1966, reaffirmed the Smithsonian's role of assistance to museums and authorized appropriations to meet needs and to study problems common to all museums. In the Act, Congress recognized that museums are important elements of the cultural and educational development of the United States.

Though no appropriations have yet been made under the Act, it has stimulated requests for aid from every State and a score of nations. In the spirit of the Act, the Smithsonian has entered into agreements with other museums to train science-museum technicians, has participated in the first Museum Conference for Small Museums, in Texas, and has provided many on-the-spot consultative services ranging from the direction of

Secretary Ripley presents photographs of Korean exhibits in the Museum of Natural History to His Excellency Il Kwon Chung, Prime Minister of Korea, at a reception in his honor in the Museum of History and Technology.

the planning of acquisitions and interpretation for a large museum department (at Oakland, California) to the structuring of a workshop on exhibits preparation for a community (in Charleston, West Virginia) of small museums which are conducted largely with volunteer services.

In cooperation with officers of the American Association of Museums representations have been made to Government agencies justifying direct Federal aid for the construction of museum facilities on the basis of the increased demands made upon museums by educational institutions stimulated by the Federal aid available to schools. In addition new Federal aid has prompted schools to take advantage of museums as supplementary teaching centers and to use them for curriculum improvement and enrichment.

At the request of the Minister of Education of the Republic of Korea and of the Director of the Pacific Science Board of the National Academy of Sciences, the Smithsonian participated in the Symposium on a Korean National Science Museum and supported the attendance at Seoul of a number of museum professionals from other institutions. The report of the Sym-

posium recommended a planning study for which the Korean Government has since appropriated the equivalent of $25,000. A newly formed foundation, The American Friends of the Korean National Science Cultural Center, under the direction of Joseph A. Patterson, former Director of the American Association of Museums, is endeavoring to obtain the balance of the support required for the study.

The attendance of the Chairman of the United States National Committee of the International Council of Museums at the ICOM Cairo Conference on Museum Exhibition was supported. Progress in the planning for a regional laboratory to produce exhibits on science and technology for developing countries was set back by the war in the Middle East. The Secretary of the Smithsonian is now a member of the ICOM Executive Committee and one of its Vice Presidents.

The cooperative publishing program with the American Association of Museums was continued, with the Smithsonian Institution Press undertaking distribution of the *Museums Directory of the United States and Canada* and with an agreement to share the cost of the publication of the revision of the manual, *Museum Registration Methods*, by Dorothy H. Dudley and Irma Bezold. A more substantial share was assumed in the work of tabulating the returns from the questionnaire on museum education which was sponsored jointly by the American Association of Museums, the United States Office of Education, and the Smithsonian Institution.

One year of use of the series of teaching exhibits on the elementary physics of light for 4th- to 6th-grade students was completed in three schools of the Fairfax (Virginia) County School System. The results obtained from these exhibits were universally approved by the teachers and principals who observed them. Many side effects resulted from the experiment, such as increasing the self-reliance of students who had their first learning experiences as individuals away from the classroom, and the stimulation of determined nonreaders to learn to read. The Prince William County Schools have requested the exhibits for next year and have undertaken to provide a thorough and credible evaluation test as part of the County's program under Title III of the Elementary and Secondary Education Act of 1965.

The Smithsonian Council assembled twice, in October and again in March, for discussions with the Secretary and members of the professional staff. Dr. Ralph E. Alston, one of the initial Council members from the University of Texas, died February 17, 1967. Jan LaRue, Professor of Music at the Graudate School of Arts and Sciences of New York University, and Elting Morison, Acting Master of Ezra Stiles College at Yale University, joined the Council during the year.

At the October meeting members discussed the development of a center for scholars in Washington and the relations of such a center to the consortium of local universities. Subcommittees met with members of the department of science and technology and heard reports of current Smithsonian activities from the National Portrait Gallery and the staff of the Office of Anthropology. Among other subjects treated by the Council were: the problem of managing special exhibits and public service projects, the selection of post-doctoral research associates, the possibility of forming a union library catalog within the center for scholars, and the extent to which museum staff members should engage in graduate-level teaching. The Secretary led a discussion of the attributes of museum scholars compared to their university colleagues and the problem of the place of museum objects in scholarship.

At the second meeting there was further discussion of the Smithsonian libraries and of the proposal for a union catalog serving all Washington libraries. The Council heard reports from Eugene Wallen on Smithsonian oceanographic activities and from Peter Farb, designer of the hall of insects for the Museum of Natural History. Frank Taylor presented a report on recent experiments in museum practices and the organizational changes indicated by a modernized exhibits program. At the dinner concluding the meetings, Mrs. Adelyn Breeskin, our distinguished consultant in modern art and education, spoke on the present role of our galleries and museums in fostering an appreciation of art.

The long continuing effort of the Smithsonian Institution and other institutions and individuals to effect United States membership in the International Centre at Rome for the Study of the Preservation and Restoration of Cultural Property has made notable progress. The Department of State has said that

it will support United States membership in the Centre (which is an international organization of member states) and suggested that the Smithsonian undertake to obtain the legislation authorizing the membership. To this end the Smithsonian held a number of meetings of representatives of interested institutions and agencies who have indicated a uniform support of U.S. membership. The legislation necessary to authorize membership has been drafted for introduction in Congress during the current session. Both the United States and the Centre would gain from U.S. membership and the worldwide task of preserving cultural objects and paintings would be greatly aided by an increase of research, training, consultation, and the dissemination of knowledge of advances in scientific conservation.

A start has now been made in developing the Arts and Industries building as the renamed Smithsonian Exposition Hall. Exhibits which are outside the scope of the interests of particular Smithsonian elements but which have substantial social interest were held: the exhibit of work of the young men and women of the Job Corps was one; another was the collection of present day appliquéd *molas* produced for sale by the San Blas Indians.

The Smithsonian Institution's Traveling Exhibition Service has circulated 108 exhibitions during the year, including the tremendously successful "Art Treasures of Turkey." Among its innovative projects, the Service has implemented an art program for District of Columbia schools on a matching-fund basis with with the National Endowment for the Arts, through the D.C. Recreation Department. Seven schools were involved, with seven exhibitions redistributed five times.

The general public's insatiable quest for information on every subject was reflected again this year in letters of inquiry and letters transmitting items for identification. These communications, coming particularly from elementary and secondary students and numbering 250 to 275 a week, were received and processed through the Office of the Registrar. Dinosaurs remained the most popular subject, with American Indians running a close second, followed by Stradivarius violins, coins, and requests for information on early Americana. The NBC Smithsonian television series generated a sizable influx of questions relating to the subject matter of the programs. Typically, one

young man wrote, "I love your television shows but I like the one on meteorites best. Please send me . . . ."

The shipping office completed a most active year, having processed 14,947 incoming and outgoing pieces, totaling 1,079,702 pounds. Among the interesting and significant types of cargo handled were 16,000 pounds of whale bones and skulls carried by motor freight from California; the 15,000-pound El Taco, Campo del Cielo meteorite, shipped back to the Smithsonian from Germany after cutting, and later, by special arrangement, returned to Argentina together with a model of the original specimen; and a collection of Mexican coins weighing 4,000 pounds that was successfully moved by combined air and armored car service on a rigid schedule and security basis. Valuable pieces of art for the National Collection of Fine Arts' special shows, a 25,000-pound McMillan synchrotron, a chariot dated 1825, and a fragile Flemish marquetry cabinet were also transported through careful and painstaking efforts of the staff.

Maintaining the high quality and level of exhibits productivity of the past several years, the Office of Exhibits of the United States National Museum opened six new permanent exhibition halls to the general public during the year—including the first two halls of the Institution's unique Growth of the United States exhibition in the Museum of History and Technology, a comprehensive visual survey of every aspect of United States history. In addition, the Office completed supplementary portions of 25 other permanent exhibition halls and produced 29 temporary and special exhibits—some of them of major national and international importance, such as the special exhibit on Chile, in conjunction with that country; the large-scale Alaska Centennial exhibit; the World Exposition of Photography exhibit; the Vinland Map exhibit, which with its accompanying symposium drew scholars from all over the world; and the breathtaking Wedgwood exhibit, produced in conjunction with the 1967 Wedgwood International Seminar.

Continuing in its role of service for the development and application of exhibition techniques throughout the museum world, the Office of Exhibits received into its laboratories—for purposes of observation, instruction, and advice—more than 200 professionals from museums all over the United States and more than a score of foreign countries.

The Bill (H. R. 6125) authorizing the construction of a new Air and Space Museum building on the Mall was signed by President Johnson on July 19, 1966. This legislation expanded the name officially to National Air and Space Museum and, among other provisions, also expanded the membership of the Museum's Advisory Board to include all Federal and Defense Agencies dealing with aerospace activities. During the year the President appointed an additional civilian member, Mr. James Wilmot of Syracuse, New York.

Since no construction funds have yet been considered by the Congress, budgets for current operations are being held at levels approximating those of prior years, seriously restricting efforts to build up the necessary professional staff and to improve the character and quality of current exhibits. Within the available dollar and manpower limitations, however, work has progressed toward sorting, preserving, and cataloging specimens for display and documentary material for inclusion in the growing historical research center. The Museum has also acquired for its aerospace collections a number of new specimens of importance.

An important step in this direction was taken in March 1967 with the signing of a joint agreement between the Smithsonian Institution and the National Aeronautics and Space Administration, as a result of which the historically important air and space artifacts developed by NASA will be transferred to the National Air and Space Museum after technical evaluation. To allow this program to get under way, NASA provided a $200,000 fund on a nonrecurring basis.

A number of nationally important aerospace award ceremonies were held in the Smithsonian during the year. These included two presentations of the Robert J. Collier Trophy; the 1965 award to the late Dr. Hugh Dryden and Mr. James E. Webb, and the 1966 award to James McDonnell. The Smithsonian's own Langley Medal was presented to Dr. Wernher von Braun on June 6, 1967.

Central to the issue of the new Museum are two questions of importance to scholars of the future. The first revolves around the presentation of the exhibits, which must be creative and stimulating, revealing to the layman and the specialist alike new insights into man's quest for mastery of the air. At the same time the Smithsonian's Air and Space Museum, if it is to be appropri-

Kite-flying contest on the Mall, sponsored by Smithsonian Associates and National Air and Space Museum, March 25, 1967. It was preceded by a lecture series and workshop conducted by curator Paul Garber, who described the national origins of kites, their types, technical characteristics, and role in the development of the airplane. Exhibit in Museum of Natural History rotunda displayed kites—68, of 20 different types from 18 nations. Contest winners demonstrated their kites at the Pageant of Transportation, April 1.

ately creative and innovative, must become a pioneer force in a new aspect of history, the history of air and space. Little is being done in the Nation at large, either with archives and records or with objects, to create such a branch of history—the history of aeronautics as a branch of the history of science and technology and of social history. In conjunction with other Smithsonian scholars, the Air and Space Museum staff should prepare for teaching and the publication of research in this new field. A tangible incentive to such activity has been the receipt this year of a most generous bequest from the estate of Mrs. Juanita Ramsay, late widow of Admiral DeWitt Clinton Ramsay, the income of which may be used to support publications in the field of historical scholarship in aviation. Much more of this needs to be creatively attempted if the Air and Space Museum is to live up to its important obligations.

In this year the Joseph H. Hirshhorn collection has formally come under the aegis of the Institution. A site on the Mall for this unique new museum and sculpture garden has already been authorized by Congress; the architect, Gordon Bunshaft, is at work; and funds for operation have already been appropriated by the Congress. Abram Lerner has been appointed Director of the new gallery and has continued his busy role as curator of the collection in preparing materials for loan, one of which, a collection of 53 pieces of sculpture, is currently on exhibition at Dartmouth College (see *Sculpture in Our Century;* selections from the Joseph H. Hirshhorn collection, 1967, Hopkins Center, Dartmouth College, Hanover, New Hampshire). Mr. Hirshhorn is continually adding important works to the collection. Since the formal presentation of the collection to the United States, an abbreviated list of acquisitions includes works by Cassatt, Cornell, Stuart Davis, Ernst, Falguiére, Fontana, Sam Francis, George Grosz, Ipoustéguy, Zoltan Kemeny, Moore, Nadelman, Nicholson, Olitski, Picasso, Pomodoro, Rauschenberg, Rodin, Sargent, Sheeler, and Frank Stella. Mr. Hirshhorn's continued enthusiasm and personal spirit and energy know no bounds. The Nation will long have cause to remember him.

In some of the Institution's special science fields the past year has been one of notable achievement. In the work of the Radiation Biology Laboratory, a "first" has been the successful measuring of the relative sensitivity of the control of growth and

bending responses of moss cells by various regions of the visible spectrum. These data, obtained by plant physiologist Bernard Nebel, indicate that light control occurs through continuous excitation of both absorbing forms of the well-known pigment system phytochrome. This role of phytochrome has not been reported previously, and may have general significance in understanding plant development under natural environmental conditions.

Plants were grown under newly developed artificial light sources having a constant color quality but capable of mimicking natural daily variations in sunlight intensity and daylength. Normal daylength responses, such as time of flowering, known to occur in these plants, were greatly altered, depending upon the direction of incremental change in daylength. For example, the critical photoperiod to induce flowering could be changed by several hours depending upon whether the daily photoperiod was decreasing or increasing. Such data, obtained by Laboratory Director William Klein, assisted by plant physiologists Leonard Price and Victor Elstad, indicate that the concept of a specific critical photoperiod for any given species of plant may be incorrect, and these data may change entirely our present views of the mechanism of light control of flowering.

During the winter a graduate-level seminar series of 13 lectures in photobiology attracted an average of 160 participants weekly. Experts in the major areas of photobiology lectured and then informally answered questions and discussed their current research. The program was jointly supported by the Smithsonian and the Consortium of Washington Area Universities. Graduate credit was offered and new research interests of both students and professionals were greatly stimulated.

At an ecology seminar held with a visiting group of ecologists from the University of Michigan, led by Professor Lawrence Slobodkin, biochemist David Correll of the Radiation Biology Laboratory suggested a new method for measuring gross primary productivity in aquatic ecosystems. The method involves the measurement of the rate of incorporation of ^{32}P-phosphate into imidodiphosphate compounds, which are the first products of photophosphorylation in algae. Combined with net primary productivity, as measured by ^{14}C-carbon dioxide incorporation or bomb calorimetry, an estimate of the efficiency of primary

productivity could be obtained. The proposed determinations of productivity would be rapid and could be applied to streams, lakes or oceanic situations, a suggestion which should be of immediate value to the International Biological Program.

The appearance of Professor Slobodkin and his students for a week-long visit provided a welcome infusion of vigorous discussion into the Smithsonian laboratories. As he himself observed, "The Smithsonian, like almost all institutions concerned with pure research, stands permanently balanced between emphasis on intellectual quality, intellectual styles and social demands. With luck these three can be served simultaneously. Sufficiently profound intellects create intellectual currency, both by refusing to become bogged down in trivial problems, and by refusing to deal with any problems in trivial ways. At the same time socially significant problems are typically difficult to solve and therefore constitute interesting challenges to important intellects."

This Institution has been remarkably lucky to hold on to a talented staff. One of the increasingly difficult problems is the continued falling behind of laboratories, such as those of the Smithsonian, in the competition with the universities to hold distinguished intellects. Civil service salaries, while still roughly equivalent for certain categories of scientists, are woefully deficient in the area of the social sciences (which includes anthropology) as well as in the humanities. Government-salaried employees of the Smithsonian of faculty rank outside the scientific categories are treated like proverbial stepchildren under present Government regulations. The universities, in spite of their own financial difficulties, continue to beckon with important grants, surrounding facilities, and amenities ranging from guaranteed tuition support for scholars' children to the most extraordinary appeals to personal idiosyncrasies and desire for academic prestige.

Above all there are the students, for better or worse, a constant lure and an intellectual stimulus. This Institution strives constantly to make our laboratories and field stations available to students at all levels, knowing how crucial such interactions can be not only for the staff but also for the students themselves, and our desire is to expose them to the specialties

in science and related scholarly fields uniquely developed in the Institution. Last year some 86 students were brought to the Smithsonian for extended periods of research; others visited in special groups such as the rewarding visit of the Michigan ecologists. Visiting research appointments were given to 19 distinguished postdoctoral scientists and scholars.

One of the great national resources of the United States is the National Herbarium, maintained in the Museum of Natural History. Since the days when it sponsored Asa Gray's classic *Synoptical Flora of North America*, the Smithsonian Institution has been an important contributor to our knowledge of indigenous plants of North America. Now it is joining in a large international project that will utilize its vast collection of dried specimens and library sources in a brand new effort to survey the American flora. When the American Society of Plant Taxonomists on August 14, 1966, decided to organize the "Flora North America Project," Stanwyn G. Shetler was named executive secretary, and the Smithsonian Institution agreed to serve as headquarters for the Secretariat. In his new capacity, Mr. Shetler has spent considerable time during the year laying groundwork for the project. In January 1967 the first meeting of the nine-man editorial committee was held in the department of botany to establish the framework of the project and to appraise its financial and manpower requirements. The project, which is being sponsored and managed by the American Institute of Biological Sciences, will be a fifteen-year, cooperative effort by American and Canadian taxonomists to produce a four-volume manual of the 15–20 thousand native vascular plants of North America north of Mexico. In addition to the publication which will result, the project is expected to result in the training of many new taxonomists and to attract many potential young students in the field. With the completed *Flora U.S.S.R.* for the Soviet Union and the developing *Flora Europeae*, which together will cover all of Eurasia, this new North American treatise will fill the last gap in our knowledge of Boreal and Arctic floras of the world.

Another of the great resources of the Natural History Museum is its historic strength in marine biology collections, both recent and fossil. A study of the taxonomically difficult and very

poorly known coralline red algae in the eastern North Atlantic has kept Walter H. Adey aboard ship for most of the year. This is part of a broader study of the systematics and ecology of these algae in the entire North Atlantic area from the Tropics to the Arctic. During the past year, Adey has worked in Iceland, Scandinavia, and the British Isles; he will next proceed south to the Canary and Cape Verde Islands, and thence westward to the tropical Caribbean area.

Crustose corallines are the dominant benthic organisms in shallow northern waters. In the Tropics, however, they are frequently prime contributors to reef formations. Being calcified, they are potential fossils, and as such they are potentially important time-stratigraphic and paleoecological indicators. In the 130 years since their plant nature was generally understood, the group has had only two major students—largely because of their heavy calcification and the difficulty of preparing them for study.

The study includes data from investigations of the anatomy, cytology, and morphology, with conclusions being drawn on a population basis. In addition to demonstrating a number of hitherto unrecognized but important cytological, anatomical, and morphological characteristics, Adey has been able to obtain for the first time quantitative ecological data for crustose corallines and to show correlations with physical variables, especially temperature and substrate. In addition to the materials which he is obtaining from shipboard, he spent the winter months, when it was not practical to work at sea, studying type materials in Scandinavian museums.

The Smithsonian Institution has long been concerned with the problems of classification and identification of nonhuman primates. The dramatic and still-increasing use of such animals in medical research and other scientific studies has exposed repeatedly the confusion and inadequacy of primate classification. In the latter part of 1967 the Smithsonian Institution will establish a center for the study of primate animals from the viewpoint of their morphology, anatomy, genetic constitution, paleontology, and behavior. Professor John R. Napier, from the University of London, has been invited to participate with the Institution in organizing such a program, which will benefit both European and U.S. institutions of higher learning, mu-

seums, primate centers, and biomedical research units generally. As it is currently planned by Napier and curator Charles O. Handley of the Smithsonian, the proposed center would include both research and service functions; for example, a standard checklist of names and a preliminary guide to the identification of primates will be prepared as quickly as resources permit. At the beginning, systematic or taxonomic studies will be concerned with those nonhuman primates of most immediate concern to the various research centers in Europe and in the United States. In the future, studies will be undertaken of the comparative external structure of these animals, their behavior as it relates to taxonomic problems, breeding patterns, and such techniques as may be appropriate from physiology, serology, and cytology. Ultimately, a descriptive manual of the primates is anticipated.

Under the direction of Dr. Handley, two field groups continued the work of the Smithsonian Venezuelan Project in the eastern and southern part of that country. They collected mammals, their ectoparasites, blood sera, and biological and ecological data. More than twenty scientists in six countries are participating in this project with the cooperation and support of several Venezuelan scientific organizations.

Through the generosity of Mr. and Mrs. William S. Cowles, who contributed their airplane and their time as pilots, it was possible for Handley to make an aerial ecological survey of Venezuela. Covering about 10,000 miles from the air, Dr. Handley studied variations in vegetation and terrain that might affect the distribution of mammals, as a means of further refinement of the Venezuelan project.

The United States National Museum, beginning in 1964, has been attempting to pioneer the use of computer techniques for information retrieval as an aid in handling collections. During the past year curator James A. Peters has become actively concerned in the development of computer programs directly applicable to systematic research in the department of vertebrate zoology and in the Museum of Natural History generally. Three teletypes installed in the Museum permit direct access to a commercial computer located outside the Institution. Peters and others have written programs, permitting rapid calculation of

standard statistical values, which have already made it possible to carry out analyses previously impossible because of the amount of time required. Peters is also developing a computer-key to the genera of snakes of Latin America, about 75 percent of which are already included. Insertion into the computer of basic data on a new collection results in a print-out of the correct generic name in less than four seconds by the use of the computer-key. In at least some areas of biology, keys of this kind may permit rapid sorting and preliminary identification of collections by research assistants.

Along the same lines, the Pacific Ocean Biological Survey Program, in collaboration with the Smithsonian information systems division, has developed a data-processing program for the analysis of sea bird observations. The data base now includes more than 100,000 observations of sea birds in the Pacific, along with associated oceanographic and meteorological data.

During the past few years the theory of sea-floor spreading and continental drift has received strong support from oceanic geophysical evidence, especially from magnetic surveys across the midocean ridges. This theory, long accepted by Southern Hemisphere geologists, is becoming for the first time widely accepted by geologists in the Northern Hemisphere. Samples collected by William Melson and colleagues at St. Paul's Rocks on the mid-Atlantic Ridge have been radiometrically dated by Stanley Hart at the University of California, La Jolla. The results indicate that St. Paul's Rocks is an exposure of an extremely young intrusion, and since sea-floor spreading entails constant formation of new oceanic crust along the mid-Atlantic Ridge, the zone at which rifting and spreading should occur, the young age of St. Paul's Rocks is clearly consistent with the theory of sea-floor spreading and of continental drift. This conclusion is a part of Melson's study of the rocks from the mid-Atlantic Ridge, directed toward tracing the development of the oceanic crust.

In astrophysics the results of a comprehensive space-age survey of the world, using artificial satellites as triangulation points, have been published in a special report by the Smithsonian Astrophysical Observatory. The three-volume, 686-page

report, "The Smithsonian Standard Earth,"* provides one of the most accurate representations of the earth's geometrical figure and gravitational potential ever made. The ten-year satellite geodesy project is the first to complete a circumferential measurement of the globe by means of simultaneous observations of satellites. Intercontinental distances are determined with an accuracy of better than 50 feet, as compared with previous errors measured in hundreds of feet. Based on more than 40,000 precise satellite observations made by the Observatory's network of Baker-Nunn tracking cameras, the research was done as part of the National Geodetic Satellite Program and was supported by the National Aeronautics and Space Administration.

The "Standard Earth" will serve as the foundation for all future geodetic research at the Observatory. Also, it will provide a basic reference book for scientists engaged in other international programs of satellite geodesy. The data may be used for calculation both of distances between points on the surface of the earth and of irregularities in the earth's gravitational field. The geodetic reference points established by the "Standard" also may help investigators studying the history and composition of the earth's interior.

In the 1966 *Smithsonian Year* there is a brief discussion of the Institution's classic and historic interest in its own environment, the Washington Mall. This year has seen a continuation of the program of keeping that environment alive and vital. This we have attempted in the past two years in conjunction with the Master Plan for the Mall as well as the operations of overall stewardship being constantly undertaken by the National Park Service. It is important to recognize that buildings are not simply entities in themselves, set down haphazard in an alien environment. Rather, if they develop a strong interplay with the landscape, both are benefited, both come alive.

One of the most interesting examples of this principle occurred over the July Fourth weekend of 1967, when the Institution—aided by the State Art Councils of Oklahoma,

*Published as *Smithsonian Institution Astrophysical Observatory, Research in Space Science, Special Report 200,* edited by Drs. Charles A. Lundquist and George Veis, 1966.

Arkansas, and Virginia; the State of New Mexico; Alaskan Airlines; the State of North Carolina Travel Council; the Southern Highland Handicraft Guild; the Navaho Tribal Council; and the Iowa Tourist Council—held a folk festival on the Mall adjacent to the Museum of History and Technology. As Congressman Thomas M. Rees of California said in the Congressional Record (July 20, 1967, H 9160–1), "For the first time, thousands of people, over 430,000, experienced a live museum which exhibited the art of American folklife and they loved every toe-tapping minute . . . . Basket weavers, pottery makers, woodworkers, carvers, doll makers, needleworkers, tale tellers, boat builders, and folk singers, dancers, and musicians from all over the country were brought to remind Americans of their heritage—still a living part of our nation. In this day of the frug and jerk Americans need to be shown what their own culture has produced and continues to produce."

Within—in the Museum—the tools, the products of craft work, the musical instruments hang suspended in cases, caught in beautifully petrified isolation. Without, for the space of a few hours they came alive in the hands of specialists from all over America, many of them proponents of a dying or little-known craft or musical art. In all of this, the great sight was the quiet and immense satisfaction of the people who came to watch and listen, sitting around and taking it all in, while their children romped nearby on the grass. It was a moving spectacle and one that underscored the principle that a museum, to be a museum in the best sense of the word, must live and breathe both within and without.

Folk Festival on the Mall: Mrs. Ambrose Roanhorse, Navajo rug weaver, Window Rock, Arizona; and (below) Mr. Bea Hensley, blacksmith, Spruce Pine, North Carolina.

FOLK FESTIVAL ON THE MALL: Mrs. Margaret Coochwytewa (far left), Hopi basketmaker, Second Mesa, Arizona; and (below) McGee Brothers, folk musicians, Nashville, Tennessee.

This page: Mr. Herman Benton, scoopmaker, Livingston Manor, New York; Mr. James Miracle, chairmaker, Middlesboro, Kentucky; and Mr. Dewey Harmon, whittler, Boone, North Carolina.

FOLK FESTIVAL ON THE MALL: Freedom Quilting Bee, Tuscaloosa, Alabama; and (below) Mr. Norman Miller, potter, Sprott, Alabama.

STAFF CHANGES

A number of senior positions throughout the Institution were filled during the year. Charles L. Clapp was appointed Assistant to the Secretary for problems concerned with development. He had been associated with the Institution for five years as the legislative assistant to Senator Leverett Saltonstall, a former Regent of the Smithsonian.

Carl Fox joined the Institution as Director of the Museum Shops. During fifteen years as manager of the Brooklyn Museum sales shops, Mr. Fox became widely respected throughout the museum field for the excellence of his sales exhibitions. More recently he served as international art curator for Hallmark, Inc.

The Secretary appointed Abram Lerner to be the first Director of the Joseph H. Hirshhorn Museum and Sculpture Garden. Mr. Lerner has been the curator of the Hirshhorn collection for ten years and earlier he was associate director concurrently for two New York City museums: The American Contemporary Arts Gallery and the Artist's Gallery.

Dr. Donald Menzel, retiring Director of the Harvard Observatory, recently joined the Smithsonian Astrophysical Observatory as a senior physicist. The Observatory gained the services of another senior physicist, Dr. Winfield W. Salisbury from the Varo Manufacturing Company, Garland, Texas, who will work on applications of advanced electronic techniques to astrophysical problems.

Dr. Brian Mason, after serving for twelve years as the chairman of the department of mineralogy at the American Museum of Natural History, joined the Museum of Natural History as research curator in the division of meteorites, in the department of mineral sciences.

James R. Morris came to the Institution with a background in operatic singing and theatrical production to direct the division of performing arts. This new unit was formed to assist the existing performance activities of the museums, to develop new performance programs related to the museum collections and the subjects of scholarly investigation conducted by the curatorial staff. Outdoor performances on the Mall will be a special responsibility of this division.

Mrs. Helen L. Hayes has joined the Assistant Secretary (Science) to serve as his special assistant. Before coming to the Smithsonian, Mrs. Hayes was Head of the Oceanographic Biological Program in the Office of Naval Research.

Robert R. Engle came from the District of Columbia government to aid the Assistant Secretary with engineering and architectural review of plans for the Institution's many construction and renovation projects.

After directing the Public Information Office since September 1965, B. Richard Berg resigned to accept the position of Vice President of

Lindenwood College in St. Louis, Missouri. John Whitelaw was granted a ten-month leave of absence to accept a fellowship for study of Congressional operations awarded by the American Political Science Association.

During the year several members of the staff were lauded for their contributions to the Institution. James Bradley received the Exceptional Service Award, the highest award bestowed by the Smithsonian. Special mention was made of his efforts on behalf of the National Air and Space Museum and the Joseph H. Hirshhorn Museum and Sculpture Garden. Frank A. Taylor was commended for his role as statesman of the museum world as a result of the enactment of the National Museum Act by which Congress has recognized the cultural and educational importance of museums.

Also deserving of special recognition are Charles Blitzer, for his direction of the experimental neighborhood museum, and William W. Warner, for his skillful negotiation of international research agreements in the Smithsonian Foreign Currency Program.

Three members of the staff who left the Institution for professional advancement last year should be mentioned. Dr. William L. Stern, chairman of the department of botany, has accepted an appointment to the department of botany, University of Maryland. Peter Morse, acting curator in the division of graphic arts, has joined the Honolulu Academy of Fine Arts. In September 1966, G. Carroll Lindsay left the Institution after serving for four years as the Director of Museum Services and more recently as Executive Secretary of the Smithsonian Associates. He has become the Director of Museum Services for the New York State Museum.

Through retirement our professional staff has lost the valued services of Henry B. Collins, archeologist in the division of cultural anthropology; Paul S. Conger, associate curator, division of cryptogams, department of botany; and Richard Ettinghausen, head curator of Near Eastern art at the Freer Gallery of Art, who has joined the staff of the Institute of Fine Arts at New York University.

SMITHSONIAN MEDALS

The Smithsonian's Hodgkins Medal was awarded twice in 1967: on February 15 to J. Grahame Clark, Disney Professor of Archeology in the University of Cambridge; and on April 26 to Fritz W. Went, Professor of Botany at the University of Nevada Desert Research Institute.

Professor Clark, who received the award "for outstanding contributions to the knowledge of the physical environment bearing upon the welfare of man," was cited as one—

Whose archeological studies of settlement and land use in Western Europe have illuminated the cultural influences of biological and physical factors in man's environment;

Whose insights into the mute objects of prehistory have extended to the entire phenomenon of man; and

Whose teaching and research have contributed to maintaining the unity of anthropology in all its aspects.

Professor Went was cited as a scientist—

Whose discovery of the photochemical transformation of plant volatiles led to an understanding of the phenomenon of blue haze, a form of atmospheric pollution observable in nature as well as in the landscapes of Leonardo da Vinci;

Whose perfection of the phytotron for precise control of experimental environments increased our understanding of daily and seasonal rhythms in the life of plants;

Whose research on growth substances contributed to the earliest knowledge of hormonal control of plant growth in relation to environmental variables; and

Whose enthusiasm and example have inspired generations of students and scientists of the environmental physiology and ecology of plants.

The Smithsonian's Langley Medal was awarded on June 6, 1967, to Wernher von Braun, Director of the George C. Marshall Space Flight Center, National Aeronautics and Space Administration: "In recognition of his creative vision of the practical application of rocket power to space flight leading to the first U.S. satellite, and of his technical leadership in development of the Saturn class of large launch vehicles upon which the Apollo moon flight is based."

THE BOARD OF REGENTS

The membership of the Board of Regents was changed upon the retirement of Senator Leverett Saltonstall in December 1966. The Board at the May 1966 meeting recorded its gratitude to Senator Saltonstall for his distinguished service as a Regent from January 1949 to December 1966. The Members of the Board expressed their admiration for his dedication to the Nation through his many years of public service.

Senator Hugh Scott of Pennsylvania was appointed as a Member of the Board of Regents on January 12, 1967. Senator Scott is a recognized expert on Chinese art and is a member of the Oriental Art Committee of the Philadelphia Museum of Art.

The present membership of the Board is given on page iii.

The annual meeting of the Board of Regents was held in the Presidential Room of the Museum of History and Technology on January 25, 1967. After the meeting the Regents dined in the newly com-

RECORD OF VISITORS DURING FISCAL YEAR 1967

JULY 1, 1966–JUNE 30, 1967

1966	*Smithsonian Building*	*Arts and Industries Building*	*Museum of Natural History*	*Air and Space Building*	*Freer Gallery of Art*	*Museum of History and Technology*	*Total*
July	165, 841	257, 547	454, 285	252, 829	29, 365	753, 545	1, 913, 412
August	185, 794	303, 231	466, 456	298, 573	36, 059	875, 825	2, 165, 938
September	56, 788	93, 163	155, 393	88, 276	16, 896	349, 938	760, 454
October	57, 461	80, 509	167, 290	66, 893	12, 727	334, 442	719, 322
November	58, 989	85, 193	190, 620	66, 038	13, 421	295, 808	710, 069
December	32, 936	41, 990	108, 580	32, 729	7, 988	175, 658	399, 881
1967							
January	38, 422	47, 991	127, 972	39, 270	9, 832	173, 460	436, 947
February	38, 625	60, 439	128, 127	47, 552	8, 269	194, 185	477, 197
March	91, 649	142, 981	272, 601	118, 509	18, 579	398, 948	1, 043, 267
April	105, 866	176, 335	422, 198	153, 625	19, 943	701, 111	1, 579, 078
May	89, 266	155, 643	446, 402	144, 865	20, 005	606, 617	1, 462, 798
June	98, 675	193, 851	470, 033	175, 263	19, 836	686, 565	1, 644, 223
Total	1, 019, 812	1, 638, 873	3, 409, 957	1, 484, 422	212, 920	5, 546, 102	13, 312, 586

pleted hall of the series depicting the growth of the United States. Curator of political history Keith E. Melder spoke on the American Revolution Bicentennial Commission and Director Robert P. Multhauf of the Museum of History and Technology spoke on the new hall.

The spring meeting of the Board of Regents was held on May 24, 1967, in the Regents' Room of the original Smithsonian Institution Building. At the conclusion of the meeting an informal dinner was held in the Great Hall.

FINANCES

Federal funds appropriated to the Institution for its regular operations for the fiscal year ended June 30, 1967, totaled $22,730,000 and were obligated as follows (Appendix 1 contains a report on the private funds of the Institution):

Astrophysical Observatory	$1,638,000
Education and Training	342,000
Freer Gallery of Art	34,000
International Activities	60,000
International Exchange Service	128,000
National Air and Space Museum	454,000
National Armed Forces Museum Advisory Board	125,000
National Collection of Fine Arts	677,000
National Portrait Gallery	449,000
Office of Ecology	118,000
Office of Oceanography and Limnology	268,000
Radiation Biology Laboratory	394,000
Tropical Research Institute	304,000
United States National Museum	7,504,000
Research Awards	400,000
Office of the Secretary	369,000
Management Support	432,000
Buildings Management Department	6,648,000
Administrative Services	2,344,000
Unobligated	42,000

VISITORS

Visitors to the six buildings comprising the Smithsonian complex on the Mall this year totaled 13,312,586, of whom 4,079,450 came in July and August. The greatest number of visitors for a single day was 98,847 on April 1, 1966. The tabulation on page 40 gives a summary of attendance records for the six buildings. The National Zoological Park had an estimated 4,937,615 visitors during the year. This figure, added to the attendance in the Institution's buildings on the Mall, and to the record 1,510,967 at the National Gallery of Art, brings the total Smithsonian attendance for fiscal 1967 to 19,761,168.

PUBLICATIONS AND ADDRESSES

The scientific papers of the secretary are listed on pages 51 (ecology) and 152 (ornithology). The following addresses and statements were made by him:

Remarks on the occasion of receiving the Management Achievement Award from the Washington, D.C., Chapter of the Society for the Advancement of Management, June 9, 1966.

Our people and their cities. Urban America Conference, September 11, 1966.

The research administrator: An intellectual barometer of our changing science. U.S. Civil Service Commission Seminar for Executives in Science Programs, September 19, 1966.

Address to the Foreign Service Institute, October 5, 1966.

Address to the Smithsonian Conference on Tropical Biology, November 10, 1966, Panama City, Republic of Panama.

The complexity of the environment. Smithsonian Symposium on The Quality of Man's Environment. February 18, 1967.

Publications and speeches by members of the Secretary's staff included the following:

Ritterbush, P. C. Institutions of science. Address, Science Policy Research Programme, Lund University, Lund, Sweden, September 17, 1966.

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Smithsonian Activities

Natural Sciences

Smithsonian Office of Ecology

HELMUT K. BUECHNER, *Head*

HUMANITY IS BEING JOLTED into a sharp awareness of its environment. We are concerned over the polluted air we breathe. We are concerned over the physiological effects of biocides in the food we eat and the accumulation of strontium-90 in our bones. We are concerned over the mental stresses that develop from living in overcrowded and deteriorating cities. As a result, we are entering a new era, scarcely imagined 25 years ago, in which society is facing the urgent need to adjust patterns of human culture to the physical and biological limitations of the earth's ecological systems.

For the average citizen, ecology is fast becoming a household word, as increasingly it is being demonstrated to him that man is in nature and is a part of nature. No longer can he regard himself simply as a separate creation divinely appointed to manipulate nature at will. He now begins to understand that a human society with its total environment functions as an integrated whole in nature—that is, as an ecological system, or ecosystem.

ECOLOGY: from the Greek oikos, abode, dwelling; the study of interrelationships among living organisms (as individuals, populations, and communities) and their environments.

He sees, moreover, that with his modern technology man is capable of massive environmental manipulations that were unimagined even a few years ago; and because he is told that such changes are usually irreversible and can adversely affect the lives of future generations as well as his own, he now senses the importance of seeking scientifically valid means of predicting the consequences of any alteration in the ecosystems of the world.

He begins to recognize, in short, that he must increase his scientific understanding of whole ecosystems, taking man as an essential component, if he is to establish a viable basis for the cultural and intellectual development of human society. Leading humanists, scientists, and

Congressmen have for some time been keenly aware of this and of the adverse ecological changes occurring throughout the world today, and they express mounting concern lest the quality of human life deteriorate to an unbearable degree through improper management of the environmental systems which sustain it.

We openly admit that between man and his total environment unstable relationships have formed, and that under the twin pressures of an expanding economy and of excessive self-constricting population growth, competition for the finite resources of the earth almost inevitable results in their misuse.

Having accepted the fact that human society is an integral part of the earth's ecosystems and that the resources of its environments are limited, what then must we do? If the critical problem facing humanity today is the ecological one of harmoniously relating human societies to sensitive environments of finite scope and potential, we are forced to conclude that the growth of human society must henceforth be measured mainly in terms of quality rather than of quantity. The problem, in its most restricted form, lies within the domain of the natural sciences. Indeed, from one point of view, we can regard ecology as the most recent scientific outgrowth of natural history. But in its most general form the problem involves all the dynamics of man-in-society. Here it is that ecological principles are confronted with those of economics, political theory, law, and education—indeed, with all the institutions and organized structures of knowledge that deal significantly with the social reality. Clearly, the problem is too intricate and too important for the ecologist alone to solve.

Putting in perspective the present destructive influences of man on his environment, and ultimately on his own society, requires a new approach involving a synthesis of relevant knowledge from the humanities and behavioral sciences as well as from the natural sciences. Eminent contemporary intellectuals have already pointed out that we need a new science, ecologically oriented but not ecology in its traditional sense. The subject matter of the new science is human society and its total environment. If we think in terms of levels of biological integration—the molecular, cellular, organismal, population, community, and community-plus-environment levels—then we must regard the highest and most complex level as that dealing with the human dimension, where human society and its containing environment exist as a functioning whole in nature. We have seen that in molecular biology, near the bottom of the spectrum, spectacular advances in our understanding of the genetic code have resulted from the integration of ideas found in chemistry, physics, mathematics,

and biology. Can we expect anything less exciting and significant to grow out of our concentration upon the highest levels of organization, at the other end of the spectrum, where the penalty of ignorance may well be irreversible and devastating change?

The challenge is enormous and the difficulties immense. In view of the complexity that presents itself, even at the lower levels of biological integration, the task of building a conceptual structure that would enable us to deal effectively with the upper regions of the spectrum, and with the spectrum in its entirety, seems almost overwhelming. Some have remarked that the highest ecosystem level is not only more complex than we think it is, it is more complex than we *can* think.

Yet the problem is often one of perspective; and if we are to face our work squarely, we must make every effort to rid ourselves of that form of cultural nearsightedness which obscures the total design of the canvas even while it brings the details into focus. For example, the cycling of radioactive particles or pesticides through plants and animals into man—who released these destructive contaminants in the first place—is an ecosystem phenomenon, the attributes of which involve decisions in the minds of men as well as the physical movement of these substances through the air, water, soil, and living organisms. Thus, recognizing that human values and the motivating forces of economics and politics can contribute directly to the structural and functional characteristics of ecosystems in which man is the dominant force, it is clear that one must direct thought and research toward searching out the unique and possibly controlling phenomena—in this case, man's cultural behavior—that operate at whatever level in nature is under study.

Within this broad context of the search for solutions to contemporary ecological problems relevant to or embracing modern society, the Smithsonian program in ecology is evolving. Its primary goal is to advance basic ecological theory at all levels of biological integration, but its emphasis is upon the largely unexplored higher levels—on such areas as populations and communities of animals, on vegetation as a structure or pattern of plant communities, and on communities-plus-environments as total ecosystems. It seeks particularly to study ecosystems that are least modified by man. These are natural complexes and are self-maintaining when human interference does not intrude upon the regulatory processes enough to cause the system to deteriorate; they can therefore provide the means to understand and measure the effects of such interference. This type of undisturbed area is becoming increasingly rare in our day and, without protection from man's activities, it will soon disappear.

The Smithsonian program of ecology also, therefore, encourages and practices conservation, which has two aspects—the aesthetic and the scientific. With the aesthetic aspect all are familiar—so familiar, in fact, that the arguments in favor of preserving unmolested the beauty of the land elicit something like a conditioned reflex, and we dutifully nod our approval.

But with the other aspect—the scientific values of conservation—we are much less familiar. From a scientific point of view, conservation means preserving the capacity of ecosystems to support rich and varied forms of life. This is a matter of biological necessity if we are to maintain a diversity of environments in which it is not only possible to live but also in which it is worth living. The natural area, so-called because the works of man are not significant elements in its composition, is an outdoor laboratory and, as such, it is the only apparatus by which we can gauge the changes that occur in the regions dominated and modified by man. These reserves are the only frame of reference we have. In them we can make observations with a minimum of disturbance, or carry out controlled and carefully recorded environmental manipulations to determine how ecosystems actually function in nature. This sort of research contributes to our ability to predict the consequences of man's alteration of his environment.

The Smithsonian Institution encourages, and aids where possible, the establishment of natural areas for research, education, and as a means of communicating ecological ideas to society. The Chesapeake Bay Center for Field Biology, under the administration of the Office of Ecology, reflects this interest and activity. Such areas must be under the best protection that society can provide through its laws and institutions; and the 120 years of Smithsonian tradition in preserving objects of cultural and scientific importance provides assurance that natural areas, which might be thought of as outdoor museums, will be saved in perpetuity for science and society.

While emphasis is placed on the higher orders of biological integration and on the conservation and study of natural ecosystems generally, the Smithsonian ecology program also includes species-oriented ecology, and the biological problems related to urban development are not excluded. And although research is given priority, the ecology program is also deeply committed to education and to the diffusion of sound ecological information throughout society. In this sphere its efforts are directed toward constructing a conceptual framework, drawing upon the humanities, the behavioral sciences and the natural sciences, that will enable man to deal purposively with his world on the level of human-society-plus-its-total-environment. To gather these strands together, research is being linked with university education at

home and abroad, and contemporary ecological thought is being transmitted through lectures, seminars, and publications.

If we accept the thesis that advancement of scientific theory about ecosystems and man's place in these systems is oriented primarily around the understanding of how they actually behave in nature, then with sufficient knowledge about how ecosystems work, we may be able to manage them in the best interests of society by manipulating the controlling (or regulatory) processes. Increasing our understanding of how an ecosystem works requires two general types of research.

One type of research is concerned with basic descriptions (1) of the physical, chemical, and biotic components of the system; (2) of the structural and functional relationships of these components to each other and to the system as a whole; (3) of the variations of the system in time and space; and (4) of the environmental relationships of the system to other ecological systems. The total systems approach, embracing climate, soils, hydrology, vegetation, and animal life (including man), provides a foundation for studies of regulatory processes. These basic descriptions require a solid foundation in the taxonomy of the species components: precise identification of plants, animals, and other organisms is fundamental to the advancement of ecological theory. Basic descriptions also include preliminary interpretations. These concern, for example, the ecological interrelationships of the component populations, the cause and effect of changes in vegetation and its associated animal life through time, or the influence of upwelling ocean currents on the productivity of marine life—and in turn they often generate ideas for further studies on the functions and processes of ecosystems.

As was pointed out earlier, ecology is sometimes said to be the scientific outgrowth of natural history. In the ecology program of the Smithsonian a strong foundation for research concerned with basic descriptions is provided by the vast collections and the enormous bank of taxonomic knowledge in its Museum of Natural History, a bank to which the Smithsonian has contributed for over 100 years through its expeditions into the virgin areas of the Western States, the Arctic regions, the Tropics, and elsewhere throughout the world.

The massive task of curating the collections from these expeditions leads naturally into systematic and evolutionary biology, and as a consequence, taxonomists have often become so specialized in the systematics and biogeography of their own particular group of organisms that they have had little time or inclination to explore the significance of ecological studies. Ecologists, on the other hand, have often tended to underestimate the importance of these basic descriptions and the significance of systematic biology and ecology at the species

level. A related objective of the Smithsonian ecology program, therefore, is to bridge the gap that has developed between systematists and ecologists and to renew the close relationships that formerly existed between these two disciplines. Obviously, such interdisciplinary integration is essential if we are to increase our knowledge of how ecological systems work in nature.

The second type of research required to increase understanding of how ecosystems work is concerned with interpretive, ecosystem-oriented studies rather than basic descriptions. Examples of such studies would be (1) the role of social behavior, or the significance of predator-prey relationships in the numerical regulation of animal populations; (2) the principles of vegetation change; (3) the flow of energy through the system as expressed in rates and amounts of primary and secondary productivity; (4) the cycling of mineral nutrients; or (5) the consequences of man's environmental manipulations. These examples point the direction in which the new quantitative ecology is developing. These are the studies at the higher levels of biological integration, although usually below the level of human-society-plus-environment, that excite ecologists intellectually, even though they are often without direct consequence to society.

To sum up: the Smithsonian program in ecological research embraces both basic descriptions and ecosystem-oriented studies. It emphasizes studies of significance to both ecological theory and to the understanding of man's place in nature. Its aim is to form a small group of scholars, each of whom will advance knowledge significantly in his own specialty—be it vegetation science, animal behavior, the dynamics of animal populations, or the energetics of ecosystems—and who will also help construct a new interdisciplinary framework that will enable us to assemble a broad spectrum of knowledge relevant to the current ecological problems of our society. By this means, it is hoped, a viable scientific basis can be established for maintaining and improving the quality of man's environment.

In this challenging new era of multiple, competing demands and shifting perspectives, the Smithsonian Institution, as a privately endowed organization with strong governmental relationships, serves as an important focal point for both national and international programs in basic research and education in ecosystem-oriented ecology.

Further ideas and additional information on the evolving program in ecology at the Smithsonian Institution may be found in the following

articles, some of which were in press as this report was written. (Reprints are available through the Smithsonian Office of Ecology.)

Buechner, Helmut K., and Fosberg, F. Raymond. A contribution toward a world program in tropical biology. BioScience (August 1967), vol. 17, no. 8, pp. 532–538. There is an urgent need to study the energy-rich tropical ecosystems, both to evolve new ecological theory and to provide the foundation of knowledge required for sound management of the Tropics in man's best interest. This article is a report on a Conference on Tropical Biology held in Panama in November 1966.

Ripley, S. Dillon. A perspective of the Smithsonian program in ecology. National Parks Magazine (October 1966), vol. 40, no. 229, pp. 10–13. This is the first published statement on the Smithsonian program in ecology.

———. The future of environmental improvement. *In* Environmental improvement (air, water, and soil), pp. 85–93. Washington: The Graduate School, U.S. Department of Agriculture, 1966. The holistic concept of the ecosystem as an open-energy system, with human society as an integral component is examined in this article, along with other fundamental ideas relevant in this emerging era of environmental awareness.

———. The challenge of adapting human societies to arid environments. *In* Arid and semi-arid lands—a preview: A symposium held in conjunction with the inauguration of President Grover Murray as eighth president of Texas Technological College, October 31–November 1, 1966, pp. 23–31. Lubbock, Texas: International Center for Arid and Semi-Arid Land Studies, publ. 1, 1967. In a context that views man, fire, and grasslands as evolving together, thoughts are focused on man's expansion of deserts through overgrazing, on the ecological problems of irrigation, and on programs of international education and research.

———. Perspectives in tropical biology. BioScience (August 1967), vol. 17, no. 8, pp. 538–540. The compelling scientific reasons and the social responsibilities for studying tropical biology are presented.

Ripley, S. Dillon, and Buechner, Helmut K. Ecosystem science as a point of synthesis. Daedalus (fall 1967), vol. 96, no. 4, pp. 1192–1199, 1967. Ecosystem science is defined in terms of levels of biological integration and points of view, and the ecological viewpoint is suggested as an integrative theme for a new orientation of knowledge in the context of contemporary world problems.

INTERNATIONAL PROGRAM IN ECOLOGY

Surveys of opportunities for ecological research have been initiated in countries where Public Law 480 funds are available. The objective is to make initial contacts with scientists, with university and government officials, and with other relevant persons in the country to

explain the Smithsonian program, obtain cooperation, and determine their interests in ecosystem-oriented ecology. Opportunities are sought for research in basic principles and concepts concerning the dynamics of animal populations, vegetation change, primary and secondary productivity, the cycling of nutrients, demography, numerical regulation of populations with emphasis on social behavior, and ecological anthropology.

Although emphasis is placed on ecosystem-oriented research, species-oriented ecology and environmental physiology are also included, and insofar as possible all research is in meaningful context to society. Through these preliminary surveys, programs of interrelated projects within and between countries can be developed. With this information at hand, scientists in U.S. institutions, including the Smithsonian, whose research interests echo the opportunities in the foreign countries, are sought out to develop specific research projects.

Under the program of surveys of opportunities, Jagmohan Sing Maini, of the Canada Department of Forestry, visited his native India for six weeks in April and May; professor George A. Petrides of Michigan State University extended his attendance at the International Conference on Tropical Ecology in New Delhi for preliminary talks with Indian scientists; and Kai Curry-Lindahl of the zoology department, Nordiska Museet and Skansen, Stockholm, Sweden, and Walter Leuthold, Zoological Institut, University of Zurich, Switzerland, completed a survey during May and June in the Republic of the Congo (Kinshasa). Ecological research in the Congolese National Parks and equivalent reserves is of special high priority. Charles H. Wurster, Department of Biological Sciences, State University of New York, Stony Brook, Long Island; George M. Woodwell, Brookhaven National Laboratory, Long Island, New York; and George E. Watson visited Israel in early April to initiate arrangements for studies of the effects of pesticides on bird populations, with special attention to the movements of pesticides through selected arid and irrigated ecosystems in Israel.

Preparations were completed for Robert L. Fleming, a postdoctoral student from Michigan State University, and Robert H. Horwich, a postdoctoral student from the University of Maryland, to spend one year in India as consultants to the Smithsonian Office of Ecology, during which time they will initiate long-term research in avian migration and mammalian behavior. These studies are related to the interests of Smithsonian scientists.

In Ceylon a three-year research project on the behavior and ecology of elephants has been initiated by John F. Eisenberg, resident scientist

at the National Zoological Park, and Helmut K. Buechner, using Public Law 480 funds. This research is directed primarily toward basic principles in ethology, but it will also provide the scientific foundation for conservation practices that are compatible with the development of forestry and agricultural resources. A grant from the World Wildlife Fund provides for salaries and equipment not covered by Ceylonese currency, and a gift of two Land-Rovers by the Fauna Preservation Society of London solved the problem of transport. Field work was initiated in late January 1967 by Eisenberg and his predoctoral student George M. McKay, of the University of Maryland. Fred Kurt, a postdoctoral student from the University of Zurich, joined the project in March.

A two-year research project on systematic botany, palynology, and vegetation was also initiated in Ceylon in January by F. Raymond Fosberg, special advisor on tropical biology. Field work is under way by Dieter Mueller-Dombois, a vegetation scientist from the University of Hawaii, and Peter Comanor, a postdoctoral student of palynology from Rutgers University, on a project complementary to that of the study of elephants, in that it provides a basis for studies of food habits and vegetational relationships of the elephant.

An effort is being made to involve Ceylonese students in these studies. Excellent relationships have been established with the faculty at the University of Ceylon, with relevant Government agencies (wildlife and forestry), and with the Wildlife Protection Society of Ceylon.

The studies in Ceylon are now being expanded by Eisenberg and research associate Suzanne Ripley of the National Zoological Park to include a comprehensive study of the biology of primates, with emphasis on behavior, and a study of the behavioral relationships of man to elephants. The latter study by Ripley, an anthropologist, is likely to be as significant in the conservation of elephants as the studies of their behavior and ecology.

In Brazil, where there are no Public Law 480 funds, ecologically oriented, interdisciplinary investigations of the Amazonian biota are evolving rapidly under a cooperative program between the Smithsonian Institution and the Instituto de Pesquisas e Experimentação Agropecuarias do Norte (IPEAN) at Belém, Brazil, under the guidance of Philip S. Humphrey, chairman of the department of vertebrate zoology. This program was initiated by funds from the Office of Ecology, which continues to provide financial support.

In Africa the Smithsonian Office of Ecology provides partial support for an ecologically oriented taxonomic survey of mammals being conducted under the direction of Henry W. Setzer, associate curator of mammals.

Vegetation on eroded hills (above) surrounding a Korean village in the DMZ Study Area recovers remarkably after being protected from fuel-gathering for 14 years. Normally 60 percent of the rainfall in Korea occurs during the growing season, favoring rapid recovery of vegetation on watersheds.

Buechner, continuing his investigations on the territorial behavior, reproduction, and ecology of the Uganda kob, one of the African antelopes, has in preparation a major manuscript summarizing the results of earlier work. His paper, "A Preliminary Estimation of Energy Flow in Uganda Kob," prepared jointly with Frank B. Golley of the University of Georgia, was presented at a conference of the International Biological Program in Warsaw, in late Summer 1966.

In Korea, under a contract with the U.S. Air Force Office of Scientific Research, a long-range program of research has been initiated, using as an ecological baseline a study area immediately south of the demilitarized zone. This area has been rigidly protected over the past 14 years, and provides a key to understanding man's impact on Korean environments. Following a visit to the DMZ study area by Buechner, Talbot, Fosberg, Smithsonian field representative Edwin L. Tyson, and Harold J. Coolidge of the Pacific Science Board, National Academy of Sciences, Tyson began working with scientists at various universities in Korea to prepare a five-year plan of research for presentation to granting agencies.

Curator of insects Ke Chung Kim, of the University of Minnesota, spent January 1967 in Korea as a consultant for the Smithsonian Office of Ecology to assist with the development of the five-year plan. Tyson and Kim were able to draw together 55 project proposals that will form the basis for a unified program of research in the study area. This is the beginning of a 25-year program in ecosystem-oriented ecology, the objective of which is to acquire knowledge about environmental relationships of living organisms, including man, as a basis for achieving stable relationships between human societies and the natural resources of Korea. By providing the basic scientific information required to assist Korea in its efforts to become self-sufficient, the program has relevance to the preservation of our own natural resources here in the United States.

In other countries, opportunities to conduct short-term research or planning studies for long-range investigations in environmental physiology and ecosystem ecology are provided under a contract with the U.S. Air Force Office of Scientific Research.

Thus there begins to emerge at the Smithsonian Institution an international program in ecological research in which ecologists in the United States can collaborate with scientists abroad to develop ecological theory, to foster graduate studies, and to help construct a scientific foundation for the harmonious adjustment of human societies to the environments of which they are integral parts.

CHESAPEAKE BAY CENTER FOR FIELD BIOLOGY

The Johns Hopkins University and the University of Maryland have joined the Smithsonian Institution in establishing the Chesapeake Bay Center for Field Biology (CBCFB) for ecological research and the education of graduate students. This cooperative arrangement increases the effectiveness of an interdisciplinary research program by enlarging the pool of scientific talent. It is an open-ended consortium that may be joined by other universities as the program evolves.

The Center is located about 7 miles south of Annapolis, Maryland, on the western shore of the Bay. Under Smithsonian ownership, it consists of about 700 acres of land, including over 10 miles of undeveloped shoreline, that are preserved effectively for a program of studies extending indefinitely into the future. The abandonment of about half the area from agriculture more than two decades ago provides unusual opportunities to study changes in vegetation and associated animal life. With its relatively undisturbed areas of mature forest, salt marshes, eroding bluffs, sandy beaches, and shallow estuaries, the CBCFB constitutes an ecological baseline against which to compare other systems in this rapidly changing region, and offers a variety of opportunities for long-term ecological studies. The research information produced can be applied in the development of both environmental standards and the construction of models for determining the effects of man's accidental or premeditated environmental manipulations in the vicinity of Washington.

Populations of Foraminifera are being studied at the Center and elsewhere in Chesapeake Bay by Martin A. Buzas, associate curator of invertebrate paleontology. The purpose of these studies is to understand the factors influencing distribution, numbers, and the structure of recent populations of Foraminifera as a basis for interpreting the characteristics of fossil populations and reconstructing their environments. The systematics of estuarine mollusks are being studied by Joseph B. Morrison, associate curator of mollusks. Other marine invertebrates collected with the mollusks are being preserved for other research workers. The effects of wintering waterfowl on mollusks and other bottom organisms of estuaries are being studied by Kyle R. Barbehenn, Director of the CBCFB. His principle study at the Center concerns the concepts of stability of populations and intercommunity interactions between the small mammals of a salt marsh and the adjoining forest. The social organization of the forest community of small mammals is apparently more integrated than that of the marsh community, and therefore more resistant to invasion and more

moderate in annual fluctuation of numbers as compared to the mammalian community of the marsh. The marsh community of small mammals seems to be more strongly influenced by severe weather, while the numerical regulation of the forest community depends more on intrinsic behavioral mechanisms.

George E. Watson, curator of birds, with the assistance of Jan Reese is conducting studies on the dynamics of populations of ospreys and great blue herons on Poplar Island. The determination of recruitment rate and mean annual adult mortality rate of these populations is particularly significant since these predators concentrate quantities of insecticides large enough to influence reproduction and mortality. Both birds are keys to evaluating the influence of man's activities in contaminating ecological systems with insecticides.

Sedimentation, with emphasis on the estuaries, is being studied by Jack W. Pierce, curator of sedimentology, using remote-sensing techniques from aircraft and satellites as well as conventional methods.

The archeology of the Center and vicinity is being studied by Henry T. Wright, of the University of Michigan Museum of Anthropology, under the direction of Smithsonian curator of anthropology Clifford Evans. After a survey of sites, limited explorations will be made to determine the activities of early man in the region.

The effects of the considerable increase in numbers of whistling swans on Chesapeake Bay are being studied by William J. L. Sladen of Johns Hopkins University. Apparently these swans feed extensively on soft-shelled clams and submerged aquatic plants. Movements of these swans within the Bay area and during their migrations back to the Arctic breeding grounds are being traced by means of color-marking with dyes, and it is hoped that biotelemetric techniques can be employed. Studies of the estuarine ecology, including the distribution of submerged aquatic vegetation, water quality with respect to temperature, salinity, dissolved oxygen and carbon dioxide, and mineral nutrients, are being conducted by Charles H. Southwick and his students from Johns Hopkins University. The frequent luxuriant growth of milfoil and its sudden, unexplained disappearance is of particular interest and significance. The estuaries at the Center are being compared with other estuaries in Chesapeake Bay, especially those of Back and Middle Rivers near Baltimore, each of which seems to have its own particular character.

Investigations being conducted by the faculty at the University of Maryland include Jack P. Hailman's investigations of the causes and mechanisms of change in bird populations in correlation with vegetational change. Epidemiological studies of free-ranging and confined

The Chesapeake Bay Center for Field Biology provides the only natural area on the western shore of Chesapeake Bay against which to measure man's influences on the estuaries and adjacent lands of the Bay region.

The water's edge around Fox Point (opposite and below) frequently includes salt marsh. From Locust Point (above) the Chesapeake Bay can be seen across the Rhode River.

populations of rodents and investigations of the parasites of catbirds are being conducted by Leo A. Jachowski, Jr. A survey of the insect fauna and studies on specific groups of insects are being conducted by Donald H. Messersmith and William E. Bickly. The behavior, and the underlying neurophysiological mechanisms thereof, of the turkey are being studied by Wolfgang M. Schleidt to clarify hypotheses on the innate behavior of birds. A major objective of this research is to determine how various behavioral elements are integrated into a system that serves to control social structure and its relation to the environment.

It is intended that the ecological systems at the CBCFB become taxonomically and ecologically among the best known in the United States, and that research conducted here will contribute toward understanding both the mechanisms that underlie changes in vegetation and associated animal life and the processes that control populations and the stability of ecosystems. Such knowledge will not only have significance in ecological theory but also be of practical importance to the management of natural systems in man's best interest.

The flora and fauna are being studied by Smithsonian systematists. Research is concerned with not only lists of plants and animals but also the genetic variability and ecologic relationships of the species present. An initial survey of the vascular plants has been completed by Daniel Higman under the direction of Stanwyn G. Shetler, associate curator of phanerogams, and the floristic survey is now being extended under the direction of Mason E. Hale, curator of cryptogams. Over 1000 specimens, representing 520 species of plants, have been collected, and an ecologically annotated list with keys has been completed. The floristic studies provide the groundwork for research on the principles of vegetation change, knowledge of which is essential for the management of vegetation for forestry, wildlife production, control of watersheds, landscaping highways and open spaces, and right-of-way maintenance. Sufficient evidence has been accumulated in the North Temperate zone over the past 25 years, particularly by Frank E. Egler, Director of Aton Forest at Norfolk, Connecticut, to challenge seriously the concept of a 3- to 5-stage pattern of succession in which one community creates an environment less favorable to itself and more favorable to the succeeding community. Egler is collaborating with the Smithsonian in testing his hypothesis of "Initial Floristic Composition" at the CBCFB. According to this concept, vegetational change results primarily from the disseminules (fruits, seeds, roots, rhizomes) already present on the site at the time of a major change such as abandonment of cultivation. Vegetation at the Center lends itself well to these studies of the underlying mechanisms of change.

CONSERVATION

The Smithsonian Institution is actively engaged in international conservation of nature and natural resources. Lee M. Talbot, Smithsonian field representative for international affairs in ecology and conservation, is collaborating with E. M. Nicholson, convenor of the terrestrial conservation section of the International Biological Program (IBP), in the development of a worldwide program in conservation. Under this program an effort is being made to establish a world network of nature reserves and to evolve international cooperation in conserving natural resources. The Smithsonian Institution may ultimately be engaged in assisting with inventories of plant and animal components of these selected natural ecosystems and the necessary basic general descriptions of physical characteristics, vegetation, and animal life. The IBP provides opportunities for attracting funds to support such inventories, and to support research by systematists and ecologists in connection with descriptions of these sites. Smithsonian scientists have a tradition of devotion to conservation of natural resources, and they now lend their strong support to the world conservation effort under the IBP.

TROPICAL BIOLOGY

A program in tropical biology is evolving under the guidance of special advisor Fosberg. In November a conference, in Panama, on tropical biology was sponsored by the Smithsonian Institution, supported by a grant from the Air Force Office of Scientific Research, with the objectives of (1) drawing the attention of the scientific community and the public to the urgent need for providing a scientific foundation for the preservation of the productivity of the world's energy-rich tropical systems and (2) obtaining advice and guidance from scientists as to the role of the Smithsonian in helping to develop an effective world program in tropical biology. A report on this conference appeared in the August 1967 issue of *BioScience*, and some of the results are discussed in the report of the Smithsonian Tropical Research Institute (p. 171).

EDUCATION

The Office of Ecology is concerned with education in ecology at American universities. As the United States emerges into its new awareness of the relevance of environmental relationships to man's future, we are caught in a critical shortage of ecologists at all levels of the subject matter. The formal consortium of the Smithsonian Institution, The Johns Hopkins University, and the University of Maryland for mutual cooperation in research and education at the CBCFB is one mechanism through which students are being attracted into the field of ecology.

In a study of education and research programs in ecology at American universities the Office of Ecology is determining (1) how the Smithsonian program in ecology can complement university research programs, (2) how to develop joint programs to attract young scientists to the field of ecosystem-oriented ecology, (3) what are the interests of both faculty and students that can be supported through the Smithsonian Foreign Currency Program, and (4) how the resources (scientists, collections, and facilities) of the Smithsonian Institution can contribute to education in the field of ecology. With this information the Smithsonian can integrate its program in ecology effectively with those of universities.

GIFTS AND GRANTS

Several gifts and grants have helped greatly in the development of the CBCFB during FY 1967. Poplar Island (about 70 acres) was given to the Smithsonian Institution by Dr. William L. Elkins, a physician from Philadelphia. This island harbors one of the few large rookeries of great blue herons on Chesapeake Bay and nearly two dozen pairs of ospreys. The land acquisition program was facilitated by generous grants from the Research Corporation and the Max C. Fleischmann Foundation. The Old Dominion Foundation provided a highly important grant for initial laboratory facilities, living quarters, equipment, and other basic requirements of the Center. At this early stage of development all this assistance is particularly meaningful.

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Office of Oceanography and Limnology

I. Eugene Wallen, *Head*

The office of oceanography and limnology, which provides coordination and assistance to scientists of the Smithsonian in their diverse studies of organisms and sediments of the World Ocean, was established separately within the Office of the Assistant Secretary (Science) in June 1966. Dr. William I. Aron was appointed Deputy Head in March 1967.

As part of its mission, the office is responsible for the operation of the Smithsonian Oceanographic Sorting Center and the newly established Mediterranean Marine Sorting Center.

Research Activities

An agreement has been reached whereby the Smithsonian research vessel *Phykos* will be jointly used with the Southern Maine Vocational Technical Institute in Portland. Under the initial one-year agreement *Phykos* will be used in Maine from Labor Day until November 15 and from March 15 through June 5. The Institute will maintain the vessel, and it will be available to the Smithsonian for the other seven months, whenever we can provide operating funds. The Institute can provide full support for short research cruises in that area during their possession of the ship and would assist in crewing the vessel during our possession.

The Coast and Geodetic Survey vessel *Oceanographer* is on an around-the-world cruise endorsed by the President. At the urging of the National Council on Marine Resources and Engineering Development, arrangements have been made for Richard Pieper (former General Motors associate of Dr. Aron) and Conrad E. Mahnken and Jack W. Jossi of the Bureau of Commercial Fisheries Laboratory in Miami to join the ship in Bombay and make comparative collections using the Hardy Plankton Recorder, the Indian Ocean Expedition Net, and the Tropical Atlantic Expedition Net. R. Glover of Edinburgh will process the Hardy samples in his Laboratory.

To the National Council on Marine Resources and Engineering Development Secretary Ripley proposed that the United States set

aside an atoll, an underwater tablemount, and a deep trench as preserves for scientific work. Investigation of possible areas centered on the naming of Rose Island in the American Samoa group, the Tonga-Kermadec Trench, and Capricorn Tablemount, adjacent to the Trench. This concept was approved by the President for implementation.

About 50 dives have been made by 15 Smithsonian scientists in nine different submarine vehicles. Although most of the dives have been for familiarization, these vehicles are of interest to many Institution staff members for biological and geological research on the origin of undersea canyons, the identity and behavior of echinoids and other bottom organisms, the identity and behavior of midwater organisms, the structure of the mid-Atlantic ridge, and many other projects. Edwin A. Link provided free use and support of his ship *Sea Diver*, his Submersible Diving Chamber, his underwater house, and Ocean Systems' new vehicle *Deep Diver* for initial experiments in the south Florida-Bahamas area.

Marine science activities under the Foreign Currency Program were initiated in Tunisia, Pakistan, India, Israel, Yugoslavia, and the United Arab Republic. Most projects have involved planning visits thus far, but firm programs have been developed in Israel and in Tunisia. Additional countries on the list are being considered as possible sources for the production of marine data. Cooperation with individual scientists has been arranged in Argentina, Australia, Brazil, New Zealand, Philippines, Ghana, Iran, Taiwan, Japan, Canada, Thailand, Great Britain, Dominica, Lebanon, and Antarctica.

Support through the Smithsonian from the Vetlesen Foundation enabled Miss Julie Booth to spend the last 18 months on Fairfax Island of the Barrier Reef, off Australia. Miss Booth has assembled photographs, notes on behavior, paintings, and specimens, most of which will come to the Smithsonian Institution.

SMITHSONIAN OCEANOGRAPHIC SORTING CENTER

The Smithsonian Oceanographic Sorting Center (SOSC) continues to act as a service organization to the scientific community by receiving, sorting, recording, and distributing marine biological, and geological specimens. It also processes material from such international expeditions as those to the Indian, Tropical Atlantic, and Antarctic Oceans. Research ships are provided with records forms to insure that specific categories of data are provided to the scientist in his evaluation of the sample. Preferred collection and preservation techniques are demonstrated by SOSC personnel aboard ships. Shipping containers and other supplies are furnished for shipboard use.

Since SOSC began operations, 34,545 samples of marine organisms and sediments have been received. From 26,717 of these samples, 15,256,659 specimens and 277,895 cc. of an estimated 2,000,000 shell fragments have been sorted to date. During the year, 6,885,151 specimens were sorted. Shipments made totaled 276, including 3,675 unsorted lots and 21,050 sorted lots, the latter containing 989,595 specimens. A total of 1,000 shipments of marine specimens have been sent during the four and one-half years of SOSC existence. These shipments included 7,650 unsorted lots and 41,823 sorted lots, the latter including 5,542,631 whole specimens and 277,895 cc. of shell fragments.

Approval by the seven Advisory Committees and/or by principal investigators has been given 254 specialists to receive biological and geological material processed at SOSC. Of these, 139 receive benthic and midwater-trawl invertebrates; 64 (50 duplicates) receive plankton groups, 80 (6 duplicates) receive fishes; 14 receive algae and 3, other plant groups; and 10 receive geological specimens.

These authorized recipients have included specialists from the United States and from 26 foreign countries: Argentina, Australia, Austria, Belgium, Brazil, Canada, Cuba (displaced), Denmark, France, Germany, Ghana, Great Britain, Hong Kong, India, Israel, Italy, Malgache, Netherlands, New Zealand, Nigeria, Norway, Puerto Rico, Singapore, Sweden, U.S.S.R., and West Africa.

With the technical advice and assistance of a specialist in systems analysis, William R. Wheeler, an ADP system was prepared to meet the specific requirements of SOSC. Standard reports will be programmed for rapid location of data on specific parameters, such as the determination of geographic areas in which given taxa have been present. Another report will list all taxa present in each sample processed at SOSC. These reports will also include information on the present location of specimens either at SOSC or at other institutions for identification and study.

With funds from the National Science Foundation, Office of Antarctic Programs (OAP), a centralized record is being assembled of all marine and terrestrial specimens collected by past and continuing U.S. expeditions in Antarctica, in accordance with provisions of the International Antarctic Treaty. A descriptive file is prepared and maintained of the ocean-bottom photographs taken from the NSF-funded Antarctic research ship *Eltanin*. Prints and negatives are duplicated and sent to scientists studying the topography and bottom communities of the ocean floor. A file of collecting permits issued by the International Cooperation and Information Program, OAP, is maintained at SOSC as a preliminary record of material removed from Antarctica.

Under the Antarctic Records Project, two SOSC staff members visited Antarctic specialists in the University of Southern California, Los Angeles County Museum, Scripps Institution of Oceanography, University of California at Berkeley, California Academy of Sciences, and Stanford University. Cataloged were small collections of Antarctic fishes, birds, and mammals at the California Academy of Sciences, deep-freeze fish collections remaining at the Stanford Museum, and various fungi now located at Berkeley. References to other collections in the West Coast area were recorded for future contacts. Under the same project, Betty J. Landrum and Harrison Sheng obtained data on Antarctic entomological collections from the Bernice P. Bishop Museum, Honolulu.

Although much of the information on Antarctic and sub-Antarctic entomological collections has been distributed to interested specialists, the remainder of the material was quite voluminous and much of it was cataloged. The records included data on over 2,200 combinations of taxa samples. The uncataloged material was estimated to include over 1,200 slides, 25 jars of an unknown number of *Acarina* specimens, and a large volume of sub-Antarctic material.

About 900 new black-and-white prints, 900 black-and-white negatives, and 59 color slides were received and processed during the year. For each of these, station data have been checked and recorded. The amount of material now processed and stored totals over 7,000 black-and-white prints, 7,000 black-and-white negatives, and 1,100 color slides from Cruises 2–27. From these more than 10,000 prints have been distributed to 22 scientists and institutions.

MEDITERRANEAN MARINE SORTING CENTER

Most of the many countries of the Mediterranean area have made or are presently making collections of marine plants and animals. Usually these countries have only a few marine specialists, and much of the knowledge that could be obtained from the specimens has, as a result, been lost to science. Also, the burden of maintaining taxonomic storage often has ultimately led to the disposal of much valuable material. This is especially unfortunate because of the expense of making the collections, the impossibility of duplicating the material, and the existence of specialists in other countries who would be willing to study the specimens. The cost of processing, moreover, has deterred most countries from sorting whole collections and distributing sorted specimens to foreign specialists. Exchange of specimens within the area has therefore been limited.

Responding to the need implicit in these conditions the Smithsonian Institution established the Mediterranean Marine Sorting Center

(MMSC) at the Institut National Scientifique et Technique d'Océanographie et de Pêche, in Salammbô, Tunisia.

Plans had been made in 1965 to create a facility that would provide sorting services in the Mediterranean-Red Sea region similar to those of the Smithsonian's Oceanographic Sorting Center in Washington, D.C. Several sites were available for the establishment of this regional center. Tunisia was chosen primarily for its location in the central Mediterranean and because of the enthusiasm shown by the scientists and Government of Tunisia to cooperate with the Smithsonian Institution in this project.

Representatives of the Smithsonian Institution met with Tunisian government officials in late 1965 and mid-1966, and with the assistance of the Embassy of the United States, an agreement to establish the Mediterranean Marine Sorting Center was signed in September 1966. The Director of the host Institut, Dr. Z. Ben Mustapha, has, since the early planning stages, provided indispensable assistance and guidance. The Institut is situated on the Gulf of Tunis, twelve kilometers north of Tunis, at the traditional site of the important and ancient seaport of Carthage.

The Center offers its services to marine scientists of all countries, especially in the Mediterranean area. New collections, or collections that have been partly worked, are processed by MMSC. These are sorted to specimen groups which are then distributed to specialists for study. Identified series of specimens ultimately return to MMSC, whence representative sets are returned to the country of origin and to recognized depositories around the world.

A working principle of MMSC is that the collector owns the collection. Generally a collector studies one group of specimens, and a few groups are sent to some of his colleagues, perhaps associated with his project. MMSC honors all such primary commitments, and distributes the committed portion of the collection according to the instructions of the collector. MMSC will, whenever appropriate, ask specialists to work on the uncommitted, sorted fractions of the collections.

A series of Advisory Committees of recognized scientists of many nationalities reviews and approves the qualifications of specialists to receive MMSC specimens and do research on them. Besides sectional Advisory Committees which guide MMSC on these matters, a General Advisory Committee views MMSC in the broad framework of Mediterranean research. This Advisory Committee, which had its first meeting January 17–19, 1967, includes members of international scientific bodies who are responsible for much of the policy and direction of the region's oceanographic activities. This Committee will meet regularly to provide MMSC with administrative and general guidance.

At the Mediterranean Marine Sorting Center

Documents for customs clearance of shipments to MMSC are prepared by Mrs. K. Gmaty.

Newly arrived material is checked for preservation and label quality by M. Shili and S. Karaborni.

Freshly caught organisms are fixed according to specific requirements by D. M. Damkaer and M. Shili.

Plankton from the Gulf of Tunis is sorted by Mrs. N. Benjemia.

Fishes from the Gulf of Tunis are identified by Mrs. A. Ben Alaya and S. Karaborni. Right: Vials of sorted plankton are packed by H. Zaoui and S. Karaborni for distribution to specialists.

Departing for a shore-collecting trip are K. el Ghezail, Gayle A. Heron, H. Zaoui, and M. Shili.

When samples are received at MMSC, the preservatives and the labels are immediately examined. If necessary, preservatives and containers are replaced and new preservative-resistant labels are added. The sorting of samples is to a degree that effectively balances what specialists desire and what can be rapidly and accurately done by trained technicians. Fishes and algae are sorted to families or genera, but plankton and benthos are sorted to varying toxonomic levels, depending on the group. All specimens are distributed with copies of summarized collection data or field notes.

A great many of the specimen groups are expected to be eagerly sought by specialists, especially when the new material supplements examples already at hand, provides specimens from areas to which the specialist has no access, or furnishes rare specimens. For some specimen groups, however, specialists are so few that they are already overwhelmed with study material. MMSC will indicate these shortages and encourage the training of new specialists. Also MMSC will emphasize the importance of certain collections, and try to persuade some scientists to study material which might otherwise be overlooked. Finally, there will be groups for which there are no specialists at all; here, too, MMSC can indicate the availability of study material, and the lack of qualified investigators.

A second aspect of the distribution of specimens by MMSC is in the equitable apportionment of identified series of specimens resulting from the work of specialists. First priority for such series generally goes to the collector and his sponsoring institution. Suggestions are obtained from the Advisory Committees as to appropriate museums for deposition of duplicate sets of identified specimens. Deposition will be encouraged in museums throughout the world where important related collections are already housed, and where the material will have permanent care, and be readily available to scientists.

For maximum efficiency, and to better cope with the variety of organisms and their techniques for processing, MMSC has been divided into four sections—vertebrates, plankton, benthic invertebrates, and algae. Professional scientists are recruited, from Tunisia whenever possible, to supervise each section.

At MMSC there is a strong atmosphere of working together. Frequent informal discussions about techniques and identification are held among the technicians and the Director of the Center, and ideas are freely exchanged. To continually improve the quality of specimen handling by learning new techniques, and to introduce the staff and associates of MMSC to a variety of experiences and training, MMSC will occasionally bring systematics specialists to Salammbô. The Ad-

visory Committee members themselves have served as consultants for administrative and general scientific matters.

The Center sorts collections of the Institut National d'Océanographie, which has continuing sampling programs for fishes, benthos, and plankton. The sorting of this material will provide Institut specialists with certain groups for detailed study; other groups will then be available for distribution to other specialists.

Mediterranean-Red Sea collections from many sources will be accepted by MMSC for processing and distribution. As demands increase, priorities will have to be placed on the sorting of collections from broader survey projects. Highest priority will generally be given projects which are international in character.

Information about the Center will be given through contact with specialists, notices in scientific bulletins, and distribution of descriptive leaflets. MMSC seeks to obtain wide collection coverage, and at the same time encourages the participation of a maximum number of countries and specialists in research on the specimens.

The Mediterranean Marine Sorting Center began operations November 2, 1966, when Director David M. Damkaer, who normally serves as supervisor for plankton at the Smithsonian Oceanographic Sorting Center, reported to the Institut National d'Océanographie et de Pêche, in Salammbô, Tunisia.

Two laboratories on the grounds of the Institut are used for fixation and preservation of newly-collected organisms. A large room at the Institut houses the office and laboratory of the Director and his research associate. A villa has been rented 1000 feet from the Institut to triple the Center's working area.

H. Adair Fehlmann, Supervisor of the Smithsonian Oceanographic Sorting Center in Washington, D.C., worked at MMSC from March 15–31, 1967. Fehlmann led two cruises and two shore-collecting trips in which all technicians were able to participate. M. DiGenova, an expert in preservation of marine organisms at the Stazione Zoologica in Naples, served as a consultant to MMSC for five weeks, and instructed MMSC technicians in many aspects of specimen-handling, with particular emphasis on fixation and preservation. Fresh material was gathered on 10 shore field trips and during 13 daytime cruises.

In FY 1967, Professor Jose Stirn, from the Institute for Sea Research at Portoroz, Yugoslavia, joined MMSC as supervisor for benthic invertebrates.

An administrative assistant, five technicians, and two maintenance men complete the present MMSC staff. All except the latter two have had university studies in biology and speak some English; some have studied abroad. They have passed several months in training in every

aspect of collection-handling. The technicians are imaginative, eager, and responsible. With the arrival at MMSC of large collections, the technicians will help in the training of additional technicians, as the demands for services increase.

In addition to the collections which have been received from Tunisia, plankton samples have been sent to MMSC by the Stazione Zoologica in Naples. Quantitative benthos and sediment samples also have been received from a recent Yugoslavian-Tunisian survey of the Lake of Tunis, a brackish, eutrophic lagoon.

The Institute for Sea Research at Portoroz, Yugoslavia, has sent MMSC 174 plankton samples from the northern Adriatic Sea. Three specimen groups (cladocerans, chaetognaths, and fish eggs and larvae) were committed by the Institute for Sea Research. MMSC has been asked to distribute the remaining groups to approved specialists. This plankton collection has more than ordinary value because of the detailed concurrent hydrographic data available.

Museum of Natural History

RICHARD S. COWAN, *Director*

THE SYSTEMATIC BIOLOGIST, whether in a university or in a public museum, daily faces the unpleasant fact that the cost of maintaining his essential and ever-growing collections rises continually, that space and staff seem to shrink vis-a-vis expanding research requirements, and that other, more glamorous scientific programs compete fiercely and all too successfully for the never adequate funds available. Small wonder, then, that he has sensed an alarming trend toward the downgrading of systematic studies in the United States.

Is a reversal of this trend possible? In our view, it is both possible and, in view of the ecological problems man is creating for himself, obviously and urgently necessary.

One recalls that in the last century natural history museums became inevitable as the private collector's "cabinet of curiosities" became inadequate to exhibit, or to contain, even a small part of the diversity of the world of nature. As private collections grew, their scope tended to lessen and the selectivity to increase, until only the choicest specimens could be retained. This condition, plus jealousies among private collectors and, oftentimes, the inaccessibility to science of their specimens, stimulated development of more generally available research collections in university centers and in public museums and botanical gardens. These institutions also became the repositories for biological vouchers obtained during the early days of exploring this continent, when the aim was simply to accumulate vast collections—often without critically assessing the data associated with the specimens or the representation thus obtained.

Growth of our National Collections is typical of this. Aware of the need to amass a representation of the Nation's wealth of natural

history and urged by the Smithsonian's first Secretary, Joseph Henry, the Federal Government included zoologists, botanists, geologists, and anthropologists on early exploring expeditions. Agencies such as the Geological Survey in the Department of the Interior, the old Biological Survey and the Bureau of American Ethnology, and the Department of Agriculture all contributed heavily to the National Collections. In the areas represented by these agencies, the Smithsonian's Natural History Museum is by law the national repository.

Today, for the reasons earlier noted, collectors in all biological disciplines throughout the country tend more and more to deposit in the Museum their types and rare specimens. The resulting increase in the Collections—they have nearly tripled in the last 20 years—has placed on the Museum staff an increased responsibility for preserving them. It is, perhaps, a prime reason for the restive concern among the systematic science community that growing emphasis on research in the Museum of Natural History may cause it to slight the curatorial responsibilities entailed in custody of the National Collections, even though the research is based upon these collections.

To such expressions of concern, answer can be given swiftly and conclusively: over the past three years, the Museum staff has increased by forty percent its production of published research, yet in the same period the National Collections have on the whole become better housed, better cataloged, better maintained, more accessible, and more used than ever before.

Custody of the National Collections, it is true, poses a challenge requiring constant innovation. As prime repository for documentation of the Nation's natural history, the Museum cannot limit the Collections in scope or in numbers of specimens. At the same time it must heed the quality of the materials accepted, and carefully avoid competing with other centers in any way that would deter the growth of systematic biology in the United States.

With 51 million specimens already in the Collections, how can their management improve and research output increase simultaneously? It is true that for decades the Collections grew so rapidly that a timely record of accessions often could not be kept by old-fashioned hand entries in catalogs and day books, and that sizeable backlogs of uncataloged and unidentified material accrued. But with the advent of data processing, the Museum has in the past few years painstakingly and soundly developed improved techniques for cataloging specimens and for processing and manipulating the data associated with them.

Today, cataloging is accomplished in less than half the time previously needed, it is many times more accurate, and the system adopted has a

potential for further extensive savings. Data processing, moreover, after several years of planning has reached the stage where we have under way several pilot projects that involve collections of various groups of organisms representing a variety of curatorial problems.

We have thus made a start toward the goal of freeing the staff biologist from routine curatorial tasks, so that he can function more nearly as a research scientist. And so that the specimens continue to be maintained in the best possible condition, "curators" demonstrating an all-consuming interest in the care of specimens have been advanced to the position of our first collections managers. Assisted by technicians and aids, they make a full-time profession of collections care, thus relieving the professional scientists for progressively greater research effort.

Sound scientific judgments concerning the growth and management of the collections will always have to be provided by the professional staff, but routine curation is to an increasing extent being handled by collection management teams. A program is being developed to seek out and train qualified persons having the natural bent for collections management. It should in a few years assure a steady flow of such trained personnel into the entire museum community.

What is the goal of the Museum of Natural History regarding its own use of the National Collections? To increase the size of the research staff obviously will not, indeed cannot, serve to keep pace with the enormous growth of natural history collections that must continue if man is to gain sufficient knowledge of his environment to manage it. Perhaps no more than a twenty-five percent increase in the size of professional staff should be expected: the fond but unrealistic dream of past generations of museum curators—to have a specialist for every group of organisms—is simply not achievable in any research center. Instead, a limited cadre of inspired, productive systematic biologists can and is being assembled. The work of this staff must, however, be complemented by a vigorous program of research in systematic biology throughout the country, and that program, in turn, must be strengthened by ready access to the National Collections.

Through expanding fellowship programs at the postgraduate and predoctoral levels, this access to the Collections is already being accorded for extended periods. Each scientific department in the Museum has, or is developing, facilities for further such research cooperation. In addition, loans of collections of all kinds have reached new peaks, and development of new packing and shipping techniques will enable us to match the increased number of loan requests expected in the future.

In short, the Museum of Natural History reaffirms its mandate to care for and make available to all serious biologists the natural history

collections the Nation has entrusted to it, to continue to describe the components of the world ecosystem and their interrelationships, and to serve systematic biology generally.

Through joint educational programs, through long- and short-term loans of collections, and through cooperative research projects, we stand prepared to assist educational institutions in returning systematic biology to its central, integrative position in every university curriculum across the land.

The Summer Institute for Systematics was characterized by lively discussion and differences of opinion.

Research and Publication

OFFICE OF SYSTEMATICS

The most important accomplishment during the year was the staging of the first annual Summer Institute in Systematics, with the collaboration of the Society of Systematic Zoology and the American Society of Zoologists, and the support of the National Science Foundation and the Air Force Office of Scientific Research. Ellis Yochelson, U.S. Geological Survey, and Robert Higgins, Wake Forest College, represented the two zoological societies. They planned and carried out the program with R. S. Cowan, Head of the Office of Systematics.

From 200 applicants the 25 participants were selected on the basis of the impact they would have on systematic biology on their return to their home universities; all were active researchers and teachers of zoological systematics. Each morning for three weeks the participants, with many members of the staff of the Museum of Natural History and from Federal science laboratories, gathered with an outstanding speaker to consider one of the several facets comprising systematic biology today. Afternoons were free for research in the national collections, but discussions generated during the morning often continued into the afternoon and evening as well. A transcript of the speaker's remarks and the substantive parts of the discussions will be released as soon as it can be prepared.

Planning for the Flora of North America project was materially advanced with the support of the Office of Systematics. Progress on this 15-year project is discussed on page 88.

A project to develop a manual for neotropical squamata (reported under Vertebrate Zoology, p. 105), was initiated with support provided by the office of systematics for bringing Dr. Donoso-Barros from Chile to work with James Peters.

In addition to these major projects, the office of systematics provided support and encouragement for field research, for the acquisition of shared computer time, for the translation of scientific papers and the preparation of scientific illustrations, and for equipment essential to the development of several staff research projects.

OFFICE OF ANTHROPOLOGY

With the assistance of professor Sol Tax from the University of Chicago, who serves as special advisor for anthropology, considerable progress was made in developing new research projects in which the staff participated jointly with many colleagues outside the Institution.

One of these projects, the new *Handbook of North American Indians*, got under way with William C. Sturtevant serving as editor, assisted by Samuel Stanley who joined the Office in September 1966 as project coordinator. As a result of wide publicity by Sturtevant and Stanley, more than one thousand potential authors of sections of the handbook have responded. The 12,800 entries in the 1907–1910 *Handbook of American Indians North of Mexico* have been analyzed and sorted according to subject matter as a foundation for the effort to provide for this standard work a replacement which will incorporate the results of the last sixty years of research on the subject. The publication is expected to occupy twelve or more volumes and is intended to be useful for audiences from scholars and students to school teachers and librarians. Geographically, the *Handbook* will cover Indians from northern Mexico to the Arctic; topically, it will include physical anthropology, ethnology, archeology, linguistics, and an assessment of the current condition of North American Indian societies.

The long-standing commitment of the Smithsonian Institution to the study of native American cultures was reaffirmed in an International Conference on Changing Cultures in April 1966. In consequence, a new urgent anthropology project of international scope has been inaugurated. Responses to the questionnaire distributed by the journal *Current Anthropology*, requesting anthropologists to list anthropological research known to be urgent and to name people to undertake it, have been analyzed. The analysis of these data and those from other sources will be published in a catalog of research projects on rapidly changing cultures.

A Wenner-Gren Foundation grant for field work in rapidly changing cultures provides assistance to many anthropologists over the world who require small sums for urgent anthropological research. The aim is to stimulate field research in these areas of urgency and to assist in developing and strengthening professional anthropologists and anthropological institutions in those countries where cultures are subject to rapid modification.

The ancient technology project, co-directed by Clifford Evans and Gus W. Van Beek, with the collaboration of the Battelle Memorial Institute, has initiated a study of ancient metal objects using metallographic and spectrochemical techniques. Already laboratory tests of

several hundred artifacts from Ecuador have been analyzed, revealing important information concerning aboriginal methods of working gold, copper, silver, and various alloys. As a part of this project, research associate Theodore Wertime spent two months in Iran as part of a team of archeologists and metallurgy historians studying ancient metal-smelting sites.

With excess currencies and Smithsonian research funds, Hans Wulff, University of New South Wales, Australia, is conducting a study of ancient urban technology in Iran. In a joint expedition between his university and the Smithsonian, Wulff conducted field work for seven months, gathering data on the technology of pre-industrial crafts. Among the outstanding discoveries concerning present-day Iranian crafts is that of the method of making alkaline turquoise glaze, a substance known since the fourth millenium B.C. and still used by local ceramicists for the manufacture of small ornamental objects. Details of the process were recorded and sufficient raw materials were collected to conduct a series of experiments on the chemical and physical nature of the material.

Senior ethnologist, John C. Ewers, completed the editing of a centennial edition of George Catlin's *O-kee-pa, A Religious Ceremony, and Other Customs of the Mandans*, which will be published in fall 1967. He also completed a manuscript on the development of artistic consciousness of the American West in the 19th century, as his contribution to a textbook entitled *The Artist in America*.

In preparation for completion of *The Indians of Texas in 1830*, Ewers examined collections of Southern Plains Indian artifacts and records. This volume involves the translation of a manuscript on the Indians of Texas written by Jean Louis Berlandier, biologist for the 1828–1830 Mexican border expedition. In the process of drawing together this information, he is also evaluating the watercolors which were prepared under Berlandier's supervision to accompany his manuscript; the book will also include descriptions of the ethnological specimens collected by Berlandier.

Editorial work for the projected volume on physical anthropology in *The Handbook of Middle American Indians* occupied T. Dale Stewart during most of summer 1966. He also presented a paper and chaired a program at the 37th International Congress of Americanists in Argentina. After the Congress, on the invitation of the University of Chile, he went to Santiago for a week to consult with the physical anthropology faculty and to review their research programs.

In March, Stewart spent several days in Yucatan identifying and studying the human skeletal remains uncovered by E. Wyllys Andrews during his excavations in the Mayan site known as Dzibilchaltun. The

numerous examples of cranial deformity and tooth mutilation were of particular interest.

Through communication with John R. Groome of Grenada, W.I., Stewart obtained possession of the skeleton of a Negro with teeth mutilated in a manner known to have been practiced earlier in Cameroon, Africa. In a paper jointly authored by Stewart and Groome, a case is made for this having been one of the original African slaves, and, if so, this is only the second such example on record.

Senior archeologist Waldo R. Wedel resumed his investigations of the so-called council circles of central Kansas. Long a puzzling feature in Plains archeology, the council circles each consist of a little earthen mound surrounded by a shallow ditch or a series of elongated depressions placed end-to-end to form a circular or subcircular pattern 100

Prehistoric wooden carving, approximately one foot high, from Spiro Mound, Oklahoma, part of a large collection presented to the U.S. National Museum by Richard K. Meyer.

to 200 feet across. Each is associated with a village complex and no village has more than one such circle; only five are on record, all within 20 miles of each other. The sites with which they are associated date from about A.D. 1500 to 1700, and are believed to represent a period of Wichita Indian occupancy.

Of prime interest was the finding of human bones at every point where the archeological trench intersected the circle. Most of the bones were scattered randomly about the area and occurred essentially in the same levels as the refuse, bison, and other animal bones. Almost without exception, the bones were in poor condition, giving the impression of having lain a long time on the surface before finally being cast into a pit or trench along with other camp refuse. At or near the center of the mound which forms the heart of the circle complex, a large fireplace was uncovered. It seems possible that this was the site of a succession of large, perhaps ceremonial, fires, rather than a slow accumulation of ashes from household use over a long period of time. The position of the hearth near the center of a circle complex suggests that large fires may have been built as signals to other council circles in the area.

Henry B. Collins, senior scientist, retired from Government service on December 30, 1966, and soon thereafter was appointed archeologist emeritus. In this capacity he will maintain his office and continue his research in Arctic anthropology.

Paul H. Voorhis joined the anthropology staff as a language specialist in March. Already he has completed initial preparation of his doctoral dissertation on Kickapoo grammar, he has begun preparation of other texts for publication, and he has started to obtain a translation of Kickapoo documents long on deposit in the anthropology archives. These documents, previously incomprehensible to all but the Kickapoos, are now yielding both linguistic and ethnological data.

Research on human ecological systems and prehistoric water systems continued to occupy Richard B. Woodbury who is completing a report on water-control systems in the Tehuacán Valley, Mexico. Woodbury relinquished the chairmanship of the office of anthropology at the end of January in order to devote greater time to research.

Museum specialist George E. Phebus, Jr., has discovered in the ethnological collections of the Northwest Coast, many objects that help explain other fragmentary artifacts found in that area. His own stratigraphic excavations during past years in Oregon and Washington have enabled him to identify and put in order the Museum's vast archeological collections from the Columbia River drainage. He is preparing several scientific papers and larger monographs based upon his research.

Research associate C. G. Holland completed a monograph on the archeology of Southwestern Virginia. This study was conducted under

auspices of the Museum of Natural History, under a National Science Foundation grant, and he has turned over all the specimens to the permanent collections of the Museum.

A program of archeological survey in Brazil under the direction of Clifford Evans and research associate Betty J. Meggers began in 1965 with funds from a Smithsonian research award and with the official collaboration of the Conselho Nacional de Pesquisas of Brazil. During summer 1966, they undertook a tour of inspection of the archeological sites, checking field notes, film records, maps and data assembled by each field project. In addition to developing a considerable body of knowledge about Brazilian archeology, the program has served as the stimulus for archeology in Brazil. A grant from the Wenner-Gren Foundation provided opportunity for the Brazilian participants to attend the 37th International Congress of Americanists in Argentina. Following the Congress, Evans and Meggers formulated plans with an Argentine archeologist for the development of a coordinated archeological program similar to that which is so successful in Brazil. Professor Ramiro Matos M., professor of anthropology at the Universidad Nacional de Centro del Peru, Huancayo, continued his training under Evans and Meggers in modern archeological methods of analysis and interpretation of artifacts, with the support of a fellowship from the John Simon Guggenheim Foundation. With Professor Matos they have also developed plans for a long-range, coordinated, research-training archeological program in Peru.

The 37th International Congress of Americanists awarded a gold medal to Evans and Meggers for their outstanding contributions to South American archeology. They were also recognized by the Government of Ecuador, which conferred upon them the National Order "Al Merito," for their work in that country.

Research associate Olga Linares de Sapir returned at the beginning of this year from archeologic and ethnographic field work in Southern Senegal, West Africa. Hers was the first stratigraphic archeology ever attempted in the area and it is hoped that the large number of charcoal samples collected will permit the development of an absolute dating sequence and a chronology based on artifact types and pottery. She also completed for publication a monograph on the cultural chronology in the Gulf of Chiriquí, Panama.

The three-year project of interdisciplinary investigation into the prehistoric cultural ecology of the Valley of Oaxaca, Mexico, continued under the direction of Kent V. Flannery. In addition to the discoveries reported last year concerning the geomorphology and ecology of the valley in Early Formative times, it is now known that habitation of the dry caves excavated by the expedition extends back to about 7800 B.C.

The archeologically later Early Formative period in the Valley of Oaxaca about 10 kilometers north of Monte Albán appears to be as rich and complex as any found in Mesoamerica. Deeply buried levels at one site yielded a series of packed-clay house floors with well-preserved post-moulds and fragments of wattle-and-daub walls and storage pits. A number of dry caves from the late phases of the Monte Albán sequence yielded thousands of cultivated plant specimens, as well as bits of nets, baskets, textile and sandal fragments, and fire drills.

Future plans include mapping of all edible species in selected vegetation areas, faunal studies, and more intensive study of the late preceramic and Early Formative phases of the valley.

"The most complete dictionary compiled since the 16th century for any American Indian language" describes the Tzotzil dictionary compiled by Robert M. Laughlin. Entries total about 25,000, and special attention has been given to the Tzotzil vocabulary pertaining to the plants and animals. With the assistance of Alexander F. Skutch for the native birds and Peter H. Raven and Dennis E. Breedlove of Stanford University for plant identification, several thousand native terms for organisms were recorded.

Compilation of a *Bibliography of Anthropological Bibliographies of Africa* was completed during the year by Gordon D. Gibson, who also served as acting chairman of the office of anthropology from February to June. Although not exhaustive, this work attempts to provide the broadest possible coverage, and is expected, therefore, to be useful to all types of anthropological research on Africa.

In his continuing study of Micronesian ethnohistory, Saul H. Riesenberg, who in February became chairman of the Office of Anthropology, studied ships logs, journals, and other ethnohistorical materials in various marine depositories in New England. In February he joined Thomas Gladwin of the National Institutes of Health and Samuel Elbert of the University of Hawaii in a joint project at Puluwat in the Caroline Islands to study Micronesian navigation and sailing. Here the aboriginal methods of navigation are still practiced in voyages of up to several hundred miles across the open sea. Riesenberg is investigating the complex of ethnographic features—economic, social, and political—which center upon or are affected by the frequent long voyages of these people.

Eugene I. Knez revisited Korea to gather additional data for his illustrated index of Korean material culture, preparation of which is nearing completion. While there he also participated in the international conference to reestablish a Korean National Science Museum.

William H. Crocker returned to Brazil to initiate a two-month comparative survey of the Apanyekra-Canela, closely related to the Ramkokamekra-Canela which he has been studying since 1957.

Hajar Bin Humeid, the title of a work nearing completion by Gus W. Van Beek, presents a cultural cross section of a South Arabian farming town and trading center during the first millennium B.C. and the early centuries following. Of special interest is the pottery chronology, the first long-range, stratigraphically based chronology for southern Arabia.

Van Beek also visited Phoenician archeological sites in Tunisia and, with the staff of the Tunisian National Institute of Archeology and the Arts, developed plans for a long-range project to excavate ancient Carthage, the capital of the western Phoenician empire from 814 to 146 B.C. While basically a conventional archeological excavation, this project is expected to be interdisciplinary, in that it involves the paleontological correlation of sea-level fluctuations, as revealed by microfossils, and closely dated artifacts of man's culture. This study will also involve examination of subsistence patterns in a complex historical site with special reference to man's use of his environment. It will also be cooperative in the sense that both American and Tunisian archeologists will participate in all stages of the field work and publication.

Some selective forces in human evolution are revealed for the first time in J. Lawrence Angel's study of the skeletal remains of an ancient population near Lerna, Greece. Combining evidences of marked contrasts in fecundity with evidence of greater fertility in family groups whose skull bones showed high incidence of thalassemia, a disease which protects against malaria, Angel concluded that thalassemia was a selective factor in ancient Greece. His monograph on Lerna puts great stress on the total ecological picture of the time and deals particularly with changes in population density and demography and changes in malaria which appears chronically to have affected the people of that area.

Angel, with the collaboration of Donald J. Ortner and others, both within and outside the Smithsonian, began a research program on development and aging in human bone, including the biochemical and micromorphological end results of aging processes. A laboratory for these studies has been completed and work will begin in the next fiscal year.

Lucille St. Hoyme, accompanied Jane Phillips of Howard University on a two-week field trip to Jamaica. She continued work on her study of changing concepts of fossil man during the last 200 years.

Katharine Luomala, professor of anthropology at the University of Hawaii, worked most of the year as a research associate on manuscripts concerned with Gilbert Islands culture and ecology. Gilbertese artifacts in the museum were studied, photographed, and described, particularly the shark-toothed weapons.

River Basin Surveys

In contrast with the recent past, only 50 percent of River Basin Surveys field projects were concerned with archeological problems within the Middle Missouri area of the Dakotas. This does not indicate the abandonment of an area long of prime interest; rather, it reflects the substantial completion of field investigations within the major reservoirs of the Missouri River. Field investigations will continue, but at a reduced level. Several areas not adequately sampled are endangered by shoreline erosion or by recreational developments, but future investigations here will be completed only as other projects become less pressing.

A total of twelve field projects were undertaken during the field season—seven in North Dakota, three in South Dakota, and one each in Iowa and Wyoming:

1. The Durkin site, a small village of the Extended Middle Missouri horizon, situated in the upper Big Bend Reservoir of central South Dakota. The artifact inventory and house pattern are close parallels of those from the Thomas Riggs site but with a significant increment of rim sherds symptomatic of the Initial Coalescent horizon.

2. The Ketchen site, in the upper Big Bend Reservoir, proved to be a close counterpart of the Durkin village and contained similar evidence of ceramic influences deriving from the Coalescent tradition.

3. The Cattle Oiler site, immediately upstream from the Ketchen site. The occupation attributable to the Initial Middle Missouri horizon is closely related to the Anderson component of the Dodd site in the Oahe Reservoir to the north. In addition, there is good evidence of a Thomas Riggs component (perhaps no more than a peripheral development of the Ketchen village) only a short distance to the south.

4. The South Cannonball site, an intensively occupied village in the upper Oahe Reservoir, central North Dakota. The site is representative of the Extended Middle Missouri horizon. A cursory examination of the ceramic collection suggests close ties with Mississippian developments in Minnesota, a matter of great significance in view of the long-standing problems, vis-à-vis the origins of the Middle Missouri tradition.

5. The Larson site in the Oahe Reservoir in northern South Dakota. The site manifests a long sequence of occupations extending from late prehistory to the period of Euro-American contact. Although the village, at least in its late components, has been labeled as Arikara, much more work will be required to clarify the cultural situation.

6. The Fort Manuel site, in the upper Oahe Reservoir, North Dakota. This important post was operated during 1812–1813 by the Mis-

souri Fur Company for trade with the Arikara. The structures and palisaded defenses were completely excavated and much of the surrounding area was cleared by means of earth-moving machinery. Both European and aboriginal artifacts of the early 19th century were recovered but in relatively small numbers. Despite a diligent search, no evidence was uncovered that would shed light on the remains of the persons who died at the post during its brief use.

7. The Fisher site, in the Bowman-Haley Reservoir of northwestern South Dakota. The site contains five zones of occupation; only the two lowermost (both of McKean affinities) produced distinctive cultural remains.

8. The Red Fox site, also in the Bowman-Haley Reservoir, held a somewhat similar sequence of components. The lowermost is related to the McKean complex; the uppermost representative of the Coalescent tradition of the Middle Missouri area.

9. The Pipestem Reservoir, near Jamestown, North Dakota, was surveyed but with negative results. While apparently devoid of archeological features, it is possible that a few sites, masked by the heavy vegetation of late summer, were missed by the reconnaissance party.

10. The lower Garrison Diversion Project of eastern North Dakota. The area was examined late in the season, thus adding more archeological sites to the growing number already recorded in the area.

11. The Saylorville Reservoir, along the Des Moines River in north-central Iowa was surveyed as a prelude to large-scale excavation. Of the 66 archeological sites recorded by the survey party, only 16 were considered to warrant excavation.

12. The Mummy Cave site, near Cody, Wyoming, was excavated as a joint project of the National Geographic Society – Whitney Gallery of Western Art – Smithsonian Institution. The deposits within the site contained some 38 occupational levels extending from before 7000 B.C. to the ethnographic period. The extensive collection of perishable objects from the dated McKean levels are deemed to be of particular importance.

In June of 1967, six additional projects were begun or continued by River Basin Surveys field parties;

1. Continued investigation at the South Cannonball site to exploit areas of the village partially cleared by machinery during 1966.

2. Continued work at the Larson site in the hope of adding to the fragmentary cultural sequence presently known.

3. Excavation in portions of the Medicine Creek site in the Big Bend Reservoir now threatened by recreational developments.

4. Excavation at sites threatened with immediate destruction by construction activity within the Garrison Diversion Project.

5. An archeological reconnaissance of the Cottonwood Springs Reservoir, just west of the community of Hot Springs, South Dakota.

With the beginning of the year, the River Basin Surveys initiated a new series, *Publications in Salvage Archeology*, to report the results of excavations completed under the broad aegis of the Inter-Agency Archeological and Paleontological Salvage Program. The series is edited by staff members of the River Basin Surveys and printed by modern offset press in editions of 1,500 copies. As of the end of the fiscal year, four numbers totaling about 500 pages have been printed and distributed. It is anticipated that others will follow at the rate of four issues per year.

BOTANY

The development of broad concepts in systematic botany may be the culmination of a lifetime career in the study of one particular aspect of plant life or in the investigation of one particular group of plants. These concepts often result only after years of intense concentration on the taxa involved, and an understanding of the whole is something that follows only after a keen appreciation of the parts.

Research associate F. A. McClure has spent a lifetime studying the bamboos, a most important group of plants which enter into the daily lives of so many persons in the tropics. From his early days as a teacher and plant collector in the Orient, through his work with the plant explorers of the U.S. Department of Agriculture, to his intensive studies of the preserved bamboo specimens in the U.S. National Herbarium and living plants in his personal garden, McClure has had his eye upon a single goal—a complete understanding of these plants.

Since the appearance in 1887 of the last systematic revision of the bamboos, the number of validly published genera has nearly trebled and the number of species is now nearly eight times as great. A fresh perspective on the generic patterns currently discernible within this group of plants is now long overdue. His studies in progress have the objectives of exploring these patterns, providing revised and uniform descriptions of the tenable genera among the 60 or more which are validly published, redefining their boundaries, proposing new genera where necessary, providing plates to illustrate a typical species of each, and setting up keys to facilitate generic identifications.

The service performed through the identification of plant specimens is often integrally associated with the research of the professional staff. Bryologist Harold Robinson has successfully combined the traditional service function of providing identifications with his research into the systematics of tropical mosses. Identification of over a thousand

bryophyte specimens collected by Robert M. King and José Cuatrecasas in Colombia became the basis for a preliminary publication on the bryophytes of that country. While it is far short of being a Colombian bryophyte flora, it is the first major effort in over thirty years at offering a means of identifying these plants from that part of the world. Mosses collected by Julian Steyermark from Venezuela are expected to provide a foundation for a similar moss flora of that country.

Since the days when it sponsored Asa Gray's classical *Synoptical Flora of North America*, the Smithsonian Institution has been active in research and publication on the indigenous plants of North America, and it will soon be involved in a new effort to survey the American flora. When the American Society of Plant Taxonomists decided in August 1966 to organize the "Flora North America Project," the Smithsonian was chosen as headquarters and Stanwyn G. Shetler was named executive secretary. The editorial committee met at the Smithsonian in January and elected William L. Stern temporary chairman of the steering committee. The principal accomplishment was the preparation of a draft of the first grant proposal.

Flora North America is a 15-year cooperative effort of American and Canadian taxonomists to produce a four-volume manual of the native vascular plants of North America exclusive of Mexico. The project is expected to result in the training of many new taxonomists, and the resulting manual should benefit various economic research activities, as well as biology in general. At its completion, knowledge of the Boreal and Arctic floras of the world will be largely completed, since the *Flora U.S.S.R.*, covering the Soviet Union, and *Flora Europeae*, covering all of Europe, are either complete or in preparation.

Research activities on plant anatomy were expanded with the arrival of Edward S. Ayensu whose major interest is in the comparative anatomy and phylogeny of angiosperms, especially the monocotyledons. With senior botanist Lyman D. Smith, Ayensu is studying the comparative anatomy of the Velloziaceae, a plant family that is one of the most interesting and geographically puzzling links between the floras of tropical America and Africa. He will also continue his studies in the Dioscoreales, the order of true yams.

Most of the time of José Cuatrecasas has been used in the completion of a monograph of the Brunelliaceae, a tropical family of 50 species distributed from southern Mexico to Peru, Bolivia, and the Caribbean Islands. It will be published as a part of the international project Flora Neotropica. Cuatrecasas also participated in a symposium on geoecology of the mountainous regions of the tropical Americas, held in Mexico City, and presented a paper on life forms in the paramos.

In addition to continuing his research on the floral anatomy and evolutionary history of the dogwood family, Richard H. Eyde studied the floral anatomy of the Brunelliaceae for Cuatrecasas' monograph. His studies indicate that there is validity in the viewpoint of taxonomists who see an evolutionary link between this family, the Cunoniaceae, and the Rosaceae.

An extensive paper by Conrad V. Morton on the subgenera and sections of the filmy fern family will serve to counterbalance and correct a radical and incomplete study on this family published about 30 years ago which, for want of a more suitable treatment, has been widely and uncritically adopted. He has also completed studies of other fern groups and of the Peruvian species of a genus of the African violet family.

Subsequent to his three-month visit to study types and other historical collections in Western European herbaria and botanical gardens, Lyman B. Smith continued to refine his monographic study of the pineapple family, began a cooperative research project with Ayensu, completed a revision of the bamboos of Santa Catarina, Brazil, supervised the preparation of two doctoral dissertations, and supervised the research of a former Smithsonian pre-doctoral student on the pineapple family in Ecuador. In January he was voted honorary citizenship by the City Council of Itajaí, Brazil, for his valuable contributions to the knowledge of the flora of Santa Catarina.

William L. Stern, who resigned as chairman of the department at the end of the fiscal year, concluded his research on the comparative anatomy of the vegetative structures of Columelliaceae, which resulted in a more natural taxonomic placement of this curious plant family. Detailed anatomical studies of the leaf node and xylem indicated clearly that this family is far more primitive than was supposed, and belongs in the Englerian concept of the Saxifragaceae. This family is usually treated by modern taxonomists as several families and Stern began studies of this complex to determine proper familial boundaries employing the techniques of comparative anatomy.

Excellence in research in systematic botany is associated very closely with the availability of adequate library resources. Until recent years the botany department library has been grossly neglected because of the sparsity of its holdings, the lack of a card catalog, absence of an organized program of accession, and scattered deposits through the offices of the department. With the guidance of several members of the department, Ruth F. Schallert, a professional librarian, with the dedicated assistance of research associate William A. Archer, has already made remarkable strides in providing Smithsonian botanists with the quality library they require. Although still incomplete, the various parts have been collected, and cataloging is well under way.

Archer is putting in order and cataloging several hundred collectors' field notebooks, some dating from the beginning of the century, containing many important historical and geographical references, as well as plant observations.

ENTOMOLOGY

This has been a particularly significant year in terms of accomplishments for the department of entomology, including substantial field explorations, acquisition of important collections, improvement of curation of the collections, exhibits planning, educational activities, and the most productive research year since the founding of the Department.

The progress of current research and curatorial programs, as well as future goals and the resources to obtain them, were reviewed with an advisory committee of outstanding entomologists. An excellent report which has already had significant impact on future planning was signed by: E. Gorton Linsley, chairman (University of California, Berkeley), William L. Brown, Jr. (Cornell University), Kenneth W. Cooper (Dartmouth Medical School), and P. J. Darlington (Harvard University).

Richard C. Froeschner completed a paper on the Galápagos species of lacebugs and made substantial progress on an illustrated manual of the world genera by evaluating morphological characters of 1,800 species in 270 genera. His studies of certain hemipterous families from Dominica indicates that the Dominican fauna has its principal generic affinities with Tropical America but that there is considerable isolation at the species level.

Opposite (top): Turtle Mountains in southern California, visited by Gerald I. Stage during his seven-week quest in the Colorado and Mojave Deserts for new information on the behavior of desert bees.

Female melittid bee (center) takes nectar from a blossom of the desert-sunflower. The long paper tag is used to slow the bee and make it more conspicuous during flight so the observer has a better chance of tracking it to its nest.

Male halictid bee (bottom, left) displaying its alert posture while watching for females from its perch inside a blossom of the ghost flower. Its massive gaping jaws are used against other males, which frequently intrude.

Hapless honeybee (bottom, right) being devoured by a crab spider that ambushed it from inside a blossom of rock-nettle.

Karl V. Krombein, chairman, devoted most of his research time to getting into print two large publications, one a second supplement of the catalog of Hymenoptera of America North of Mexico, and the second, a large volume on the life histories, nests and associates of the trap-nesting wasps and bees. The latter work is already being hailed as a modern classic of insect natural history.

Gerald I. Stage joined the entomology staff in November as a specialist on the systematics and behavior of wild bees. A monograph of one genus, emphasizing relationships between a phenetic and phyletic classification and biological data, was nearly complete and the study of the bees of Dominica was begun.

J. F. Gates Clarke assembled the plates and completed the manuscript for volume 6 of his monumental study on the Meyrick types of Microlepidoptera.

Donald R. Davis nearly completed his revision of New World Carposinidae and he expanded his earlier project on New World Incurvariinae to include a general world survey at the generic level, in an attempt to understand more clearly the entire composition of this group of primitive lepidoptera.

Field investigations in Colombia and Venezuela occupied much of the year for W. Donald Duckworth in his long-term study of neotropical Stenomidae. He also completed and published several papers during the year on genera of this family.

The South East Asia Mosquito Project (SEAMP), a cooperative venture between the Smithsonian and the Department of the Army, continued its investigations of the mosquitoes of this strategically important area. Various members of the Project staff made trips to collect materials and to study specimens in other museums. In addition to publishing individual research papers, SEAMP issued a revision of its extremely useful "Preliminary Keys to the Mosquitoes of Vietnam."

Oliver S. Flint, Jr., completed and published several papers during the year on the systematics of the larvae and adults of the New World caddis flies. An extensive field trip to Mexico and Central America provided much valuable new material for his studies of this family.

Close collaboration between the Smithsonian Institution and the University of Maryland School of Medicine has continued, with research associate Robert Traub and a group of scientists studying ectoparasites collected in overseas programs on viral and rickettsial infections. Collections during the year were made in West Pakistan, Nepal, New Guinea, and Mexico. Taxonomic and ecological research on fleas and mites laid the basis for selecting areas for intensive microbiological investigations.

INVERTEBRATE ZOOLOGY

The reborn emphasis on research as a primary activity of the Museum and the stimulus provided by the Offices of Systematics and of Oceanography and Limnology are reflected in the diverse research programs of this department and of the numbers and kinds of publications issued by it during the year. Monographic studies and revisions continue to be a major interest, although a large portion of the departmental research program is concerned with more generalized investigations of the systematics and zoogeography of invertebrates.

Under the impetus of the Antarctic Research Program, sponsored by the National Science Foundation, investigations of antarctic invertebrates continued to be a focal point for many research activities. David L. Pawson continued his work on antarctic holothurians and echinoids, and completed charts of the distribution of the species of these groups, accompanied by an analysis of distribution patterns in relation to physical environmental factors.

J. L. Barnard continued studies of antarctic amphipods and completed a review of one genus. Mary Rice initiated studies of the sipunculid and echiurid worms collected in the Antarctic by the *Eltanin* expedition. Clyde F. E. Roper joined the staff in September and continued his studies of the systematics, biology, and distribution of the squids. His studies of *Bathyteuthis abyssicola*, the dominant squid in the Antarctic, included conclusions on the effect of water depth, oxygen content, and other oceanographic parameters on distribution and morphology of this animal.

Studies of tropical organisms have attracted the attention of most members of the staff, many of whom conducted field expeditions to acquire new specimens and to observe the environmental conditions under which they have developed: Raymond B. Manning collaborated in West Pakistan on a study of the stomatopod crustaceans of West Pakistan, Mary Rice studied the biology and development of sipunculid worms in Puerto Rico, and Klaus Ruetzler studied sponges in the mangrove association in Puerto Rico and Bermuda.

As a result of the study of collections of sharks in the Indian Ocean and eastern South Pacific, Roger F. Cressey has been able to show that a correlation exists between adult parasite copepod size and surface temperature at the collection station. This relationship has been demonstrated in free-living crustaceans but never before among parasitic forms. He also continued his study of the phylogeny of parasitic copepods on elasmobranch and scombroid fishes.

J. L. Barnard spent most of the year as a Smithsonian Fellow in invertebrate zoology at the Bernice P. Bishop Museum in Honolulu.

His studies of certain Hawaiian amphipods has shown a significant affinity between them and the warm-temperate North American fauna, a unique condition among marine invertebrates. He believes that this may reflect the abilities of amphipods to drift long distances on flotsam, as well as the relative isolation of Hawaii in relation to other shallow-water areas of the tropical Pacific.

Studies on the biology of planktonic organisms have been continued by Thomas E. Bowman, who focused his attention on the pelagic decapod crustaceans, and completed a review of the distribution of *Lucifer* in the western North Atlantic. He also published the first report of self-luminescence in a pelagic gammaridean amphipod.

The aim of Mary Rice's investigations of the development, systematics and zoogeography of Caribbean sipunculids, carried out in close cooperation with scientists at the Woods Hole Oceanographic Institution, is to ascertain the life history of members of several representative genera. Nothing is presently known of the developmental history of tropical forms.

The studies on North American crayfishes and their ostracod symbionts by Horton H. Hobbs, Jr., included the preparation of a revision of the genus *Procambarus* which ranges from Canada to Guatemala and Cuba. He has also completed a monograph of the Mexican and Cuban entocytherids. In collaboration with Perry C. Holt, Virginia Polytechnic Institute, and Margaret Walton, Mountain Lake Biological Station, Hobbs completed a study of the crayfishes and their epizootic associates from the Mountain Lake area. In addition to taxonomic accounts of these species, the authors included a discussion of the habitats of the species, population sizes and fluctuations, food habits, information on origin and distribution in the area, and a summary of data on elevations and drainage systems.

The freshwater and terrestrial decapod crustaceans of the West Indies, with special reference to Dominica, have been the subject of a collaborative study by Fenner A. Chace, Jr., and Horton H. Hobbs, Jr. Materials were collected by Hobbs in Dominica under the auspices of the Bredin-Archbold-Smithsonian Biological Survey of Dominica. The study promises to be the most comprehensive ever made on the non-marine West Indian decapods.

Studies on ostracods from Hadley Harbor, Massachusetts, by Louis S. Kornicker led to the discovery of a high incidence of parasitism of one of the ostracods. Kornicker and Thomas E. Bowman have collaborated on a study of the host and parasite, both undescribed species. The incidence of parasitism is very high, with about one in 15 of the adult ostracods infested. The copepods have developed a host-deceiving egg-mimicry, and deposit their eggs in sacs, each with several eggs,

J. L. Barnard, studying the gammaridean amphipods of the Hawaiian Islands, here is collecting amphipods from the algae in an intertidal habitat.

Isaacs-Kidd Midwater Trawl (right), a high speed sampler used to collect pelagic animals, being used in southern waters aboard the *Eltanin;* most of the specimens of the squid *Bathyteuthis abyssicola* Hoyle studied by Clyde F. E. Roper were taken with this gear.

and of a size similar to that of the ostracod eggs, in the ostracod brood chamber.

Using serial sections across the hinge area of representative species of several genera of myodocopid ostracods, Louis S. Kornicker traced the origin of the ligament, as well as the relationship of the ligament to the hinge and the shell. Knowledge of the placement of the ligament in living ostracods may help those working with fossil species to determine the ligament line, particularly in those forms lacking Recent species.

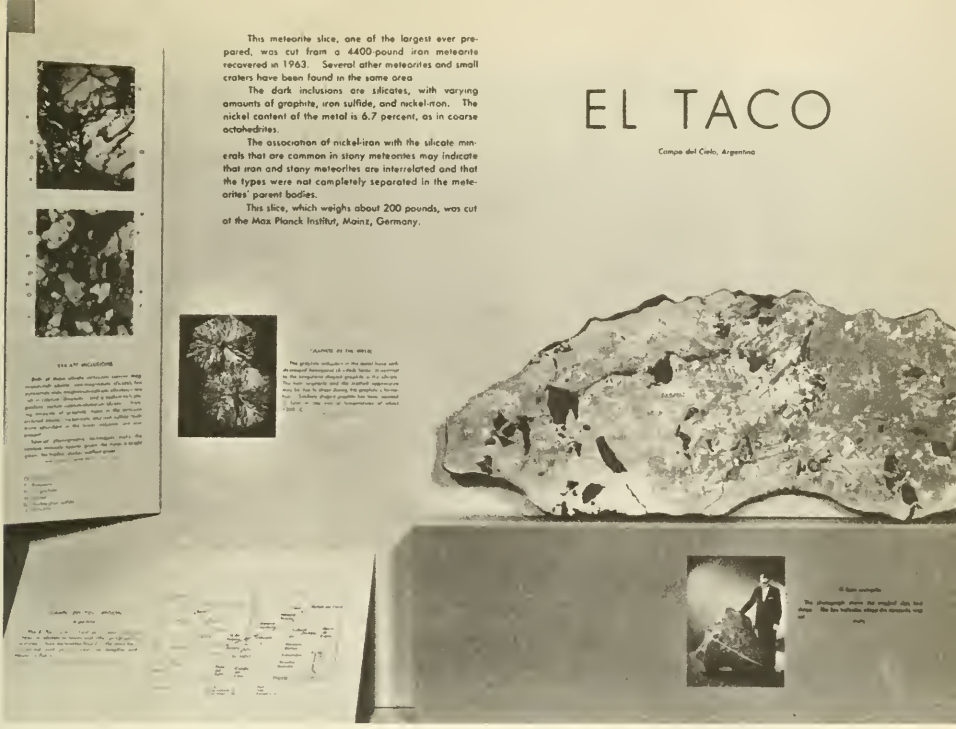
Histological examination of the circulatory system of the polychaetous annelid *Magelona*, conducted by Meredith L. Jones, confirmed field observations that there is a heart-like pumping action intrinsic in the dorsal blood vessel. In addition, earlier observations of unusual segmentally arranged capillary beds were confirmed and a separate series of segmentally arranged valves in the posterior dorsal vessel was found.

MINERAL SCIENCES

The most significant department-wide event during the year was a two-day meeting with an advisory committee of eminent specialists in earth sciences—Felix Chayes, chairman (Geophysical Laboratory, Carnegie Institution of Washington), Clifford Frondel (Harvard University), Hans Suess (University of California, San Diego), and William Thurston (U.S. Geological Survey). The truly excellent report of this committee identified goals for the department and the resources required to attain them, as well as evaluating present research and service activities.

Research in meteorites was concentrated on the chemical and mineralogical composition of stony meteorites; detailed studies, based on a careful review of the Museum's collection, were carried out on the most significant specimens. This broad program, involving some 30 individual projects, is being carried forward jointly with other institutions and universities both in this country and abroad with the support of grants and contracts from the National Aeronautics and Space Administration, U.S. Air Force, National Science Foundation, National Geographic Society, and the Smithsonian Research Foundation.

Several iron meteorites from Campos del Cielo, Argentina, particularly "El Taco" which contains large silicate inclusions, are also being studied in collaboration with scientists from the Max-Planck-Institut in Germany, the Lamont Geological Observatory, the California Institute of Technology, the Ames Research Center, and the Carnegie Institute of Technology.



In the new hall of meteorites is featured a slice from the two-ton El Taco, Campo del Cielo, Argentina, meteorite. This specimen is playing a leading role in a cooperative international research program involving a number of centers of meteorite research.

An investigation and review of meteoritic pyroxene was completed under Brian Mason, who also reviewed the pyroxene-plagioclase chondrites. A new chondrite, "Rupota," from Tanzania was studied in detail especially by Kurt Fredriksson in cooperation with R. O. Pepin from the University of Minnesota. It was found that this meteorite is a rather typical olivine-hypersthene (L-group) chondrite, and it is the first of this group which has been shown to contain primordial rare gases. This finding contradicts a recent hypothesis that these meteorites may have come from Mars while the olivine-bronzite chondrites (H-group) should have originated on the moon. These projects benefited materially from the excellent chemical analyses made by Eugene Jarosewich, who also analyzed several mineral separates, iron meteorites, and terrestrial rocks.

Robert F. Fudali joined the staff at the beginning of the year and has begun studies of phase equilibria in meteorites at relatively high temperatures and under controlled oxygen fugacity, as well as diffusion studies in olivine and in iron meteorites. Rather extensive studies on recrystallization of chondrites at temperatures in the range of 700° C. to 1000° C. are also in progress in cooperation with Dr. A. Reid, University of California.

Research in petrology during the past year continued to focus on rocks from the mid-Atlantic Ridge and their use in tracing the development of the oceanic crust. These, and other studies, show that the crust may be viewed as a dynamic product of processes occurring in the upper mantle. Partial fusion of mantle material evidently has produced and is producing vast quantities of basaltic magma, particularly beneath the mid-Atlantic Ridge. Eruption and piling up of this material and emplacement of possibly large basaltic intrusions, some of which cool sufficiently slowly to become gravity-differentiated, is probably the dominant manner in which the oceanic crust has formed, particularly in the undisrupted north-south trending zones of the mid-Atlantic Ridge, studied by William G. Melson and T. H. Van Andel at latitude 22° N.

At various places the normally undisrupted, north-south trending mid-Atlantic Ridge is displaced hundreds of kilometers along so-called "fracture" zones and in these, intrusion of partially serpentinized peridotite is evidently the major crust-forming process. These intrusions, based on evidence from studies of samples from St. Peter and St. Paul's Rocks by Melson and his colleagues at Woods Hole Oceanographic Institution, have had a remarkable origin. Evidently, when partial fusion begins in the sub-oceanic upper mantle, the magma normally is separated from a refractory, olivine-rich crystalline residua and moves upward, giving rise to formation of oceanic crust by volcanic eruption and intrusion, and leaving behind in the mantle a dense, olivine-rich residua. Beneath the fracture zones, however, the magma and solid residua evidently become mobilized together as a plastic, low-density, solid-plus-fluid mass which is rapidly displaced upward and eventually is emplaced in the oceanic crust and uppermost mantle.

Studies of rocks from island and submarine outcroppings of the mid-Atlantic Ridge strongly suggest that the oceanic crust will not provide "primitive" mantle rocks, that is, mantle-derived rocks which are *not* the products of partial fusion or of some other sort of chemical differentiation. While oceanic rocks, particularly those from St. Paul's Rocks, may not provide examples of "primitive" mantle rocks, they may provide important clues about the details of magma generation in the mantle, and studies are in the planning stage to focus on this particular aspect.

During the past few years the theory of sea-floor spreading and continental drift has received strong support from oceanic geophysical evidence, especially from magnetic surveys across the midocean ridges. This theory, long accepted by Southern Hemisphere geologists, is becoming widely accepted in the Northern Hemisphere for the first

time. Samples collected by Melson and his colleagues at St. Paul's Rocks indicate that this is an exposure of an extremely young intrusion. Since sea-floor spreading entails constant formation of new oceanic crust along the mid-Atlantic Ridge—the zone in which rifting and spreading should occur—the young age of these rocks, which are on the mid-Atlantic Ridge, is clearly consistent with the theory of sea-floor spreading and continental drift.

A new manganese iron phosphate mineral, switzerite, was described by John S. White and Peter B. Leavens from the Foote Mineral Company Mine, Kings Mountain, North Carolina.

PALEOBIOLOGY

In February, G. Arthur Cooper resigned as chairman of this department and was appointed senior paleobiologist in order to devote more of his time to his study on the Permian brachiopods of the Glass Mountains in Texas. The manuscript for this joint study with R. E. Grant is nearly completed and most of the diagrams have been made. During March and April, Cooper and Grant extended their field observations of the Permian from the Glass Mountains westward to the Del Norte Mountains and determined that an extension of some of the Glass Mountain formations reach into this area.

Research on the morphology, anatomy and taxonomy of early Devonian land plants was continued by Francis M. Hueber. Research progress was reported in a paper on the genus *Psilophyton* and a second paper is in press. In addition, Hueber conducted field work in eastern Canada, northern Maine, and Australia during the year.

The monographic study of the crustose coralline algae of the North Atlantic took Walter H. Adey to the coasts of Iceland and Norway, where he made extensive collections of living corallines for anatomical study and, at the same time, he conducted ecological studies of these poorly known organisms. By the end of the year, he had extended his shipboard research program as far south along the European coast as Great Britain.

C. Lewis Gazin, who served as departmental chairman from February to July, completed a historical review and a statistical analysis of the Eocene species of the condylarthran mammal *Hyopsodus* from the viewpoint of their morphology, systematics, and paleoecology.

Exceptional three-dimensional preservation of several fossil fish specimens from the Lower Cretaceous of Texas enabled David H. Dunkle to describe the cranial osteology that is so useful in systematic comparison of Late Mesozoic orders of families of teleostean fishes. He also

Off the Florida Keys, Porter M. Kier examines a starfish caught in the act of preying on a sea urchin in 12 feet of water, and (below) he photographs a group of long-spined sea urchins at a depth of 85 feet.

continued his compilation of data on the stratigraphic distribution and correlation of the fish fauna of the Upper Devonian Ohio shales.

A paper on functional morphology of the jaw in *Emydops* and *Lystrosaurus* has been completed for publication by Nicholas Hotton III with A. W. Crompton of the Peabody Museum at Yale University. Assisted by his wife Ruth O. Hotton, he is studying the petrology of the Beaufort sediments of South Africa from the viewpoint of heavy minerals, with the objective of working out the metamorphic history of the beds.

Clayton E. Ray's research on Quaternary mammals, primarily those of the eastern United States, the Antilles, and the Galapágos Islands, resulted in the completion of a review of the fossil mammals from Saltville, Virginia, with D. M. Cooper and W. S. Benninghoff. Another manuscript surveying the mammalian fauna of the Pleistocene from Ladds, Georgia, was completed in collaboration with paleontologists at Shorter College at Rome, Georgia.

Research associate Remington Kellogg completed manuscripts on two new Calvert Miocene whalebone whales, and assembled supplementary data on a small, previously described Calvert cetothere. He also prepared a review of the types of Miocene Maryland and Virginia whalebone whales described by E. D. Cope.

After having served several months as supervisor for the division of invertebrate paleontology, Porter M. Kier was appointed chairman of the department, effective July 1, 1967. He has continued his studies of fossil and living echinoids, and completed a monograph of the fossil echinoid order Oligopygoida. He undertook research on the evolution of the jaw apparatus on both fossil and Recent echinoids, and completed a preliminary study of the morphology of this apparatus in four orders. He has also studied sexual dimorphism in fossil echinoids. In April, for his paper on "Evolutionary Trends in Paleozoic Echinoids," Kier received the Best Paper Award for 1966 from the Society of Economic Paleontologists and Mineralogists.

By using morphological comparisons of scar patterns in the valves of Pleistocene ostracodes of Oklahoma, and Kansas and Nebraska, Richard H. Benson has been able to identify species which are significant to the geological search for ground-water deposits in these States. These fossil remains of animals, which lived in valleys and hollows in the landscape just after glaciation and before the deposit of windblown silts, help to identify these prehistoric depressions which now serve to trap water; their presence is difficult to predict without knowledge of ancient topography. In anticipation of deep-sea drilling and coring of the sediment of abyssal regions of the ocean basins of the world, Benson is studying ostracode faunas on a worldwide basis. These microfossils can be used to date the ages of strata penetrated, and to indicate for

climatic and hydrologic interpretation the changes in bottom conditions.

Martin A. Buzas completed a study on the population ecology of Foraminifera in the Choptank River of eastern Maryland. Three stations were sampled in replicate for 2 years to determine foraminiferal densities, with six environmental variables being measured at the same time; these data are now being analyzed by a multivariate technique. Another study concerning the special distributions of Foraminifera has just been completed and further investigations are under way to determine population size and special pattern of these distributions.

A new member of the staff, Alan H. Cheetham, a specialist in post-Paleozoic Bryozoa, has begun the quantitative sorting, preparation, study, and photographing of fossil and Recent cheilostome Bryozoans in a new laboratory established for this purpose. Quantitative and numerical methods will be used in his study of the taxonomy, functional morphology, paleoecology, and evolution of distributional patterns in this group.

The systematics, functional morphology, and evolution of the late Eocene to Recent genus *Metrarabdotos* have been studied by Cheetham, using multivariate analysis and numerical techniques, as well as anatomy and morphology, in order to interpret what appear to be major climatic fluctuations during late Tertiary and Quaternary time. This genus is at present restricted to the Tropics but ranged much farther north in both the West and East Atlantic during earlier periods of geologic history. Other similar genera are being studied as part of a quantitative paleoecological analysis of moundlike structures of earliest Tertiary age in southern Scandanavia.

As part of a monographic treatment of all Caribbean inoceramids, Erle G. Kauffman, completed a study of the Jamaican representatives of the bivalve *Inoceramus*. This study established a refined Cretaceous faunal zonation for interisland correlation, as well as the first correlation with zones on the North American continent. Another study, on the paleoecology of macroinvertebrate assemblages in the Cretaceous Colorado group, was completed by Kauffman. Considerations of the distribution of individual faunal elements and community distribution

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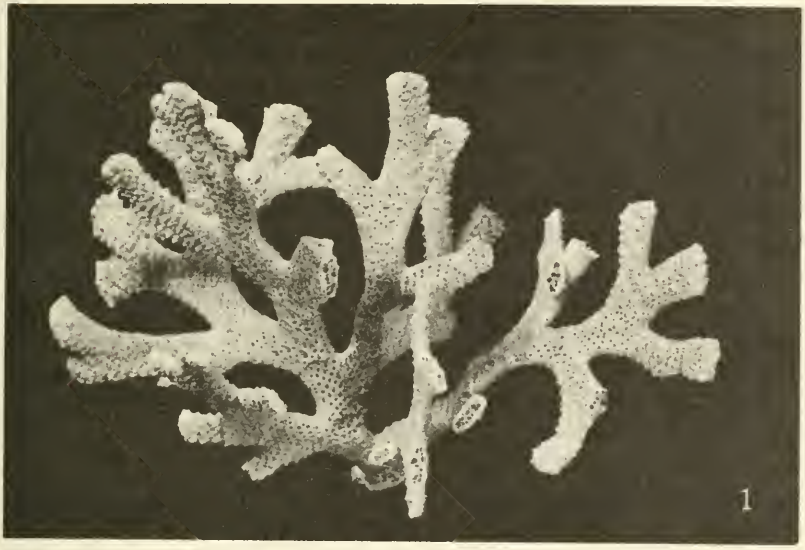
Evolution in the bryozoan *Metrarabdotos:* 1, Unusually large colony of the Recent *Metrarabdotos tenue* taken at 50 fathoms northeast of Puerto Rico, × 2. 2, well-preserved individuals of an Eocene colony of *Metrarabdotos micropora* from southwestern Alabama; the individual at center is modified for brooding larvae; × 50. 3, Individuals, one with brooding apparatus, of the Recent species *Metrarabdotos unguiculatum* taken at 22 fathoms off Accra, Ghana.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were involved in the study, along with the construction of a model of sedimentation and formal recognition of the marine sedimentary cycles shown by the rocks of the area.

Kenneth M. Towe completed a study of wall ultrastructure and cementation in the arenaceous Foraminifera and, in cooperation with Richard Cifelli, on the wall and problems of calcification in the calcareous Foraminifera. In addition, Towe and his associate, G. H. Hamilton, are completing a paper on the ultrastructure of the macreous layer in some bivalve mollusks.

As part of a cooperative project between the Smithsonian Institution, the National Oceanographic Committee of Argentina, and the George Washington University, J. W. Pierce, in a cruise on board the Environmental Science Services Administration vessel *Oceanographer*, obtained 65 samples of sediments from the estuary of the Rio de la Plata. These samples have been analyzed for clay content and trace elements in an attempt to define the source of the bottom sediments of the estuary.

Sediment dispersal patterns in submarine canyons are in the research interests of Daniel J. Stanley, who mapped ancient canyon deposits in the French Maritime Alps and examined bottom profiles in cores collected in the Gully, the major modern canyon off Nova Scotia. Interpretation of morphology and sediment distribution of the coast in the continental shelf off Nova Scotia continues, and the effects of sea-level changes were examined in the vicinity of Sable Island on the Bermuda platform. Studies were completed on the color of sediments on the continental margin off the United States, and of large calcareous and phosphorite concretions of Miocene age on Georges Bank.

VERTEBRATE ZOOLOGY

Emphasis has been given in the department of vertebrate zoology to studies dependent on computers and automatic data processing. This has significance in the area of collection management, but its most exciting applications have been in systematic and ecological research.

The systematics and zoogeography of two Indian Ocean stomiatoid fishes was the subject of a study recently completed by Robert H. Gibbs, Jr., with Barbara A. Hurwitz. He has also made considerable progress on the systematics of the scombroid fishes and in this connection he contributed to the development of plans for a worldwide cooperative monograph on the family Scombridae with the Food and Agriculture Organization Working Group on Tuna Taxonomy.

Ernest A. Lachner conducted extensive field observations over the eastern half of the United States to collect specimens and observe

breeding behavior of fishes of the genus *Nocomis*. With Martin L. Wiley he completed a study of hybridization among several species.

In addition to studying beach-erosion control on the western shore of Chesapeake Bay and conducting studies of the biology of sea nettles, Leonard P. Schultz completed a revision of the serranid genus *Labrinus*.

Considerable interest has developed with respect to studies dependent on computer and automatic-data-processing facilities. James A. Peters has been very active in the development of computer programs directly applicable to systematic research in the department and in the Museum. Through his efforts and the efforts of colleagues, three teletypes have been installed in the Museum with direct connection to a distant shared-time computer. Programs have been written which permit rapid calculation of standard statistical values and Peters is developing a computer key to the genera of snakes of Latin America. About 75 percent of the genera have now been included in the key, which requires less than four seconds to derive a generic name in response to a series of basic data supplied to the computer. It is possible that this kind of key will permit rapid sorting and preliminary identification of collections by nonprofessional technicians. Peters has also prepared a set of computer programs for one of the standard textbooks of biological statistics, making it possible for anyone to utilize any of the statistical techniques in the book simply by calling up the appropriate program from the memory core of the central computer.

Another application of data-proces ing techniques is in the Pacific Ocean Biological Survey Program under the direction of Philip S. Humphrey. The data base on sea-bird observation now includes more than 100,000 observations in the Pacific along with associated oceanographic and meteorological data.

Stanley H. Weitzman completed papers on the osteology of the deep-sea stomiatoid fish family Astronesthieae, and on the origin and relationships of the oceanic fish suborder Stomiatoidei. These are particularly valuable contributions in that they clarify the evolutionary trends through which primitive teleosts gave rise to more advanced forms in that group.

Using soft X-ray facilities to reveal skull structure in skins and skeleton, Richard L. Zusi studied the classification and relationships of finchlike birds. His work is expected to lead to a better understanding of the limits of the cardueline finches and the probable relationship of the endemic Hawaiian honeycreepers to the carduelines.

During the summer of 1966, with the support of the Smithsonian Foreign Currency Program and the Naval Medical Research Unit 3 in Cairo, Egypt, George E. Watson began his studies of the migration

of birds through northeastern Africa. Birds are obtained from Bedouins near Alexandria and are banded and released or sent to the NAMRU–3 laboratories in Cairo for study. The United Arab Republic granted permission to band birds in November and more than 5,000 birds have now been marked with bands bearing code letters and a unique number.

The Pacific Ocean Biological Survey Program has now banded more than 1,500,000 birds on islands in the Central Pacific and on the Pribilofs in the Bering Sea in the study of the migration and movement of birds in the Pacific Ocean.

Two field groups continued the work of the Smithsonian Venezuelan project in eastern and southern Venezuela under the direction of Charles O. Handley, Jr. They collected mammals, their extoparasites, blood sera, and biological and ecological data. More than twenty scientists (parasitologists, virologists, serologists, mammalogists, and ecologists) from six countries are participating in the project which has the cooperation and support of the Consejo de Bienestar Rural, Museo de Ciencias Naturales, Universidad Central de Venezuela, and the Instituto Venezolano de Investigaciones Cientificas in Caracas. The project is supported by the Office of the Surgeon General, Department of the Army, and the Middle America Research Unit.

Grass landing strip at remote Indian village of Belén, in extreme southern Amazonas Territory, where Charles Handley visited a Smithsonian field group working on the Venezuelan project (see text, above); Río Cunucunuma is on the left, slopes of Cerro Duida on the right.

Below: The Helio Courier plane of Mr. and Mrs. William S. Cowles who piloted Handley on his 10,000-mile survey of Venezuela, on the landing strip at Belén; Cerro Huachamacari in the background. Above: Looking up the Río Capanaparo near its mouth; llanos lie beyond the gallery forest near the river.

Through the generosity of Mr. and Mrs. William S. Cowles of Shelburne, Vermont, who contributed their Helio Courier aircraft and their time as pilots, it was possible for Handley to make an aerial ecological survey of Venezuela. In sixteen days of flying, covering about 10,000 miles, he studied variations in vegetation and terrain that might affect the distribution of mammals.

One of the most interesting and significant developments in the department is the firm establishment of a cooperative program between Brazilian biologists and counterparts in the Museum of Natural History. This is the program of Area de Pesquisas Ecologicas do Guama (APEG), which is administered by the Instituto de Pesquisas de Experimentação Agropecuarias do Norte and supported by subventions from the Smithsonian and a grant from the Army Research Office. The first annual report includes the information that the Mocambo and main APEG reserves have been surveyed and subdivided into numbered and staked quadrates, and basic studies of micrometeorology, soils, vegetation, social insects, vertebrates, and epidemiology have been carried out. Cooperating with Philip S. Humphrey are a number of institutions and individuals in Brazil. The most active people are Drs. Domiciano Dias, Fernando Novaes, John P. Woodall, and Murça Pires.

Henry W. Setzer, in addition to his field program for the collection of African mammals and their ectoparasites, continued the development of the "Smithsonian Institution Preliminary Identification Manual for African Mammals." Sections were completed and distributed on Rodentia: Sciuridae, Cetacea, Proboscidea, and Perissodactyla. Additional manuscripts are in hand and will be issued shortly.

Dr. Roberto Donoso-Barros of the Universidad de Chile, Santiago, has been working with James A. Peters in the preparation of a manual of neo-tropical squamata. This project, as well as the African mammal manual, is an approved Smithsonian project for the International Biological Program.

The Collections

CARE AND CONSERVATION — GIFTS AND ADDITIONS

Anthropology

The processing laboratory, established in 1965 to catalog, accession, and store archeological and ethnological collections, added to its tasks the processing of physical anthropology materials. By streamlining some of the operations, and by assigning museum specialists and technicians to tasks heretofore performed by the curatorial staff, the large backlog of uncataloged and unaccessioned collections is being drastically reduced. The assignment of a full-time secretary familiar with accessioning, loan, and other procedures has also increased the efficiency of the Laboratory.

In reworking the China, Philippine, and Northwest Coast ethnological materials the collection data have been rechecked and the specimens stored in a tribal and regional classification system. Special storage racks for Asian musical instruments and Pacific Island weapons were designed and constructed, and plans are under way for adding special storage racks for spears and paddles.

The conservation and restoration laboratory processed almost 2,000 specimens during the year; the nearly 50 percent increase in volume is owing in part to special new conservation and restoration processes being carried out on a wide variety of materials. Museum technician Bethune M. Gibson experimented with various chemical reagents to remove stains from Greek pottery, tested various dessication preventatives, and tried various kinds of waxes for the treatment of wood surfaces to prevent atmospheric changes in temperature and humidity which cause warping and cracking. One of the most important projects completed by the laboratory was the cleaning and restoring of the Museum's very valuable Northwest Coast ethnological collections, consisting of approximately 670 pieces, such as wood and bone carvings, model boats, wooden masks and dishes, and totem poles.

The anthropology archives, under the management of Margaret C. Blaker, continues to serve the needs of anthropology by answering large numbers of inquiries and requests for photographs and reproductions of anthropological manuscripts. Construction had begun on new quarters for the archives in the Museum of Natural History.

Portion of an Attic red figured kylix (cup) before and after cleaning in the anthropology conservation laboratory.

A gift of archeological materials from the Spiro Mound in Oklahoma was made by Richard K. Meyer of Peoria, Illinois. Among the most important items in this large private collection are some 100 engraved conch shells, four human and two animal effigy pipes of stone, five finely carved and remarkably preserved wood effigies, copper beads, ear spools, and hair ornaments. The Spiro Mound contained numerous burials accompanied by elaborate ritual objects reflecting the complex religious systems which characterized the Southeastern United States in late prehistoric times. The objects also reveal the skilled craftsmanship and economic wealth of the Oklahoma Indians.

Unusually rich documentation of a collection of 150 Moroccan ethnographic specimens presented by Mrs. Elizabeth Bailey Wills of Bainbridge Island, Washington, made it especially valuable for research purposes.

Lawrence H. Robbins donated an assortment of household equipment from members of the Turkana tribe, who lived near the western shores of Lake Rudolph in Northern Kenya. The collection is especially valuable because of the rarity of such materials and it will be extremely useful for comparative studies. Robbins also excavated some mesolithic skeletons in the same area, and these have been sent by Richard Leakey to the division of physical anthropology for repair and analysis.

Additions to the collections of physical anthropology include ten careful portraits of presumed unmixed Carib Indians, a Peruvian skull willed by Mrs. Clara Thompson; and two Caribbean skeletons of considerable interest. Both of these are Negro slave skeletons with tooth mutilation typical of that practied in Cameroon and Southeastern Africa. One is on deposit from the Government of Grenada, West Indies, and the other is from St. Croix, Virgin Islands, given by Lieutenant Commander J. J. Wachtel.

Botany

The National Herbarium has historically concentrated on developing collections from the New World, but there is also a recognized need for representation of plants from the Old World. In the past year several significant additions of specimens from Australia and Papua were received through the Commonwealth Scientific and Industrial Research Organization, Canberra, Australia, as well as Indonesian plants from the Herbarium Bogoriense, a valuable collection of ferns from remote parts of Thailand sent through Japan's Kyoto University, and several large collections of African grasses from the Royal Botanic Gardens, Kew, England.

Additions to the New World collections included a large set of critically selected United States and Mexican plants from Stanford

Thomas R. Soderstrom (left) and Reginald J. Sayre examine clumps of grasses for exhibit in new hall of plant life.

Grasses, and the lichens being inspected by Richard S. Cowan (left), were obtained by botany – exhibits expedition to the Colombian paramos in fall 1966, led by Soderstrom.

University, a set of specimens collected in the Brazilian planalto by Howard S. Irwin of the New York Botanical Garden, and a large collection of specimens from the Brazilian state of Santa Catarina made by Padre Raulino Reitz, a collaborator with Lyman B. Smith on the flora of that state.

Staff additions to the collections included specimens from the West Indian island of Dominica made by William L. Stern and Dieter Wasshausen, the Colombian wood collections made by José Cuatrecasas, and Panamanian wood collections made by Stern and Richard H. Eyde. Noteworthy cryptogamic collections continued to arrive, including a large lot of algae received from Isabella Abbott of Stanford University, moss specimens from the Rijksmuseum in Leyden, and a collection of lichens from the western and southern United States, from Mason Hale.

Specialists on the grass family will be pleased to find the grass herbarium rearranged with the genera in alphabetical sequence. Previously they had been arranged by tribes and "phylogenetically" within the tribes. In addition, several thousand sheets which have been in storage will shortly become available to researchers.

Through Dr. Chester Benjamin, 122 used metal herbarium cases were transferred to the herbarium from the national fungus collections at Beltsville, Maryland. The new storage space permitted the expansion of a large block of flowering plant families so that they are more easily used without risk of breakage.

The collections were used by a large number of visiting scientists from the United States as well as from elsewhere in the world. International visitors included Syo Kurokawa, National Science Museum, Tokyo, who studied lichen collections for seven months; Brother Alain Liogier, Manhattan College, who studied herbarium specimens in preparation for his fieldwork on the Island of Hispaniola; Armando Dugand, Barranquilla, Colombia, who completed his term as a Guggenheim Fellow working on the Catalpa family and on the flora of semiarid northern Colombia; and Julian Gonzales Patiño (Brother Daniel), Rector of the Colegio de San José, Medellín, Colombia, who continued his investigations of the medicinal plants of Colombia and the flora of the Departmento de Antioquia.

Entomology

The addition to the staff of two museum technicians, Marc Roth and Ronald Faycik, permitted a small reduction in the enormous backlog of insect specimens awaiting processing. Gloria House sorted to family more than 270,000 specimens of Coleoptera from Bolivia.

The addition of Glenn Taylor as a preparator of Hemiptera and of Gerald I. Stage as a specialist on Hymenoptera resulted in substantially reducing the large accumulation of unmounted, unlabeled, and unsorted specimens of these orders, as well as their rearrangement for use by the staff and by visiting researchers.

W. H. Rowe prepared, labeled, and sorted for distribution more than 36,000 specimens of Lepidoptera, sorted to family 190 museum drawers of butterflies, and assisted in arranging over 600 species of arctiid moths for photographing. William D. Field completed about 75 percent of the task of reclassifying and rearranging the collections of Indo-Australian Papilionidae.

Mrs. Sophie G. Lutterlough, with Ralph Crabill, restored, relabeled, and rehoused great numbers of dried specimens of Myriapoda, including many unsuspected type specimens.

Preparator Nancy Heath transferred the collection of papered Neotropical Odonata to new transparent plastic envelopes; previously these had been stored in any convenient container, resulting in a collection almost impossible to arrange or to use. In addition, she mounted and labelled more than 25,000 specimens, sorted and distributed over 150,000, and carried forward reference work toward a catalog of Neotropical Trichoptera.

Under a grant from the National Science Foundation, Mrs. Phyllis Spangler pinned, dissected genitalia, labeled, and sorted to genus 10,500 aquatic beetles and recorded data from 9,000 identified specimens of the genus *Tropisternus;* she also completed cataloging one family and made considerable progress on cataloging three others, as well as rearranging the entire collection of aquatic beetles.

The entomological collections continued to grow through gifts from generous donors, through field collections by staff members, by purchase, and by exchange of critical specimens with corresponding scientists and other museums.

Almost 40,000 Neotropical beetles were accessioned, of which more than half were obtained by purchase. Among the notable donations or exchanges were some 7,500 collected by O. S. Flint, Jr., in Mexico and Central America; over 4,000 Brazilian beetles from M. Alvarenga; more than 500 aquatic beetles from the British Museum (Natural History), including critically important type material; and 23 paratypes from R. Mouchamps, Belgium. J. F. G. Clarke contributed more than 3,000 specimens from Ceylon and Sarawak; P. J. Spangler, nearly 9,000 from the United States; D. Owens, nearly 6,000 from Mississippi; A. Blanchard, 4,400 from Texas; and L. O. Warren, over 1,000 from Arkansas.

A very generous gift of more than 88,000 Irish Hymenoptera, donated by A. W. Stelfox of Newcastle, County Down, is the first important acquisition of this group from the British Isles. Its value is greatly enhanced by the inclusion of holotypes of species described by Stelfox and of topotypic material from areas in which Haliday described numerous new species and genera.

G. E. Ball enriched the collections of Myriapoda and Arachnida by donating more than 1,300 specimens of Mexican chilopods; through his efforts over a number of years, the national collections now have the finest extant collection of Mexican centipedes. O. S. Flint, Jr., working in the Antarctic, collected some 22,000 mites and 109,000 Collembola and Mallophaga.

As in previous years, Museum entomologists and U.S. Department of Agriculture colleagues were active in the Bredin-Archbold-Smithsonian Biological Survey of Dominica in the West Indies. Through the efforts of O. S. Flint, Jr., A. B. Gurney, and R. J. Gagne, more than 22,000 specimens from that Island were added to the collections.

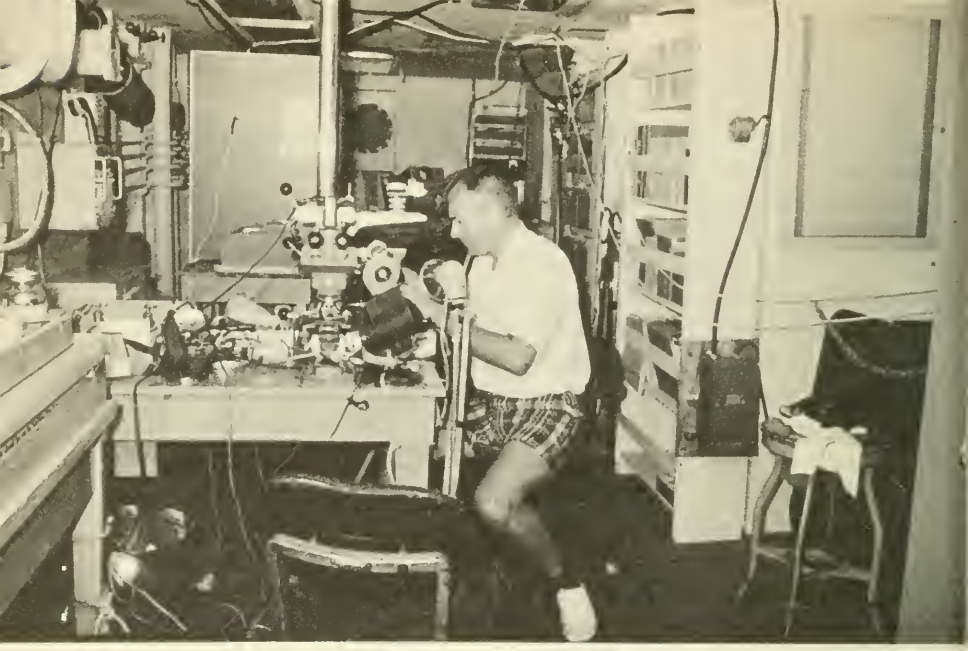
The Department of Agriculture transferred 59,056 specimens of insects and their allies to the Smithsonian, of which a number were of more than ordinary interest or value. They represented the choicest materials submitted to USDA and Museum specialists for identification and many represented species not previously in the national collections. Others were reared series consisting of immature and adult stages.

The collections were also enriched by the addition of thousands of mounted and labeled insects collected through Department of Agriculture contracts with several universities and individuals, and USDA preparators sorted, mounted, and labeled many additional specimens.

In addition to the use of the collections by the research staff of the Museum and the USDA, the collections were studied by nearly 400 visiting scientists from universities and other museums in the United States and abroad.

Invertebrate Zoology

The diversity and extent of the Museum's holdings of invertebrate animals, other than insects, is reflected in the large number of investigators who visited the department of invertebrate zoology during the past year. More than 170 visitors, including graduate students and established researchers as well, from the United States and numerous foreign countries utilized the collections. Crustaceans, echinoderms, and mollusks were most attractive, because of their good systematic and geographic representation.



Kjell B. Sandved, photographer for the Office of Exhibits, photographs living planktonic organisms aboard the Woods Hole Research Vessel, *Atlantis II*. More than a thousand color transparencies were made as reference materials for the hall of ocean life.

Among the more significant additions to the crustacean collection during the year was the gift of an extensive collection of North American freshwater amphipods accumulated over many years by Leslie Hubricht of Meridian, Mississippi. Also significant were a series of more than 34,000 ostracods from Texas, collected by L. S. Kornicker of the Museum staff; approximately 70,000 specimens of brackish water and marine mollusks from Louisiana, received from the estate of the late Percy Viosca, Jr.; and a collection of almost 25,000 marine mollusks from Polynesia, acquired as a result of Harald A. Rehder's field study there.

In curatorial work, largely handled by a capable supportive staff, particular attention was paid to organizing the collections, reducing the backlog of unidentified and uncataloged holdings, and cataloging and filing, so that specimens and data were more readily available to the staff and to visitors as well. The Smith-Corona-Marchant Typetronic machine, a partially automated typing system equipped with a microtypewriter, as well as a standard one, proved to be very effective in reducing cataloging time. With the machine, the specimen labels, in microtype, and all necessary data cards can be filled out in one operation. The machine, acquired last year, was put into full-time operation this year with the addition of a cataloger.

Mineral Sciences

Cataloging of the meteorites and minerals in the Carl Bosch collection continued through the year. Of the 587 specimens representing 305 different meteorites, 24 were of particular importance to the collection because they were not previously represented. Specimens of 80 to 90 other meteorites constituted important additions to the collection and the remaining specimens added much needed depth. The addition of 28,000 specimens of minerals from this collection represents a 20 percent increase in the total holdings of such materials; a large increment like this will require two to three years to integrate into the national collections. Already the Bosch collection has provided much valuable research material.

Two important freshly fallen meteorites were obtained and made available to researchers in several laboratories studying shortlived radioisotopes. The Barwell, England, chondrite was obtained through the cooperation of the British Museum (Natural History). The St. Severin, France, amphoterite was obtained from Jacques Labeyrie, of the Centre National de la Recherche Scientifique, with the cooperation of the U.S. Atomic Energy Commission. A specimen from the largest individual meteorite known, the Hoba, Southwest Africa, meteorite, was obtained through the cooperation of the Smithsonian Astrophysical Observatory. Other important specimens of meteorites obtained were the Nakhom Pathom, Thailand, meteorite; the Essebi, Congo, carbonaceous chondrite; and the Faucett, Missouri, and Social Circle, Georgia, meteorites.

Among many important gifts by individual donors to the mineral and gem collection were a 265-carat, complexly twinned group of diamond crystals, by J. M. Wachtler; a set of 22 colored, irradiated diamonds, by Theodore and Irwin Moed, Inc.; and a white jade teapot of the Chien Lung period, by Mrs. Mildred Taber Keally.

Through exchange many fine specimens were added, such as the largest and finest known crystal of kunzite, from a recent discovery in Brazil; a large and beautiful group of smoky quartz crystals from Goscheneralp, Switzerland; a specimen, with extraordinarily large crystals, of uvarovite garnet from Outokumpu, Finland; and a 911-carat aquamarine, and a 172-carat tourmaline, both from Brazil.

The collections were also enriched by the purchase of a very fine group of morganite crystal from the White Queen Mine, San Diego County, California; excellent specimens of apatite, wolfamite, and arsenopyrite from Panesqueria, Portugal; a very fine 178-carat morganite from California; and an unusually good specimen of sphene from a new occurrence at Capelinha, Brazil.

Other important additions were an outstanding series of eclogites from diamond-bearing kimberlite pipes, obtained as a result of George Switzer's trip to Africa last year; several described suites of rocks from the U.S. Geological Survey; and additional samples of oceanographic rocks, mainly from the mid-Atlantic Ridge.

A pilot program for automatic information retrieval was begun on data attached to the rock collections, in order to answer the increasing demands by outside researchers for information on described specimens.

Paleobiology

The task of getting the fossil plant collections into usable condition continued with cleaning and sorting of specimens from the Tertiary and Pennsylvanian, checking of type specimens of Tertiary plants against the published literature and catalog data, and the reorganization of the collections in systematic order.

Holotype specimens of the fossil fern *Itopsidema vancleavei* and the coniferous tree root *Araucariorhiza joae* were received as a transfer from the Museum of the Petrified Forest National Park, Arizona. Professor J. Harlan Johnson of the Colorado School of Mines added other type specimens by his gift of four slides containing three primary and seven secondary types of fossil algae from the Mississippian of Alberta. Sixteen polished slabs of well-preserved petrified wood from Washington, Oregon, and Nevada were prepared for use in the new exhibit planned for the paleobotanical section in the hall of fossils, with support of the Roland W. Brown fund.

Near completion of covered storage racks now permits proper care and arrangement of the many rather large specimens of vertebrate fossils. This facility permits large slabs of fossil fish, portions of dinosaur skeletons and the collection of Oligocene titanothere skulls, many of which had been on display and a number of which are type specimens, to be arranged in accessible, protected storage.

Teeth of Pleistocene mammoths and mastodons, and remains of Pleistocene walrus from as far south as New Jersey, were among the interesting collections of vertebrate fossils recovered by dredging operations near the Atlantic seaboard. Some of these were contributed by private individuals but several came to the Institution from the Department of the Interior's Bureau of Commercial Fisheries.

Some exceptionally fine specimens of vertebrate fossils, to be featured in the hall of Pleistocene vertebrates, include a composite skeleton of the mammoth *Mammuthus primigenius* from frozen deposits near Fairbanks, Alaska, and several fine specimens of glyptodonts from the early Pleistocene of Arizona; these specimens were obtained from the Frick Laboratories at the American Museum of Natural History either on

open exchange or as a gift. Another outstanding acquisition, also to be featured in the Pleistocene exhibit, is a skeleton of the extinct ground sloth *Megalonyx*. from Blackstone Cave near Gate City, Virginia, which was purchased through the Walcott fund.

Among the several specimens of marine mammals obtained during the year, principally from the Miocene beds in the Maryland-Virginia region, is an unusually good representation of a fossil whale (cetothere) from the Choptank Formation along the Potomac River in Westmoreland County, Virginia. The collection of this specimen, featured in one of the Smithsonian Institution television programs, was accomplished by Albert C. Myrick, Jr., of the vertebrate paleontology laboratory, Charles F. Buddenhagen of the U.S. Geological Survey, and William B. Sonntag of the Smithsonian buildings management department.

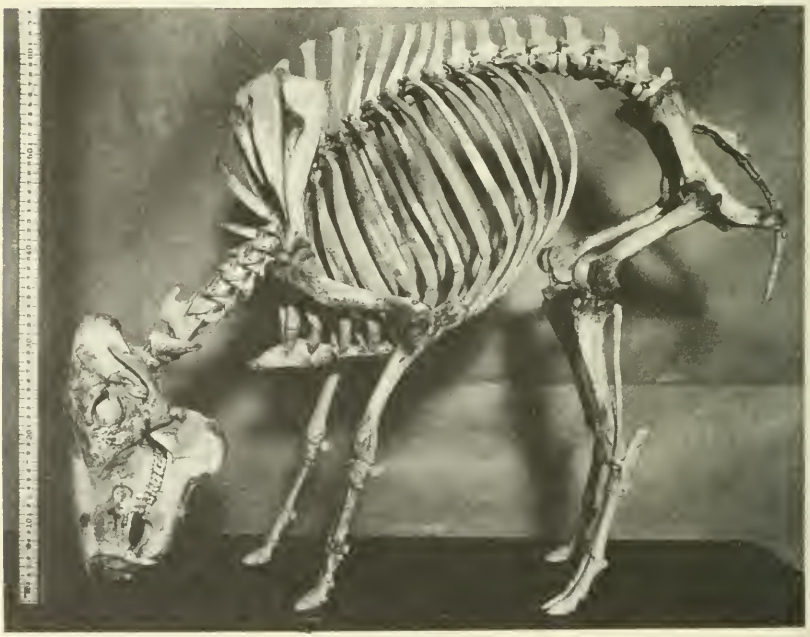
Curatorial activities related to the collections of invertebrate fossils have been mainly involved with type specimens, of which more than 4,000 were processed during the year. Each type has been checked against published literature, labeled, recorded, and placed in systematic order in the collections. The first chapter of the catalog of type specimens of invertebrate fossils was completed by Louis Purnell, and work is progressing on subsequent chapters that will ultimately result in a complete catalog of the Museum's invertebrate types.

Using funds from the Walcott bequest, Richard A. Robison collected more than 5,000 invertebrate fossils of Early Ordovician age in the vicinity of Nochixtlán in southern Mexico. This collection is of particular significance because faunas of unquestioned early Paleozoic age were unknown from rocks south of the northern border states of Mexico. The trilobites studied thus far are a mixture of genera containing elements that have been reported from Asia, North America, South America, and Europe, a situation which will make the collection of great importance in making intercontinental correlations.

The Walcott bequest also enabled Erle G. Kauffman to make a collection of 20,000 specimens from the Mesozoic of Jamaica and the Cretaceous of the Western Interior. These collections, together with the existing one, constitute the largest and best-documented Mesozoic faunal representation in the Western Hemisphere.

Other noteworthy additions to the collections were more than 50,000 sorted and labeled specimens of mollusks from the Tertiary of Maryland and Virginia, from Charles Buddenhagen; many lots of type specimens from the U.S. Geological Survey, including a collection of more than 4,500 smaller foraminifera types; and a collection of several thousand identified specimens of cheilostome Bryozoa representing species of Cretaceous through Recent age from all over the world, donated by Alan Cheetham, who recently joined the Museum staff.

Museum technician Albert C. Myrick, Jr., packaging in plaster and gauze for transport to the museum the skull and jaws of a cetotheriid whale from Miocene strata along the lower Potomac River at Westmoreland State Park, Virginia. Below: Skeleton of the extinct peccary *Platygonus compressus* from glacial deposits near Mosherville, Pennsylvania, presented to Smithsonian by Troy Community Junior High School and mounted for exhibition by museum technician Gladwyn B. Sullivan (U.S. Geological Survey photo).



Cataloging the backlog of sediment samples accumulated over the years has absorbed most of the curatorial effort of the division of sedimentology. Using the cataloging system of the National Oceanographic Data Center the samples are being recorded so that collation of a specimen in the collections can be made with the analytical data stored in the Data Center for that sample.

Scripps Institution of Oceanography donated to the Institution all their cores and samples from the Gulf of Mexico and Gulf of California; the Marine Mineral Technology Center of the Bureau of Mines transferred more than a hundred samples from Monterey and Carmel Bays, California; and the Coast and Geodetic Survey transferred more than a hundred samples from Narragansett Bay, Rhode Island.

Vertebrate Zoology

Collection management of bird specimens was streamlined by use of a Typetronic machine on which the operator simultaneously types the data on a label and generates punched-paper tape, which is then used to prepare additional labels and a permanent museum catalog page with no further manual labor. The tape is also available for incorporation into a Smithsonian-wide, automatic-data-processing system. George Watson has finished preliminary format and coding for the labels and catalog pages, and all curators are actively working on a definitive species list of birds of the world for use in processing the data. All new specimens will be cataloged by this system and it is anticipated that the entire seabird collection will soon be incorporated.

The seabird skin collection is growing in importance. New distributional records were incorporated, based on specimens from the central Pacific Ocean, Atlantic Ocean, western South America, and Macquarie Island. Large general collections of bird skins also came from North and South America, the Aegean Islands, Kenya, Rhodesia, Bechuanaland, and New Guinea. During the year 25 species and four genera new to the collections were added.

The bird skeleton collection was improved by the addition of storage space, additional work surfaces, and new boxes designed to facilitate the use of the specimens and at the same time reduce the possibility of breakage of delicate skeletons. An index collection of skeletal elements of most avian families has facilitated identification of fossil and archeological material by visiting investigators. The anatomical collection of birds also continued its rapid growth with the addition of spirit specimens from the West Indies, Venezuela, Egypt, and the Pacific Ocean.

Museum technician Edgar N. Gramblin positioning fishes (groupers) under x-ray with a range of approximately 30 to 115 kilovolts. This machine is used in the study of large fish specimens. Another, ranging from about 5 kilovolts upward, is used in the examination of small, delicate specimens.

In an extensive program of improving the condition of the collections of fishes, the result of an energetic program of activity by the museum aides in the division of fishes, specimens in the small evaporation-prone ground-glass jars are being transferred to more secure clamp-top jars, and large collections of fishes previously unsorted and unidentified have been integrated into the regular collection.

The collection of fish specimens grew considerably by the addition of approximately 5,000 specimens from the Peru-Chile Trench through the efforts of Robert H. Gibbs and Bruce B. Collette; about 10,000 specimens from the Great Barrier Reef collected by Victor G. Springer; approximately 2,000 fish specimens from Brazil received from J. S. Dendy, Auburn University; 10,000 specimens from the southeastern United States donated by Frank J. Schwartz, Chespeake Biological Laboratory; and nearly 10,000 specimens from Lebanon, given by Carl J. George, American University of Beirut.

Outstanding accessions of reptiles and amphibians include 417 collections from the South Pacific made by Robert M. Roecker; nearly 240 specimens of lizards from the Pacific Islands, collected by personnel of the Pacific Ocean Biological Survey; 640 specimens of reptiles and

amphibians from Senegal and Gambia, collected by the Smithsonian African Mammal Project; over a hundred specimens of ring-neck snakes from the southeastern United States, collected by Bernard Martof; and 152 specimens of reptiles and amphibians collected in Venezuela by the Smithsonian Venezuelan Project.

SPECIMENS IN THE NATIONAL COLLECTIONS MAY 31, 1967

ANTHROPOLOGY		1,101,720
Cultural Anthropology	973,891	
Physical Anthropology	37,829	
BOTANY		3,288,748
Phanerogams	2,044,758	
Ferns	259,247	
Grasses	398,957	
Cryptogams	539,207	
Plant Anatomy	46,579	
ENTOMOLOGY		17,834,090
(Former Division of Insects total, 1963	15,978,513)	
(divisional totals are shown from this date)		
Coleoptera	392,806	
Hemiptera	384,799	
Lepidoptera	319,126	
Myriapoda and Arachnida	431,229	
Neuropteroids	327,617	
INVERTEBRATE ZOOLOGY		12,344,181
Crustacea	1,540,700	
Worms	659,395	
Echinoderms	85,198	
Mollusks	10,058,888	
MINERAL SCIENCES		433,820
Mineralogy	124,097	
Meteorites	10,602	
Petrology	299,121	
PALEOBIOLOGY		13,393,582
Invertebrate Paleontology	13,337,512	
Vertebrate Paleontology	49,561	
Paleobotany	4,601	
Sedimentology	1,908	
VERTEBRATE ZOOLOGY		2,918,212
Mammals	352,890	
Birds	525,011	
Reptiles and Amphibians	169,862	
Fishes	1,870,449	
TOTAL NATURAL HISTORY COLLECTIONS		51,224,353

SPECIMEN TRANSACTIONS—FISCAL YEAR 1967

Departments	*Accessions (transactions) 1967 (new)*	*Received on loan*	*Exchanged with other institutions*	*Transferred to other Government agencies*	*Lent for study to investigators and other institutions*	*Specimens identified*
Anthropology . .	129	440	109	0	21, 963	2, 410
Botany	323	4, 431	41, 986	295	42, 240	9, 850
Entomology . . .	472	5, 637	1, 826	0	192, 114	26, 648
Invertebrate Zoology	529	1, 796	1, 184	0	12, 435	27, 427
Mineral Sciences .	331	27	1, 623	126	734	511
Paleobiology . .	160	1, 349	362	0	107, 311	49, 337
Vertebrate Zoology	170	3, 508	1, 078	0	13, 885	33, 804
TOTAL . .	2, 114	17, 188	48, 168	421	390, 682	149, 987

The new meteorite hall was opened in December 1966. Wall cases contain descriptive and systematic exhibits. A Moon model is suspended from the ceiling, and a recorded talk discusses lunar features and their origins.

Exhibits

The hall depicting the peoples of Africa neared completion during the year. A life group illustrating the making of poisoned arrows, bows, and ostrich-egg shell-beads by Bushmen of the northern Kalahari was essentially completed; a second life group depicting a domestic scene among the Hereros of southwest Africa, which will be displayed in a hut-shaped exhibit case, neared completion. The hall will be opened officially in the next fiscal year.

The planning and writing of scripts for the future hall of Old World archeology made progress, with Mrs. Elly Dubinsky preparing exhibit units for the Greco-Roman alcove under the supervision of Gus W. Van Beek.

In June an exhibition of Tunisian Mosaics was opened for public exhibition. This display, which had wide showing in Europe, will be exhibited in eleven museums of the United States and Canada in the next two years under the auspices of the Smithsonian Traveling Exhibition Service. Gus Van Beek arranged for the Washington exhibition, worked with designer Dorothy Guthrie in planning it, and assisted SITES in reviewing and editing the catalog.

Two additions to the hall of physical anthropology, both dealing with cultural modifications of the human body, were made under the direction of T. Dale Stewart. One of these is a central glass case containing examples of mummifications, drying, and fat saponification of complete human bodies. The other is a large oil painting by New York artist Alton Tobey showing some of the more dramatic body alterations usually undertaken for aesthetic reasons—such as deformed heads and feet, patterns of tattooing and scarification, stretched necks, and pierced ears.

Planning for the future hall of plant life was advanced by a field expedition to Colombia under the leadership of botanist Thomas R. Soderstrom, accompanied by Paul Marchand, master model-maker from the Science Museum in Buffalo; artist Jay Matternes; Smithsonian photographer Kjell Sandved; and Smithsonian exhibits specialist Reginald J. Sayre. Marchand made molds and models of plants from living specimens; Matternes set up his easel on the mountainside where the chilling winds and frequent rain made his

STATUE OF JAPANESE STATESMAN REPATRIATED

In 1858 Baron Naosuké Ii, the first prime minister of modern Japan, concluded a treaty of friendship with the first United States minister to Japan, Townsend Harris. Two years later Prime Minister Ii was assassinated by opponents of his foreign policy as he was leaving the imperial palace grounds in Tokyo. Today Prime Minister Ii is greatly honored in Japan as a courageous man who upheld a liberal and wise national policy at the cost of his life. Had it not been for his penetrating foresight and his resolute stand in opposition to popular opinion, Japan might have adhered much longer to the tradition of isolation which that nation had shared with the rest of the Orient.

A life-size wooden statue of Prime Minister Ii, sculpted by Sekka Shima, was exhibited at the World's Columbian Exposition at Chicago in 1893 and then presented to the Smithsonian Institution. There it remained in the Museum of Natural History until the late summer of 1966 when it was decided that this statue should be returned to Ii's homeland. About this same time Roger Pineau, of the Smithsonian Institution Press, received naval orders to temporary active duty to assist Admiral Samuel Eliot Morison with historical research in Japan. It seemed propitious to ask Admiral Morison—who is a member of the *Smithsonian Journal of History* board—to represent Secretary Ripley in the return of the statue, and the Navy Department arranged for its transportation.

With the help of Mr. Walter Nichols, the American cultural attaché in Tokyo, the statue was returned to Baron Ii's birthplace at Hikone in Omi Province.

job extremely difficult; Sandved photographed more than 3,000 views of the high Andes, as well as many close-up photographs of the plants; and Sayre prepared for shipment back to the Museum plants that included dried grasses, the woody parts of shrubs, and many specimens preserved whole in formalin. The five-paneled panoramic view of the paramos made by Matternes will be used to prepare the background painting of the life group in the Museum. The photographs made by Sandved will be used in an automatic projection system which will accompany the exhibit.

Insects and related groups will be presented in a future exhibit hall tentatively titled "The World of Insects and Their Allies." Preliminary discussions of the departmental staff determined that the underlying theme of the hall will be ecological, and planning was begun in December. Writer Peter Farb, as consultant, will act as liaison between the departmental staff and the Office of Exhibits in developing the hall outline and the eventual exhibit scripts. Joseph Shannon is the designer.

Two new permanent exhibits were opened in the hall of life in the sea. The first of these demonstrates the variety of reproductive mechanisms in marine invertebrates, while the second shows various examples of parental care among the marine animals. The case on reproduction has been used as the basis of a tour guide produced as a cooperative effort between the District of Columbia public schools, the Smith-

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The ancient castle and grounds of the Ii family—as well as the modern museum in which the statue now stands (left, above)—are maintained as an important cultural property.

The presentation took place on 16 November 1966 in the Hikone Public Hall, where the statue was accepted by Mayor Naoyoshi Ii, great grandson of Prime Minister Ii. The ceremony was attended by John L. Stegmaier, U.S. Consul-General for the Kobe-Osaka area, and Mr. Walter Nichols.

The remarks of Admiral Morison and Mayor Ii were covered by Japanese press and television. After a tea and flower ceremony Mayor Ii took his visitors on a tour of the castle and museum, and hosted a dinner for them at the family estate.

Mayor Ii—who was first shown this statue of his forebear in May 1954 at the Smithsonian (left) by Remington Kellogg, then Director, United States National Museum—is a leading authority on crustaceans. His recent *Fauna Japonica Mysidae* (*Crustacea*) is an outstanding contribution to the carcinological literature.

sonian's Office of Education and Training, and the Museum of Natural History's department of invertebrate zoology. It is intended that this experimental tour guide provide the necessary background information for making a class trip to the Museum truly significant.

The new hall of meteorites was opened in December. With scripts prepared by the curatorial staff of the division of meteorites and exhibit design by Dorothy Guthrie, it features displays illustrating phenomena of the fall of meteorites, their systematic classification, and their scientific study. A tektite exhibit and a large globe illustrating the moon's surface were also included. One display is centered around a section of the El Taco meteorite, a large individual from the Campo del Cielo meteorite area in Argentina. Four sections were obtained by the Smithsonian of this 4,400-pound specimen which has been the object of study in Germany, Argentina, and many laboratories in this country.

Nine exhibits units have been installed in the introductory section of the physical geology hall. Noteworthy among these is a six-foot-diameter relief globe depicting the geology of the earth, and a mural by Pierre Meonde which illustrates one theory of the evolution of the solar system. Work on this hall is under the overall direction of Paul E. Desautels with the assistance on scripts of other members of the department and of the department of paleobiology; design is by Dorothy Guthrie.

Work has progressed on the dioramas depicting vertebrate life of the Mesozoic era with the completion of the background painting by Jay Matternes for the Triassic period. The Jurassic and Cretaceous dioramas have been received from the contractor and now require only the background painting. Models for a fourth diorama, illustrating marine vertebrate life during the Cretaceous, have been approved. At completion, the four dioramas will be viewed on the balcony of the dinosaur hall.

Construction of the new hall depicting vertebrate life during the Pleistocene has been completed this year and certain of the skeletons, such as the giant Panamanian sloth, three mastodons, and the Hagerman group of horses, have been installed. Mounting of several skeletons has been completed and several others have been remounted in different poses.

The first part of the hall on cold-blooded vertebrates was opened during the year, and an excellent reproduction in the form of a life group depicting a niche in the Everglades environment is a feature attraction. This section also includes exhibits on amphibians and reptiles, intended to give a rather full picture of the total biology of these animals—their anatomy, ecology, and behavior.

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National Zoological Park

THEODORE H. REED, *Director*

HEALTHY GROWTH AND ACHIEVEMENT in all areas again mark the year for the National Zoological Park. No one event overshadows all others. In the animal department a third gorilla and a sloth bear were born. In the research division a field study of the Ceylonese elephant was started. The new hoofed-stock area was opened and occupied. And constant improvement in such aspects of the Zoo's work as education, nutrition, and beautification of the grounds contributed to a very good year.

In the interest of conserving endangered species of animals, two female pygmy hippopotamuses from other zoos were bred to the National Zoo's Totota. Word has also been received that our male orangutan, Butch, who was sent to the Boston Zoo last year* is now residing in Colorado Springs for breeding purposes.

The Animals

Through gifts, births, purchases, and exchanges, the collection has increased so that it now contains not only more individual animals, but a greater number of species than ever before in its history, greatly adding to the diversity of the exhibits.

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*See *Smithsonian Year 1966*, p. 154.

STATUS OF THE COLLECTION

June 30, 1967

Phylum: *Class*	*Orders*	*Families*	*Species or subspecies*	*Individuals*
Chordata: Mammals	13	47	233	610
: Birds	21	75	426	1, 309
: Reptiles	3	23	256	873
: Amphibians	3	13	38	228
: Fishes	5	10	31	177
Arthropoda: Insects	1	1	1	5
: Crustaceans	1	1	2	33
: Spiders	1	1	1	1
Mollusca: Snails	1	1	1	30
TOTALS	49	172	989	3, 266

To these figures should be added the 28 species, comprising 138 individuals, of small mammals under the care of the research division and not always on exhibit, giving a grand total of 1,017 species and 3,404 individuals.

Increased interest of the scientific community in the history of captive animals has led the Zoo to improve with an easy-retrieval system its method of keeping animal records.

NOTE: Certain tabulated, statistical, and other information formerly contained in the report of the National Zoological Park in *Smithsonian Year* now appears as appendices to the Separate of this Report (available on request from the Director of the National Zoological Park). This information includes:

Visitor statistics and other operational information.

Report of the Veterinarian, augmented by case histories and autopsy reports.

Complete lists of (a) animals in the collection on June 30, 1967; (b) all births and hatchings during the year; and (c) changes in the collection by gift, purchase, or exchange.

In cooperation with the American Institute of Biological Sciences, the Smithsonian Institution sponsored an intensive course in biomedical telemetry at the Natural History Museum auditorium, August 10 to 13. Special exhibits in connection with the course, held at the Zoo August 10 to 19, were:

Caiman: This reptile swallowed a radio transmitter which senses temperature and telemeters it to an external receiver, whether the animal is in or out of the water. Visitors could detect the clicking signal and calculate the caiman's temperature for themselves.

Four-day-old Inaki, lowland gorilla, the third offspring (and first female) born to Moka and Nikumba.

Llama: A subcutaneous probe from an attached external transmitter sent pulses to a receiver for continuous recording. These indications, which are useful in disease diagnosis, showed much smaller changes in this warm-blooded animal than in the caiman.

Pronghorn: A transmitter carried externally by the animal emitted a pulsating signal which could be heard on a receiver with turnable antenna. Rotation of direction-finding receiver by the visitor allowed him to locate the animal in the paddock.

These exhibits were set up by R. Stuart Mackay of the University of California, in cooperation with the Zoo staff.

Moving the white rhinoceroses turned out to be one of the most elaborate engineering feats to be accomplished during the year. From their rather small cage and outdoor yard in the elephant house, which they had occupied ever since their arrival here on September 4, 1956, Bill and Lucy were transferred to a moated hillside where they can be viewed without any obstructing bars. Their new home is in an area reserved for hoofed stock too delicate to winter outdoors, and it is an ideal spot in which to display these valuable and magnificent animals.

Special ramps that would bear the weight of the rhinos (Bill weighs 4,865 pounds, Lucy 3,630) were built by the mechanical department in order to have the animals walk onto the waiting trucks. With the aid of tranquilizers administered by Zoo veterinarian Clinton Gray, and with eleven stalwart keepers to push and tug, both animals made it safely. The distance traveled was about 500 feet—the time required, four hours.

With completion of the new hoofed-stock area, the zebras and Mongolian horse were returned on September 2, 1966, to the Zoo, after having been boarded at a farm in Maryland. The first major birth in the area was that of a male Grant's zebra on April 12, 1967.

BIRTHS

Outstanding mammal births included a sloth bear, a brown lemur, golden marmoset twins, five serval kittens, two of the rare little South African black-footed cats, and two golden cats. As always, the excitement that surrounds the birth of a gorilla in captivity attended the birth to Moka, the Zoo's lowland gorilla, of her third infant and first female, on April 8, 1967. Inaki, as the youngster was named, is being reared by Mrs. Bernard Gallagher, who successfully reared the first two gorillas born at the National Zoo. The birth this year of 5 Barbary apes, more than in any previous year, brings to 27 the colony which is being built up for the monkey island that is in the Zoo's future plans. Mating of the black rhinoceroses has been observed, and if the signs of pregnancy are reliable, a rhinoceros will be born during fiscal year 1968.

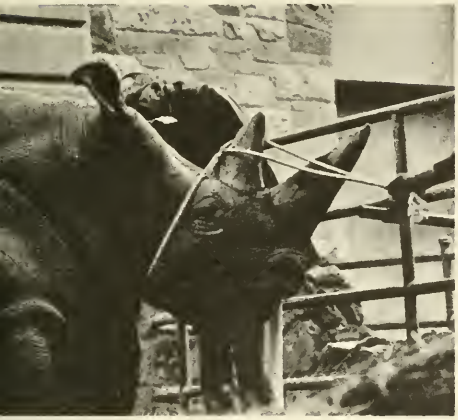
Among the bird hatchings followed by successful raising were those achieved by crested green wood partridges (14), Hawaiian ducks (9), black-necked swan (1), kookaburras (5), Pentland's tinamou (2), and the bare-throated tree partridge (1). The first emu chick to be hatched in the Zoo appeared, but perhaps the rarest of all was a tiny elf owl; so far as is known, the only other elf owls to be hatched in captivity are at the Sonora Desert Museum in Arizona, where conditions closely simulate their natural habitat and are not at all like those for our little pair behind glass in the bird house. Birds that had first nestings but were unsuccessful in hatchings were the rufous-thighed falconet, red-billed oxpecker, and collared forest falcon.

Noteworthy reptile hatchings were those of the banded red snakes (2) and the eastern indigo snake (1).

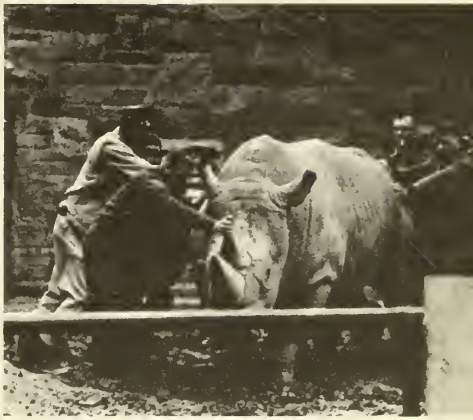
GIFTS

As usual, the Zoo was the recipient of numerous, much appreciated gifts. A complete list will be found in the Appendix (see note, p. 156).

MOVING A WHITE RHINO TAKES . . .



Tranquilizing . . .



coaxing . . .

hauling . . .

pulling . . .

and finally . . .
the new quarters.

Of particular interest were two baby cheetahs, presented by Woodward & Lothrop, which were part of a window display at the store in January. Dr. Harry Hoogstraal, at the time stationed in Cairo, sent the Zoo a North African banded weasel, eleven European hoopoes, other birds, and a number of interesting reptiles. John Archbold, of Upperville, Va., gave two river otters. Edward Marshall Boehm, of Trenton, N.J., presented 29 specimens of rare birds, and S. Dillon Ripley contributed 18 birds, mostly waterfowl, and a muntjac—a small species of Asiatic deer. An albino turtle from Thailand was a gift from the Dusit Zoo, Bangkok, to the National Zoo, and was accepted on the Zoo's behalf by Mrs. Lyndon B. Johnson, who visited the Dusit Zoo in October.

A much appreciated contribution, received from *Reader's Digest*, was $500 ear-marked for the purchase of animals.

PURCHASES

Four Père David's deer were purchased to start a National Zoological Park herd. These rare animals exist only in captivity, having been extinct in the wild for many years. All are young, and breeding is not expected for several years.

One male greater kudu was received and females now in quarantine in Germany are expected to arrive in midsummer.

Pure species gibbon colonies are hard to find in the United States, as these "species" readily crossbreed, but the Zoo has been fortunate in obtaining five crested gibbons, *Hylobates concolor*, sometimes called white-cheeked gibbons.

New animals purchased and placed on exhibit this year include lesser pandas, Colobus monkeys, Sykes' monkeys, Asiatic pangolins, and viscachas.

Sixty eggs of Icelandic ducks were purchased and are being incubated; old squaw and red-breasted merganser are two of the several species bought. Also purchased and placed on exhibit were 2 rhinoceros hornbills from Malaya, known for their high, red-and-yellow casque curled upward at the front.

In the bird house, on loan from the Baltimore Zoo; is a kagu, which is nocturnal and lives on the forest floor in New Caledonia.

LOANS AND EXCHANGES

The Zoo continued its custom of exchanging surplus animals with other zoos and of receiving specimens in return, and a complete list of these will be found in the Appendix (see note, p. 156). In several such instances the Zoo obtained mates for solitary specimens in the

National collection, among them a hyacinthine macaw from the Catskill Game Farm and a drill from the Dallas Zoo. From Pretoria, South Africa, came the largest exchange, which included a pair of spotted hyenas, four Stanley cranes, eight sacred ibis, and a number of rare reptiles.

REMOVALS

Saddest loss of the year was the death on November 26, 1966, of the Bengal tiger Samson, mate to Mohini the white tigress. Specialists called in consultation found it impossible to save the animal from a degenerative kidney ailment. Details of the terminal illness may be found in the Veterinarian's report in the Appendix (see note, p. 156). Ramana, Samson's son, a male of normal color from Mohini's first litter, is now of breeding age and has been successfully introduced to his mother. Genetic makeup from this union should produce a litter of which half the cubs are white and half yellow.

Because of a shortage of great ape quarters, the Zoo's pair of breeding chimpanzees, Maggie and Jiggs, were loaned to the Forest Park Zoo in Springfield, Massachusetts. On April 21, 1967, two days after their tenth baby was born, Jiggs escaped from his cage and had to be shot. Maggie and the baby remain in Springfield.

Some losses in the collection were specimens that had been here for so many years that they may have established longevity records. "Granny," a red-faced macaque, received in 1942 as a gift from Harold Coolidge, in whose family it had been a pet since 1937, died March 1967 at the age of thirty.

Research

Research at the National Zoological Park has undergone rapid diversification during the past year. With the conversion of two rooms on the top floor of the reptile house into laboratories, facilities have been expanded, and the added area permits the accommodation of new predoctoral research students as well as visiting investigators from other institutions.

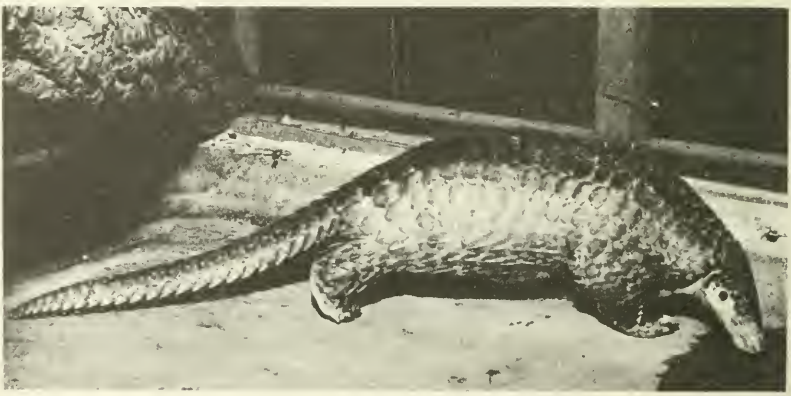
In conjunction with H. K. Buechner of the Smithsonian Office of Ecology, and with F. Kurt and G. McKay, a research program was initiated on the behavior and ecology of the Ceylonese elephant, *Elephas maximus*, financed in part through the Smithsonian Foreign Currency Program and by a grant from the World Wildlife Fund. Preliminary studies on elephant behavior were conducted at the Zoo, but the current effort is concentrated in the Yala region on the southeast coast of Ceylon.

Noteworthy Residents at the National Zoo

Adult elf owls *Micrathene whitneyi* and their young, hatched at the Zoo in spring 1967. These tiny 5½-inch owls, native to Mexico and the American southwest, seldom thrive in captivity, and as far as can be determined the only other successful hatching has been at the Sonora Desert Museum (Photo Constance P. Warner).

Linsang *Prionodon linsang*, a rare viverrine from southern Burma, Malay States, Sumatra, Java, and Borneo. Received April 16, 1958, it is the first of its kind ever exhibited at the National Zoological Park, and undoubtedly now represents a longevity record for the species in captivity.

Malayan pangolin *Manis javanicus* on exhibit in the small-mammal house.



Two spotted hyena pups, 3 months old. Although not rare as a species, this pair is interesting because they were born by caesarian section. The gravid mother was shot after being found in a poacher's snare near the Kruger National Park in South Africa, and a speedy operation produced three pups with their eyes open and able to walk. One young died shortly after, but the other two were hand-reared at the National Zoological Gardens of South Africa in Pretoria and sent to the National Zoo on April 6, 1967.

Male fossa *Cryptoprocta ferox*, one of the rarest viverrines and the largest Malagasy carnivore. This animal, the only fossa in the Western Hemisphere, was acquired by resident scientist John F. Eisenberg on his first expedition to Madagascar in spring 1966. Only other fossa ever exhibited in the United States was at the National Zoo from October 6, 1954 to January 6, 1962.

Female leopard cat *Felis bengalensis* and male young. This mother gave birth to a female kitten on January 27th which she refused. A second kitten was stillborn on January 28th, and this male was born on January 29th, accepted and successfully raised. The picture was taken on April 6th.

During fall 1966 Paul Leyhausen of the Max Planck Institute at Wuppertal visited for two months and together with John Eisenberg initiated research on the behavior patterns of our captive viverrids. It is being continued by Christen Wemmer.

In January Eisenberg left for Ceylon to initiate the elephant ecology program. Thence on January 30 he proceeded to Madagascar, where he joined Edwin Gould of Johns Hopkins University in a continuation of their studies on the insectivores of that island. Eisenberg's return in April was followed by three shipments of living mammals from Madagascar, including the mouse lemur *Microcebus*, the dwarf lemur *Cheirogaleus*, and tenrecs of the genera *Tenrec*, *Hemicentetes*, and *Microgale*. Eisenberg returned to Ceylon in May for an inspection of field work on the elephant. He presented a seminar at the University of Missouri and gave a lecture course in sociobiology during the fall semester at the University of Maryland.

Other current research projects were:

1. Studies of thermoregulation and reproduction in the tenrecs of the following genera: *Microgale*, *Hemicentetes*, *Tenrec*, *Setifer*, and *Echinops* (with E. Gould).

2. Studies of the ontogeny of vocalization in neotropical primates, the following species being currently under study: *Saguinus oedipus*, *Leontocebus rosalia*, *Ateles fusciceps* (with Miss N. Muckenhirn).

3. Studies on the social behavior and on the ontogeny of behavior among selected species of Caviomorph rodents (with Mr. N. Smythe).

4. Studies on the prey-catching behavior of carnivorous mammals, including the Tenrecidae, Dasyuridae, and Viverridae (with P. Leyhausen and C. Wemmer).

Visiting scientists using the facilities of the research division also included Theodore I. Grand, Oregon Primate Center; Muriele Bertrand, Johns Hopkins University; and Suzanne Ripley, University of Virginia.

The following papers originating in the research division were published:

EISENBERG, J. F. Nagetiere-Territorien und Wechsel. *In* Die Strassen der Tiere, edit. H. Hediger, pp. 83–101. Vieweg und Sohn, 1967.

———, and GOULD, E. The maintenance of tenrecoid insectivores in captivity. Int. Zoo Yearbook VII, pp. 194–196, 1967.

———, and KUEHN, R. E. The behavior of *Ateles geoffroyi* and related species. Smithsonian Misc. Coll., vol. 151, no. 8, publ. 4683, 63 pp., & 6 pl., 1966.

———, and MALINIAK, E., 1967. The breeding of *Marmosa* in captivity. Int. Zoo Yearbook VII, pp. 78–79, 1967.

GOULD, E., and EISENBERG, J. F. Notes on the biology of the Tenrecidae. Journ. Mammal., vol. 47, no. 4, pp. 660–686, 1966.

Conservation

As conceived by Smithsonian Secretary Langley in 1888, the National Zoological Park was to be "a home and city of refuge for the vanishing races of the continent." In the years since then, North American wildlife has been brought under generally successful management in hundreds of State and National parks, forests, and refuges. At the same time, however, wildlife in Africa, Asia, and South America has been so swiftly and drastically reduced that several hundred species are in imminent danger of extinction. Today the National Zoo's role in conservation has become international.

Within the Zoo itself, the new orientation is expressed in management of the collection, and in public education. "Vanishing Animal" signs mark the threatened mammals and birds. Captive breeding has

This symbol marks animal species now in danger of extinction in the wild.

become a necessary safeguard against extinction for a number of species. The National Zoo has had outstanding success in propagating the pygmy hippopotamus. Other endangered species successfully bred at the Zoo include the golden marmoset, orangutan, dorcas gazelle, and Hawaiian duck. The Zoo has acquired a nucleus herd of Père David's deer and is awaiting arrival of a trio of scimitar-horned oryx.

The Director and the Assistant Director are closely affiliated with the work of such national and international conservation agencies as the International Union for the Conservation of Nature, the Wild Animal Propagation Trust, and the Committee on Conservation of the American Association of Zoological Parks and Aquariums, which also has a Subcommittee on Endangered Species. A principal function of the latter is to help suppress the traffic in illegally captured and smuggled animals. Zoos considering purchase of species on the critical list are required by AAZPA policy to consult this Subcommittee, which verifies the required licenses and certificates.

Day-to-day cooperation with foreign zoo associations, conservation groups, and public officials has virtually halted the trade in smuggled orangutans. In February 1967, in the first action of its kind, U.S. authorities seized a young orangutan at Dulles Airport. Pending final court action, "Dennis" has been housed at the National Zoo. Authorities have recommended that he be placed on deposit, for breeding purposes, in a zoo designated by the Wild Animal Propagation Trust. The Subcommittee has also helped suppress illegal traffic in monkey-eating eagles, Javan and Sumatran rhinoceroses, Galápagos and Aldabra tortoises, golden marmosets, and Zanzibar red Colobus monkeys, all gravely threatened species.

A long-term objective of the Zoo is to establish a "survival center," a farm or ranch with more space for breeding groups of endangered species than an urban zoo can provide. A suitable farm owned by the Smithsonian Institution is available to the Zoo, provided funds can be obtained for improvements and operating costs.

Information and Education

The information-education section continued its signing and labeling program. It also provided graphic arts services and support, editorial assistance and copy writing for various activities, as well as assisting with press, radio and TV coverage of Zoo activities. Also continued was the dissemination of natural history and Park information by telephone and correspondence. The Zoo library was reorganized. The photographic files are being completely reorganized.

Some 38 guided tours were conducted for groups of handicapped children, visting schools and colleges, visitors from other zoos and museums, and special guests and dignitaries. The section also cooperated with the Friends of the National Zoo in various projects.

Friends of the National Zoo

Of prime importance to the Friends of the National Zoo is the realization of means to enable them to acquire financial support and an income for continuation of their educational aims and objectives. On November 6, 1966, the President signed P.L. 89–772, which permits the Friends of the National Zoo to operate concessions, the proceeds to be used for research and educational work for the benefit of the Zoo. On May 31, 1967, a contract was signed, authorizing the Friends to operate a sales kiosk near the clock in the center of the Zoo.

The annual Zoo Night for members was held June 5. Members toured the new hoofed-stock area and the two new buildings for delicate hoofed stock. There were refreshments on the bird-house lawn and a guitar concert by Charlie Byrd.

The official emblem and seal (line drawings of the white tigress, Mohini) were produced and copyrighted. These are used to identify the organization in numerous ways. Publication of the quarterly newsletter, *Spots and Stripes*, was continued.

At the annual meeting on May 31, new officers elected for the coming year were Timothy V. A. Dillon, president; Margaret W. Harlan, vice president; Frank Ridgdill, treasurer; and Warren Iliff, secretary. Outgoing officers were Malcolm C. Henderson, president; Timothy V. A. Dillon, vice president; Luis Corea, treasurer; Mary Ellen Grogan, secretary.

The Friends cooperated with the Zoo in "operation preg. watch,' during which members generously volunteered their time for all-night vigils of closed-circuit TV monitoring—watching for parturition in the lioness Princess. The volunteer watching the monitor was instructed to turn on the film tape-recorder at first sign of the birth process and to notify veterinarian Clinton W. Gray. For a week Princess was watched by Zoo personnel by day and by Friends volunteers by night. The pregnancy unfortunately turned out to be a false one, but the watchers were eager to participate again at any future time to assist the Zoo in obtaining valuable footage on the behavior and birth processes of captive exotic animals.

Construction and Improvements

A long-sought project for a continuous 24-hour scenic park road in Rock Creek Valley to connect the Arlington Memorial Bridge and Potomac Parks with Rock Creek Park has become a reality. The Zoo bypass on the Rock Creek and Potomac Parkway, which provides the missing link by carrying parkway traffic around instead of through the Zoo, was dedicated on August 19, 1966. The project included a 400-foot tunnel under Administration Hill and a bridge over Rock Creek at Calvert Street. A parkway overpass at Harvard Street to accommodate Zoo traffic is nearing completion.

The hardy-hoofed-stock complex was completed and occupied during the year. These quarters were designed for animals which require a minimum of shelter and protection from the Washington weather, such as the Cape buffalo, white-bearded gnu, zebra, Przewalski horse, and llama. The site is built on a 3½-acre area, with four separate buildings laid out in a rectangular pattern. The area enclosed by the buildings is used as a holding, or off-exhibit area. The perimeter area is divided into six exhibit paddocks, all viewed across dry moats from the visitor walk which circumscribes the complex. Building design of each of the four shelters is the same, and the construction is similar to that used in the deer area—masonry block with flat roofs on exposed laminated wood beams. The loafing shed extends the full length of each shelter, and back of it is the building, divided into a bull stall and a loafing stall, the latter so arranged that it can be subdivided into three separate stalls each the size of the bull stall. Service is through an alleyway running along both axes of the complex.

The delicate-hoofed-stock complex, opened to the public on June 6, 1967, consists of two buildings, totaling 15,850 square feet, built on the upper part of the three-acre sloping site. Landscaping and grading are so designed that visitors can view the four delicate-hoofed-stock paddocks from the promenade roofs of the two buildings, and then proceed via ramps and stairs to view the exhibits inside. This inside view is from a visitor corridor which runs the length of, and connects, the two buildings. Each building has three exhibit stalls, with the usual adjacent retiring stall and keeper and service rooms and access. The back (paddock) wall of each exhibit stall is a window wall that allows the visitor to view the inside as well as the outside area, and gives a feeling of spaciousness to the inside exhibit.

The delicate-hoofed-stock buildings are of poured concrete construction with natural stone facing and trim on exposed surfaces. Since delicate-hoofed stock are considered to be those animals which, in the Washington area, require heated quarters in the winter and protection from the extreme summer temperatures, the heating system for these buildings is designed to provide a minimum temperature of 60° F. during the winter, and one of the buildings is air conditioned. Planned for exhibit in these buildings are dorcas gazelles, kudu, sable antelope, and scimitar-horned oryx. Since the Zoo has pairs of three different species of rhinoceros (white, black, and Indian) one of the enclosures was modified to accommodate the white rhinos.

The trunk sewers and retention basin, started in January 1966, were completed in June 1967, and Beaver Valley has again been opened to the public.

Most of the new construction completed to date centers at the north end of the Zoo between Connecticut Avenue (1) and the Elephant House (10). Earlier construction includes the remodeled bird house (5), great flight cage (6), deer paddocks (7), parking for 260 cars in lots A and B (3 and 4), and the perimeter vehicular road (2). The recently opened hoofed-stock area is a 7-acre complex consisting of two permanent buildings for delicate stock (9) and four multi-stall shelters with eight yards for hardy stock (8). It is expected that 50 to 60 animals will eventually be accommodated in this area as the herds develop. (Blue Ridge Aerial Survey photo.)

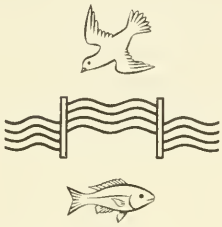
Plans for the hospital, research, service, and supply complex are completed and have been approved by the various reviewing agencies. Bids will be opened early in August and construction should start some time in fall 1967.

The fiscal year 1967 Appropriation Act contained an item of $1,589,000 for improvements at the National Zoological Park, to include the multi-climate complex. Plans for this building were started by the architects after approval was obtained from the various reviewing commissions. Construction is expected to start in late spring 1968.

Beautification of the Park continued under head gardener John W. Monday with the planting of 65 trees, 2000 evergreens, 4000 bulbs, and 5,100 annuals. Gifts of plants were received from Mrs. Lyndon B. Johnson, and also from the Arboretum, the D.C. Water Works, Botanical Gardens, Glendale Nursery, Glendale Hospital, and Walter Reed Hospital. An account of the work of the grounds department is contained in the Appendix (see note, p. 156).

Smithsonian Tropical Research Institute

MARTIN H. MOYNIHAN, *Director*



ACTIVITIES HAVE CONTINUED TO EXPAND at the Smithsonian Tropical Research Institute essentially along the same lines as in previous years, but with some slight changes of emphasis. Among these activities—research by the staff and support of research by visiting scientists and students, education and training, and the encouragement and practice of conservation—it is the latter two that have shown the greatest relative increase.

STRI scientists and students have begun long-term research on several biological processes or problems which are particularly conspicuous in the Tropics (e.g., the evolution of social behavior and social systems, and the relationship between species diversity and evolutionary "success"). We are beginning to get results from these studies. Unfortunately, however, some of these results are difficult to interpret, due largely to the fact that the studies have been confined to Central and South America. We have been able to identify some distinctive characteristics of organisms and biotas in these regions, but we do not know if they are typical of the Tropics as a whole or only of the New World. Thus, we badly need comparative data from other parts of the Tropics, and ideally, from the tropical parts of all the major zoogeographic realms.

During the latter part of the year, the staff of the Institute began to develop plans for research in the Old World Tropics and for cooperation with other scientific institutions in that area. In order to establish preliminary contacts, and to acquire the necessary background informa-

tion, Rand and Robinson attended an international symposium on tropical biology at Varanasi, India, and then investigated possible research areas in Ceylon. Rand also visited Malaya. Moynihan subsequently made a more extensive survey of research possibilities in Senegal, the Ivory Coast, the Congo (Kinshasa), Madagascar, Assam, Ceylon, Thailand, and the Territory of Papua-New Guinea. It is hoped that these efforts will produce practical results in the form of new research programs by the end of FY 1968 or the beginning of FY 1969.

In November, the Smithsonian Institution held a conference on tropical biology in Panama City attended by more than 60 outstanding scientists from the U.S. and Latin America. In the course of the discussion, an attempt was made to determine the most urgent and important problems confronting biologists in the Tropics. Special attention was paid to the possible effects of a new sea-level canal joining the Atlantic and Pacific somewhere across Central America or northern Colombia. It was resolved that an urgent need exists to begin long-term ecological studies now, especially in the marine environments. Under present world conditions of exploding human populations and the limitations of the resources that support them, it is essential that any environmental manipulations as significant as the proposed Atlantic-Pacific sea-level canal be based on a comprehensive background of fundamental information.

Research and Publication

In terms of research in progress or completed at STRI, the study of tropical biology has provided and continues to provide results of both theoretical value and practical usefulness. From a purely scientific point of view, tropical biotas are interesting primarily because they are so rich and varied; they include much larger numbers, and a greater diversity, of species than the biotas of any other regions of the world: and the ecological and behavioral relations among species are more complex, on the average, in the Tropics than anywhere else. Convincing evidence points to the Tropics as the place of origin and principal center of evolution of most groups of organisms. It would appear, too, that new and major types of adaptations to new ways of life are more likely to be evolved by tropical species than by species of other regions, and Tropical species seem to be more successful in invading other regions than are species of other regions in invading the Tropics. As a result of this combination of features, tropical biotas provide invaluable opportunities for the analysis of such fundamental biological processes as evolution, competition and cooperation among species and individuals, animal communication (with its implications for the origin of human language), and the development of social organization.

Within the Tropics, the Panamanian region is particularly interesting or several reasons. The isthmus itself is a bridge between two continents. It is the route by which species of northern origin move south, and southern species move north. Thus, it is a living laboratory for the study of zoogeographic change. The fact that the Atlantic and Pacific are only 50 miles apart in central Panama is also significant. Nowhere else in the world can the distinct floras and faunas of two oceans be compared as easily and under such favorable conditions.

The practical implications of basic research in the Tropics are less obvious but not less important. The human societies of tropical regions are developing and expanding at breakneck speed. They will need to learn a great deal more about their environments, if they are to manage these environments successfully and thus attain the goals they have set for themselves.

In view of all these facts, it is not surprising that the Panamanian region attracts more and more scientists and students. And there is every reason to believe that this increase will continue, or even accelerate, during the next decade. The following tabulation shows the number of visitors for whom the Institute provided appreciable support during the past year.

Senior scientists	96
Graduate students	138
Undergraduate students	27
Technical assistants	13
Amateur biologists and members of natural history groups	103
Other	91
TOTAL	468

Mention of a few of their projects may illustrate the range of activities which the Institute has been able to facilitate, encourage, or support.

Owen J. Sexton, his associates, and graduate students from Washington University continued their researches on the factors regulating reproduction in lizards, particularly anoles. Such studies are particularly significant for they are revealing endogeneous cycles in reproductive activity. This work was supported by the National Science Foundation.

John W. Smith of the University of Pennsylvania and his students investigated for several months the auditory communication patterns among birds, especially flycatchers. This approach to the study of animal behavior is rewarding, for it is demonstrating the various evolutionary pathways by which essential information is encoded and

BARRO COLORADO ISLAND: Wildlife and behavior studies

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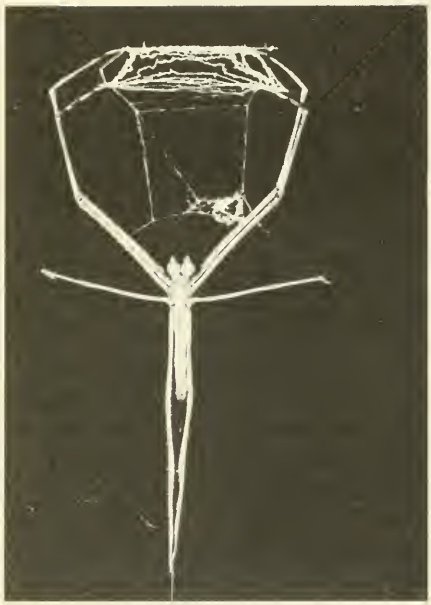


3

1, White-faced monkeys *Cebus capucinus* grooming. 2, Fulgorid bug showing "eye spots" on hind wings. 3, Web-throwing spider.

2

4

4, Automatic camera shows that agoutis, rodents that resemble small forest deer, fight with their hind feet.

5

PHOTOS:
1, John Oppenheimer
2–8, Nicholas Smyth

5, *Corythophanes cristatus*, one of the more than 22 species of lizards on the Island.

6

7

8

6 and 7, Caught by automatic camera, a family of pacas feeding in the forest and a Jaguaroundi *Felis yagouaroundi* drinking from a forest pool. 8, *Phyllomedusa callidryas* is one of the more than 30 species of frogs on the island.

transmitted, and it also sheds light on the phylogeny of the organisms themselves.

At the marine laboratories, Howard Winn of the University of Rhode Island and his graduate students recorded and analyzed the sounds produced by a variety of fishes, particularly marine catfishes. The large concrete tanks of the Naos Island facility proved most suitable for this research, which is supported by the Office of Naval Research.

Eric Davidson of Rockefeller University continued his experimental studies of gene activity in anuran oögenesis. One local species, *Engystomops pustulosus*, has proven particularly useful, and is yielding new information on possible extranuclear synthesis of DNA, and the specific roles of various cytoplasmic factors in repressing or activating portions of the genome during ontogeny. This research is supported by the American Cancer Society.

Various aspects of the biology of ants were investigated by several researchers. Roger Akre, Washington State University, and his graduate students spent several months studing the factors involved in the movements of army ants (*Eciton*). Paul Kannowski, University of North Dakota, studied the mating-flight behavior of several ant species. The peculiar leaf-cutting ants (*Atta*) were studied by Bruce Haines of Duke and Paul Martin of Michigan Universities. Haines investigated the role that *Atta* plays in determining vegetational patterns. This is a two-sided effect, for although these ants defoliate many plants, they also fertilize the soil near their nests, adding phosphorus which is scarce in the poor tropical soils. In cultivating fungus in their leaf gardens, they manage to grow only one species to the exclusion of all other fungi. Martin, a chemist, seeks to know how this remarkable feat is accomplished.

Most of the subjects investigated by scientists of the Institute staff (permanent resident scientists and graduate student interns) fall into the fields of evolution, social behavior, communication, species diversity, and zoogeography. Unless specifically noted otherwise, the research was supported from federal funds appropriated to the Smithsonian Institution.

Martin Moynihan continued his studies of social behavior among Andean birds, supported by the National Science Foundation, and of communication in Neotropical primates. He presented two seminars at the University of Texas on the evolution of social and communication systems. Also, he was awarded the William J. Walker prize by the Boston Museum of Science for outstanding achievements in biology.

Robert L. Dressler, on leave for the past year, served as executive director of the Association for Tropical Biology. Despite heavy administrative duties, he continued his research on the pollination relationships between euglossine bees and orchids of the subtribe Stanhopeinae. The peculiar adaptations in structure, flowering time, and odor serve to attract the "right" kind, or kinds, of bees and thus to supply the principal isolating mechanisms between many orchid species. This relationship has been a major factor in orchid evolution.

A. Stanley Rand's studies of the vocal communication in the frog *Engystomops pustulosus* have now reached the stage where the entire repertory has been cataloged. Experiments are in progress to determine the information content and how this information is encoded. He also continued his work on the selective forces affecting egg type and clutch size in tropical reptiles in general. Rand became a member of the editorial committee of the journal *Copeia*.

Michael H. Robinson, from Oxford University, joined the regular scientific staff last year. Using monkeys and spiders as predators and various insects as prey, he began a series of experiments investigating the complex adaptations evolved in such interactions. Among the many questions that he is posing is: do appendages common to all insects serve as cues for prey recognition? Initial results suggest that, like the marmoset *Saguinus geoffroyi*, predators can distinguish insect prey only be features which are often concealed by the behavior and morphology of cryptic insects.

Ira Rubinoff continued his studies of the evolution of isolating mechanisms in certain species of Panamanian marine fishes. Working with Rubinoff on various problems of the complex Panamanian fish fauna was Richard Rosenblatt of the Scripps Oceanographic Institute, who spent several weeks as a special consultant on Panamanian marine fishes. Rubinoff presented a paper, "Measurement of Isolation Achieved Between Sympatric and Allopatric Combinations of the Genus *Bathygobius* in Panama," at a meeting of the American Society of Ichthyologists and Herpetologists. He was appointed associate in ichthyology at the Museum of Comparative Zoology, Harvard University.

Neal Smith's continuing experiments on the evolution of adaptations for and against brood parasitism between several species of oropendolas (Icteridae) and the parasitic icterid *Scaphidura* revealed an unexpected result. Oropendolas who fail to discriminate eggs of *Scaphidura* from their own, and therefore raise the young parasites, usually do so to the detriment of their own offspring. Selection then favors increasing discrimination by the oropendolas, and better mimicry by the *Scaphidura*. Under certain conditions, however, selection may favor non-

discrimination. In these cases, young oropendolas have a better chance of reaching the fledging stage when they are raised in the same nests with young *Scaphidura*, than when they are not. The balance between discrimination and nondiscrimination appears to be delicate, and the complex factors producing this unique situation are still being studied.

Marcel Hladik's studies are showing an interesting parallel between Old and New World monkeys in the correlation betwen the kinds of food eaten and the microstructure of their digestive gut. Using light and electron microscopy, Hladik is finding that the intestinal mucosa very rapidly adjusts morphologically and histochemically to changes in the types of food consumed. This is an important adaptation to living areas where insect and fruit abundance may vary asynchronously.

Martin Naumann continued his study of several species of social wasps (*Protopolybia*). Unlike many wasps and bees, the size of the nest in these species is not indicative of the age of the nest, but rather of the size of the founding swarm and this, in turn, is a function of the number of queens present.

Significant progress in analyzing the social behavior of the white-faced monkey *Cebus capucinus* was made by John Oppenheimer, whose observations of how new groups form and how territorial rights are established were of special interest.

Using automatic cameras in the Barro Colorado Island forest, Nicholas Smythe has been able to obtain an almost complete record of the behavior and ecology of the large caviomorph rodents, the agouti *Dasyprocta punctata*, and the paca *Agouti paca*. Symthe's detailed work with these species show how the diverse social systems found in the caviomorphs can be considered specific adaptations to particular features of their environments.

National Academy of Science Fellow Howard Wright studied the sexual behavior and other interactions of several species of grapsoid crabs. These poorly known crabs exhibit remarkable geographic variation in certain features of their behavior which can be correlated with predator pressure.

Estanislau da Silveira of Brazil, Organization for American States Fellow at the Institute, completed a catalog of the endoparasites of the anteater *Tamandua*. José Olazarri of Uruguay, another OAS Fellow, began his studies of the molluscan fauna of Barro Colorado and the behavior of the spiny rat *Proechimys*. He is also assisting Michael Robinson with his work on spiders.

More than 20 papers by visiting scientists, based wholly or in part upon the results of research at Institute facilities, were published last year (a listing of earlier such works is to be found in Smithsonian

Information Leaflet 281, rev. August 1965). Papers by the staff are listed on page 182.

Educational and Related Programs

Under the continuing fellowship program with the Science and Educational Division of the Organization of American States, the fellows are learning modern techniques of field biology under the guidance of the resident members of the Institute staff. Field classes of the Organization for Tropical Studies visited the Institute's facilities and conducted exercises at the marine laboratories, and a class of students from Harvard, under the direction of Giles Mead, curator of fishes at the Museum of Comparative Zoology, spent several weeks studying the marine and fresh-water organisms of the area. Senior members of the Institute staff are assisting and to some extent directing the work of the graduate student interns. They also provide informal guidance to visiting students from other institutions.

A fellowship program sponsored by the U.S. Air Force was established to bring scientists to Panama and adjacent regions to investigate the feasibility of doing extensive research in the Tropics. The first are expected to arrive early next year.

The past year was a period of major construction and renovation at the Barro Colorado Island laboratory. Ernest Hayden, formerly master sergeant, U.S. Army, was appointed station manager. A new building was finished which will serve as a residence for a staff scientist and as additional dormitory space for visiting scientists. Eastman Kodak's experimental facility was relocated and the old Kodak building was converted into a combination residence and laboratory area. A new house and a screened-in dining building were constructed for the labor staff. The station acquired the new 40-foot fiberglass-hulled vessel *James Zetek II* to supplement and eventually to replace the present wooden vessel which has been in service for many years. The boat dock area, which had been filling up with stream sediment for a number of years, was cleared and dredged. The library, possibly the best in the Neotropics, continued to expand and is now more than 8000 volumes. Mrs. Alcira Mejia was promoted to full-time librarian, and Mrs. Nicholas Smythe was appointed library assistant.

The marine laboratories, opened last year, were expanded and their facilities improved. Archibald Turner, formerly of the U.S. Army Tropic Test Center, was appointed manager of both stations. Construction was completed at the Galeta Island station, and now both marine laboratories are fully operational. The Naos Island station was enlarged to include another building, which will serve

BARRO COLORADO ISLAND, CANAL ZONE

ANNUAL RAINFALL 1925–1966

Year	Total inches	Station average	Year	Total inches	Station average
1925	104. 37		1946	87. 38	108. 81
1926	118. 22	113. 56	1947	77. 92	107. 49
1927	116. 36	114. 68	1948	83. 16	106. 43
1928	101. 52	111. 35	1949	114. 86	106. 76
1929	87. 84	106. 56	1950	114. 51	107. 07
1930	76. 57	101. 51	1951	112. 72	107. 28
1931	123. 30	104. 69	1952	97. 68	106. 94
1932	113. 52	105. 76	1953	104. 97	106. 87
1933	101. 73	105. 32	1954	105. 68	106. 82
1934	122. 42	107. 04	1955	114. 42	107. 09
1935	143. 42	110. 35	1956	114. 05	107. 30
1936	93. 88	108. 98	1957	97. 97	106. 98
1937	124. 13	110. 12	1958	100. 20	106. 70
1938	117. 09	110. 62	1959	94. 88	106. 48
1939	115. 47	110. 94	1960	140. 07	107. 41
1940	86. 51	109. 43	1961	100. 21	106. 95
1941	91. 82	108. 41	1962	100. 52	107. 07
1942	111. 10	108. 55	1963	108. 94	107. 10
1943	120. 29	109. 20	1964	113. 25	107. 28
1944	111. 96	109. 30	1965	92. 80	106. 91
1945	120. 42	109. 84	1966	111. 47	106. 80

COMPARISON OF 1965 AND 1966 RAINFALL

[In inches]

Month	Total 1965	Total 1966	Station average	Years of record	1966 excess or deficiency	Accumulated excess or deficiency
January	2. 78	3. 23	2. 27	41	+0. 45	+0. 45
February	0. 26	0. 15	1. 28	41	−0. 11	+0. 34
March	0. 21	0. 44	1. 15	41	+0. 23	+0. 57
April	1. 08	3. 20	3. 48	42	+2. 12	+2. 69
May	9. 88	6. 88	10. 89	42	−3. 00	−0. 31
June	8. 13	13. 65	10. 90	42	+5. 52	+5. 21
July	7. 75	9. 27	11. 57	42	+1. 52	+6. 73
August	9. 90	14. 17	12. 48	42	+4. 27	+11. 00
September	11. 91	9. 93	10. 34	42	−1. 98	+9. 02
October	10. 85	12. 81	13. 68	42	+1. 96	+10. 98
November	23. 00	23. 72	18. 16	42	+0. 72	+11. 70
December	7. 05	14. 02	10. 60	42	+6. 97	+18. 67
Year	92. 80	111. 47	106. 80		+18. 67	+4. 67
Dry Season	4. 33	7. 02	8. 18		+2. 69	−1. 16
Wet Season	88. 47	104. 45	98. 62		+15. 98	+5. 83

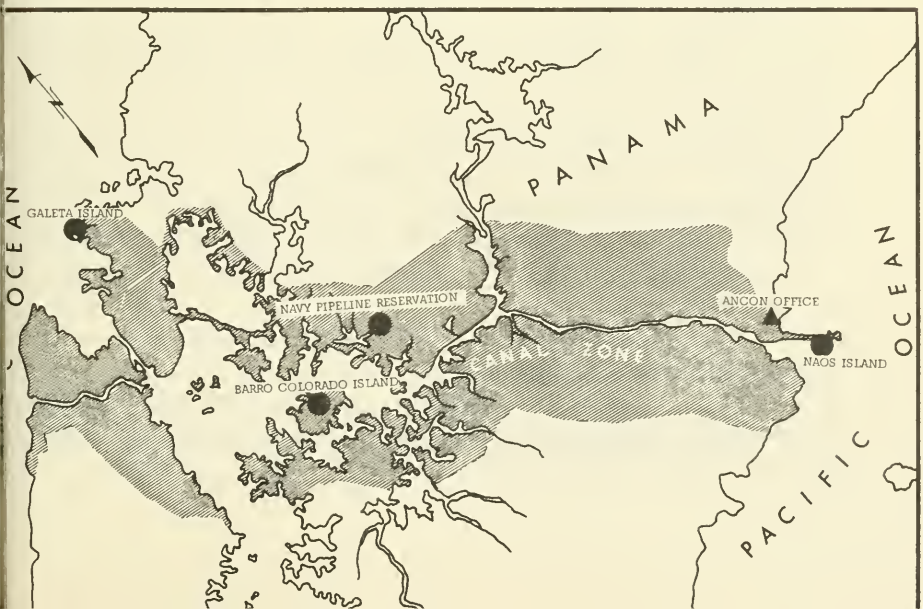
as laboratory and office space for resident and visiting scientists. Construction was completed on several concrete tanks, each 29′ x 23′ x 8′ deep, in the largest building of the Naos Island complex. The tanks now have running sea water and are being used for the study of large and pelagic organisms. The second floor of the original building, the "bunker laboratory," was remodeled to provide a seminar hall, office and laboratory space for visiting researchers, and an area for the storage of specimens. An 18-foot fiberglass outboard skiff and two 4-wheel-drive vehicles were other additions which have greatly facilitated field work.

Dr. Peter Glynn, who was engaged to begin a marine invertebrate program, is expected to arrive early next year. Three new research associates were appointed: John Eisenberg of the National Zoo; Paulo Vanzolini of the Departmento de Zoologia in Sao Paulo, Brazil; and Patricio Sánchez of the Catholic University of Chile.

Conservation

The Institute continued to preserve the areas under its control but because poaching pressure has increased, especially from boats, the legal limits of the Barro Colorado Island Preserve were extended to include a wide band of water around the island. The new boundary is being marked by signs.

All physical facilities of the STRI are located in the Panama Canal Zone: Barro Colorado Island, with its laboratory for research on terrestrial and fresh-water organisms; marine biology laboratories on Naos Island and Galeta Island, both connected with the mainland by causeway; a tract in the Navy Pipeline Reservation; and an office in Ancón.



The staff continued to encourage, both formally and informally, conservation practices in the Republic of Panama. Martin Moynihan was made a member of the Comisión Nacional de Protección de la Fauna Silvestre. He also gave advice on the management of reserves in Madagascar and New Guinea.

Guy A. Ramanantsoa, chief of the Forestry Bureau of the Malagasy Republic, visited Barro Colorado in order to make personal observations of conservation practices. He also conferred with members of the Reforma Agraria on the types and extent of exploitation of Panama's natural resources.

Acknowledgments

The Smithsonian Tropical Research Institute can operate only with the excellent cooperation of the Canal Zone Government and the Panama Canal Company, the U.S. Army and Navy, and the government authorities of the Republic of Panama. Thanks are due especially to Gen. Robert W. Porter Jr., Commander, U.S. Armed Forces, Southern Command; Executive Secretary of the Canal Zone Paul M. Runnestrand and his staff; Lt. Col. Jack G. Null, Post Commander, Fort Amador, Canal Zone; the customs and immigration officials of the Canal Zone; the dredging division and police division of the Panama Canal Company; Comdr. K. L. Robinson, Commanding Officer Naval Security Group; the 605th Air Commando Squadron, Howard Air Force Base; the U.S. Army Maintenance Division; and C. C. Soper of Eastman Kodak Company.

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Radiation Biology Laboratory

W. H. Klein, *Director*

The sun is the principal source of all energy required for life on the earth. Radiant energy from the sun is trapped by pigments and converted to potential chemical energy. Food produced by this process of photosynthesis is either stored or utilized immediately for the growth and development of biological systems.

Organisms not only derive their energy supply from the process of photosynthesis, but also use signals from sunlight to regulate and control their rates of growth and development. Most of these "regulatory" responses use short-duration or low-energy light signals in contrast to photosynthesis, in which large amounts of energy are captured and stored.

The research of the Radiation Biology Laboratory (RBL) is directed toward understanding the cellular and subcellular mechanisms and processes by which organisms utilize radiant energy from the sun for their growth and development. This research has been directed into four main areas: (1) Regulatory biology—physiology of developmental responses to light; (2) regulatory biology—biochemical processes of developmental responses to light; (3) measurement of solar radiation; and (4) carbon dating—measurements and research techniques.

Regulatory Biology—Physiology

Growing cells of the moss *Physcomitrium turbinatum* utilize light signals for regulating their growth rate as well as orienting the direction of their growth axis. These moss cells are a potentially important tool for

studying the mechanism by which light controls growth because single cells can be examined and their responses measured.

Detailed action spectra, the determination of the relative sensitivity of different quality light stimuli, for both growth and oriented growth responses have been measured. Such action spectra measurements provide information about the nature of the pigments present which absorb light stimuli and regulate growth. For red wavelengths the growth action spectrum matches closely the *in vivo* absorption spectrum of a single moss filament. A major peak at 680 nanometer (nm) and a shoulder at 640 nm are characteristic of absorption by chlorophyll. For blue wavelengths, however, where there is appreciable chlorophyll absorption, there is no photogrowth response.

Moss cells of *Physcomitrium* also exhibit a positive directional photo-orientation. An action spectrum determined by a null balancing method in which a filament grew between two light sources and indicated the relative effectiveness of the two beams, indicated maximum effectiveness in the far-red at 730 nm with a broad region of effectiveness extending from 600 to 800 nm. A significant fact is that the shape of the action spectrum determined for photo-orientation depends upon the quality of light being used as a reference beam. This fact suggests that probably two pigment systems are being utilized by the moss cells to regulate growth. It is postulated at present that these two pigment systems are chlorophyll and phytochrome which interact to regulate both growth and photo-orientation of growth.

Pollen from higher plants can be germinated and grown under laboratory conditions and the elongation rate of the pollen tube as well as mitosis of the tube nucleus can be measured. The effect of light on the elongation growth of pollen tubes has not been studied previously. Pollen of flowering plants has an advantage for the study of light-controlled growth in that it is a one-celled structure which does not show the presence of a chloroplast or chlorophyll. Thus, it is a favorable material for the study of phytochrome-mediated responses without the complication of photosynthesis of chlorophyll-mediated responses. Pollen tubes grown on lactose-agar medium were exposed to red and far-red monochromatic irradiation. Growth measured after 3, 4, and 6 hours and compared to controls kept in the dark indicated that both red and far-red stimulate growth elongation, and that far-red was more effective in stimulating growth (dark $131 \pm 34\ \mu$; red $196 \pm 36\ \mu$; far-red $308 \pm 59\ \mu$ in 4 hours).

Seeds of higher plants are also known to be sensitive to red and far-red light in controlling their germination. Some seeds require a red-light exposure before they will begin to grow even if all other environmental conditions are favorable for growth. This light sensi-

tivity for germination is apparently determined by the relative amounts of red and far-red in the light to which the maturing seeds are exposed. Seeds of the mustard *Arabidopsis thaliana* have been grown to maturity under rigidly controlled environmental conditions exposed to either fluorescent lamps alone or fluorescent plus incandescent white lamps. Seeds grown under fluorescent lamps (relatively rich in red energy) appear to lose much of their light requirement and as high as 40% germinate in the dark; however, seeds matured under fluorescent plus incandescent lamps (rich in far-red) do not germinate in the dark for long periods of time. Similarly, it has been found that there is also a quantitative difference in light sensitivity in which much more energy is required to produce germination in fluorescent-grown seeds than in fluorescent- plus incandescent-grown seeds. The relative amounts of the two absorbing forms of phytochrome in the mature seeds are indicated as the controlling mechanism, and experiments are continuing to determine the effects of temperature, photoperiod, spectral quality and time of after-ripening upon the subsequent light sensitivity of the seeds.

Regulatory Biology—Biochemistry

The influence of light on phosphate uptake and incorporation in corn leaves was studied. Corn-leaf sections 2 cm. long grow and unroll when floated on aqueous solutions and exposed to red light. Radioactive phosphate can be added to these solutions and the incorporation of phosphate can be measured and compared with the physiological growth responses controlled by red light. Organic phosphate determined by colorimetric methods and P^{32} counted electronically, for irradiated compared to dark sections, gave ratios of 1.03 ± 0.16 for organic phosphate and 1.04 ± 0.11 for P^{32}. Several factors which might influence the uptake and incorporation rates were tested. Among these variables were the developmental stages of the corn seedlings employed, hydration status of the excised leaf segments prior to irradiation, and amendments to the $H_3P^{32}O_4$ solution including buffers, various salts, and sugars. No significant differences between irradiated and control plants were found and the average ratio (irradiation/control) for all experiments was 0.99 ± 0.14. It is concluded that at the present time no significant effects of light on phosphate uptake and incorporation can be demonstrated.

Chloroplast development and differentiation can be controlled by light and offers a good *in vitro* system for studying the mechanisms by which differentiation occurs. Chloroplasts from developing bean leaves incorporate the radioactively labeled amino acid leucine into

protein. During the past year it has been found that at the end of a one-hour incorporation period, half the radioactive protein formed is in a soluble fraction (100,000 × g for 60 minutes) and half is sedimented as an insoluble fraction. Only a small portion of the radioactivity in the insoluble fraction is sedimented with free ribosomes (30,000 to 100,000 × g for 60 minutes) while 75% can be sedimented at 6,000 × g for 30 minutes. Repeated washing with water removes only a portion of the radioactivity in the 6,000 × g fraction. The radioactivity remaining is associated with chlorophyll when centrifuged in a sucrose density gradient. Also, the addition of unlabeled leucine to chloroplasts incorporating labeled leucine, followed by continued incubation under incorporation conditions does not remove radioactivity already incorporated into either the soluble or insoluble fraction. It is concluded that the *in vitro* protein synthesizing system is producing both soluble and lamellar chloroplast proteins. The data also suggest the existence of two separate incorporation sites since the soluble fraction does not act as precursor for the insoluble fraction and vice versa.

Isolation and chemical characterization of pure phytochrome from dark-grown rye seedlings has continued, and improved yields and more reproducible extraction methods have been developed. The question of how many species of phytochrome subunits are present was resolved by fingerprinting the peptides released by trypsin; 34 to 41 peptides were released. Amino acid analysis indicated that phytochrome contained 100 trypsin-sensitive bonds per 100,000 molecular weight units. Thus the chemical molecular weight of the subunit is 34,000 to 41,000. This is in good agreement with the physical molecular weight, 36,000, which was determined by high-speed equilibrium

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Electron micrographs of bean chloroplast as it appears (top) when pieces of leaf are fixed and (middle) when a preparation of freshly isolated chloroplast is fixed. Freshly isolated chloroplasts such as this are used to study chloroplast protein synthesis. In these preparations the chloroplasts appear the same as those from intact leaves, except that they are slightly swollen. Protein synthesis by these chloroplasts is not prevented by an enzyme which degrades ribonucleic acid.

Fragments (bottom) of two chloroplasts from a preparation of isolated chloroplasts which has been incubated at 25° C. for 1 hour before they were fixed show severe disruption when compared with chloroplasts in leaves, or with freshly isolated chloroplasts. Protein synthesis by these disrupted chloroplasts is prevented by an enzyme which degrades ribonucleic acid.

centrifugation of the ultimate subunit. Thus, only one species of phytochrome subunit exists in the aggregate which was isolated. If two or more subunits existed then a multiple of 36 peptides would be expected.

Electron microscopic examinations of pure phytochrome which had been prepared for examination in white light gave variable results. In some cases fibers and large symmetrical aggregates were observed. In other cases small five-membered rings of subparticles 20 angstroms in diameter could be observed. When phytochrome was prepared under green plus far-red light none of the five-membered small aggregates could be observed. If an aliquot of the same phytochrome solution was treated with red light, immediately before preparation for microscopy, many of the small five-membered aggregates could be seen. A tentative aggregation hypothesis has been constructed to explain these results. In the postulated system the subunit has a molecular weight of 36,000 and aggregates into pentamers of 180,000 m.w. These, in turn, aggregate into tetramers (m.w. approx. 800,000) consisting of 20 subunits.

Many biological responses require a time-measuring system and it has been postulated that the dark reversion of the far-red absorbing form of phytochrome to the red absorbing form might be such a time-measuring device. For this reason the kinetics of the dark reversion of pure rye phytochrome *in vitro* have been studied. The absorption spectra of solutions initially in the far-red absorbing form were measured after various periods of time in the dark. The temperature was maintained at 25° C. and the pH at 7.5 to 7.9, while in the presence of sodium chloride at concentrations of 0.005 to 0.5 M, and in the presence of air. Within one hour 50% of the maximum red absorption at 660 nm which could be obtained by driving the system with far-red irradiation, had reappeared, with a concomitant loss in the absorption at the far-red maximum (730 nm). The kinetics of this dark reversion suggest a system more complex than a first-order reaction.

Solar Radiation Measurements

Measurements of total sun and sky short-wave radiation have continued, using an automatic system sampling once every 3 minutes for 100-nm bandwidths from 0.29 to 2.5 μ. Six new detectors, modified pyranometers, with an internal electrical heating current for calibration, have been constructed and installed, along with new amplifiers. Data for daily and seasonal fluctuations of radiant energy are being collected with this system that are correct to $\pm 1\%$ for the six 100-nm spectral bands being monitored. The sensitivity of the system has been increased to 0.01 Langley/minute.

James E. Mielke (left) and Austin Long collecting water samples at Tuborg Lake on Ellesmere Island. Knudsen bottles are lowered with the hand winch through an 8-inch-diameter hole in the ice to the sampling depth, a messenger dropped along the line closes the bottle, and the sample is drawn up. At least 20 liters are collected from each depth.

Correlative studies of plant growth are being made with several day-length sensitive plants in the greenhouse and control environment rooms. Responses occur in both vegetative and floral structures (such as internode length, pod formation, tillering or floral development) as a function of the direction of changing day length and the relative red to far-red energies present.

Day neutral plants such as the Black Valentine bean, exhibit little sensitivity to red to far-red ratios under the experimental conditions employed. Flowering occurs in all three growth areas. Internode development appears to be sensitive to day length, in that the lower internodes are inversely related to the length of day, whereas the upper internodes are directly related to day length.

In long-day plants such as Wintex barley, there appears to be a high degree of sensitivity to both red to far-red ratios, as well as to the direction of the changing day length. Tiller formation is comparable in all three growth areas. Node development and its associated floral maturation, however, are to be found only in those areas where there is an appreciable amount of far-red present. Floral maturation decreases very rapidly in these two areas as the day length diminishes.

Carbon Dating

The carbon-dating section of the laboratory has continued to provide age determinations of samples submitted. During the past year approximately 80 samples were dated.

Field studies were made on Ellesmere Island, Northwest Territories, to determine the age of trapped seawater at the bottom of Lake Tuborg. Lake Tuborg, at the head of Greely Fiord, was formed when a glacier advanced across the fiord. At present, water of about 25 parts per million salinity lies in the bottom 60 meters while the upper 60 meters is fresh water. Temperature and salinity profiles indicate no complete mixing since the time of lake formation. Carbon-14/carbon-12 and carbon-13/carbon-12 ratios from analyses on dissolved bicarbonate from the lake and from a nearby fiord indicate that the salt water in the bottom of the lake has been trapped there for about 3,000 years.

Staff Activities

David L. Correll attended, as delegate, the Antarctic Oceanography Symposium in Santiago, Chile, in September 1966.

During September and October 1966, William H. Klein was one of the eight lecturers at the five-day Solar Radiation Symposium at the National Physical Laboratory in Jerusalem, Israel, where he presented the paper, "Variation in Spectral Quality of Solar Radiation and Biological Responses," and discussed with Harry Z. Tabor, and officials of Hebrew University, the feasibility of setting up a solar radiation station in Israel to measure the spectral quality of daylight.

At the Biology Department, Western Reserve University, Cleveland, Ohio, in March 1967, Maurice M. Margulies gave a seminar, "Amino Acid Incorporation into Protein by Developing Chloroplasts."

At the annual meeting of the Association of Southeastern Biologists in Columbia, South Carolina, in April 1967, Te-Hsiu Ma presented a paper, "The Red and Far-red Light Effects on the Pollen-tube Elongation and Pollen Germination in *Tradescantia*."

In May 1967, Bernard J. Nebel and David L. Correll participated in the Symposium "Growth and Development—Form and Function" that officially opened the new Michigan State University – Atomic Energy Commission Plant Research Laboratory at East Lansing, Michigan.

Several visiting scientists were invited to present current results of their work. These included:

N. K. Boardman, Division of Plant Industry, C.S.I.R.O., Canberra, Australia, was invited to come to Washington in October to consult

with Margulies and to give a seminar on "The Photochemical Systems of Photosynthesis".

David Dennison, Department of Biology, Dartmouth College, Hanover, New Hampshire, was invited to consult in February 1967 with the research staff of RBL and provide information for a bibliographic search of *Phycomyces* research.

Donald S. Berns, Division of Laboratories and Research, New York State Department of Health, Albany, New York, was invited to Washington to present a seminar on phycobiliproteins in cooperation with the Washington area section of Plant Physiologists.

W. Shropshire assisted with a summer workshop on photobiology at the Cold Spring Harbor Laboratory of Quantitative Biology during June.

A significant teaching venture was initiated in cooperation with the Consortium of Washington Area Universities. A series of 13 lectures in photobiology was presented for which seminar credit was given to students. Approximately 200 persons attended each lecture. The speakers and their topics were:

Orientation—What is Photobiology?, W. Shropshire, Radiation Biology Laboratory, Smithsonian Institution.

The Molecular Basis of Human Vision, George Wald, The Biological Laboratories, Harvard University, Cambridge, Massachusetts.

Comparative Structure of Photoreceptors, Jerome J. Wolken, Biophysical Research Laboratory, Carnegie Institute of Technology, Pittsburgh, Pennsylvania.

The Vertebrate Eye, George K. Smelser, College of Physicians and Surgeons, Columbia University, New York, New York.

Information Flow in Photoreceptors, W. A. Hagins, Laboratory of Physical Biology, National Institute of Arthritis and Metabolic Diseases, Bethesda, Maryland.

The Daily Photoperiod in the Control of Annual Cycles in Animals, Donald S. Farner, Department of Zoology, University of Washington, Seattle, Washington.

Photoperiodism—Plants, Sterling Hendricks, Mineral Nutrition Laboratory, United States Department of Agriculture, Beltsville, Maryland

The Photoreceptor Process in Lower Animals, Timothy Goldsmith, Department of Biology, Yale University, New Haven, Connecticut.

Phototaxis in Microbes, Roderick Clayton, Section of Genetics, Development and Physiology, Division of Biological Sciences, Cornell University, Ithaca, New York.

Phototropism, George Curry, Department of Biology, Tufts University, Medford, Massachusetts.

The Molecular Basis of Ultraviolet Inactivation and Photoreactivation, Jane K. Setlow, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

The Energy Conversion Process in Photosynthesis, Daniel I. Arnon, Department of Cell Physiology, University of California, Berkeley, California.

Evolution of Photoreceptors, Richard M. Eakin, Department of Zoology, University of California, Berkeley, California.

A 30-minute color TV film, "Secrets of Life," describing the research activities of the laboratory was prepared by the RBL staff and Craig Fisher of NBC. The film was shown nationally several times and has resulted in many requests from interested students about the field of photobiology.

Scientists who joined the staff during the year are Dr. Elisabeth Gantt, biologist, from Dartmouth Medical School, who will work on membrane and pigment structure of algae. Chemist Vicente Julio Medina, postdoctoral student from the University of Georgia, joined the laboratory in January to work on light effects on nucleic acid and nucleotide metabolism. Dr. Francesco Parenti, visiting postdoctoral from the University of Milano, Italy, continued his work on protein synthesis in chloroplasts this year. Director William H. Klein was detailed to the Biology Branch of the United States Atomic Energy Commission for one year beginning September 1. During his absence, Walter Shropshire was Acting Director.

Publications

KLEIN, W. H.; EDWARDS, J. L.; and SHROPSHIRE, W., JR. Spectrophotometric measurements of phytochrome *in vivo* and their correlation with photomorphogenic responses of *Phaseolus*. Plant Physiol., vol. 42, pp. 264–270, 1967.

LONG, AUSTIN, and MIELKE, JAMES E. Smithsonian Institution radiocarbon measurements III. Radiocarbon vol. 8, pp. 413–422, 1966.

MARGULIES, MAURICE M. Effect of chloramphenicol on formation of chloroplast structure and protein during greening of etiolated leaves of *Phaseolus vulgaris*. Plant Physiol., vol. 41, pp. 992–1003, 1966.

———. Concerning the preparation of chloroplasts active in Hill and photosynthetic phosphorylation activities from leaves of *Phaseolus vulgaris*. Plant Physiol., vol. 41, pp. 1320–1322, 1966.

———. Effect of chloramphenicol on chlorophyll synthesis of bean leaves. Plant Physiol., vol. 42, pp. 218–220, 1967.

Smithsonian Astrophysical Observatory

Fred L. Whipple, *Director*

Work of the Astrophysical Observatory is reported in ten discrete sections, but the broad program of research now in progress is not easily divided. The Observatory strives to provide a balance to the forward thrust of science by actively pursuing areas that appear to be receiving too little attention elsewhere. In doing so it often cuts through interdisciplinary boundaries as it probes the frontiers of science.

Optical Astronomy

Site development at the Southwest Observatory on Mount Hopkins moved rapidly forward during the year. Surveying and preliminary layout for the access road were completed, and a pioneer road was cut through to the ridge where the first large instruments are to be erected, 7600 feet above sea level. Thomas E. Hoffman, David W. Latham, Charles A. Lundquist, Leonard H. Solomon, Stephen E. Strom, and Robert W. Noyes prepared detailed specifications for a 60-inch photometric telescope to be placed on the mountain.

With William Liller and Richard M. Goody of Harvard and F. L. Roesler of Wisconsin, Nathaniel P. Carleton and Ashok Sharma obtained a good absorption spectrum of Mars with a triple Fabry-Perot interferometer on the 61-inch telescope at Agassiz station.* [1] From the spectrum they are calculating an accurate value for the CO_2 abundance on the red planet. This group also studied CO_2 line profiles on Venus for comparison with theoretical results.

*Unless otherwise noted, research is supported from Federal funds appropriated to the Smithsonian Institution. The Observatory, by paying scientists' salaries, shares in the support of all research. Support from outside sources is detailed in the notes on page 228.

Using the Harvard collection of over 500 24-inch Bruce plates that provide almost continuous coverage from 1898 to 1950, Cecilia Payne-Gaposhkin completed a systematic study of variable stars in the Small Magellanic Cloud. A catalog and light curves of 1,592 stars were completed and published this year.

In spring the Smithsonian Institution Press published a major work of the Observatory, an atlas and catalog of the Large Magellanic Cloud. Composed of 168 photographic charts and a 116-page text, *The Large Magellanic Cloud* by Paul W. Hodge and Frances W. Wright presents an historical survey, an identification atlas, reference tables, and a complete bibliography.

Continuing his study of the Large Magellanic Cloud, Hodge discovered 457 new star clusters and is nearing completion of a survey of the ages of 1300 clusters. With F. Wright he studied 26 variables in the Large Cloud to refine the period-luminosity relation for that galaxy.

In conjunction with his work at the University of Washington, Hodge used photographic, photoelectric, and narrow-band filter photometry techniques to survey H II regions in 90 galaxies. He investigated the structure of dwarf and normal elliptical galaxies, normal and peculiar irregular galaxies, and members of the local group to determine the nature of galactic evolution.

An expedition to the Peruvian Andes resulted in successful observations of the November 1966 solar eclipse. In collaboration with J. M. Beckers of Sacramento Peak Observatory and F. J. Low of the University of Arizona, Noyes measured the intensity distribution of 22-micron, far-infrared radiation coming from the sun's limb. With a germanium bolometer on a 12-inch telescope, they discovered that the expected limb brightening does not occur. The data indicate that the temperature dip in the solar atmosphere is broader than was formerly believed, and occurs higher above the surface.

The network of Baker-Nunn camera telescopes continued to yield an abundance of satellite-tracking data. In fiscal 1967, more than 67,000 observations were made and reduced, and more than 30,000 films were precisely reduced. The program of simultaneous observations to tie together the geodetic datums to an accuracy of ten meters made new progress. The inflation of PAGEOS-A and the apogee burn of the Agena-D were photographed. The station in Shiraz, Iran, was moved to Debre Zeit, Ethiopia; that in Curaçao, Netherlands Antilles, to Natal, Brazil; and that in Villa Dolores to Comodoro Rivadavia, Argentina. Modified K–50 cameras for geodetic observations were temporarily installed at the station sites in Iran and the Netherlands Antilles.

SAO's laser tracking system operated successfully throughout the year and produced about 1000 range observations of the three American and two French satellites that are equipped with retroreflectors.[2] Carlton G. Lehr's analysis shows that the error in present range measurement is about one meter. This is one-tenth of the error associated with the Baker-Nunn camera. The construction of a more powerful laser system that will permit daytime tracking was started.[3] It will be installed on Mount Hopkins.

Barbara Kolaczek analyzed the possibility of timing the passages of artificial satellites in front of stars. The observed time of a star occultation can give an accurate topocentric position of the satellite. With Lehr, she estimated the frequency of these phenomena for different satellites, and investigated observational equipment that could be used. Experiments have begun with the cooperation of Wright-Patterson Air Force Base.

At the Cordoba Observatory in Argentina, Thornton L. Page obtained the spectra of 10 southern galaxies, using the fast spectrograph designed and built at Wesleyan University in 1961. The spectra of 17 galaxies were observed with a cascade image tube and the same spectrograph. This technique increased the "speed" by a factor of 5 to 10. The spectra cover the range from 3900 to 7900 angstroms—considerably farther into the infrared than is possible with photographic plates.

Cooperative flare-star work with Sir Bernard Lovell at University of Manchester, England, and O. B. Shea and C. S. Higgins at CSIRO, Australia, has been continued by Solomon and the Director.[4] Data from previous observing periods have been reduced to light curves, and several large flares correlated with radio events. To aid in this work, Solomon studied the limiting magnitude of the Baker-Nunn cameras and the effects of sky brightness. He also completed light curves of Nova Herculis 1963 and Nova Pyxidis, which were photographed with Baker-Nunn cameras.

Radio Astronomy

To study the observable universe at longer wavelengths, the Observatory has been actively pursuing several promising programs in radio astronomy. A significant event in June was the formation of the Northeast Radio Observatory Corporation (NEROC), composed of Boston University, Brandeis University, Brown University, Dartmouth College, Harvard University, University of Massachusetts, Massachusetts Institute of Technology, University of New Hampshire, State University of New York at Buffalo, State University of New York

at Stony Brook, Polytechnic Institute of Brooklyn, Yale University, and the Smithsonian Astrophysical Observatory. The Director is a founding member of the Corporation. Formed to continue and strengthen the work of the Cambridge Radio Observatory Committee (CAMROC), the new corporation hopes to build a 440-foot paraboloid antenna as the heart of a major radio-radar observatory. Such an installation would greatly enhance both the research efforts and the teaching potential of academic and research organizations in the eastern part of the United States.

A special study panel, under the direction of Hoffman, studied methods for precisely surveying for CAMROC paraboloidal surfaces 300 to 500 feet in diameter. The actual radio shielding of mountainous terrain was investigated in the field for CAMROC.

Through an agreement for a joint Harvard-Smithsonian radio observatory, SAO is installing its 84-foot-diameter precision paraboloid at Harvard's George R. Agassiz Station, to be operational in October 1967. A design for an equatorial mounting was selected by A. Edward Lilley and the SAO engineering department, and a flexible multiple-purpose spectral-line radiometer was constructed.

Using the 60-foot radio telescope at the Agassiz station, Dale F. Dickinson and Ben M. Zuckerman have worked with Patrick Palmer and Hayes Penfield of Harvard College Observatory, under Lilley's direction, in the area of recombination lines of highly excited states of hydrogen, helium, and other atomic species in the interstellar medium. Mario D. Grossi, working with G. Richard Huguenin of Harvard College Observatory, attempted to detect three recombination lines of hydrogen near 22 megahertz. A switched-frequency radiometer was developed by SAO for use in further observations.

Giovanni G. Fazio and Zuckerman have estimated the possibility of successfully detecting interstellar quarks by means of a hyperfine line at 280 megahertz. A quark is a hypothetical elementary particle in some fundamental physical theories.

Donald H. Menzel investigated the theory of radio emission from transitions between high quantum levels in cosmic hydrogen. Deriving exact formulas for many of the physical parameters involved and extending Leo Goldberg's theory to take into account simulated emissions of negative absorptions, he continued with the quantitative application of this theory to observational data.

Gamma-Ray Astronomy

Continuing its pioneering investigations in gamma-ray astronomy, the Observatory has been analyzing data from the balloon flight reported last year, preparing equipment for new experiments, and

The 84-foot steerable dish shown here being taken apart at Huntsville, Alabama, is now being installed at the Agassiz Station in Harvard, Mass., where it will replace the 60-foot one formerly at Agassiz and will sit on the same pedestal and be operated by the same machinery.

making a theoretical prediction of the cosmic gamma-ray spectrum.[5]

Fazio and Henry F. Helmken analyzed more than four miles of 16-mm. motion picture film exposed during last year's high-altitude balloon flight. The film showed that the video transmission of the spark chamber tracks was excellent. Since no source of primary gamma radiation was detected above the experimental limit, a new upper limit to the flux of gamma rays from the Crab Nebula with energies above 100 million electron volts was established at 3.1×10^{-5} photons per square centimeter per second per steradian. The flux observed from the quiet sun was less than or equal to 7.4×10^{-5}. A type-2 solar flare occurring during the flight produced a flux less than or equal to 6×10^{-3} photons per square centimeter per second per steradian, which is also a new upper limit. The gamma-ray background flux at an altitude having four grams of atmosphere per square centimeter above the instrument and at 42° N. geomagnetic latitude was $(1.9 \pm 0.2) \times 10^{-3}$ photons per square centimeter per second per steradian, and the energy spectrum was measured in the region between 1.0 and 2.5 billion electron volts.

Calculations by Fazio, Floyd W. Stecker, and Sachiko Tsuruta have indicated an important contribution to the cosmic gamma-ray spectrum above 100 billion electron volts from the decay of nuclear isobars and hyperons.

Construction is well advanced on a 34-foot-diameter light collector to be installed on the 7600-foot ridge at Mount Hopkins. Fazio, Helmken, and Trevor C. Weekes have estimated that the theoretical gamma-ray flux from the Crab Nebula in the energy range of 100 to 1000 billion electron volts is 10 times greater than the minimum sensitivity of the instrument.

Theoretical Astrophysics

In collaboration with Peter D. Usher, of the Harvard College Observatory, Charles A. Whitney formulated a model for stellar pulsation in terms of a one-dimensional nonlinear oscillator.[6] Their procedure simplifies the geometrical and mathematical treatment of the problem so that the interesting physical aspects can be considered in some detail. The prime motivation for undertaking this examination is to bridge the gap between earlier work on the quasi-adiabatic linear oscillations and elaborate numerical integrations. The former was inadequate to answer many important questions, while the latter incorporate nonlinearity but are too complex for physical interpretation.

Whitney completed a preliminary investigation of the formerly pulsating star RU Camelopardalis and, in a qualitative discussion, showed that the cessation of pulsation in this star is characteristic of the phenomenon known as oscillational hysteresis.

In his general studies of the effect of magnetic fields on stars and gaseous nebulae, Menzel found that magnetic forces play an important role in the ejection of matter from stars and are significant in the interpretation of certain kinds of variables, notably the long-period variable stars.

Stephen E. and Karen M. Strom continued research in stellar atmospheres and abundances. During the fall of 1966, he was a guest investigator at the Mount Wilson and Palomar Observatories of the California Institute of Technology, where he used the 60-inch Cassegrain scanner to obtain spectrum scans of a large number of subdwarfs. By using the luminosities and the effective temperatures deduced by comparison of these scans with theoretical models, S. E. Strom was able to determine the value for subdwarf helium abundances from a comparison of the position of the subdwarfs in the H–R diagram with computed evolutionary tracks.[7] The observations and analyses all but rule out the total absence of helium in the primordial galaxy. If correct, this represents an important boundary condition in discussions of element production in the early stages of the galaxy or the universe itself.

In conjunction with Judith Cohen, S. E. Strom found that convection plays an important role in determining the structure of subdwarf atmospheres. Moreover, in contradiction to previous results, they found an appreciable microturbulence for these stars.

S. E. Strom and Peter Conti of the University of California at Santa Cruz found that for eight A stars in the Pleiades the strontium-to-scandium line ratio represents a means of detecting stars having metallic line characteristics even at temperatures near 10,000 degrees, where spectroscopic detection by ordinary criteria is quite difficult. Another interesting conclusion of this analysis was that the carbon abundance in the extreme metallic line stars is down compared to that in normal A stars, in analogy with the results for peculiar A stars.

S. E. Strom and Wolfgang Kalkofen continued their investigation of departures from local thermodynamic equilibrium (LTE) in stellar atmospheres.[6] To test for departures from LTE in A and B stars they suggested a technique involving simultaneous measurement of the Paschen and Balmer discontinuities.

Kalkofen studied the dependence of departures from LTE on effective temperature and surface gravity, and the influence of the departures on the continuous radiation of stars in spectral classes B to K. He finds that with the departures the continuum radiation causes the atmospheres to appear hotter and surface gravities higher than in LTE models.

For G and K stars, S. E. Strom proposed that the ratio of fluxes in the hydrogen free-free continuum to fluxes in the hydrogen bound-free continuum would provide a sensitive test of departures from LTE.

George Rybicki continued his studies of the mathematical problems associated with studies of stellar atmospheres. In collaboration with D. G. Hummer of the Joint Institute for Laboratory Astrophysics, Boulder, Colorado, he developed a computer program that determines stellar spectral line profiles under rather general conditions. He also investigated the effects of inhomogeneities in stellar atmospheres using primarily analytical techniques, and developed a method of correcting observed spectra for instrumental effects.

Charles J. Bartlett developed a simplified model of a shock wave in a stellar atmosphere to study the interaction of the various collisional and radiative mechanisms. Extending the recently developed weak turbulence theories to account for the steep gradients and large amplitudes found in shock waves, he also studied strong plasma instabilities and the problem of shock waves in low-density plasmas such as the interplanetary medium.

Jeffrey L. Linsky used the McMath solar telescope at Kitt Peak National Observatory to observe the H and K lines of calcium in the sun. Intensities of the calcium lines are being computed by solving the coupled radiative transfer equations for the line source functions.

Eugene H. Avrett is analyzing the profiles of strong absorption lines in solar and stellar spectra to provide a diagnostic technique to determine the thermodynamic and kinematic structure of solar and stellar chromospheres. In collaboration with Rudolf Loeser, he developed a computer program for the general calculation of line spectra produced by an atmosphere with specified properties. It was used for a detailed analysis of the lines of neutral sodium, where the sodium atom is represented by eight bound levels and a continuum. Full consideration is given to the individual processes that determine the populations of atomic energy levels.

He is also studying the lines of neutral magnesium with Eric Chipman and of neutral helium with Deane Peterson.

Studies of the silicon and metal absorption edges in the solar ultraviolet by Owen J. Gingerich and John Rich of Harvard demonstrated inadequacies of earlier models for the solar photosphere. In April, Gingerich attended an international study week near Arnhem, Holland, where he helped to formulate the new "Bilderberg Continuum Atmosphere." His detailed investigation of the solar "windows" undertaken with Duane Carbon and Robert Kurucz showed that these spectrum regions are clear of absorption lines; hence, the resolution of remaining

discrepancies between the predicted and observed solar continua must be sought on other grounds.

In collaboration with Linsky, Gingerich computed idealized model atmospheres for low effective temperatures; with the inclusion of a better approximation for water-vapor absorption this represents a step closer to realistic M-type stars. An important result is that the photospheres of these stars may exhibit temperature inversions at small optical depths even if there is no dissipation of mechanical energy in these regions.

Henri E. Mitler made a careful survey of the literature in search of rate constants for all kinds of thermonuclear reactions. He investigated a new hypothesis for the origin of the light elements and, in conjunction with P. Mehta, continued the study of a possible model for supernovae involving the interaction between the members of an evolving binary star.

Tsuruta, in collaboration with J. W. Truran, W. D. Arnett, and A. G. W. Cameron of NASA, studied the production of heavy elements in expanding supernova envelopes. They found that typical conditions estimated for these envelopes are very promising for element synthesis by neutron capture on a fast time scale. She continued her work on vibrating neutron stars and investigated the suggestion that some of the energy extracted by the URCA process would be converted into thermal energy to heat the star. She found that this heating does not significantly increase the cooling times of neutron stars.

Myron Lecar investigated the dynamical evolution of galaxies described by the collisionless Boltzmann equation. With Leon Cohen of Hunter College of the City University of New York, he demonstrated that the probability distribution for the positions and velocities of the stars evolves to a distribution that is independent of time and depends only on the energies of the stars. Also, it is, in general, not the Maxwell-Boltzmann distribution.

In collaboration with Carlos Cruz Gonzales, he also investigated the escape of stars from a cluster via two-body interactions. The third body, necessary for the dynamics of the escape, is provided by the remainder of the cluster. They have shown that high-velocity escapes are possible and may explain the observed runaway stars. Lecar has estimated that a significant fraction of the mass of the galaxy may be in the form of stars with masses less than $\frac{1}{10}$ that of the sun; these stars have very low luminosities during most of their lifetime. He points out that it may be possible to observe these "starlets" while they are still contracting from the interstellar gas.

Planetary Studies

Planetary investigations at the Observatory progressed along two broad fronts: investigations of the earth as a planet, and research dealing with the other major bodies in the solar system.

Considerable effort is being devoted to analyses of the earth's atmosphere.[2] Luigi G. Jacchia and his group are continuing their studies of the upper atmosphere based on the orbital analysis of artificial satellites. During this year, eight satellites have been tracked by the Baker-Nunn cameras specifically for this work, including the two atmospheric-density satellites Explorer 19 and Explorer 24, which were launched for Smithsonian's drag-analysis project and related studies elsewhere.

The atmospheric-density variations that accompany geomagnetic disturbances were considered by Jacchia, Franco Verniani, and Jack Slowey. Using drag data derived from high-inclination satellites, they found that at high latitudes the heating is systematically greater and occurs with a smaller time delay than at low latitudes; there is no discernible difference in heating or time delay from this cause between the bright and the dark hemispheres.

Jacchia and Slowey completed a study of the diurnal variation from 1958 through 1966, covering a maximum and a minimum of solar activity. A previous suggestion that the diurnal bulge might be elongated in the north-south direction and anchored on the equator has been definitely disproved, and the model of the bulge proposed by Jacchia in 1964 was shown to be correct. The relative amplitude of the diurnal temperature variation was somewhat smaller at sunspot minimum and showed fluctuations that could not be accounted for by solar activity. A large seasonal variation at high latitudes, found in the drag of Explorers 19 and 24, was attributed to the formation of a polar helium bulge in winter, caused by a subsidence in the turbopause.

Using radio techniques, Grossi is attempting to probe the ionosphere out to several earth radii. He is prepared to measure propagation times and path losses at several frequencies between 7.5 and 15 megahertz from stations at magnetic conjugate points in Jupiter, Florida, and Usahaia, Tierra del Fuego.

In addition to this observational work being done in the field, the Observatory is conducting laboratory and theoretical investigations into atmospheric phenomena.

Carleton continued his detailed study of the behavior of electrons in the ionosphere, aimed at better understanding of the ways in which energy originally vested in newly created photoelectrons finds its way into thermal energy of the atmosphere. His calculations yielded numeri-

cal results that predict how the temperature of the bulk of the electrons depends on the input of new electrons, and how the excitation rates of various day-glow emissions may be related to the electron temperature. With Ronald F. Woodman, he studied the problems of obtaining data on the ionosphere through incoherent backscatter. Woodman has returned to Lima, Peru, where he will apply this work in analyzing results from the Jicamarca Radar Observatory. Tsuruta and Carleton have begun to investigate the transfer of energy from one hemisphere to the other by electron motions along the geomagnetic field lines.

Costas Papaliolios is studying the metastable states of atmospheric gases. To determine electron impact excitation cross sections and lifetimes of the various excited states, he designed a large-aperture ultraviolet spectrometer of moderate resolution. He has also been working on a determination of the lifetime of the $a^3\pi$ state of CO by absorption spectroscopy.

Using a crossed-beam technique under high vacuum, Anthony R. Lee is determining the cross section for the excitation of positive ions by electrons at near-threshold energies. He finished building his equipment and took preliminary data on the excitation of N_2^+ ions by electrons, a case that is of considerable astrophysical interest.

The influence of general relativistic effects on the orbits of satellites was considered by James P. Wright and Brian G. Marsden, who assumed an accuracy of one meter in the observations. In furtherance of this research, they also determined the periods of long-period comets, using Einstein's and Newton's theories, and found that the differences in the results depend on when the observations are made.

The physical body of the earth is the object of intensive research by Observatory scientists. Using its network of astrophysical observing stations to supply observational data, the Observatory has developed a strong program in satellite geodesy.[2] *Geodetic Parameters for a 1966 Smithsonian Institution Standard Earth*, announced last year, was edited by Charles A. Lundquist and George Veis and published as Special Report 200. Veis, Antanas Girnius, Walter Köhnlein, and Edward M. Gaposchkin continued their analyses of satellite-tracking data and reduction methods. Improved observing techniques, using laser ranging devices, are expected to yield more accurate results that will be incorporated into an improved representation of the Standard Earth. In the coming year, considerable effort will be devoted to the comparison of tracking systems.

During summer 1966, a weekly seminar convened at the Observatory to review and explore the research opportunities offered by satellite tracking. Papers presented were published in Special Report 236, edited by Lundquist and Henry D. Friedman. This report showed that

Operating console and tape drives of the CDC 6400 computer, one of the fastest calculating machines in the world, which was installed this year. Among its principal uses are in connection with satellite tracking and geodesy and with project Celescope.

the Observatory, with its new digital computer, was prepared, through broadened capabilities and flexibility, to meet the challenge of expanding national and international programs.

With Louisa Lam and Geraldine Mendes, Lundquist completed a preliminary design study of an experiment that would measure atmospheric density and the departure from free-molecule flow at low altitudes by placing two or more spherical artificial satellites in essentially identical orbits. Lundquist also examined the relationships between orbit determination and satellite altimetry.[8] If the altitude of a satellite above the ocean surface is determined by, say, laser ranging from the satellite, this may be viewed as a measured relationship between a point on an equipotential surface of the geopotential and a satellite position determined by the equations of motion derived from the geopotential.

Other planets are also being investigated in detail by the Observatory. Continuing their analysis of radar doppler spectroscopy of the Martian surface, Carl Sagan and James Pollack have concluded that the broader Martian canals are ridges or chains of mountains transecting the bright areas.[9] From their studies of the physics underlying the observational results of Martian polarimetry, infrared

spectrometry, and visible spectrophotometry, they conclude that a principal, although not necessarily exclusive, constituent of the surface material is ferric oxide polyhydrates. In a statistical analysis of Focas' photographic photometry of the Martian wave of darkening, they have concluded that biological models and windblown-dust models of the seasonal changes are each allowed by the observations, although some of the correlations found, such as that between the extent of darkening and proximity to a bright area, are suggestive of the windblown-dust model. Just those particles most likely to be moved by saltation on Mars are the ones that are required to be moved according to the windblown-dust model in order to explain the photometric and polarimetric data on the wave of darkening.

With near-infrared spectral plates obtained in the 1965 opposition by Hyron Spinrad, they have attempted to detect elevation differences on Mars by differential carbon dioxide absorption, in order to test the hypothesis previously made, on radar and other evidence, that the dark areas have systematically higher elevations than the bright. The sensitivity of this method does not yet appear to provide a useful check of the elevation differences previously deduced.

With Joseph Veverka, Sagan calculated the expected ionization of the Martian atmosphere due to the incidence of solar protons in the absence of a Martian magnetic field. Proton ionization sources were found to be comparable to those expected from solar ultraviolet and X-radiation, suggesting that the 95-km. subsidiary electron density maximum found in the Mariner-4 occultation experiment may be due to solar protons. In that case, the major 120-km. maximum must be an F_2 region.

In the laboratory, Bishun N. Khare, Sagan, and Pollack investigated the possibility that water vapor condensing out of the Martian atmosphere before sunrise liquefies for a short time each day before vaporizing. If this in fact occurs, it greatly enhances the prospects of indigenous life and of propagation of microbes carried to Mars by spacecraft.

Sagan, David D. Morrison, and Pollack successfully tested an infrared planetary camera, and began photographing the planets with the 82-inch telescope of McDonald Observatory. One initial result is an excellent definition of the dark polar collar that follows the receding polar ice cap in the Martian spring.

Pollack and Sagan have shown that the electric-discharge model of Venus microwave emission is inconsistent with the reliable fraction of the Mariner-2 microwave-experiment data. Sagan calculated the mean surface temperature of Venus, independent of passive microwave observations, from the difference between the radar and optical diame-

ters of the planet, the cloud-top temperature, and the deduced atmospheric temperature gradients, and came to a result of $700° \pm 150°$K. Using the Haystack facility of Lincoln Laboratory and the 140-foot telescope at the National Radio Astronomy Observatory, Morrison and Sagan have been making observations of Venus designed better to determine phase and polarization values.

Fred A. Franklin and Giuseppe Colombo employed the computer to obtain orbits of a particle of negligible mass moving under the attraction of two other bodies of arbitrary mass, particularly in cases where resonances can occur.[2] This type of analysis is applicable to the problem of the gaps in the asteroid belt at certain fractions of the period of Jupiter, and to the gaps in Saturn's ring caused by perturbations of the satellite Mimas. Early results, with the perturber confined to a circular orbit, indicate many encouraging features, showing that resonances do indeed produce zones of instability at distances from the primary corresponding to $1/M$ times the period of Mimas. For the two cases mentioned, these investigators established the width of the gaps and how the width is related to the mass ratio of the two primary masses.

Several times in the late fall of 1966 when the earth passed through the plane of Saturn's ring, Franklin used the Cassegrain spectrograph at the Kitt Peak National Observatory to obtain spectra of certain of Saturn's satellites as they lay on the far side of the planet and their light skimmed over the ring plane on its way to the earth. Because several spectrograms revealed no enhancement of the solar lines for those elements that might conceivably have been present in the ring, he set upper limits to the density of gas surrounding the ring. These in turn gave limiting values of the density of charged particles surrounding the ring and hence will allow discrimination between several possible ring models in which electrostatic forces are called upon to stabilize the ring thickness at some finite value.

Winfield W. Salisbury conceived a method for using the moon as a focusing device for radio waves and as a medium for translunar communications. He plans to test this hypothesis in the Apollo manned spaceflight program.

Flight Experiments

Two artificial satellite missions involving Observatory scientists, OGO 2 carrying a micrometeoroid experiment, and Gemini 12 with a dust-collecting slide aboard, were successfully launched this year. Several high-altitude balloon experiments and the OGO–D micrometeoroid satellite reached final planning stages. The flight payload and ground support equipment for Project Celescope were completed

and are now undergoing acceptance tests at NASA; current plans call for launching in 1968. The Director has been active on a committee of the National Academy of Sciences that is considering the possibility of a large orbiting telescope.

Robert J. Davis recalibrated Project Celescope's secondary spectrophotometric standard against a thermocouple standard.[10] He found that the sodium salycilate deposition technique yielded coatings with non-flat spectral response. Decreases in sensitivity at the shorter wavelengths make it necessary to recalibrate the working standard every two to four months.

Another high-altitude balloon experiment under the direction of Fazio and Helmken is ready for flight in September 1967 to search for high-energy solar neutrons with energy greater than 200 million electron volts, which may be the cause of the single-particle tracks detected in the spark chamber of the May 1966 flight.

Data from the OGO–2 micrometeoroid experiment were reduced and analyzed by Carl S. Nilsson.[11] He found no genuine impacts in over 700 hours of data. He therefore deduced that the number of micrometeoroids heavier than 10^{-12} gram in the vicinity of the earth must be less than 3×10^{-2} particles per square meter per second per 2 pi steradians. Nilsson also completed preparations for the July launch of the micrometeoroid experiment of the OGO–D satellite.

Frances W. Wright and Paul W. Hodge are analyzing data from a slide that was aboard Gemini 12. They have also completed tests on two settling-plate collectors for use with balloons to collect dust at altitudes of 110,000 feet. This study was made in conjunction with the University of Washington.

Meteorites and Cosmic Dust

The Observatory is continuing its intensive investigations of matter from space. Coming to us in the form of meteorites and dust particles, these materials yield otherwise inaccessible information on past and present physical processes in the solar system.

Studying the meteoritic content of interplanetary space, with emphasis on the interaction among the different types of particles and the numerous dissipative processes that occur, the Director derived values for the lifetimes of particles from a few microns to kilometers in dimension. It appears probable that comets can maintain the smaller material in quasi-stable equilibrium. He is now concentrating his attention on the physics of asteroidal bodies, with special regard to fragile, less developed asteroids and to the question of the origin of asteroids whose orbits cross that of the earth.

Analyzing samples collected from 200-year-old Greenland ice, Edward L. Fireman and Robert H. McCorkell have found that the aluminum–26 and beryllium–10 they contain are the result of cosmic-ray activity in the earth's atmosphere.[11] One possibility to account for the absence of signs of solar-flare activity is that before entering the atmosphere the particles coming from space must have been protected by several inches of material. The nickel and cobalt contents relative to that of iron indicate an influx to earth of 700,000 tons of material per year.

Fireman analyzed the content of tritium, argon–37, and argon–39 in a sample of the St. Severin meteorite, which fell on June 27, 1966, and found it to be similar to that of other freshly fallen meteorites.

The ratios of Sodium-22 to Aluminum-26 due to cosmic rays integrated over the meteoroid orbit in six recently fallen meteorites show that the eleven-year cosmic-ray variation is smaller at the average solar distance of most meteoroids than it is at the earth's distance from the sun.

Using electron-microprobe techniques, John A. Wood determined the composition of igneous minerals in 10 of the 18 known carbonaceous chondrites of type II. These bodies are of interest because they seem to be samples of primordial planetary material in an almost perfectly preserved state. The presence of igneous minerals indicates that high-temperature events were associated with their formation; the mineral compositions measured in this study yield information on the composition of the medium in which the high-temperature events occurred. Most of the minerals Wood examined would have been at equilibrium in a gas environment 10 to 20 times richer in oxygen than present solar gases. Therefore, if the chondrites were formed in a primordial gas nebula, a view held by many scientists today, oxygen must have been very abundant in some localities. Perhaps a settling or concentration of primordial dust grains to the median plane of the early nebula concentrated oxygen there in the form of solid Fe_3O_4. A concentration about 5,000 times the mean would account for the measured mineral compositions.

George H. Megrue analyzed the isotopic abundances of the light rare gases and the potassium content in three hypersthene achondrites and in olivine separates from six pallasite meteorites. He found that the achondrites crystallized more than 3.2 billion years ago and were never subjected to thermal metamorphism in the parent body. Neither were they subjected to prolonged heating during the last 21 million years, when they were exposed to cosmic rays. The pallasite meteorites, believed to be samples from a core-mantle boundary in a larger body, crystallized 4.2 billion years ago. These meteorites have been exposed

to cosmic rays for different periods of time, ranging from 40 million to 300 million years.

The rate of mass loss from a body exposed to high-velocity, micron-sized dust particles was investigated by Matthias F. Comerford.[12] He finds that brittle materials lose mass 100 to 1000 times faster than ductile materials. Comparison of these results with erosion data in the literature suggests that an increase in the size of the bombarding particles increases the erosion rate significantly when the average effective size of the projectile becomes comparable with the mean distance between defects in the target. This is true even if the kinetic energy remains constant.

Iron meteorites are usually categorized according to their internal geometrical structure as hexahedrites, octahedrites, and ataxites. An X-ray and metallographic examination by Comerford showed that the distinction between several nickel-rich ataxites and octahedrites is somewhat artificial, since the structural characteristics and crystallographic orientation relationships are to a large extent carried over from one class to another.

McCorkell and Comerford analyzed a 28-kilogram iron meteorite recovered by Samuel W. Tishler in Deelfontein, South Africa. It proved to be somewhat out of the ordinary since it is one of the few known meteorites containing appreciable quantities of an iron-nickel carbide called cohenite.

To gain further insight into some of the microstructural aspects of metallic meteorites, Comerford is working with H. Posen of the Air Force Cambridge Research Laboratories on a study of annealing kinetics under high hydrostatic pressure.[13] Preliminary results indicate that pressure may enhance the rate of recrystallization.

David Tilles investigated the mechanisms by which gas is lost from extraterrestrial dust. He also made a theoretical study of the concentration of rare gases and interplanetary dust as a function of grain size for each of several possible source mechanisms.

Continuing their search for differences between spherules of terrestrial origin and cosmic dust particles, F. Wright and Franklin determined the mass densities of particles greater than 30 microns in diameter. They found a mean density of 2.75 for volcanic spherules, whereas for those from Canyon Diablo and Esterville (both known to be of cosmic origin) they found densities of 4.97 and 4.80, respectively. Since the average density of the polar spherules was 4.57, there is strong evidence that at least the majority of them are not of volcanic origin.

With Hodge, F. Wright derived tables of elemental abundances for interplanetary dust particles from old ice deposits in Greenland and near the South Pole. They found a remarkably good agreement with general cosmic abundances, with the exception of a few elements. Continuing their work with the electron-probe microanalyzer, reported last year, Wright and Hodge sectioned, polished, and analyzed 23 spherules. This work showed that there is seldom any significant difference in composition between the surfaces and interiors of the volcanic spherules they are studying.

Ursula B. Marvin collected concentrates of heavy minerals in beach sands of Miocene, Pleistocene, and Recent ages. From these she extracted magnetic iron oxide spherules of three distinct chemical types. Type I, consisting of magnetite and wüstite, contains about 70% iron, 5% nickel, 0.3% cobalt, and 0.2% chromium. These samples were found in a Pleistocene sand in Florida and a Recent one in Brazil. Their composition and distribution indicate that they are probably of extraterrestrial origin. The type-II spherules are mainly magnetite and hematite also containing about 70% iron but with 0.5% manganese. Found in Pleistocene and Recent beach deposits, polar ice caps, and many other environments, these spherules are of uncertain origin. Type-III spherules contain magnetite and glass and are relatively poor in iron but rich in silicon and aluminum. They are volcanic or industrial particles. Spherules of the first two types are being separated in quantity sufficient for isotopic analysis. The microprobe analyses were made by Marco T. Einaudi of Harvard University.

With Clifford Frondel of Harvard University, Marvin has studied diamonds they extracted from the Canyon Diablo meteorite.[14] They have found both irregular masses and morphological single crystals. X-ray diffraction patterns show that both types of occurrence are fine-grained polycrystalline aggregates of diamond with a hexagonal, wurtzite-like polymorph that they have named lonsdaleite. They have attributed the random internal aggregation and the presence of the polymorphic form to shock. Further evidence of shock was revealed by Marvin's discovery that other minerals occur as polycrystalline aggregates in the specimens of Canyon Diablo that contain diamond and lonsdaleite but as single crystals in a large diamond-free specimen. This indicates that some specimens of the meteorite have been more severely shocked than others.

The laboratory system for approximating primordial nebular conditions of pressure, temperature, and electrical discharge that Salisbury was working on last year has produced chondrule-like objects from granite dust. These tests are continuing, and objects from actual meteorite dust are to be compared with real chondrules.

Comets and Meteors

With Salah Hamid, the Director is searching for references to periodic Comet Encke in ancient Chinese records. If proof of such appearances can be found, it would provide extremely valuable information on the orbital history of this comet and the nature of physical decay of a large comet. The orbits of all the short-period comets (of more than one recorded apparition and periods less than 30 years) have been traced back for several centuries by Marsden using a digital computer. One of the difficulties of such calculations is that nongravitational forces have long been suspected to act on comets. Now it is possible to investigate the basis for this suspicion.

Hamid, Marsden, and the Director are studying the past motion of the periodic Comet Halley to establish limits on the mass of a possible comet belt near the plane of the planets, beyond Neptune. Preliminary results place the upper limit at less than one earth mass out to 50 astronomical units from the sun.

To shed more light on the physical properties of Whipple's icy conglomerate model of comet nuclei, Zuckerman and Douglas Pitman have been working on laboratory investigations of porous, icy systems under vacuum conditions. They have studied the thermal conductivity of vapor-grown dendritic snow crystals under various conditions of temperature and pressure.

Both optical and radar observations of meteors continued during the year.[15] Experimental observations of artificial meteoroids, carried out jointly with NASA's Langley Research Center, were completed. The final test, on February 14, recorded the reentry of a one-gram iron pellet travelling at 16 kilometers per second. The equipment at Wallops Island is now being used to record optical data on natural meteors as faint as 10th magnitude. This faint limit is made possible by an image orthicon system on loan from the Naval Research Laboratory. It is now possible to observe the optical effects of meteoroids in the same size range that produce the majority of the meteor-radar observations. Thus, a direct cross-calibration of the two systems is, for the first time, possible.

Giuseppe Forti treated some 13,600 meteor orbits from radar observations made in Havana, Illinois, and is nearing completion of a search for major meteor streams and new meteor showers. Studying winds in the upper atmosphere, Forti and Richard B. Southworth are reducing data on observed meteor trails gathered by the Radio Meteor System with new automatic digital recording equipment.

Plans were completed for precise calibration of the Havana Radio Meteor Network to provide more precise measurements of meteor in-

flux. Mario R. Schaffner developed a new system for processing data gathered by the meteor radar equipment.[15]

Nilsson derived an empirical equation describing the cumulative influx of meteors with masses greater than 10^{-6} gram.

The Prairie Network obtained good data on more than 300 extremely bright meteors.[16] Although four objects were suspected to have produced sizable meteorites, extended searches produced no recoveries. Richard E. McCrosky has developed improved methods for estimating meteor masses. With these methods the new data still suggest that the majority of bright fireballs have a structure that more nearly resembles material from comets than from asteroids.

Historical Astronomy

Gerald S. Hawkins, continuing his astro-archeological investigations, visited megalithic structures in England and Scotland, including Callanish on the Isle of Lewis in the Outer Hebrides. With Shoshana K. Rosenthal, he computed two catalogs giving star positions in prehistory. The first catalog covers the period since 2500 B.C.; the second catalog begins in 10,000 B.C. Both list the right ascension and declination of stars with apparent visual magnitudes brighter than +2.99.

Computational studies of the 13th-century *Alphonsine Tables* performed by Gingerich show that they are essentially Ptolemaic in construction and that they form the foundation for most of the important ephemerides until the time of Copernicus. This study is helping to destroy the myth that the Ptolemaic system underwent severe modification during the Middle Ages and finally collapsed under the weight of increasing complexity. Gingerich's computer investigations of the *Prutenic Tables* of 1551 show that their underlying details slavishly follow certain Copernican idiosyncrasies.

Central Bureaus

During this fiscal year the Central Bureau for Astronomical Telegrams distributed 59 Circulars carrying information about the comets discovered during this period, as well as supernovae, asteroids, and unusual stars. A record number of comets, 17, have been predicted to come to perihelion during 1967, but during the first half of the year the number of comet recoveries was not unusually high. In April Gingerich discussed the distribution of telegrams for Europe with Paul Simon at the Meudon Observatory. The departure of NATO from France has necessitated some changes in telegraph routing; consequently, we have begun to relay all telegrams to Meudon directly by Telex.

The Central Bureau for Satellite Geodesy issued two more publications this year. Contacts on an international level were increased to a total of 137 organizations or individual scientists in 38 countries outside the United States.

The Central Bureau was represented at international meetings on satellite geodesy held in Potsdam and Venice. Individual visits were made to optical tracking stations in the Federal Republic of Germany, Sweden, Finland, Switzerland, France, the Netherlands, and the United Kingdom. Discussions were held twice at the Headquarters of the Western European Satellite Triangulation Commission in England.

Staff Changes

The scientific staff of the Observatory welcomed, during the year physicists Bishun Khare and Ashok Sharma; astrophysicists Carl Nilsson and Max Roemer; astronomers William Deutschman, Barabara Kolaczek, Edward Lilley, and Cheng-yuan Shao; geologist George Megrue; chemist Robert McCorkell; and electronics engineer Mario Schaffner.

Consultants to the Observatory during the year were Drs. Leon Cohen, Giuseppe Colombo, Dale Dickinson, Vichitra Gaur, Avram Hayli, Gustav Kistner, Yoshihide Kozai, Robert Lumatainen, David Parkin, Alan Title, and George Veis.

During the year, the Observatory continued its program of postdoctoral fellowships in cooperation with the National Academy of Sciences — National Research Council. Appointees during the year were Drs. Charles Bartlett, Alan Title, Thornton Page, Trevor Weekes, and Richard Wattson.

Resignations were received from Drs. William Irvine, Robert Briggs, Willard Chappell, Charles Dugan, Leo Goldberg, Donald Lautman, Jean Meffroy, Ellis Monash and Chi Wang.

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200 (1966). Geodetic parameters for a 1966 Smithsonian Institution standard earth, ed. by C. A. Lundquist and G. Veis, in 3 vols.

Volume 1:
The reference system, by G. Veis.
Data reduction, by R. Haefner and R. Martin.
Geometric methods, by L. Aardoom, A. Girnius, and G. Veis.
Orbit determination, by E. M. Gaposchkin.
The orbital method, by G. Veis.
Determination of zonal harmonic coefficients, by Y. Kozai.
Determination of tesseral harmonic coefficients and station coordinates, by I. Izsak and E. M. Gaposchkin.
Combination of geometric and dynamic methods, by W. Köhnlein.

Volume 2:
Geodetic connections of the stations, by A. Girnius and J. Rolff.
Geometric results, by L. Aardoom, A. Girnius, and G. Veis.
Results from the orbital method, by G. Veis.
The zonal harmonic coefficients, by Y. Kozai.
Tesseral harmonic coefficients and station coordinates from the dynamic method, by E. M. Gaposchkin.
Combination of geometric and dynamic results, by W. Köhnlein.

Volume 3:
Geodetic interpretation, by G. Veis.
Comparison with surface gravity, by W. Strange.
The geometric structure of the earth's gravitational field; and The accuracy of the geopotential and its gradient field, by W. Köhnlein.
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216 (July 1, 1966). On the gradient line of the earth's zonal gravitational potential, by W. Köhnlein.

217 (July 15, 1966). A critical survey of upper-atmosphere density measurements by means of ionization gauges, by M. Friedman.

218 (August 22, 1966). Geomagnetic perturbations and upper-atmosphere heating, by L. Jacchia, J. Slowey, and F. Verniani.

219 (August 26, 1966). Meteor masses and luminosity, by F. Verniani.

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221 (September 6, 1966). Radar doppler spectroscopy of Mars. I. Elevation differences between bright and dark areas, by C. Sagan, J. Pollack, and R. Goldstein.

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229 (November 30, 1966). On Van Zeipel's method in general planetary theory, by J. Meffroy.

230 (December 5, 1966). Probability of recording satellite images optically, by K. Lambeck.

231 (December 6, 1966). Optimum station-satellite configurations for simultaneous observations to satellites, by K. Lambeck.

232 (December 12, 1966). Publication of orbits derived from photo-reduced Baker-Nunn observations, by E. Gaposchkin.

233 (December 14, 1966). Systematic corrections to reduce certain satellite positions to the FK4 system, by K. Haramundanis.

234 (December 16, 1966). Note on expressions for second-order short-period perturbations, by Y. Kozai.

235 (December 20, 1966). Lunisolar perturbations with short periods, by Y. Kozai.

236 (December 30, 1966). Scientific horizons from satellite tracking, ed. by C. Lundquist and H. Friedman.

Scientific horizons from tracking space objects, by C. A. Lundquist.
Estimation of scientific parameters, by H. D. Friedman.
Satellite tracking with a laser, by C. G. Lehr.
The effect of the atmosphere on laser range determination, by H. G. Horak.
Present and future research on the upper atmosphere at the Smithsonian Astrophysical Observatory, by L. G. Jacchia.
Continental drift, by U. B. Marvin.
Some geophysical implications of the satellite geopotential, by C. -Y. Wang.
Determination of Love's number from satellite observations, by Y. Kozai.
Relativistic investigations, by B. G. Marsden and J. P. Wright.
The motion of the spin axis and the rotation of the earth, by G. Veis.
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Differential orbit improvement program for lunar orbiters, by G. Veis.
The force function on a lunar satellite due to the oblateness of the moon, by S. E. Hamid.
Interface of satellite tracking and planetary orbiters, by J. Meffroy.

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238 (March 30, 1967). On the distribution of the Gibeon Meteorites of South-West Africa, by R. Citron.

239 (June 2, 1967). Studies in interplanetary particles, by F. Whipple, R. Southworth, and C. Nilsson.

240 (June 2, 1967). Model atmospheres for cool stars, by O. Gingerich; and Model atmospheres for late-type stars, by O. Gingerich, D. Latham, J. Linsky, and S. Kumar.

241 (June 5, 1967). Design of a satellite experiment for atmospheric density and near-free-molecule-flow aerodynamics, by L. Lam, G. Mendes, and C. Lundquist.

242 (June 6, 1967). Diurnal and seasonal-latitudinal variations in the upper atmosphere, by L. Jacchia and J. Slowey.

243 (June 30, 1967). South-Africa Baker-Nunn photography of the PAGEOS–A inflation and apogee burn of the AGENA–D, by W. Kirchhoff and J. Latimer.

NOTES

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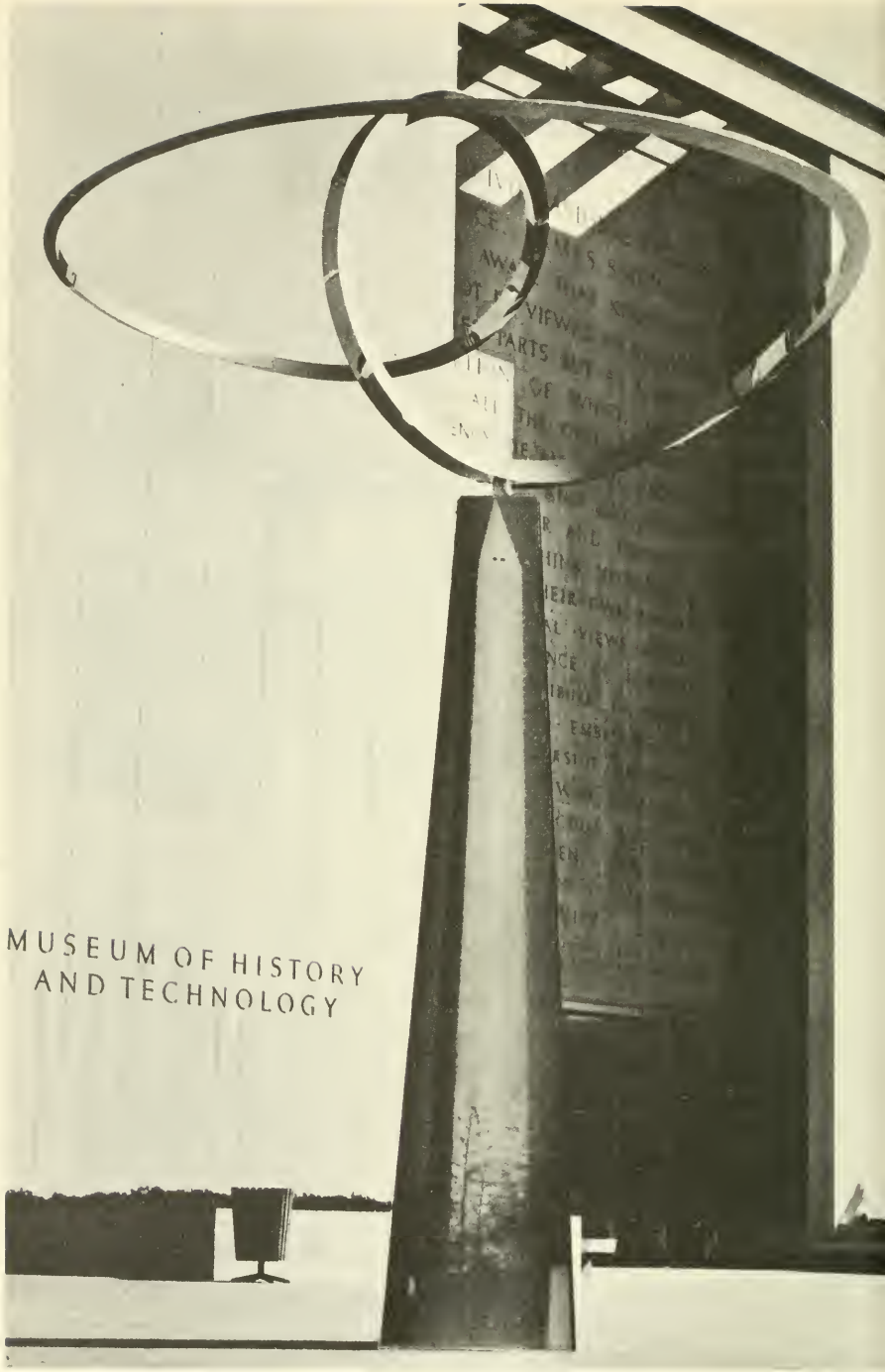
Smithsonian Activities

History and Art



Infinity, in stainless steel, by American sculptor José de Rivera, rotates once each six minutes. Located on the Museum's Mall esplanade, its 16-foot polished stone base reflects the nearby Washington Monument.

Museum of History and Technology

ROBERT P. MULTHAUF, *Director*

THE SIGNIFICANCE OF MUSICAL INSTRUMENTS lies in the sounds they are intended to make. This conviction, however furtively espoused by some museums, is firmly held at the Smithsonian. Ever since 1879, when G. Brown Goode, then Assistant Secretary in charge of the United States National Museum, classified instruments in the collection as primarily sound-emitting devices, the ultimate direction has been established. Obviously, instruments may be studied as pieces of furniture or as examples in the history of technology or of mechanical design, but their essence remains musical sound.

MUSIC AND MUSICAL INSTRUMENTS AT THE SMITHSONIAN

Like the proverbial sleeping giant, the Smithsonian's enormous collection of instruments lay dormant for many years. It grew through isolated gifts and through large bequests, such as a group of instruments from the Philadephia Centennial Exposition of 1876; a collection of wind instruments, banjos, and music boxes from the New York music dealer J. Howard Foote, in 1882; and, most important, nearly two hundred keyboard instruments given by Hugo Worch of Washington between 1914 and 1921. A small number of acquisitions is recorded from the 1920s until 1960, when the Cooper Union donated a collection of stringed and keyboard instruments. Now the division of musical instruments has responsibility for instruments from western cultures—these make up about one-third of the Smithsonian's total collection of over 4,000 musical instruments—and the office of anthropology in the Museum of Natural History houses the remainder of the collection.

Although Hugo Worch was honorary custodian of musical instruments from 1921 until his death in 1938, there was not any full-time staff member who was musically trained and responsible for the collection. The instruments were inadequately housed in the Museum of Natural History, for only the most minimal attempts at maintenance or temperature and humidity control were possible. Almost no instruments were playable and the Smithsonian was rarely credited with being the great treasure house of musical objects that in fact it was.

The renascence began in 1958, when John Shortridge, musician, historian, and instrument maker, joined the division of cultural history. With the encouragement of curator of cultural history C. Malcolm Watkins, he set about restoring the first instruments to playing condition. In the intervening years, the new Museum of History and Technology building, with its more favorable provisions for storage and exhibition, was opened; the staff was enlarged under the guidance of Cynthia Adams Hoover; and musical activity had greatly increased when, in July 1966, the newly created division of musical instruments began its first year of independent operation.

The new division has now embarked on a comprehensive program which aims to extend in breadth and depth the Museum's contribution to the art of music and the history of musical instruments. This program is distinguished by its emphasis on the combination of disciplines, each made more meaningful by its relation to the others: those of the artist (performer), the craftsman (instrument maker), and the scholar (historian). Together, these three provide a focus for interpretation through research and publication, exhibits, restoration, seminars, performances, and recordings. How, in practice, these reinforce each other to form a whole which is uniquely greater than the sum of its parts is described in the following paragraphs.

Performances sponsored by the division of musical instruments have an objective beyond that of the usual concert series, for the intent is not only to delight but also to enlighten the hearers by delineating artistic and historical contributions drawn from research in performance conventions or by the use of period instruments restored in the museum.

On occasion, performances are made possible by the results of restoration work, as when a fine instrument, unheard for many years, is finally ready for use. For instance, a rare 18th-century French harpsichord is currently being restored by conservator Scott Odell. An inaugural concert has been arranged which will bring an eminent player to the Smithsonian in a performance of French music contemporary with the instrument. An early American chamber organ, shortly due from its restorer, inspired plans for a concert of music

for organ and strings, together with a seminar in early American organ building.

Research can also lead to performances as well as to publication. A continually evolving study of performance conventions occupies considerable time on the part of the division staff. A concert of Christmas music of the Renaissance and early baroque resulted from investigation of music and performance conventions described by Michael Praetorius in his *Syntagma Musicum* of 1619. The creation of performance editions as well as the assembling of proper instruments and rehearsing of musicians is often required for a given concert. Ideally, a complete Smithsonian musical event entails the performance itself coupled with a demonstration lecture, a recording, as well as a publication and a related exhibition of musical objects appropriate to the period and place of the repertoire presented.

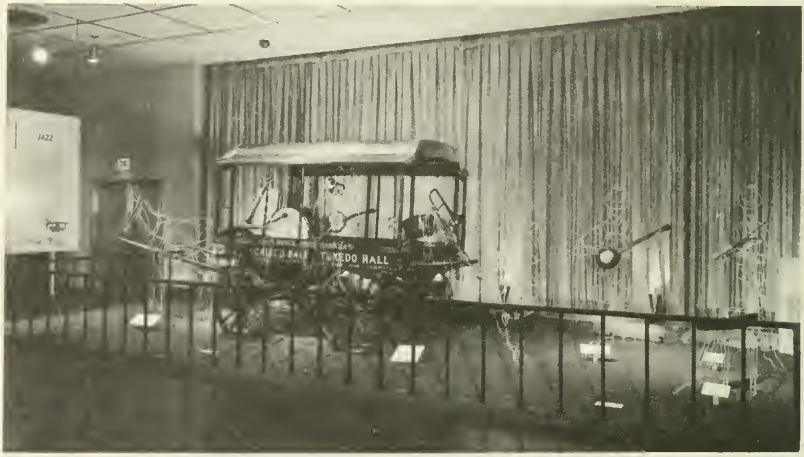
The exhibit, "Music Making—American Style," on view during 1966–1967, reflects concern for the objects themselves, their history and context, as well as for the sounds they make. In this instance, a tape of appropriate music was provided for each part of the exhibition. Also, a series of five live concerts was generated by its contents. These included programs of folk music, 19th-century band music using over-the-shoulder saxhorns from the exhibit itself, a New Orleans marching jazz band, and a program of chamber music known in America before 1800. For this latter concert, research led to archives of 18th-century Moravia, to music at Mount Vernon, to records of colonial Boston, and to documents from Spanish New Mexico. This exhibition also inspired preparation of a publication dealing with the history of American music and American instrument making.

The Smithsonian now possesses a superbly equipped conservation laboratory. The restoration program has so progressed that, in addition to a clavichord and an 18th-century Viennese piano, seven harpsichords are maintained in playing condition. This, in turn, accounts for a generous proportion of harpischord music in the performance program. For the instrument maker or performer it also provides an opportunity to compare antique prototypes.

Restored instruments not on public display are kept available for study by qualified visitors in the reference collection. Construction will shortly begin in the reference storage area which will make readily accessible many important instruments formerly consigned to overcrowded storage units and shelves. For the first time in any large collection, all the objects of special import will be visible behind glass doors and identified for the visitor by brief labels.

Publications by the staff range from those dealing with the collection

Harold Dejan and his Olympia Band in an evening of New Orleans jazz on the Mall, August 24, 1966.



Early 20th-century music making, American style: Advertising wagon carries a 6-piece jazz band. Right: Appalachian country musicians, made of wire.

Jacob and Daniel Melton, dulcimer makers of Carroll County, Virginia, tuning up for a recording session during a field trip made by Scott Odell of the division of musical instruments.

Seminar on 18th-century performance conventions held by Professor George Hunter of the University of Illinois, July 1966.

Janos Scholz of New York trying the viola da gamba made by Barak Norman, London, 1718, in the collection of the division of musical instruments.

itself to studies of early instruments and their use in performance to editions of early music. Now in press is the first complete listing of pianos, harpsichords, clavichords, and organs in the collection, prepared by Cynthia Hoover, Scott Odell, Helen Hollis, and others. A similar listing for wind instruments is being prepared by Robert Sheldon. Also in press is a facsimile, edited by John Fesperman, of 18th-century keyboard music of William Boyce.

A series of documentary recordings, planned by James Weaver, will begin in the coming year. These performances on important Smithsonian instruments will be accompained by extensive photographic and textual information about both the instruments and the music presented.

A 1966 seminar in performance conventions in early 18th-century music not only brought a group of experienced musicians to study at the Smithsonian and use its collection, but also expedited the formation of the Smithsonian Collegium Musicum. This continuing educational project involves the training of a small nucleus of musicians in early music and in the use of instruments from the collection.

During the next few years, much of the new division's program will, of necessity, continue to be experimental. Thus, both arduous and exciting times can be expected. The work must be validated by the end it seeks—to allow the music of the past to speak more eloquently to modern ears.

JOHN T. FESPERMAN
Division of Musical Instruments

Research and Publication

SCIENCE AND TECHNOLOGY

In May, Howard I. Chapelle, curator of marine transportation, was advanced to the newly created post of senior historian, in which he will continue his researches into the history of sailing vessels, with no administrative or curatorial responsibilities. John H. White, curator of land transportation, has been named curator in charge of the division of transportation.

A noteworthy feature of the work of the department is the planned involvement with scholars and institutions outside of the Smithsonian, which is taking place under a number of programs and arrangements.

Under the direction of Robert Vogel, the physical plant and machinery of Dudley Shuttles, Inc., of Wilkinsonville, Massachusetts, was recorded in detail in July 1966, with the assistance of the Historic American Buildings Survey of the National Park Service, in whose archives the final records will be deposited. The Dudley works was chosen because much of the machinery used in making textile powerloom shuttles was built on the premises, and thus Dudley is an interesting example of a firm which filled its own needs for integrated production machinery not commercially available.

A much larger survey was begun in June 1967; Vogel went to New England to conduct a survey of a group of early textile mill buildings before they disappear under pressures from urban renewal, highway construction, and other changing patterns of land and building use. Modern techniques, including aerial photography, are being used in this survey. The textile industry was selected as a starting point because it was the first American industry organized in a widespread fashion on the factory system. The program hopefully will be extended to other significant groups of early industrial buildings.

In order to bring together persons interested in the subject to discuss means of coordinating efforts, Vogel in April arranged a one-day seminar in conjunction with a visit by Kenneth Hudson, a leading British practitioner of industrial archeology.

The graduate teaching program in cooperation with the Department of the History of Science at the University of Pennsylvania continued.

Uta Merzbach was in residence at Philadelphia during the fall semester, giving a seminar on 19th-century mathematics; and Monte Calvert in the spring semester gave one on American technology. The program is scheduled to continue next year, with Bernard Finn and Edwin Battison being the visiting lecturers at Pennsylvania.

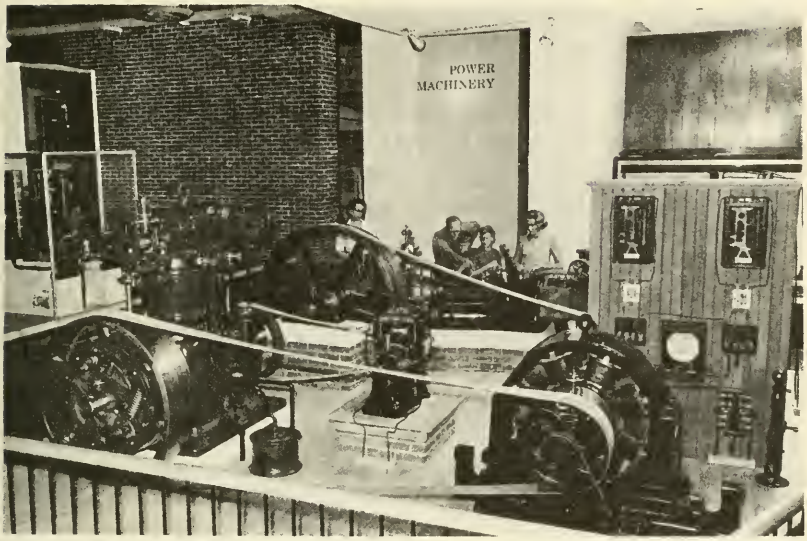
Several members of the staff participated in the teaching program of the department of American studies, and Calvert gave a directed reading course to doctoral students on the social relations of science and technology in America. Melvin Jackson cooperated with that department in preparing the exhibit for the Vinland Map Conference in November and presented a paper on medieval conventions of form and the Vinland map.

Three visiting scholars worked in or with the department this year. Professor Carl Condit of Northwestern University made use of the archival collections in civil engineering to prepare a general survey of the subject. Professor Cecil Smith of the Drexel Institute of Technology conducted a comparative study of French and American engineering practices in the 19th century. Canadian scholar W. Knowles Middleton prepared a comprehensive illustrated catalog of the meteorological instruments in the Museum's collections; this is to be published by the Smithsonian Institution Press. Sami Hamarneh of the division of medical sciences compiled a catalog of Arabic manuscripts in medicine and pharmacy at the British Museum, which the British Museum will publish.

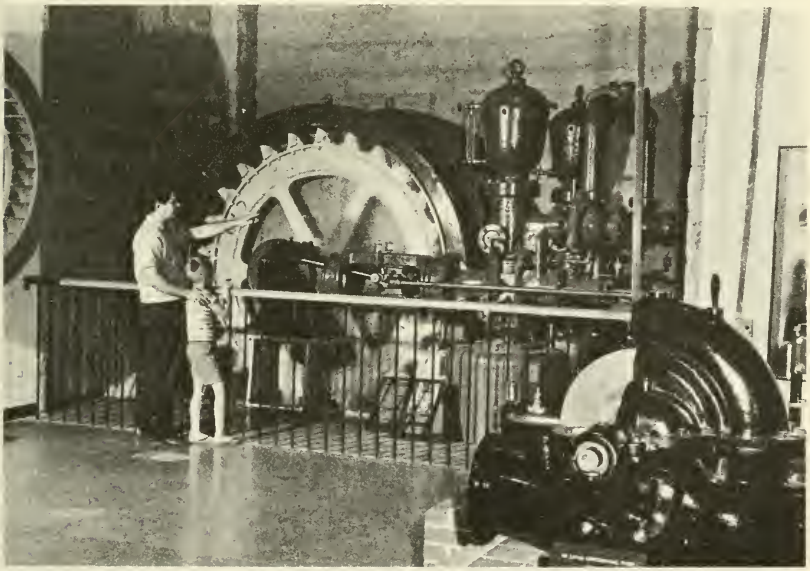
In autumn an iron Bollman-truss bridge near Washington was officially declared a national historic engineering landmark by the American Society of Civil Engineers, and title to the structure was transferred to Howard County, Maryland, for permanent preservation. Vogel and the Smithsonian have been working for several years to ensure the preservation of this historic example of early American civil engineering.

Two scholarly publications continued to be directed by members and a former member of the department. Robert Multhauf is editor and Bernard Finn is managing editor of *Isis*, the journal of the History of Science Society. Walter Cannon is editor of the *Smithsonian Journal of History*.

Among publications from the department, most scholarly comment has been caused by Edwin Battison's article on Eli Whitney, which showed that there was no basis for attribution of the well-known "Whitney" milling machine to Eli Whitney, and made it appear unlikely that Whitney ever used a system of interchangeable parts in his arms manufacture. Battison is preparing a further study of the so-called "Whitney" machine to establish its original features and to assess its importance as the earliest milling machine known to have survived.



Steam power for early electric generating plants. In the background, a Porter-Allen high-speed steam engine of 1881 drives an 1885 Edison bipolar direct-current generator, and, in the foreground, a Westinghouse compound engine of 1896 drives an alternating-current generator, the exciter for which is the small belt-driven machine in the center. Below: Reidler pumping engine driven by Pelton turbine (left). All are new exhibits in the hall of power machinery.



Bernard Finn has paid special attention to the history of television in an attempt to re-create some of the early systems. Use was made of the extensive files of the Federal Communications Commission in analyzing the development of color television and the reasons for acceptance of the current system. Finn also completed work on a study of thermodynamics and thermoelectricity. His article on Alexander Graham Bell's experiments with the variable-resistance transmitter will appear in the fourth issue of the *Smithsonian Journal of History*; and he has given lectures at the College of William and Mary and Catholic University, and to the Government Patent Lawyers Association. Eliot Sivowitch began a study of wired broadcasting in Europe and the United States in the late 19th century.

Hamarneh's paper on modern historiography and medieval Arabic pharmaceutical literature, read before the American Institute of the History of Pharmacy, is to be published in their *Proceedings*. In January 1967 he went on a sabbatical year's leave to study Arabic manuscripts in Cairo and other centers.

Monte Calvert continued his documentation of tools, especially those involved in the current changes in the hall of tools. Under his supervision a study of bearing technology is being undertaken by George Korper.

Walter Cannon's study of science in 19th-century England, *Science and Social History in Victorian England*, was accepted for publication by Routledge & Kegan Paul. The chapters range from analysis of the work of individual men to a reinterpretation of the role of science as a whole in Victorian culture, which was delivered in March as the annual Sigma Xi lecture at the University of Pennsylvania. Cannon also began a comparison of the scientific accuracy of David Rittenhouse with that of his British contemporaries.

Uta C. Merzbach completed the research for an edition of the mathematical publications of Leibniz.

Deborah Warner completed a study of the famous American telescope makers, Alvan Clark and sons, coupled with a lengthy catalog of all known objective lenses made by the Clarks.

The forthcoming publication of Howard Chapelle's *Search for Speed Under Sail, 1700–1855*, will represent the culmination of some 40 years of research in this field; it contains 134 drawings, all produced by the author. Chapelle has also completed studies of the frigate *Constellation* and of the sloop *De Braak*. In January he addressed the Navy League of Portsmouth, New Hampshire, on the subject of building a replica of the Continental frigate *Raleigh*.

John H. White's study, *American Locomotives, 1830–1880*, was accepted for publication by the Johns Hopkins Press. White completed a paper

on Baldwin's first locomotive and one on the business history of the Cuyahoga Steam Furnace Company. He gave a paper on rationalization and standardization of locomotive design at the meeting of the Society for the History of Technology in December.

Melvin Jackson's study of the operations of French privateers out of Charleston, South Carolina, during 1793–1796 is to be published by the Smithsonian Institution Press. Jackson is doing research on the pioneer Griffin Greene steamboat of 1796 and on the privateer *Prince of Neufchatel* in the War of 1812. At the invitation of the Royal Netherlands Navy League of Curaçao, Netherlands Antilles, Jackson gave three lectures on Dutch-American maritime relations in the Caribbean during the 18th century, at the celebration of the 60th anniversary of the League's founding.

Don Berkebile completed a paper on the William T. Harris motor wagon of 1892, one of the early gasoline-propelled vehicles built in the United States, and he continued work on his carriage dictionary.

William Geoghegan completed his chronology of events of the Civil War gunboats on the western rivers.

ARTS AND MANUFACTURES

With a grant from Resources for the Future, Inc., and the cooperation of the U.S. Departments of Agriculture and Interior, the division of agriculture and forest products began a study of the possibilities of establishing a number of farms on which the conditions and crops representative of stages in American agricultural history will be reproduced. The research report will be completed in November 1967. Research continues for a history of American agriculture 1607–1967.

The curators of the division of ceramics and glass began the compilation of a catalog of the Hans Syz collection of 18th-century European porcelain. Paul Gardner's technical biography of Frederick Carder should be ready for publication in fall 1967. Work on the classification of ceramics from the archeological excavations at Fort Michilimackinac, Michigan, continued. In January the curators conducted a seminar on identification of unmarked 18th-century English porcelain, chaired by Robert J. Charleston, Keeper of the Department of Ceramics, Victoria and Albert Museum, London. It was attended by fifteen curators of ceramics from such museums as The Metropolitan Museum of Art, Henry Francis duPont Winterthur Museum, Colonial Williamsburg, the Art Institute of Chicago, and the William Nelson Rockhill Gallery.

The Twelfth Annual Wedgwood International Seminar convened at the Smithsonian Institution May 3 through May 6, 1967, under the

Installation of the mural in the hall of petroleum, opened in June 1967. This 57-foot picture in polymer tempera, a portion of which is shown above, portrays the techniques of finding, producing, and distributing petroleum. Below: Early rotary drilling machine used at Spindletop oilfield in 1901. In the background are examples of blowout preventers and, at right, of drilling bits.

joint chairmanship of the curators. The 325 registrants from the United States, Canada, and Europe enjoyed a program which included 13 illustrated lectures, evening study sessions, and tours of Hillwood and the White House. A special exhibition of Wedgwood was mounted in connection with this seminar.

Jacob Kainen, curator of graphic arts since 1946, retired in September 1966 to devote more time to his painting and research. He continued to serve the Smithsonian on the staff of the National Collection of Fine Arts as curator of prints and drawings.

A catalogue raisonné of the etchings, lithographs, and posters of John Sloan and a study of his etching methods was completed by associate curator Peter Morse, who resigned, effective July 1, 1967, to join the staff of the Honolulu Academy of Fine Arts.

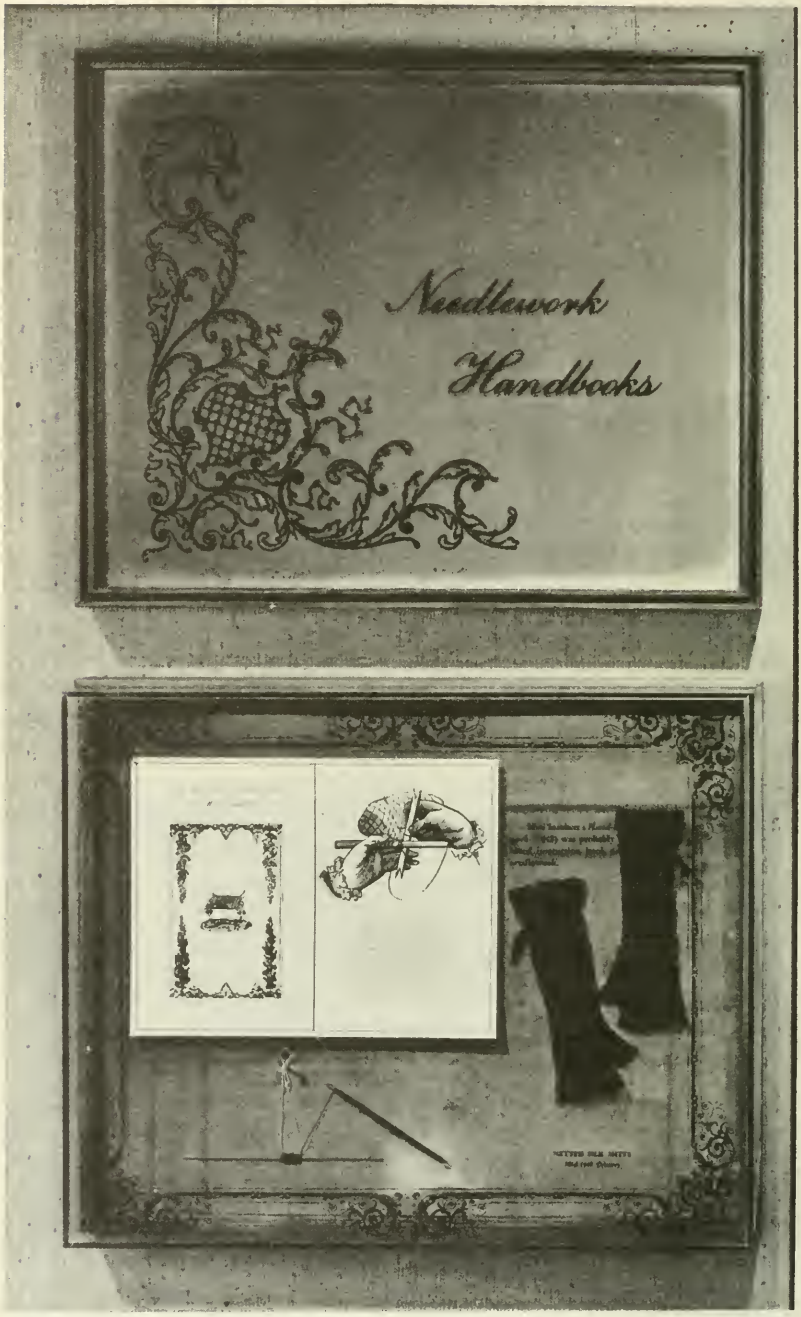
Elizabeth Harris, who held a Smithsonian fellowship until October 1966 and has continued as a consultant, completed a study of Sir William Congreve's compound-plate printing and is preparing a catalog of the Museum's collection of photomechanical printing.

Eugene Ostroff was awarded a one-year research grant to continue his work, started last year, related to the preservation and restoration of photographs. A paper on preservation of photographs, resulting from this work, will appear in *The Photographic Journal*. He visited Lacock Abbey, Chippenham, Wiltshire, England, the ancestral home of William Henry Fox Talbot, inventor of the photographic negative system used today for producing unlimited paper prints. An attempt to discover the remains of the inventor's laboratory shed, carried out in cooperation with the National Trust (Britain), failed to reveal meaningful artifacts, but six Talbot laboratory jars found in the attic were generously lent for display at the Smithsonian by Mrs. Katherine Burnett Brown, great-granddaughter of Fox Talbot.

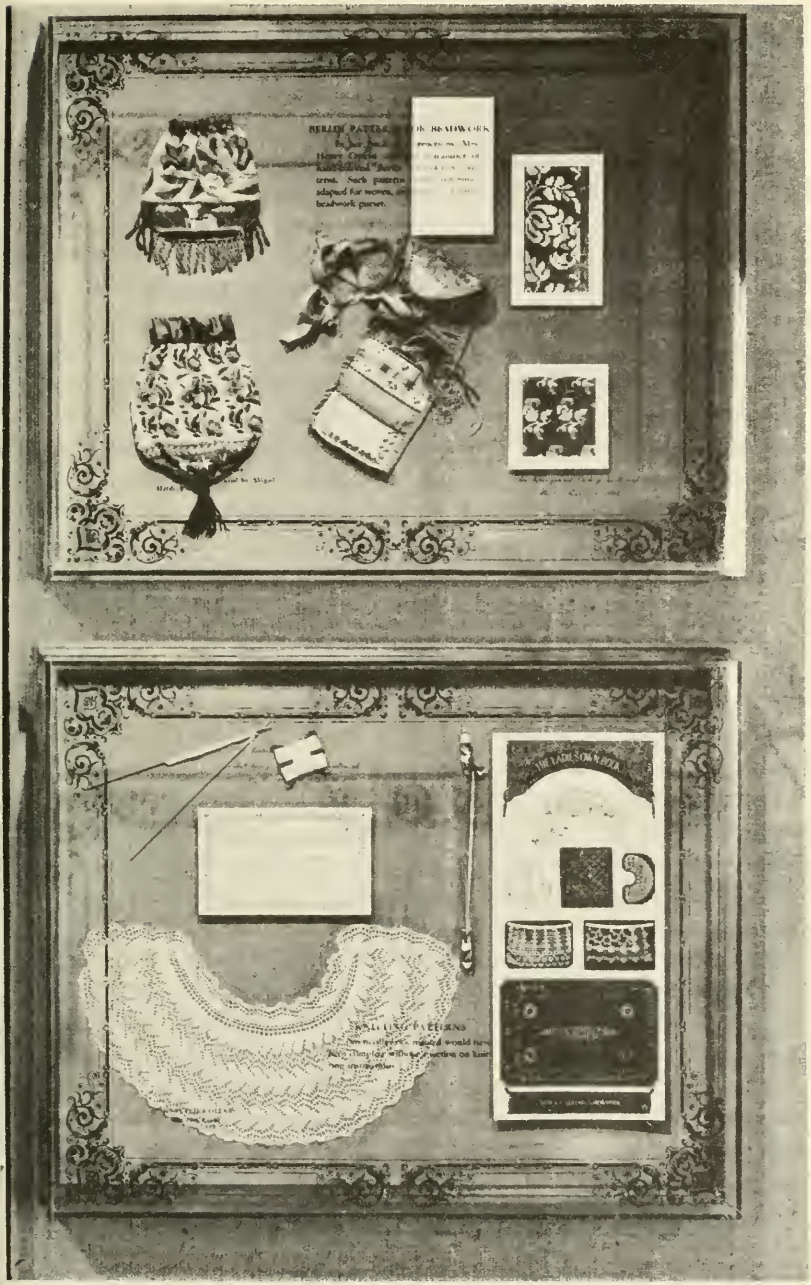
Opportunity was given to inspect Talbot's personal photographic collection, owned by Mrs. Burnett Brown; a catalog of the collection is being prepared by Ostroff, and the appropriate preservation measures applied to the prints.

Research in the division of manufactures and heavy industries was principally concerned with preparations for the hall of nuclear energy and coal. The financial records of a major coal producer, given to the Museum, have greatly assisted curator John N. Hoffman in his continuing study of the early development of the Pennsylvania anthracite region. Work on the development of the American economy through 1865 has continued.

The staff of the division of textiles continued its research in textile subjects for the script for the new permanent hall and for scheduled special exhibits. A paper, "Natural Dyes in the United States," was



Examples of Victorian needlework from the collections in the division of textiles.



After a showing at the Museum, an exhibit of *Victorian Needlework* was circulated nationally by the Smithsonian Institution Traveling Exhibition Service (see pp. 274 and 385).

submitted by Rita J. Adrosko for publication by the Smithsonian Institution Press. She continued her research on Jacquard-woven silk pictures in America and on 19th-century shawls, and Doris Bowman continued research on early machine-made nets.

CIVIL HISTORY

Many activities of the department this year reflect an increased interest in the Museum's relationships with foreign museums and collections, rapport with foreign colleagues, and strengthening ties with cultures parallel to our own. Richard H. Howland was elected secretary-treasurer of the United States National Committee of ICOMOS, the new UNESCO-sponsored international organization officially known as the Conseil International des Monuments et des Sites. At the invitation of UNESCO, he spent five weeks in Ethiopia, where he advised the Crown Prince and other government officials on the organization of a new Ethiopian Antiquities Administration.

Curator C. Malcolm Watkins continued his work on the exciting Thompson letters, written from California before 1870, and was consulted on cultural and historical displays at the new municipal museum in Oakland, California. In April 1967 he began a year's sabbatical leave to investigate early American pottery. Research collaborator Joan Pearson Watkins contributed substantially both to studies of earthenware and of Western Americana.

Rodris Roth correlated local deeds, early 19th-century house inventories, and genealogical records for a report ascertaining the history of, and furnishings for, an 1808 parlor from Martha's Vineyard in Massachusetts, soon to be displayed in the hall of everyday life. Richard Ahlborn completed research on two unique buildings used as oratories by a flagellant brotherhood in the Spanish-American villages of New Mexico. His illustrated monograph on the "Penitente Moradas of Abiquiu" is to be published by the Smithsonian Institution Press.

Mrs. Anne W. Murray completed research on her paper, "Sunshades, Parasols and Umbrellas," and continued investigation of certain aspects of the history of 18th- and early 19th-century American costume. For The Institute of Pennsylvania Life and Culture, June 21 through June 24, she lectured and served as chairman of a seminar on historic American costume.

Claudia B. Kidwell completed her paper, "Women's Bathing Dress and Customs in the United States," which is being published by the Smithsonian Institution Press, and continued research on dress of the 1920s.

Associate curator Cynthia A. Hoover continued research for an illustrated handbook, "Music Making—American Style," which will supplement the few published histories of American music through illustrations of musical objects, important musical documents and paintings, and contemporary accounts of American musical activities. She also completed an article, "Music at the Smithsonian," to appear in the fifth issue of the *Smithsonian Journal of History*.

A total listing of the Museum's extensive keyboard collection was prepared by the staff of the division of musical instruments and edited by Cynthia Hoover with assistance from Scott Odell. Its detailed descriptions of the instruments were compiled by associate curator John Fesperman, museum specialist Helen Hollis, and by summer interns Theodore Graine (1962), Robert Falck (1963–1964), and Dorman Smith (1965–1966). It is intended as the first of a comprehensive series of checklists and catalogs which will document the music collections.

Associate curator in charge John Fesperman prepared a facsimile edition with introductory notes of *Ten Voluntaries for the Organ or Harpsichord* by William Boyce, originally published in London, circa 1785, and never reprinted in full since that date. He continued investigations of early organ building in America by way of providing information about organs in the collection for the checklist of keyboard instruments. With Scott Odell, he traveled to Mexico to photograph and document 17th-century organ building in and around Mexico City. He also participated in performances of music of Praetorius, Byrd, and Monteverdi with other members of the Collegium. Research in performance conventions led to his preparation for program notes for concerts of "Music in America Before 1800" and for "Christmas Music of the Renaissance and Early Baroque."

Associate curator Keith E. Melder pursued his study of women's status in the United States, and began investigating reforms in American education during the first half of the 19th century. He participated in two orientation seminars in American material culture in the joint Smithsonian-George Washington University American Studies program. Margaret B. Klapthor, associate curator, continued research on various phases of White House history, concentrating on detailed studies of china from all the administrations.

Assistant curator Herbert R. Collins' research on American political campaign bandannas and kerchiefs involved design patent records and a study of major collections in all parts of the country. Kenneth Shipps returned to the division of political history for his second summer as a research assistant studying Presidential campaign music

in the United States and research assistant Isabel Davies accumulated valuable information on White House china and on World War I posters.

Curator Peter C. Welsh continued research on the implements of the hand crafts. He continued his work on the Harry T. Peters lithography collection and the Eleanor and Mabel Van Alstyne folk art collection. His manuscript "Track and Road," a history of the American trotting horse based upon the visual record preserved in the Peters lithography collection, was completed and is now in press. He lectured in the Cooperstown Graduate Program, Cooperstown, New York; and in May discussed tools, construction, and the Ipswich House as part of Columbia University's graduate seminar in restoration and preservation.

Assistant curator Anne Castrodale Golovin presented a paper "Daniel Trotter, Philadelphia Cabinetmaker," at the Annual Winterthur Seminar on Connoisseurship at the Henry Francis duPont Winterthur Museum. Her manuscript, "William Wood Thackera, Volunteer in the War of 1812," is now in press for the *Pennsylvania Magazine of History and Biography*.

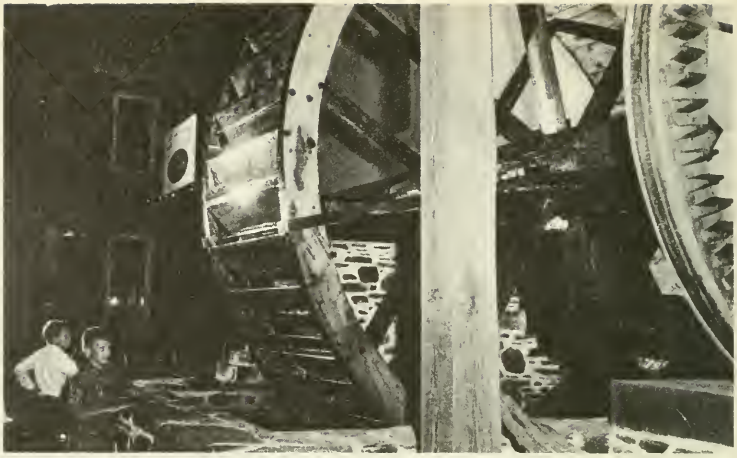
Museum technician Anne Marie Serio investigated the political caricatures in the Peters lithography collection and conducted a study of the 1848 national convention of the Free Soil Party.

A numismatic seminar consisting of eleven sessions was held by the division of numismatics from March 9 through May 18, 1967. Dr. and Mrs. Clain-Stefanelli developed the program as a survey of the science of numismatics and its aims, and it included a discussion of the most important numismatic references. Coins as documents of history and art in coinage formed the subject of two sessions. Two other sessions giving a survey of coining metals and of coining techniques provided the necessary basis for a presentation of special methods germane to numismatic research, such as the comparative study of dies in order to establish chronological sequences of coins. The application of scientific methods of investigation—particularly physics—in numismatics was the subject of another session. The concepts guiding the activity of numismatic museums throughout the world and a history of the National Numismatic Collections completed the series of seminars. In the review session, the curator emphasized the necessity for a continuous reappraisal of the scope of numismatics.

Both the curator and associate curator lectured extensively on various numismatic subjects in Washington and other cities.

Reidar Norby was appointed assistant curator of philately and postal history in August 1966. Editor of *The Posthorn* and the *Scandinavian Scribe*, and author of numerous publications on European stamps and

The two halls opened in the growth of the United States series cover the period 1640–1851. Construction methods used in 1690 and 1750 are illustrated by this house from Ipswich, Massachusetts. Below: Two-man pit saw used to rip out planks.



Wheels and gears of a 1774 grist mill from Chester County, Pennsylvania, reconstructed and working. Nearby (left) ducks are penned in by a typical woven sapling fence. Below: Conestoga freight wagon of the type used in the Pennsylvania area, 1790–1850.

postal history, he began a study of postal communications between the United States and Scandinavia.

Associate curator Carl H. Scheele, whose *Postal Service—A Brief History* is in press, continued research on mail-handling devices and airmail service. He was the principal speaker at the Combined Philatelic Exhibitions of Chicago and was appointed to the Council of the American Philatelic Congress.

A system to retrieve information from United States covers is being developed by Scheele and museum specialist Francis E. Welch.

AMERICAN STUDIES

The American studies program was carried on in cooperation with universities in the local area and tentative arrangements were made for cooperation with universities outside the local area. An orientation seminar in the material culture of the United States, given for the second consecutive year in the spring semester, was organized around the theme of technological innovation and was taught by staff members from each of the Museum's departments. Eleven graduate students from the George Washington University and the University of Maryland participated. In addition six graduate students from the George Washington University took individual reading courses with members of the Museum staff.

In November 1966 the chairman organized a conference on the recently discovered Vinland map in conjunction with a special exhibition of the map and related objects. No final conclusions about the map, either in terms of its authenticity or meaning, were reached, but much light was shed on the subject. The proceedings of the conference are being edited for publication.

In July Dr. Wilcomb E. Washburn addressed the 1966 meeting of the Anglo-American Conference of Historians, London, England, speaking in behalf of the overseas historians in response to the welcome of C. V. Wedgwood, representing the English historians. He participated in a conference on the Discovery of America held at the Centre d'Études Supérieures de la Renaissance de Tours, France, giving papers on the Vinland map and on the American Indian; in the organization meeting of the Society for Historical Archaeology, Southern Methodist University, Dallas, Texas; and in a planning conference on American Indian history at the University of California at Los Angeles, where he spoke briefly on opportunities in the study of American Indian history.

He also spoke at the Conference on Virginia History on problem areas in Virginia history; at the Conference on Early American

The Vinland map was on exhibit in the Museum of History and Technology from November 1966 through June 1967.

At the conference on the Vinland map, held November 15–16, 1966, the map is examined by Armando Cortesão of Coimbra University, Portugal; Alexander Orr Vietor of the Yale University Library; Peter Sawyer of England; Gwyn Jones of University College, Cardiff, Wales; and Thomas E. Marston of the Yale University Library.

Einar Haugen of Harvard University, Raleigh Skelton of the British Museum, England, Alexander Orr Vietor of the Yale University Library, and Ib Ronne Kejlbo of the Royal Library, Copenhagen, Denmark, examine a portion of the Vinland map exhibit.

Graduate students in the orientation seminar in the material culture of the United States observe the installation of a block road (generally referred to, incorrectly, as Belgian block) in an exhibit in the Museum of History and Technology. Museum specialist Donald H. Berkebile (extreme left) division of transportation, and (next to him) Wilcomb E. Washburn, chairman, department of American studies, conduct the discussion.

History, meeting at the State University of New York, in Albany, on status in the historical profession; and at the Second Annual Southwest Missouri Historian's Conference, on the cultural shock of discovery. He also addressed the Colloquium on Western Hemisphere Studies of the Catholic University of America, the History Club of Georgetown University, students of the Phillips Exeter Academy working as interns with members of the Congress, and a group of foreign students at the Conference of Asian Student Leaders, sponsored by The Experiment in International Living. He was reelected President of the Chesapeake Chapter of the American Studies Association, elected a Trustee of the Japan-America Society of Washington, and made a member of the Commandant's Advisory Committee on Marine Corps History.

ARMED FORCES HISTORY

Research into methods of underwater exploration and in documents relating to sites explored continued to be the major project of Mendel L. Peterson. Grants from the National Geographic Society made possible the continued exploration of sites in Bermuda and a newly discovered site in the central Bahamas. During July and August the field party explored large areas of the western Bermuda reefs and Castle Harbor using a flux-gate magnetometer made available by Anthony F. Natale, Jr., of Philadelphia. Several new sites were located in this manner.

In spring 1966 a wreck was discovered by a party of skindivers fishing off Highborn Cay in the Exumas, central Bahamas. Photographs of the site were submitted to the museum and it was determined that the wreck dated from the period before 1570. A preliminary examination was made in the fall and a thorough investigation of the site was made with the assistance of Edward B. Tucker during February and March 1967. The discoverers of the site—Robert Wilke, Clint Hinchman, and John Robinson—worked with the party and bore much of the responsibility of getting equipment together and recovering the ordnance and fittings which the site yielded. The ordnance consisted of two lombards, or broadside pieces, and twelve swivel guns, with a number of breechblocks for both. In addition, three anchors, a harpoon, many lead shot for the guns and numbers of iron fittings from the standing rigging were recovered. The nationality of the wreck and exact period are still in question. A search of the archives in Seville and Mexico City will be made to identify the vessel.

Peterson continued his investigation into the marking and decoration of muzzle-loading guns. A thorough search of ordnance records in the

Timber remains of 16th-century wreck being sketched under water by Smithsonian Institution artist James A. Mahoney.

Air lift in operation on site of 16th-century Spanish wreck buried in sand.

Public Record Office, London, being made by a researcher, is turning up much valuable material relating to ordnance contracts and makers' marks of the last half of the 18th century.

Curator of military history Edgar M. Howell and museum specialist Donald E. Kloster of the division of military history continued work on a multivolume, comprehensive, descriptive, critical, and documentary catalog of United States Army dress to include uniforms, headgear, and footwear. The first volume of this project, *U.S. Army Headgear to 1854*, is currently in press. Much of the research for the second and third volumes—*U.S. Army Uniforms to 1857*, by Kloster, and *U.S. Army Headgear, 1855 to date*, by Howell—is complete and work is continuing. This project is being performed in conjunction with a comprehensive recataloging and documenting of the uniform collections. This is a most significant undertaking in that the uniform collections of the division are the most comprehensive in America. In connection with this project, Kloster studied collections at Fort Ticonderoga and researched the Lansing manuscript collections at the New York Public Library and the New York Historical Society. In addition, Howell and Kloster studied the important collection of quartermaster "sealed samples" at the Quartermaster Museum, Fort Lee, Virginia.

Howell continued his efforts to locate original graphic material illustrative of the role of the Army in the opening and development of the West, and Kloster completed the research and much of the writing on a monograph on Quartermaster General M. C. Meigs' first attempt to publish rigid specifications to be used in the procurement of clothing and equipage for the Army.

Associate curator Craddock R. Goins, Jr., concentrated on the preparation of a detailed documentary catalog of the patent models in the firearms collection, assembling patent drawings, specifications, affidavits, and other documentary material from the National Archives and the Patent Office.

Museum specialist Alan B. Albright continued his investigations into the methods of preservation of materials recovered from sea water, and museum technician Thaddeus S. Moore, his restoration of ceramic and glass materials recovered from underwater sites.

Associate curator of naval history Edward L. Towle undertook detailed research on the P. V. H. Weems and Admiral Richard E. Byrd collections of navigational instruments. Preliminary catalogs and background studies of these and other smaller groups of oceanographic, navigational, and scientific instruments in the division's collections are in preparation. He continued research on a major monograph

on United States naval exploration during the 19th century, and is editing two previously unpublished journals illuminating American privateering in the Atlantic, 1777–1782, and the French assault on the Hudson's Bay Company fur trading posts, led by Jean de la Perouse in 1782. In conjunction with his interest in Arctic exploration, Towle is preparing a study of the 19th-century evolution of the Arctic research vessel which culminated in the design and construction of the SS *Roosevelt*, Admiral Robert E. Peary's successful polar steamer.

In collaboration with museum specialist Howard P. Hoffman, curator of naval history Philip K. Lundeberg continued research on the construction of Benedict Arnold's squadron on Lake Champlain, a study which will include detailed plans of the Continental gondola *Philadelphia.* He continued preparation of a catalog of United States warship models, and construction was undertaken of models of both the gondola *Philadelphia* (1776) and the British ship-of-the-line *America* (1749), the latter based on plans by Mr. Merritt A. Edson, Jr., of Washington, D.C. In addition to his work on the *Philadelphia* model, Hoffman prepared an exceptionally detailed set of plans of a mid-18th-century octant constructed by Benjamin King of Newport, Rhode Island, and temporarily on loan from Brown University. This remarkable early octant reveals a precision of workmanship exceptional in early American instrument making.

The department substantially expanded its educational activities in 1966, sponsoring and participating in a variety of programs for the general public, graduate students, and professional societies. Lundeberg and Towle presented seminars on the early steam navy and mid-19th-century naval exploration in the Smithsonian Institution graduate program on American civilization; they also delivered lectures to the Smithsonian Associates on squadron warfare, commerce warfare, naval exploration and diplomacy, and the role of the Armed Forces in the advancement of science. Lundeberg addressed the Society of the War of 1812 on American history as interpreted in the National Museum, and the Association of Naval Weapons Engineers on underseas warfare and allied strategy as a case study in deterrence. In connection with the American studies program and the Smithsonian Associates Goins and Kloster lectured on military history.

Some forty lectures were delivered during the year by Peterson and Albright, including two series of five lectures each to the Smithsonian Associates on methods of underwater exploration. At a meeting held in association with the Naval Historical Foundation, Peterson spoke on the study of naval ordnance on sunken ships from the 16th to 19th centuries; and he also addressed the 19th Annual Williamsburg

Antiques Forum, the biennial meeting of the Council of Underwater Archaeology in Miami, Florida, and the annual meeting of the Company of Military Historians, in Washington.

During the year, the department played host to two Smithsonian research associates, John C. Niven of Pomona College, who conducted research on a forthcoming biography of Gideon Welles, and Chauncey C. Loomis of Dartmouth College, who utilized the Charles Francis Hall collection in the preparation of a biography of that mid-19th-century Arctic explorer.

The Collections

CARE AND CONSERVATION — GIFTS AND ADDITIONS

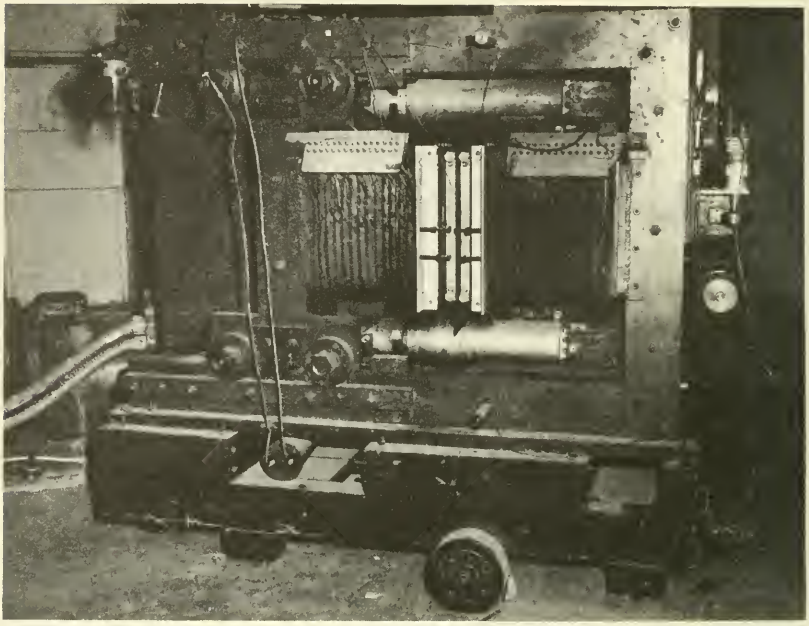
Science and Technology

In electricity, particular attention has been devoted to 20th-century apparatus. A large number of important cathode-ray tubes and television sets associated with the career of Aldan B. DuMont has been given by Mrs. DuMont and by the Fairchild Instrument and Camera Corporation. The most important single item received, from Stanford University, was a five-ton magnet constructed and used by James Arnold and others as students of Felix Bloch in extending Bloch's Nobel Prize-winning research on nuclear magnetic resonance.

A collection of valuable drug jars and other objects for the 1890 American pharmacy exhibit was purchased from the Sydney N. Blumberg collection through the Coca Cola fund. For the Old World apothecary shop a 3rd-century B.C. south Italian painted terra-cotta jug, an ancient Etruscan bronze mortar, a 4th-century B.C. Greek vase, and an ancient Persian terra-cotta massage piece were purchased through the Squibb fund.

Accessions in medical and dental history include prosthetic devices used in cardiovascular surgery from about 1940 to the present, donated by their inventor Charles A. Hufnagel; an extensive collection of quackery devices, transferred from the Food and Drug Administration; the first automatic disposable plastic injector syringe, donated by Alfred R. Henderson; a cutaway model of an air-turbine surgical drill, donated by its inventor Robert M. Hall; a collection of American microscopes, 1868–1915, donated by Bausch and Lomb; a collection of replicas of historical microscopes made by Joseph D. Lucas and donated by his widow; and an incubator bed of the kind invented by Julius H. Hess for the care of premature babies, presented by the Michael Reese Hospital.

Archival materials added to the civil engineering collection include a notable collection of original linen drawings and photographs, with supporting record journals, of the complete line of Westinghouse's steam, gas, and diesel engines from 1878 to the late 1920s, discovered in a storage warehouse in South Philadelphia. Part of this group, a

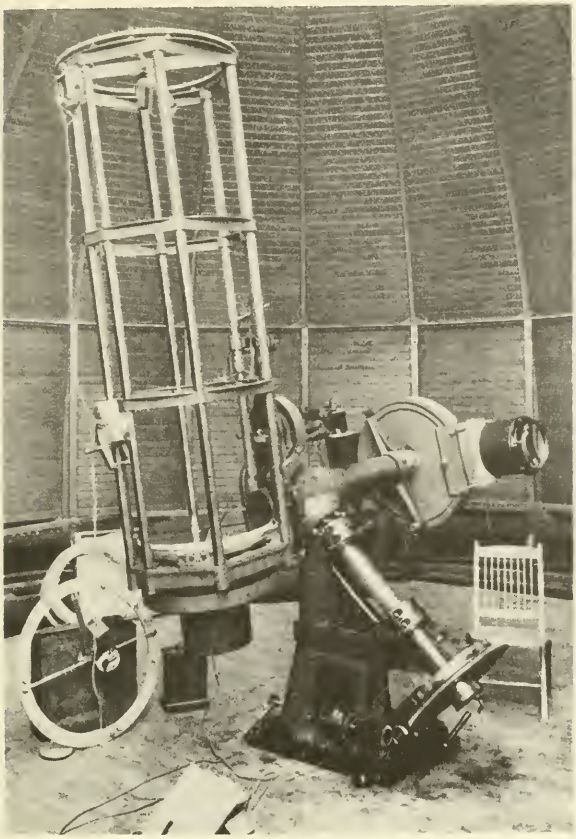


Magnet used in early nuclear magnetic resonance studies at Stanford University.

large series showing views of the works and its machinery, is an unparalleled documentation of the arrangements within a major machine works around 1900. Also received was the valuable James Forgie collection, the professional papers of one of the nation's leading tunnel engineers, whose career extended from the 1880s to the 1950s. Many contractual documents, reports, and photographs help give detail on his projects which are otherwise unobtainable.

As part of the cooperative preservation program established with the American Society of Civil Engineers, material received from members of the Society included an unusual Burt solar compass, donated by Donald Curtis, and the pamphlet and report collection of Rudolph Hering, a pioneer in the field of sanitary engineering.

The International Business Machines Corporation donated a collection of clocks, including a fine "Willard's Patent" banjo clock, a richly carved skeleton model Ithaca calendar clock, and an excellent group of industrial time clocks. A small but important collection of models of automatic timepiece regulators was donated by Jacob Rabinow, who invented several of them. Simplicity, low cost, and lack of need for attention on the part of the user have made Rabinow's designs the first to be widely accepted. Sir Arthur Sullivan's English verge-type



The 24-inch reflector designed and built by George W. Ritchey especially for photographic astronomy. Gift of the Yerkes Observatory, for which it was built ca. 1900.

stop watch was donated by Leroy C. Brown; it was a present from Sir Arthur to Mr. Brown's grandfather.

Among the tools received were a Gould Brothers metal shaper of about 1860, from the Norton Company; a fine early-19th-century mitre box from George Lewis Jones; and a boring machine with an original bill of sale dated 14 May 1853, from J. P. McAliley.

Of historical significance was the Yerkes Observatory gift of their 24-inch reflecting telescope by George Ritchey, one of the first really powerful telescopes designed by the great American telescopemaker for photographic work. A semicircumferentor of the 18th century by Pavolini demonstrates an early use of the telescopic sight in surveying instruments; it suggests that such sights were adopted quite early and

Eighteenth-century semicircumferentor by Pavolini, showing an early use of a telescopic sight on a surveying instrument.

then were abandoned in the course of the century. The rock-salt prism made by John Brashear for Samuel Langley, third secretary of the Smithsonian, has been transferred to the physical science collections. It was the largest such prism in the world when made, and was used by Langley in his important studies of the intensity of solar radiation in narrow bands of the infra-red spectrum. Georgetown University donated an Ertel transit telescope of 1844, notably enriching the collection of precision European instruments used in the United States. A large and handsome 18th-century French celestial globe marks an era in stellar astronomy. In the southern hemisphere it shows stars observed by the Abbé La Caille and grouped into constellations according to his book of 1763; some of the constellations are classical heroes and animals, but a number, invented by La Caille himself, are in the form of contemporary scientific instruments, such as a telescope, a sextant, or a balance. A terrestrial globe of 1819 by J. Wilson is one of the earliest globes made in the United States.

The most impressive transportation accession was a Bavarian state chariot used during the reign of Ludwig I (1825–1848), gift of Dieter Holterbosch. A group of valuable papers, including an engineering drawing of Griffin Green's pioneer steamboat of 1796, was acquired from Walter Rumsey Marvin. The memorabilia of Horace Thorne, an official of Westinghouse Air Brake Company, was added to the railroad reference collection. Other accessions included ten plating half-models of ships, from the Francis Russell Hart Nautical Museum of the Mas-

sachusetts Institute of Technology; and a bike wagon of about 1905, representing the final development of horse-drawn vehicles.

With respect to care and use of the collections, the Clark (radio) and Hammer (Edison) collections continue to attract researchers. To make parts of the Clark collection more accessible, a classification of the photographs was begun. When this is completed, the photographs will be placed on microfilm. The vacuum-tube collection has been stored in annotated boxes to facilitate the location of individual items. A systematic method of filing and storage of archival engineering materials relating to tools has been set up, and much of the material has been restored and repaired; the entire reference collection of the division of physical sciences is being reshelved to improve its accessibility and make the arrangement more consistent; and the railroad plan and oversize print files of over 3000 items have been cataloged, and a cross index is being prepared.

Arts and Manufactures

Deere & Company of Moline, Illinois, presented a "Waterloo Boy" Model N, and a John Deere Model "D" tractor. A 1917 Fordson tractor was given by Mrs. Frank Coron, Wantaugh, L.I.; a cheese press by Carlton M. Gunn of Sunderland, Massachusetts; and a hand-operated stump puller by Mr. McMechan, *Joplin Globe*, Joplin, Missouri.

Some of the more important gifts of ceramics and glass were: from Hans Syz, 23 pieces of rare 18th-century European porcelain, including an exceptionally fine Berlin vase; Mr. and Mrs. Edward M. Pflueger, five 18th-century ceramic items, including an outstanding Tournay bust of Louis XV; Mrs. William A. Sutherland, eight pieces of 18th-century English porcelain, including a fine Chelsea pitcher; Lloyd E. Hawes, 73 pieces of 18th- and early-19th-century English earthenware, of which 53 were various types of Wedgwood wares not heretofore represented in the collections; the Joanne Toor Cummings fund, an extremely fine English, salt-glazed teapot, dated about 1750; and from Mr. and Mrs. Jack Leon, a unique collection of 62 pieces of late-18th- and early-19th-century English, yellow glazed earthenware. The Louise M. Packard collection of 59 pieces of ancient glass was presented by her daughter, Mrs. Robert U. Geib.

Graphic arts accessions included a gift from Helen Farr Sloan, widow of the American artist John Sloan (1871–1951), of his etchings and other material, including the original copper plate and eight progressive proofs of Sloan's *Copyist at the Metropolitan;* and 25 etchings by William Glackens; the original zinc plate and a proof of Stuart Davis's early etching *Two Women;* and prints by George Luks, Boardman Robinson,

John Sloan's original copper plate for the etching *Copyist at the Metropolitan*, of 1908–1910, a recent gift to the Smithsonian from Mrs. Helen Farr Sloan.

Reginald Marsh, Peggy Bacon, Don Freeman, and other American artists. Also received were Emil Nolde's aquatint etching *Staatsmann und Burger* of 1918; blocks and progressive proofs of Carol Summers' color woodcut *Fontana;* 20 examples of O. F. Liebner's early offset lithographic printing; the only known etching by Robert Henri, from Robert Chapellier; Harold Isen's lithograph *Brigham Young*, from the Washington Society of Printmakers; and the plates and progressive proofs of Milton Goldstein's color etching *On the Beach*, gift of the artist.

Equipment for a printing shop display was given by Mr. and Mrs. William Elvin. This material, in use at the *Fairfax* (Virginia) *Herald* since 1882, comprises composing frames, type cabinets, imposing tables, type cases and type, and many associated tools and records.

The collection of photographs was enriched by the purchase of 60 calotype paper negatives and prints, dating from 1839 to the mid-1840s, from the personal collection of William Henry Fox Talbot, inventor of the first practicable paper photographs. Obtained through

the recently established History of Photography fund, these substantially increased the Smithsonian's already important holdings of Talbot materials.

Magazine and fashion photographer Richard Avedon presented 239 of his original negatives, with prints, adding to the 100 original negatives and prints he donated in 1965. Some ten thousand glass-plate negatives of news subjects of the early 1900s, from the files of Underwood and Underwood News Photos, were donated by Mrs. John M. Stratton. The news photographs presented by the Associated Press and United Press International for the exhibition "Twenty Years of News Photography" were added to the print collection, documenting the history of photo-journalism. More than sixty photographs of herons (ca. 1954–1966) by Tokutaro Tanaka, displayed in the exhibition "Tanaka: Photographs of Heron Hill," were also added to the collection. "Portrait of Rafael Sala" (1924), by Edward Weston, and a selection of prints (ca. 1890–1905) by the 19th-century British photographer Frederick Evans were added to the collection of rare prints made by the now extinct platinum-printing medium. Photographs by Arnold Genthe were donated by Miss Byrd Crimora Hazelton and Mrs. Edwin L. Ashton.

Attitudes of two 19th-century painters toward photography are illustrated by the painting *The Magic Box* (1858), by the Belgian artist Camille Venneman, and a lithograph and a woodcut by the French satirist Honoré Daumier (ca. 1862), acquired during the year.

Additions to the equipment collection included the latest complete Graflex XL camera system of interchangeable modular units, given by Graflex, Inc., and an example of one of the first "zoom" lenses (ca. 1930), manufactured by Otto Durholz and donated by his son Gustav Durholz.

From Mrs. B. K. Nehru was received an unusual black and white Indian shawl; from Mrs. J. Roswell Gallagher, a collection of 53 handwoven early-19th-century American figured table linens, and six volumes of hand-drawn diagrams of their weaves, the subject of a book written by the donor; from Mrs. H. F. Hallock, Jr., spinning and weaving implements used by her ancestors in Rumford, Maine, during the first half of the 19th century. An important 18th-century embroidery frame, an 18th-century blue-resist-dyed cotton quilt, and two spinning wheels of unrepresented types were also added to the collections.

Kenneth E. Jewett gave the remainder of his collection of tinsmith's ware, and from donors in Pennsylvania were received a number of artifacts relating to the early coal industry.

Quarter-scale model of 24-spindle Slater spinning frame of 1790, made in the Museum model shop by John W. Schultz for exhibit in textile hall now under construction. Actual size of the 1790 frame in inches: height, 63; length, 66; and width, 10.

A survey of the reference collections of agriculture and forest products and a definitive catalog are in progress. A long-range program was begun to rearrange, inventory, and cross-index the study collections of ceramics and glass.

In the course of reorganizing the photomechanical collection some 100 prints were repaired and 400 new mats cut. The printing shop equipment from the *Fairfax Herald* was cleaned and refinished for use in printing demonstrations and much old type from the same source was cleaned and sorted.

Study of the preservation and restoration of the earliest photographs in the Museum's collection, extended to all types of photographs, has contributed to the establishment of standards for the treatment and preservation of specimens in the print collection. Original patent specifications were obtained for each patent model in the collection of about 3000 items of photographic equipment.

The textile laboratory was heavily occupied with cleaning and repairing items for the exhibit *Victorian Needlework*, for the growth of the United States halls, the forthcoming exhibit of the Copp family textiles, and for other departments of the Museum.

The staff of the division of manufactures and heavy industries was occupied with the preparation of material for the hall of petroleum and in becoming familiar with the demonstration exhibits, including several intricate and unique presentations illustrative of the techniques of oil-reservoir engineering.

Civil History

Additions to the cultural history collections included a fine 1860 schoolroom interior from Mason's Island near Mystic, Connecticut, from the Mason's Island Company; and a quality series of Hispanic religious panels (*retablos*) from 19th-century New Mexico given by Mrs. William C. F. Robards of Washington, D.C., niece of the Oklahoma missionary who collected them before 1920. The archeological excavations in Alexandria, Virginia, yielded a unique collection of cultural materials giving evidence of colonial tradesmen—shoemaker, potter, doctor, coppersmith, pharmacist, combmaker and tavern keeper. Richard J. Muzzrole undertook both the excavation and restoration programs.

The complex task of organizing information about cultural history objects was skillfully advanced by Betty Walters, who worked with a Termatrex data-retrieval system.

Among the 132 examples added to the American costume collections were two gold watches given by Mrs. Robert Callen King and two Quaker wedding dresses given by Mrs. H. E. Snyder.

Several Appalachian dulcimers were acquired by Scott Odell on a field trip to the southern mountains and through correspondence with a Tennessee dealer. Further augmenting the collection of traditional American musical instruments, a rare 19th-century banjo made by the important early maker, Henry Dobson, was given by Mr. Hermann W. Williams, Jr., Director of the Corcoran Gallery of Art; and a Theremin (an electronic instrument) made by RCA was given by Mrs. Ralph Richards.

Iconography has only recently been properly utilized and its importance appreciated as a primary source in studies of the history of musical instruments. The file of iconography on musical instruments now numbers approximately 1200 cataloged and indexed photographs and color reproductions from collections in the United States, Europe, and the British Isles. Several hundred more are in the process of being cataloged and new material is constantly being added.

Robert Sheldon of the musical instruments laboratory staff put a 19th-century serpent into playing condition and also did restoration work on several other wind instruments, including an 18th-century natural trumpet. Scott Odell began the restoration of the 1760 French harpsichord by Benoist Stehlin. The laboratory staff, with the assistance of volunteer workers from the Smithsonian Associates, continued the extensive task of cleaning and repairing specimens. This work has been integrated with the preparation of checklists for the various categories of musical instruments in the collection.

To the Ralph E. Becker collection of political campaign objects the donor added several handpainted 19th-century political banners. From Mrs. Dwight D. Eisenhower was received a fuchsia matelassé evening gown.

Work has continued on completing the record of each dress in the First Ladies collection. Mrs. Sarah Lee Taft, a professional pattern maker from New York, has prepared patterns and sewing instructions for three more dresses, those of Mrs. Coolidge, Mrs. Harding, and Mrs. Wilson.

A systematic remounting of the lithographs in the Harry T. Peters lithography collection was undertaken.

To the numismatic collections Willis H. duPont donated a group of 634 silver and copper coins of Russia struck from 1826 to 1841, during the reign of Czar Nicholas I, and Mrs. Catherine Bullowa-Moore contributed a decadrachm of Syracuse (Sicily) engraved by the famous artist Euainetos around 390 B.C. A group of 44 Greek bronze coins, from the Duke of Argyll and Charles Seltman collections, and a group of rare Athenian fractional silver coins from the 5th to 4th centuries B.C., were given by the Messrs. Stack.

To the philately collections a Venetian letter dated 1390—the earliest on paper in the division—was given by John F. Rider and an extremely rare strip of North West Pacific Island stamps, by Ralph Hoffman. One of the few remaining mail carriers of the New York pneumatic tube system was donated by the Lamson Corporation.

Armed Forces History

Among the materials acquired in the underwater exploration program were a Randall diving knife, presented by the designer and maker W. D. Randall, and three diving suits with accessories, presented by U.S. Divers Co., through Tommy Thompson. Interesting acquisitions from the Virginia Company ship *Eagle*, wrecked on the Bermuda reefs in 1659, are a hand plane, auger handle, tobacco pipes, pewter mug, wooden dough tray, and pewter bottle tops. Also received were a set of goldsmith's crucibles, possibly of the early 17th century; silver buckles from the *San Antonio*, which sank in 1621; and personal effects and ship's equipment from the *L'Herminie*, which went down in 1838.

William (Bill) Mauldin donated six of his famous "Willie and Joe" cartoons of World War II to the military history collections. A rare 17th-century wrought-iron cannon was received from John N. Albright, and a significant collection of World War I situation maps, including a rare operations map from General John J. Pershing's headquarters, was donated by Lieutenant Colonel R. C. Beaudry.

To the military collections were added a unique staff officer's undress coat, circa 1821, and a cased set of 65 gauges for the U.S. rifle model 1841. These gauges, used by inspectors of arms and obtained from William Guthman, are among the earliest produced for establishing accuracy in quantity production and thus are most important in the development of the interchangeable-parts system of manufacturing.

An excellent collection of hand and shoulder firearms, cartridges, and dealers' catalogs and brochures was donated by Commander Clark E. Kauffman, USN (Ret.). The weapons are excellent examples of a wide variety of multibarrel, pepperbox, and revolving-cylinder systems, and breechloaders. These acquisitions make it possible to prepare a more representative exhibit on the development of breechloading and repeating systems.

Additions to the collection of warship models included the Continental schooner *Hannah*, one of the vessels in General George Washington's Massachusetts Bay squadron of 1776; and the torpedo-boat destroyer *Decatur*, representing another significant step in the evolution of the modern destroyer. In addition, builders' half models of the dreadnought battleships *North Dakota* and *Nevada* and the predreadnought *Connecticut* were received from the Massachusetts Institute of Technology.

Among personal memorabilia received was a silver medal, presented by Congress in 1813 to Midshipman (later Surgeon) Bailey Washington for his services in the engagement between USS *Enterprise* and HMS *Boxer*, donated by Mrs. John W. Davidge of Washington, D.C. Through Captain Roger Pineau, USNR, the division of naval history received a portfolio of 27 contemporary Japanese prints and broadsides and a contemporary Japanese diary relating to Commodore Matthew C. Perry's expedition to the Far East in 1853–54. A large Confederate national ensign taken by Union naval forces during Burnside's attack on Roanoke Island on February 8, 1862, was donated by Mrs. G. F. Connal Rowan of Stirlingshire, Scotland.

Museum specialist Alan B. Albright and museum technician Thaddeus S. Moore continued to restore and preserve materials recovered from the sea in the underwater exploration program. Moore made extensive restorations of ceramic vessels and restored iron objects by electrochemical reduction. Wooden objects were preserved by the polyethylene-glycol process. Experiments were continued with various cleaning formulas and preservatives for treating metallic cartridges to prevent corrosion and oxidation of lead.

The restoration and additional documentation of navigation instruments in the P. V. H. Weems and related collections continued. A number of broadsides in the Charles Francis Hall collection were

laminated by the National Archives, and similar preservation is planned for the extensive collection of naval posters of World Wars I and II.

SPECIMEN TRANSACTIONS—FISCAL YEAR 1967

Departments	*Accessions (transactions) 1967 (new)*	*Received on loan*	*Exchanged with other institutions*	*Transferred to other Government agencies*	*Lent for study to investigators and other institutions*	*Specimens identified*
Science and Technology	157	143	19	0	47	8
Arts and Manufactures	178	183	2	0	153	2, 501
Civil History	773	34	18	0	439	114, 833
Armed Forces History	89	16	0	0	33	816
TOTAL	1, 197	376	39	0	672	118, 158

SPECIMENS IN THE NATIONAL COLLECTIONS MAY 31, 1967

SCIENCE AND TECHNOLOGY		105, 206
Physical Sciences	4, 672	
Mechanical and Civil Engineering	12, 430	
Electricity	8, 132	
Transportation	43, 109	
Medical Sciences	36, 863	
ARTS AND MANUFACTURES		153, 742
Textiles	35, 740	
Ceramics and Glass	17, 894	
Graphic Arts	53, 652	
Manufactures and Heavy Industries	35, 822	
Agriculture and Forest Products	10, 634	
CIVIL HISTORY		10, 553, 899
Political History	49, 224	
Cultural History	24, 771	
Philately and Postal History	10, 166, 009	
Musical Instruments	43	
Numismatics	313, 852	
ARMED FORCES HISTORY		56, 020
Military History	42, 527	
Naval History	13, 495	
TOTAL		10, 868, 867

Exhibits

The hall of medical sciences was formally opened in August 1966, with George Griffenhagen, of the American Pharmaceutical Association, and George Arrington, Jr., of the Virginia Medical College, as speakers for the occasion.

In January the hall of power machinery was opened to the public. Operation of the large machinery has raised technical problems which are being worked out. Installation of a compressed-air system to drive the hall's steam engines is expected this year.

Progress toward completing the vehicle hall was achieved in February with the installation of ten different kinds of road surfaces. Old stone blocks and cobblestones were obtained from abandoned roadways, and a section of plank road was found in southeastern California. A steam-locomotive sound recording was added to the railroad hall; the whistle sounds are those of the huge locomotive (No. 1401) on exhibit.

Alterations in the hall of tools include installation of guard railings around the machine-tool platforms to make public demonstrations safe, and an enclosure to house projection equipment for a film on machine tools. New individual exhibits completed or in progress are a Gleason bevel-gear cutting machine of 1876; a Gould shaper of 1860; and the workshop of a wealthy amateur ornamental turner.

In collaboration with the department of American studies a special exhibit on 15th-century cartography was produced in conjunction with the conference on the Vinland map, which was loaned by Yale University for the period of the conference.

A special racing-car exhibit was produced in May to assist the Smithsonian Society of Associates in promoting their film night featuring the "Grand Prix." An authentic 19-century omnibus toured the Mall during the Smithsonian's festivities celebrating the April 1 start of the Museum's summer hours and the establishment of the Department of Transportation.

The hall of health was opened for a reception for wives of physicians attending the International Congress of Gynecologists and Obstetricians, at which time the newly renovated Transparent Woman was set into operation.

A special exhibit featuring the Oscillatom atom clock was held during April prior to its being sent to EXPO 67 in Montreal.

In new hall of medical sciences, pioneers of surgical anesthesia are honored. Below: Electro-therapeutic static machine of the late 19th century, designed to "treat" a variety of nervous, muscular, and other disorders.

Among loans made for exhibitions elsewhere were about 60 duplicate items from the electricity collection, to the Birla Industrial Museum in Calcutta; collections of quackery devices and patent medicines, loaned to the Illinois Chapter of the Arthritis Foundation for their exhibit at the Museum of Science and Industry in Chicago; and the first electrocardiograph of its kind to be used in Washington, D.C., to the Washington Heart Association for display in the lobby of the District Medical Society building as a memorial to Dr. Thomas Simms Lee.

For a future exhibit, Roy LaRoche is building a television system operating according to techniques available in the 1920s. For the hall of electricity, he is also building a special "teaching machine." William Henson organized material on the history of machine tools for use by volunteer docents now conducting tours on a regular basis.

A special exhibition of Wedgwood porcelain (bone china) of the first period (1812–1822) and of Wedgwood portrait medallions was prepared in connection with the Twelfth Annual Wedgwood International Seminar held at the Smithsonian, May 3 through May 6, 1967. This exhibition, continued through June 22, enabled collectors and students to see a large group of early Wedgwood porcelains and over 400 portrait medallions—some of great rarity. A number of recent accessions were placed on exhibition in both the glass and ceramic halls, 62 pieces from the Leon collection of English yellow glazed earthenware of the late 18th and early 19th century being of special interest.

Australian Prints Today, the first exhibition of its kind in the United States, was held in the graphic arts gallery from July 15 to October 15, 1966. *Rembrandt's Complete Landscape Etchings*, on loan from museums and private collections, and on exhibit from November 8, 1966, to January 31, 1967, received extensive press coverage. *Prints by Sue Jane Smock* opened in October 1966 and *Six Danish Graphic Artists*, in February 1967.

Preparations were made for a new permanent display of 19th-century hand printing. Regular demonstrations of typesetting and printing, using the Columbian press, will be given in the hall of graphic arts.

Twenty Years of News Photography, an exhibition of more than 130 photographs, selected by the curator of photography and donated by the Associated Press and United Press International, attracted considerable public interest from May to September 1966, and more than sixty photographs of herons by the distinguished Japanese photographer Tokutaro Tanaka have been on exhibition since March 8, 1966.

At opening of the exhibit *Australian Prints Today*, in July 1966, were Daniel Thomas, Curator of the Art Gallery of New South Wales, Sydney, Australia; Peter Morse, associate curator of graphic arts; and Australian Ambassador John Keith Waller. On the wall is Sidney Nolan's lithograph, *Portrait of Kelly*.

Victorian Needlework, or the Rise of the Printed Pattern, the first Smithsonian traveling exhibition of three-dimensional objects from the collections, was prepared and a two-month preview showing was held in the Museum. Because of the many requests for the exhibit, its scheduled travel time of two years was extended to three.

The spinning demonstration given for one hour each week continues to be well received; its schedule is regularly reported on "Dial-a-Museum." Special demonstrations were also given on request to special groups and to school groups at both the elementary and college level.

The hall of petroleum was formally opened on June 28, 1967, in the presence of a large company of the oil industry engineers and specialists, representative of those who collaborated in its development. A preview of the hall had been given on January 30, 1967, to government officials and industry executives and members of the National Petroleum Council. Much interest was shown especially in the magnificent 57-foot mural, commissioned by a group of Tulsa, Oklahoma, oil men and executed by Delbert Jackson of Tulsa.

A special exhibit on isotope-radiography was continued, while, during the year, some models illustrative of various steel-making processes, prepared for the hall of iron and steel by the Bethlehem Steel Corporation, were placed on temporary exhibition.

To the display devoted to the culture of the American Negro will be added displays presenting the role of the Negro in the development of American life.

A special exhibition, *Music Making—American Style*, displaying significant genteel and folk traditions in the history of American music, included groupings of pianos selected to illustrate American contributions to piano construction techniques, folk instruments made by mountain craftsmen, Benjamin Franklin's set of musical glasses (called the Armonica), American banjos, paintings by Americans of Americans performing music, and collections of music with special American notation. With the use of imaginative wire figures, jazz musicians, folk musicians, and 19th-century brass band players were shown in ensembles typical of their eras.

The wedding dress of Mrs. Dwight D. Eisenhower was placed on special exhibit in the First Ladies Hall to honor the 50th wedding anniversary of General and Mrs. Eisenhower. As part of a preliminary celebration of the Bicentennial of the American Revolution, an exhibit commemorating the 175th anniversary of the Bill of Rights gave special attention to the contributions of George Mason of Virginia toward its establishment.

On June 6, 1967, two halls of the growth of the United States exhibit were opened to the public. Covering the period 1640–1851, they contain many objects of particular interest representing the arts, technology, and science. Included are a printing press used by Benjamin Franklin, the wheels and gears from a 1774 grist mill from Chester County, Pennsylvania, and a house frame from Ipswich, Massachusetts, dating from the 1690s and the 1750s.

The hall of underwater exploration, newly opened to the public, treats the study of historic underwater sites and trade routes in the Western Hemisphere, Spanish-American treasure, the history of diving, modern methods of diving and of locating wrecks, and surveying, measuring, and recovery techniques. Display objects come from sites dating as early as 1595. The use of diving techniques in various disciplines and new deep-diving research are presented in photographs and models.

Contributors to the hall include Edwin A. Link, Edward B. Tucker, Arthur McKee, M&E Marine Supply Company, U.S. Divers Company, The American Rolex Watch Corporation, National Geographic Society, Ocean Systems, General Dynamics Corporation, Lockheed Missiles and Space Company, W. D. Randall, Westinghouse Corporation, and the Reynolds Aluminum Corporation. The hall was designed by Nadya Kayaloff. Production and installation were under the direction of Frank Gambino. Models and special devices exhibited in the hall were produced by the exhibits laboratory model shop under the supervision of Robert Klinger.

The special exhibition *Battle Art, American Expeditionary Forces, 1918,* was held during spring 1967.

Design and production of the hall of armed forces history, 1865 to date, occupied the staff during the year. Curator Edgar M. Howell of the division of military history organized the special exhibition *Battle Art, American Expeditionary Forces, 1918,* for which he prepared an illustrated catalog.

Additional exhibits installed in the halls of the Armed Forces of the United States included detailed models of USS *Hartford* and CSS *Tennessee*, arranged by curator Philip K. Lundeberg to represent their historic duel at Mobile Bay in 1864, and of the 16-inch-gun battleship *Missouri*, a superbly executed model completed by Gibbs and Cox of New York during her construction in World War II. Completed and ready for installation was the deck section of a late 18th-century American privateer, designed by museum specialist Howard P. Hoffman, and including an original low-trunnioned carronade.

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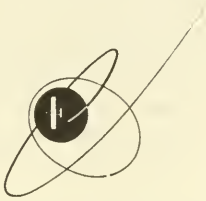
National Air and Space Museum

S. Paul Johnston, *Director*



Legislation authorizing construction of the new Air and Space Museum building on the Mall, which had been before the Congress since early 1964, was signed into law on July 19, 1966, by President Johnson. The bill, as passed and approved, changed the name of the Museum officially to the National Air and Space Museum and, among other provisions, expanded the membership of the Museum's Advisory Board to include additional Federal and Defense Agencies dealing with aerospace activities.

Although funds for construction of the Museum are not in immediate prospect, within the limits of available funds and manpower progress has been made in acquiring, preserving, and cataloging historically important artifacts for study and display, and in acquiring documentary material for use by historians and researchers in the Museum's growing Historical Research Center.

NASA Artifacts Program

In March 1967 a joint agreement was signed between the Smithsonian Institution and the National Aeronautics and Space Administration, whereby all historically important air and space artifacts developed by NASA will be transferred to the Air and Space Museum after their technical evaluation is completed. The essence of the agreement is contained in the following two paragraphs from the document:

NASA will transfer to, and the Smithsonian will accept as rapidly as reasonably possible, such artifacts currently under NASA control and which will become available in the future, after technical utility to NASA or other government agencies has been exhausted and post-flight examination has been effected.

The National Air and Space Museum, administered by the Smithsonian, will accept responsibility for the custody, protection, preservation, and display of such artifacts, in the Museum and upon loan to NASA Headquarters, NASA Field Centers, other Federal agencies, museums, and other appropriate organizations.

Since no budgetary provision for such a program had been made for fiscal year 1968, NASA agreed to allocate funds to enable the Smithsonian to begin its work under this agreement at the earliest possible date. Assistant director Frederick C. Durant III, is the principal investigator under the contract. Coordinating closely with him is James A. Mahoney, assistant director for exhibits, who will be responsible for the physical custody, preservation, restoration, and display of the specimens.

The NASA Artifacts Program will significantly increase the amount of air and space artifacts available for NASM loan programs in which specimens are loaned to outside museums and institutions, federal and private, for exhibition and for study.

NASM specimens are now on loan to the Goddard Museum at Roswell, New Mexico, the Air Force Museum at Dayton, the Naval Air Museum at Pensacola, the Naval Engineering Center at Philadelphia, and a number of private organizations. Early in the year the Alan Shepard Mercury Spacecraft (Freedom 7) was shipped to Montreal, where it was placed on exhibit in the U.S. Pavilion at EXPO 67.

Historical Research Center

The primary objective of the NASM Historical Research Center is to collect, compile, and make available to researchers and historians data relating to aerospace science and technology. Thus, the search for material which will assist in the recognition of the true determinants and controls in these areas is given the highest priority. Present holdings of the Center include over 20,000 bound books and periodicals, with over 10,000 biographical files of individuals; technical data on some 500,000 feet of microfilm; over 2,000 rolls of original drawings; and nearly 100 oral-history tape recordings of individual interviews; some 15,000 negatives (with indexed, searched prints) and over a half-million photographs in albums and subject files; plus about 200 tons of historical and technical documentation, of which only about a third has been sorted and indexed.

Construction of National Air and Space Museum was authorized by Congress July 19, 1966. This architect's model illustrates the Mall front of the building. Vast windows allow aircraft to be seen from the outside. Offices are on top floor.

On July 1, 1966, E. W. Robischon joined the then existing staff of two persons as deputy assistant director for education and information. In October 1966 an archivist was added, and in February 1967, a research assistant. During summers this staff was supplemented by several summer student employees and eight Neighborhood Youth Corps aides. Also, volunteers from the American Aviation Historical Society donated over 300 man-hours of sorting and filing time during the year. As a result of this extra help, visible progress has been made toward the development of a more effective operation.

The Center is thus in an improved position to provide invaluable day-to-day service to scholars of aerospace history and technology. As a result, in addition to the usual aid given the curatorial and exhibits staff authenticating and restoring artifacts, it serviced over 2,000 requests from scholars and historians in connection with the writing of theses, monographs, books, magazine articles, and film scripts.

Research

Although seriously undermanned and largely preoccupied with the technical supervision of the national air and spacecraft collections, members of the aeronautics and astronautics departments have engaged in a significant amount of research, and have participated in the work of related historical and scientific societies. Frederick C. Durant III continued his studies in depth on the developments of the very early (19th century) military rockets, as well as an investigation of the origins of regeneratively cooled rocket motors (liquid cooled) from all

countries of the world. He is presenting a paper at the History Symposium at the Belgrade meeting of the International Astronautical Federation in fall 1967. He is also serving a second year as chairman of the History Committee of the American Institute of Aeronautics and Astronautics.

Senior historian Paul Garber personally presented some 83 lectures on various aspects of air and space history to audiences all over the United States. It is estimated that over 11,000 persons attended these lectures. In addition, Garber made a number of radio and television broadcasts, as well as tape recordings which were broadcast on Voice of America and Armed Services Radio all over the world. To a very large number of historical writers and researchers, he rendered assistance through personal interview or correspondence. He helped organize and train the NASM docent group, and at least once a week throughout the year conducted tours for grade- and high-school classes and other organizations.

Louis Casey, curator of aircraft, continued his comprehensive study of the 40-year development of Curtiss Aircraft. He is an active member of the Experimental Aircraft Association, a Director of the American Aviation Historical Society, and is Chairman of the Aviation Subcommittee of the Transportation Division of the International Committee of Museums (ICOM). In fall 1966 he attended the ICOM meetings in Europe, and assisted in organizing several historical seminars in the United States.

Robert Meyer, curator of aircraft propulsion, completed and submitted to the Smithsonian Institution Press the manuscript of his book on "Professor Langley's Magnificent Aero-Engine of 1903." He also concluded technical review of a comprehensive manuscript by Philip S. Dickey, Lieutenant Colonel USAF (Ret.), on the development of the World War I Liberty engine.

The Collections

The department of exhibits, established last year, has used its combined facilities and manpower to support the various exhibition, preservation, and restoration programs of the NASM. Under the direction of assistant director James A. Mahoney, the department has made substantial gains in the reorganization of a great backlog of NASM specimens, accumulated over the years, and in developing new facilities.

The preservation and restoration division at Silver Hill has completed the first phase of a five-year program that involves the movement of almost all full-size specimens to more orderly preplanned storage

locations. Specimens in outdoor storage are being protected against weather as time and manpower permit.

Inventory of the aero engine collection, under curatorial supervision of Robert Meyer, has been completed.

The most significant aircraft are being located in the new Building 20, and an area has been established for curatorial research in this building. A great deal of work remains, however, in the sorting out and cataloging of large collections of instruments and ancillary equipment.

Construction of Building 21, scheduled to be completed in fall 1967, should provide much needed space for the large number of astronautical specimens beginning to flow into the NASM as a result of the NASA Artifacts Program.

The miscellaneous collections division, located at 24th Street, NW., now has most of the model collection packaged, indexed, and warehoused in an orderly manner. With the assistance of summer help, an initial sorting of the NASM collections of artwork was completed. Much time and work will still be required to complete these programs and to organize the large collection of memorabilia.

The visual presentation division moved into quarters at the 24th Street facility and is equipping an exhibits production shop for operation early in 1968.

The office of quality control conducted a number of field surveys as a means of locating and evaluating private facilities capable of performing specimen restorations of museum quality for future NASM programs.

EXHIBITS AND PRESENTATIONS

A museum function of great interest to the aerospace community was the presentation, by the National Aeronautic Association, of the 1965 Robert J. Collier Award to James E. Webb and the late Dr. Hugh L. Dryden on October 19, 1966. Due to a re-scheduling of presentation dates, the 1966 Collier Award was presented to James McDonnell of the McDonnell Aircraft Corporation on May 24, 1967. On each occasion Vice President Hubert H. Humphrey presented this, the most highly respected award in the aerospace field.

The coveted Langley Medal, awarded by the Smithsonian Institution to only 12 individuals since it was established in 1908, was presented by Secretary Ripley on June 6 to Wernher von Braun of NASA for his outstanding contributions to the science of rocketry and space exploration.

Commemorative ceremonies were held at the National Air and Space Museum on February 2, 1967, to honor the 40th anniversary of

the U.S. Army Air Corps Pan-American Good-Will Flight of 1926–1927, and on May 21, 1967, to honor the 40th anniversary of the flight of the *Spirit of St. Louis.*

The following special exhibits were opened as part of the museum's rotating exhibits program:

The NASA exhibition "Challenge of Space," which was later shown at the Paris Air Show of 1967;

A full-size USAF "Titan" missile, into which the public entered to view related, explanatory exhibits, displayed on the Mall;

A NASA exhibit of recent photographs of the moon by the Lunar Orbiter Satellite;

An exhibit by the U.S. Air Force "Vietnam Operations"; and

A full-scale model of the Apollo Command Module, by NASA, showing complete instrumentation and a crew of 3 astronauts.

In addition to the rotating exhibits program, several showings were made in the newly refurbished Aerospace Art Galleries, including:

Astronautical abstracts in enamels by John F. Puskas;

Astronautical abstracts by J. Kassanicky De Kassay;

Illustrations depicting space travel by Chesley Bonestell, which were painted in the 1950s for reproduction in *Colliers* and in several books by Willy Ley and by Wernher von Braun; and

An exhibit of watercolors entitled "Painting Aviation History" by Colonel John T. McCoy, Jr., USAF (Ret.) which included a special group covering the development of aircraft for Pan American World Airways.

Also exhibited were several paintings by Norman Rockwell on space exploration, three illustrations on astronautical subjects donated by the 3M Company and a kinetic art painting donated by the artist, Frank J. Malina.

Formal presentations were held to acknowledge the receipt of several significant specimens; these included:

A full-size, completely instrumented nose section of a DC–7 aircraft, by C. R. Smith, chairman of the board of American Airlines;

The original, hand-illuminated check presented to Charles A. Lindbergh for the transatlantic flight in the "Spirit of St. Louis," by Raymond and Jean B. Orteig;

Early liquid-propellant rocket motors, from Thiokol Chemical Corporation, presented by Dr. Harold Ritchey, President of Thiokol;

19th-century Congreve and Hale rockets, from the Royal Artillery of London, presented by Major General P. J. Glover, Director;

Swedish Air Force SAAB J–29 fighter aircraft, by Swedish Ambassador Hubert W. de Besche and Lt. General L. Thunberg and Colonel

Hale rocket made in 1863 is presented to Director S. Paul Johnston by Director of Great Britain's Royal Artillery, Major General P. J. Glover, C.B., O.B.E. Rocket in the foreground was constructed in 1815 by Sir William Congreve. Donated by the Royal Artillery Institution, both are rare examples of 19th-century rocket technology.

Model of the "14-bis" airplane in which Alberto Santos-Dumont made the first flight in Europe, September 13, 1906, is examined by Smithsonian Regent Clinton P. Anderson, Ambassador Vasco Lietão da Cuna of Brazil, and Mrs. Anesia Pinheiro Machado, who presented the model and other Santos-Dumont memorabilia to the Museum.

Collier Trophy Awards were presented by Vice President Hubert H. Humphrey. Upper: 1965 Award (from left) the Vice-President; Edward C. Sweeney, then President of the National Aeronautic Association; Secretary Ripley; Mrs. Hugh L. Dryden, representing her late husband, former Deputy Administrator, National Aeronautics and Space Administration; and the co-recipient, NASA Administrator James E. Webb. Lower: 1966 Award (from left) NAA President James F. Nields, Secretary Ripley, the Vice President, and recipient James S. McDonnell.

Lundstrom of the Swedish Air Force, representing the Government of Sweden;

Full-scale model of a "Nimbus" weather satellite, by Richard E. Roberts, representing the General Electric Company; and

Historic memorabilia, including scale models of early designs of the aeronautical pioneer Alberto Santos-Dumont, Brazilian pioneer in Aeronautics, presented by Mrs. Anesia Pinheiro Machado, and accepted by Smithsonian Regent Clinton E. Anderson.

ACCESSIONS

Additions to the collections received and recorded during the year totaled 215 specimens in 38 separate accessions, as listed below. Those from Government departments are entered as transfers unless otherwise indicated; others were received as gifts or loans.

Aerojet General Corp.: Reproduction, ⅛-scale, of the NERVA nuclear rocket engine system test device (NASM 1790).

Air Force, U.S.: Ranger L–440–7, World War II engine; Wright R–3350–57 AM, World War II engine built by Dodge (NASM 1699). Two atomic bombs, Fat Man (Nagasaki type) and Little Boy (Hiroshima type) and twenty-three cases of accessories (NASM 1775).

Albisser, Robert and Roger, and Scott, William J.: Henri L. Albisser engine of 1909, 4-cylinder static air-cooled radial of 45 hp. (NASM 1703).

Bendix Aviation Corp.: Collection of 15 instruments (NASM 1710).

Bennett, Mrs. Keith B.: Pre-planning chart used prior to NC–4 flight, course and position plotter used on the flight (NASM 1753).

Bueschel, Howard A.: East German "Jena" flying model aero engine (cutaway) circa 1960 (NASM 1783). American Atwood "Triumph" flying model aero engine, circa 1950 (NASM 1784).

Commerce, Department of, *Bureau of Standards:* Model of Johns multiplane (1919–1920) (NASM 1786).

De Houthulet, Willy Coppens: World War I commemorative medal (NASM 1777).

Delta Airlines, Inc.: Model of Douglas DC–9 (NASM 1725).

Dodd, L. E.: World War I altimeter (Tycos) and early magnetic compass (NASM 1776).

Eastern Airlines: Models of DC–9 and Boeing 727 (NASM 1779).

Filippi, Bernard P.: Collection of Lindbergh memorabilia (NASM 1711).

Fox, David: 75 antique spark plugs of 8 different types (NASM 1792).

Franklin Institute: Lockheed Vega aircraft used by Amelia Earhart (NASM 1739).

Hyde, Ken: Le Blond 60 hp. 1928 engine, widely used in private airplanes (NASM 1788). Brownback "Tiger" 90-hp. engine of 1930, last of the Anzanis (NASM 1789).

Justice, Department of: Poster of Stevens parachute (NASM 1737).

Kirk, Preston: Lawrance, World War I engine (NASM 1717).

Lockheed Aircraft Co.: Painting of Tony Le Vier; model of Lockheed F–104 (NASM 1740).

McDivitt, Lt. Col. James, and White, Lt. Col. Edward H.: American flag, 18" x 24" carried on board Gemini 4 spacecraft (NASM 1720).

Miller, Warren C.: Gibson Propeller of 1911 (NASM 1782).

National Aeronautics and Space Administration, *Manned Spacecraft Center, Houston, Texas:* Items worn by Col. James McDivitt on Gemini IV flight (NASM 1791). Mercury spacecraft Freedom 7 and Astronaut Shepard's space suit and helmet (NASM 1793). Mercury spacecraft Friendship 7 and Astronaut Glenn's memorabilia (NASM 1794). Spacecraft Gemini IV, space suit worn by Astronaut White, maneuvering device, umbilical tether and chest pack (NASM 1795). Tiros satellite (prototype) (NASM 1796). Syncom satellite (NASM 1797). Relay satellite (NASM 1798). Echo satellite (NASM 1799).

Navy, U.S.: British De Havilland H–1 "Goblin" turbojet cutaway (circa 1945) (NASM 1686).

Orteig, Jean D. and Raymond: Orteig check to Lindbergh for New York to Paris flight, 1927 (NASM 1781).

Readers Digest: Portrait in watercolor of E. T. Allen (NASM 1780).

Schirra, Capt. Walter M., Jr.: Harmonica played by donor on board flight of Gemini VI (NASM 1778).

Stultz, W. L.: Flight suit used by W. L. Stultz, pilot of 1928 flight to Europe with Amelia Earhart (NASM 1741).

Sunderland, Clyde: Early model K–5 aerial camera (NASM 1738).

Swedish Air Force: SAAB J–29 aircraft, single-seat fighter, with U.N. markings (Katanga Operation) (NASM 1787).

Walker, L. L.: Lawrance World War I engine SC–40172 (NASM 1718).

The cooperation of the following persons and organizations in providing reference materials for the Museum's Historical Flight Research Center is sincerely appreciated and gratefully acknowledged:

Aero West Magazine
Aircraft Owners and Pilots Association
A. J. Air Tankers, Inc.
Albree, G. Norman
Alderman, K. J.
All Women Transcontinental Air Races
Andrews, Hal
American Institute for Aeronautics and Astronautics
American Institute of Aeronautics and Astronautics *and* Curtiss A–1 Club
Bell Aerosystems Company
Bennett, Mrs. Keith B.
Bergling, Joseph C.
Boeing Company
Byoir (Carl) and Associates
Caldwell, Frank W.
Coast Guard, U.S.
Connecticut Aeronautical Historical Association
Cranham, R. W.
Crow, Lady Alwyn D.
Defense Documentation Center, U.S.
Dial, H.
Durant, F. C., III
Fairchild Hiller Corporation
Fernandez, Peter
Ford Instrument Company
Furnish, Joseph H.
Gay, Errol J.
Grocock, Joseph F.
Gilfert, Mrs. D.
Grumman Aircraft Engineering Corporation
Harrington, Mrs. Cora B.
Harmel, Mrs. Falk
Hastings, Russell
Hausler, Walt
Hickey, John E.
Hirsch, R. S.
Houghland, Vern
Ide, Mrs. John J.
Illinois, Elgin Area Historical Society
Johnston, S. Paul

Juptner, Joseph P.
Kinney, James L.
Krickel, John H.
Lane, Mrs. Orley
Library of Congress, U.S.
Lockheed Aircraft Company
Lockheed-Georgia
Lundahl, Eric
McDonnell Aircraft Corporation
Madison, Donald T.
Marshall, T. W.
Martin Company
Martin, W. E.
Manly, Miss Trammel
Morehouse, Harold
Mussey, Robert
National Aeronautics and Space Administration, U.S.
National Archives, U.S.
National Aviation Museum of Canada
Naval Aviation Safety Center, U.S.
Naval Institute, U.S.
Navy, U.S.
Newcomb, Charles J.
Nevin, Robert S.
Page, George A., Jr.
Patent Office, U.S.
Pratt and Whitney Aircraft Division
Ramsey, De Witt C., estate of, through Paul E. Garber, trustee
Rowe, Geoffrey
Royal Air Force Staff, British Embassy
Rules Service Company
San Mateo County (California) Historical Association
Schory, Carl F.
Shaffer, Walter J.
Sievers, Harry
Steiner, Morton
Stevison, Vincent E.
Towle, Austin C.
Towle, Tom
Trepagnier, Mrs. Henry L.
Truox, R. C.
United Aircraft Corporation
Villard, Honorable Henry S.
Vye, Whit
Wanderley, Nelson
Weeks, E. D.
Weisgerber, F. Rankin
Wiggin, Mrs. Mabel Rodgers
Williams, John M.
Wood, Donald S.
World Book Encyclopedia

In Memoriam

Kenneth E. Newland, curator of aeronautical materiel, died on April 5, 1967, after a prolonged illness. He had joined the staff of the National Air Museum in 1959, and had specialized in the collection and study of aircraft instruments, ancillary systems, and safety and life-support equipment and their application to modern aircraft. Prior to joining the museum staff, he had taught aeronautics at Stephens College, Columbia, Missouri. He held a master's degree in education from Ohio State University.

National Armed Forces Museum Advisory Board

Colonel JOHN H. MAGRUDER III, USMC, *Director*

CONSIDERABLE PROGRESS WAS made toward acquiring a site for the proposed National Armed Forces Museum Park. On December 14, 1966, the Prince Georges County Planning Board and the Maryland-National Capital Park and Planning Commission approved the proposed site in the Fort Foote area of Prince Georges County, Maryland, and on January 12, 1967, the National Capital Planning Commission endorsed the recommended boundaries. In response to the recommendation of the Board of Regents, January 25, 1967, that legislative authority be sought for acquiring the site, the Advisory Board staff, working with the Office of the General Counsel, prepared the proposed legislation for submission to the first session of the 90th Congress. As the fiscal year closed, the draft legislation was undergoing review by Federal agencies concerned.

The National Armed Forces Museum Advisory Board has directed its attention so far primarily to assembling material which, if not acquired immediately, would not be available in the future. In most instances, these are one-of-a-kind items deemed necessary to the scope of the Museum's collections—specimens of obsolete matériel, prototypes, and similar items that otherwise would be disposed of by the Department of Defense or other holding agencies.

During the year the National Armed Forces Museum Advisory Board staff continued to negotiate with the Armed Forces, the General Services Administration and other agencies for objects appropriate to the

Destruction of the Monitor *Tecumseh* in Mobile Bay, August 5, 1864, as depicted by *Harper's Weekly* (September 10, 1854). *Tecumseh*, raised intact, would provide a unique opportunity to examine in detail a United States man-of-war as she appeared 103 years ago in battle-ready condition. Now lying on the bottom of Mobile Bay, she sank within a minute of striking a Confederate mine, carrying with her most of her crew.

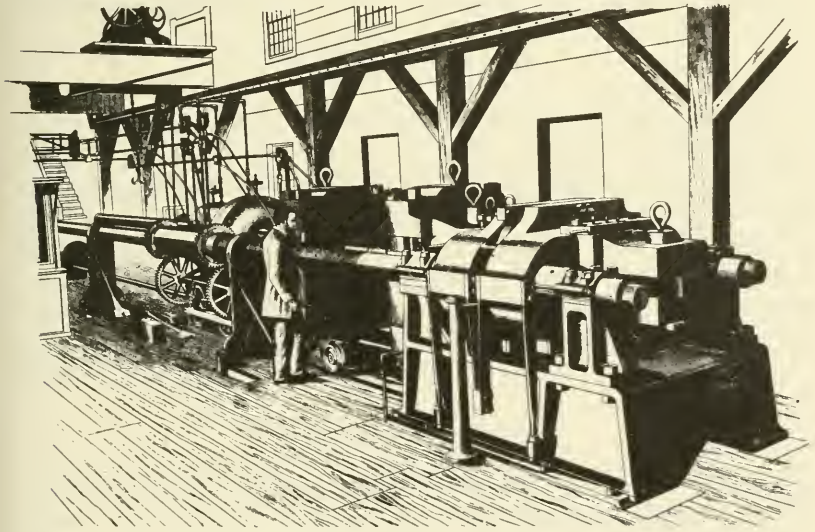
The United States Testing Machine, built in 1879 and recently acquired by the Smithsonian, could apply and measure with extreme accuracy tensile and compressive forces ranging from 1 to 800,000 pounds.

proposed National Armed Forces Museum Park. As a result, a number of items were either acquired by the Smithsonian, or set aside for eventual transfer, that will have great meaning in exhibits interpreting Armed Forces contributions to American society and culture.

Acquired from the Department of the Navy, for instance, was the bathyscaphe *Trieste I*, which in 1960 carried Jacques Piccard and Lieutenant Don Walsh, USN, seven miles down to the bottom of the Challenger Deep. *Trieste I* not only gathered important oceanographic and marine-biological data, but also provided valuable lessons for the design of more sophisticated submersible exploration vessels.

From the Department of the Army came the United States Testing Machine, a massive instrument devised by the noted engineer A. H. Emery and completed at Watertown Arsenal, Massachusetts, in 1879 to provide precise knowledge of the tensile strength and compressibility of metals and other materials. Operated by Army Ordnance and made available to American industries and engineers as well as to Government agencies, the Testing Machine was for many years unique in its versatility, range, and extreme accuracy.

In January 1967 the Advisory Board staff located and identified the remains of the USS *Tecumseh* on the bottom of Mobile Bay, Alabama, where she was sunk in battle on August 5, 1864. The historic vessel, one of the Ericsson-type monitors, lies almost totally buried under sand and mud some 300 yards off Fort Morgan. Dredging operations are



scheduled for July 1967 to clear the vessel so that divers can make a detailed inspection of the hull and determine the feasibility of raising her for exhibition in the proposed National Armed Forces Museum Park.

On the evening of April 29, 1967, before a large audience gathered on the Mall, the Army "Old Guard" Fife and Drum Corps, the Marine Band, and the Air Force Pipe Band joined the Colonial Williamsburg Fifes and Drums in a dramatic torchlight Tattoo, arranged and directed by Colonel Magruder and staff. It is hoped that a National Military Tattoo on the Mall will become an annual event.

Freer Gallery of Art

JOHN A. POPE, *Director*

THE FREER GALLERY OF ART continues to function as a center for research in the civilizations of Asia and, at the same time, it makes significant additions, whenever these become available, to the collections of Oriental art. The two functions are closely interrelated, and the research projects on which various members of the staff are engaged are primarily concerned with the cultural origins of the objects in the collection. To broaden the background of these projects, staff members travel to museums in this country, as well as in Europe and Asia, to see collections and study related material and to discuss problems of mutual interest with colleagues working on similar projects. Under established scholarship programs, students of Oriental art are encouraged and given every facility to work with objects in the collection.

Gifts and Grants

The Freer Gallery of Art received a number of grants during the year. Among these was a grant from the Kevorkian Foundation for the publication of *Indian Sculptures in the Freer Gallery of Art* and for the purchase of books on Near Eastern art for the library. Grants from the Felix and Helen Juda Foundation provided for the purchase of the final volumes of *Ukiyoe* in the Hiraki Collection, and for travel assistance for the technical laboratory. The Ellen Bayard Weedon Foundation continued its generous assistance to the library. Another gift was received from H. P. Kraus.

Curatorial Activities

Director John A. Pope, with Rutherford J. Gettens and other scholars, continued extensive research on the archaic Chinese bronzes in the collection. Their findings, including many pieces never before

published, will appear in a comprehensive catalog that greatly expands and revises the previous *Descriptive and Illustrative Catalogue of Chinese Bronzes Acquired during the Administration of John Ellerton Lodge*, by Archibald Wenley and John A. Pope, published in 1946. Much of this research was carried out in conjunction with the technical laboratory. During an extended journey abroad, Pope carried on research in the fields of Chinese and Japanese ceramics in Europe, the Near East, India, Taiwan, and Japan. In connection with his studies of the extensive ceramic collection of the Gallery, this travel included visits to kiln sites and to museums, private collections, and living potters.

His lectures during the year included "Introduction to the Freer Gallery of Art," at the National Palace Museum, Taipei, Taiwan; "Freer Gallery of Art," at the Freer Gallery of Art for Radcliffe alumnae; and "Chinese Art in the Collection of the King of Sweden," at the M. H. De Young Memorial Museum, San Francisco.

Assistant Director Harold P. Stern's research was principally centered on the Japanese paintings of the Ukiyoe and Yamatoe schools. Yamatoe paintings dating from the 11th century onward and produced in a purely Japanese style are the forerunners of the Ukiyoe, the so-called "paintings of the floating world." The Gallery holdings in this latter school are among the most extensive in the world. Both schools represent genre, and knowledge of them is essential to an understanding of life in late-16th-century through 19th-century Japan. An attempt is being made to identify artists and develop standards for evaluating paintings of both these schools. Works in private collections and public institutions have been studied. Stern chaired and organized the section on Japanese painting at the symposium on the Brundage Collection held in San Francisco August 28 through September 4. In March 1967 he was asked to consult with the University of California, Los Angeles, regarding the Japanese prints in their collection, and he is organizing a major exhibition based on this collection. He also was appointed as a member of the Expert Committee of UNESCO for the Preparation of an Exhibition and an Album on the Mutual Influence of Japanese and Western Arts, and he attended and chaired two of the related sessions at UNESCO House, Paris, June 26 through June 30, 1967.

The head curator of Near Eastern art, Richard Ettinghausen, continued research in Near Eastern studies, with emphasis on recent accessions and special attention given the two silver heads (66.23 Persian, Sasanian, mid-6th century, and 66.24 Persian, Parthian, 1st century B.C.–1st century A.D.). In February 1967 Dr. Ettinghausen retired to accept a teaching position at New York University.

Upon invitation of the Government of Iran, Mr. Ettinghausen attended the opening of the new Pahlavi Library in Teheran and a subsequent Congress of Iranologists from August 31 to September 8, 1966. To commemorate the occasion, a set of *Ars Orientalis* was presented to the new National Library of Iran.

Rutherford J. Gettens, head curator of the Freer Gallery technical laboratory, continued his study of Chinese ceremonial bronzes in the Freer Gallery, a 3-volume catalog of which is in preparation. All available scientific techniques have been used in this study—microscopy, metalography, spectrographic and wet-chemical analysis, analysis by X-ray diffraction, ultraviolet-light study and, in some cases, radiographic study. Research on Japanese pigments continued, as did the preparation of a handbook for identification of painting materials. Research also continued on two Chinese bronze weapons with meteoritic iron blades. Information was collected from worldwide sources on the care and treatment of out-of-doors bronze sculpture.

William Trousdale, associate curator of Chinese art, completed his dissertation, "The Long Sword and Scabbard Slide in Asia," and was awarded his doctorate in the history of art from the University of Michigan on April 29, 1967. He continued his research on Chinese jade and Chinese bronze weapons, to be used toward completion of a catalog of this material in the collection.

From April through June 1966, he participated as assistant director in the University of Michigan Expedition to Qasr al-Hayr al-Sharqi, Syria. This was the second season of continuing excavations at this early Islamic site. In July 1966, he conducted a preliminary archeological survey in the lower Helmand River valley and Sistan regions of southern Afghanistan.

For the Smithsonian Associates he presented a series of eight lectures on "Chinese Art" in the Freer Gallery auditorium. He also lectured on "The Archeological Exploration of Afghanistan," at Columbia University; and on "Archeological Reconnaissance of Sistan in Iran and Afghanistan," at the Freer Gallery of Art for the Washington Society of the Archaeological Institute of America.

Assistant conservator W. Thomas Chase joined the technical laboratory staff in September 1966. He completed his thesis, "Chinese Belt-Hooks in the Freer Gallery of Art," and received from New York University the Master of Arts degree in February 1967, along with a "Conservation of Works of Art" certificate.

He assisted in the preparation of the manuscript for the forthcoming publication on Chinese ceremonial bronzes, and he researched aspects of fabrication techniques of ceremonial vessels, notably inscriptions and false patina.

In March 1967, Ben B. Johnson completed a contract assignment as restorer, and in April was appointed consultant to the technical laboratory.

Donald Kelman (The Conservation Center of New York University) and Yoshiaki Shimizu (University of Kansas) reported in June for duty as summer research assistants.

In May, Robert Moes completed his Freer Fellowship and accepted a teaching position at the University of Hawaii.

Mrs. Ellen Johnson Laing completed her work at the Gallery in June on her Hackney Scholarship and accepted a teaching assignment at Wayne State University, Detroit, Michigan. She received her doctorate in April from the University of Michigan.

In June, Miss Vicki F. Weinstein completed her work at the Freer Gallery on a Hackney Scholarship.

The Collections

Among the new acquisitions were a number of pieces of major importance. In Japanese art, there was a dry-lacquer sculpture of a Bodhisattva dating from the late 8th century (66.34); an ink painting of orchids and rocks by Bompo, 1344–ca. 1420 (67.10); and a unique ten-fold screen representing a horse race along the Kamo River, early 17th century (66.35). In Chinese art, a perfect example of molded Ting ware, Sung dynasty, was added (66.30). In Near Eastern art, a rare Aghkand-ware bowl with a representation of a rabbit, 12th-13th century, was purchased (67.4).

Other purchases consisted of:

BRONZE

Japanese, Kamakura, ca. 14th century; mirror with cranes, mandarin oranges and pine tree; tortoise-shaped knob. (67.11)

LACQUER

Japanese, Momoyama, late 16th century, Negoro; pitcher, red, foliate lid. (67.5)

Japanese, Namboku Chō, 14th century, Kamakurabori, incense box. (67.9)

Japanese, Kamakura; basin, three-legged; Negoro, with natural wood sides. (67.12)

Japanese painting, Muromachi-Suiboku school, by Gyokuen Bompo (1344–ca. 1420). (67.10)

PAINTING

Indian, Rājput, 16th century, Mewar; episodes from the *Bhagavata Purana*, showing two scenes in a palace surrounded by water. Sanskrit text on the back. (66.31)

Indian, Rājput, 16th century, Mewar; episodes from the *Bhagavata Purana*, showing worshippers before Krishna, seated in front of a pavilion. Sanskrit text on back. (66.32)

Indian, Rājput, Păharĭ, Kāngṛā school, ca. 1830. The many-eyed Mahādeva (Siva) with Pārvāti holding the elephant-god Ganesa and Kārttikeya, the warrior god. (66.33)

Persian, Herāt school, ca. 1525; Yusuf at the party of Potiphar's wife Zuleika; multicolor, numerous figures. (67.6)

Persian, Isfahan school, early 17th century; old man in landscape; ink with slight touch of color. (67.7)

Persian, Herāt school, A.D. 1513 (919 H.); two lovers with two attendants; multicolor. (67.8)

POTTERY

Chinese, Sung, Ju-type celadon; bowl, five-lobed with slightly flaring lip; low square-cut foot; fine-grained grayish buff stoneware; thick lustrous gray-green with brownish areas; uneven crackle. (67.1)

Japanese, Namboku Cho-Ashikaga, Tamba; large jar with wide shoulder and flaring lip; coarse, grey stoneware, fired glossy red on surface; glossy with crackle dripping unevenly over surface. (66.28)

Japanese, Edo, late 17th – early 18th century; Nabeshima ware; round dish on high foot; fine white porcelain; camellia blossom and scrolling leaves. (66.29)

Persian, Kashan, early 13th century; bowl on ring foot; black and blue foliate design under green glaze on inside; inscription in four panels; series of leafy stems on outside; foot partially glazed. Iridescence in interior. (67.2)

Persian, Rayy, late 12th century; pitcher; one-handled; black champlevé sgraffito under green glaze. (67.3)

Care of the works of art was shared by several of the staff members. The technical laboratory examined, cleaned, and/or repaired, as necessary, a total of 26 objects. In addition, 47 objects under consideration for purchase were examined; 29 objects were examined or repaired for other museums and individuals. Restorer Ben B. Johnson examined, repaired, and cleaned 16 oil paintings. Mr. Takashi Sugiura, with the help of Mr. Makoto Souta and Mrs. Kumi Kinoshita, cleaned, retouched, and remounted a total of 21 Chinese and Japanese paintings.

Top: Persian Aghkand-ware bowl, 12th-13th century (67.4). Middle: Japanese standing figure of the Bhodisattva Kamon, Tempyo, ca. 790, dry lacquer, with stand (66.34). Bottom: Japanese pitcher, Momoyama period, late 16th century (67.5).

Illustrator Frank A. Haentschke rematted 53 Persian, Turkish, and Indian paintings.

A total of 270 exhibition changes was made by museum specialist Martin Amt: American, 4; Chinese, 190; Japanese, 51; and Near Eastern, 25. All the necessary equipment for these changes was provided by the cabinet shop under the direction of the building superintendent, Russell C. Mielke, who has also maintained the building in its usual immaculate and sound condition.

Library

During the year, 366 books were incorporated by purchase, exchange, and gift into the library collection. The library facilities were utilized by the staff and a total of 514 university students and other scholars doing reference work and casual visitors requiring less scholarly material on the objects displayed in the galleries. To the study files were added 2,037 photographs, and the slide collection was increased by 2,939.

Through the generosity of the Weedon Foundation and the Kevorkian Foundation, the library was able to acquire additional and valuable books. Among the books purchased through the Weedon fund were:

Shang-Hai Po-Wu-Kuan Ts'ang Li-Tai Fa-Shu Hsüan-Chi. Shanghai, 1964.

Chung-Kuo Li-Tai Ming-Hua Chi. Peking, 1965.

Seian Hirin. Tokyo, 1966.

Books purchased through the Kevorkian Foundation included:

Old Oriental Carpets. Vienna, 1926–1929.

Art of India (*Indo Bijutsu*). Tokyo, 1965.

Indian Jewelry. London, 1906–1909.

Public Services

The Gallery was open to the public from 9:00 a.m. to 4:30 p.m. daily except on Christmas. The total number of visitors to come in during the year was 212,920. The highest monthly attendance, in August, was 36,059. A total of 2,830 visitors came to the Gallery office for such purposes as consulting with staff members, submitting objects for examination, studying in the library, and viewing objects in storage. In all, 13,140 objects and 2,313 photographs were examined and 1,026 Oriental language inscriptions were translated for outside individuals and institutions, and 257 persons were shown objects in storage. By request, 33 groups, totaling 573 persons, met in the exhibition galleries for docent service by staff members; and four groups, totaling 53

persons, were given docent service in the storage areas. Among the visitors were 195 distinguished foreign scholars or persons holding official positions in their own countries who came here to study museum administration and practices.

The fourteenth annual series of illustrated lectures, held in the auditorium, included:

"Recent Discoveries in Mainland China," Dr. Bo Gyllensvärd, Östasiatiska Museet of Stockholm, Sweden (September 12, 1966).

"Portraits of the Priest Ikkyū," Professor Donald Keene, Columbia University (October 18, 1966).

"Excavations in Assyria, Nimrud and Its Remains," Professor Max E. L. Mallowan, formerly at the University of London (November 1, 1966).

"Chinese Tomb Figurines," Dr. Jan Fontein, Boston Museum of Fine Arts (January 10, 1967).

"Japanese Literati Painting," Professor Calvin L. French, University of Michigan (February 14, 1967).

"Chin Nung (1687–1764) and the Eccentric View," Professor Peter Swann, Royal Ontario Museum, Canada (March 14, 1967).

"The Individual in Late Egyptian Portraiture after 700 B.C.," Dr. Bernard V. Bothmer, The Brooklyn Museum (April 11, 1967).

The auditorium was used by 14 outside organizations for 48 meetings. A total of 6,217 individuals attended functions in the auditorium.

The photographic laboratory, under the supervision of Raymond Schwartz, processed a total of 29,102 items including negatives, photographs, color slides, color-sheet films, polaroid prints, and album and registration prints. This workload amounted to an increase of 100 percent over last year.

The sales desk sold 117,037 items consisting of 5,012 publications and 112,025 reproductions (including postcards, slides, photographs, prints, and reproductions in the round).

Publications

"Paintings, Pastels, Drawings, Prints, and Copper Plates by and Attributed to American and European Artists, together with a List of Original Whistleriana, in the Freer Gallery of Art," by the late Burns A. Stubbs (*Freer Gallery of Art Occasional Papers*, vol. 1, no. 2, 1st edition 1948; 2nd edition 1967) was revised and reprinted. Final work was completed on the preparation of volume 6 of *Ars Orientalis*, and considerable time was given to the preparation of the first two volumes of *The Freer Chinese Bronzes*, now in publication.

Publications by staff members were:

POPE, JOHN ALEXANDER. Some Ming porcelains in the National Palace Museum. National Palace Museum Quarterly, Taipei, vol. 1, pp. 1–4, 1966.

TROUSDALE, WILLIAM. The bear tamer: bronze statuette, China, fifth-fourth century B.C. *In* Man through his art, vol. 3 (Man and Animal), pp. 30–31. Published in the United States with the sponsorship of the World Confederation of Organizations of the Teaching Profession (WCOTP) and with the financial help of UNESCO. Greenwich, Connecticut: New York Graphic Society, 1965. [Issued 1966.]

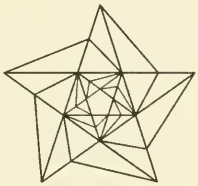
———. Scholars of northern Ch'i collating classical texts. In Man through his art, vol. 4 (Education), pp. 23–25. Published in the United States under sponsorship of WCOTP and with the financial help of UNESCO. Greenwich, Connecticut: New York Graphic Society, 1966.

———. A Chinese handle-bearing mirror from northern Afghanistan. Afghanistan: Quarterly Review of the Historical Society of Afghanistan, Kabul, vol. 19, no. 4, 1964, pp. 27–38. [Issued 1966.]

———. Rock-engravings from the Tang-i Tizao in central Afghanistan. East and West, new series, vol. 15, nos. 3 and 4, 1965, pp. 201–210. [Issued 1966.]

National Collection of Fine Arts

David W. Scott, *Director*



A notable milestone in the history of the National Collection of Fine Arts was marked by the transfer of most of the staff and activities into permanent quarters in the renovated neoclassical structure originally constructed to serve as the Patent Office building. This handsome Washington landmark, covering the area between 7th and 9th and F and G Streets, N.W., was begun in 1836 under the supervision of Robert Mills. The building itself is of great interest historically and architecturally; at various periods, it has served as a Civil War hospital, the scene of President Lincoln's second inaugural ball, and, more recently, the administrative home of the U.S. Civil Service Commission.

In addition to planning for the opening, the National Collection of Fine Arts (NCFA) has concentrated efforts on expansion of its holdings, in research, and in improvement of its records systems. The most significant accession of the year was the gift by Irene and Herbert F. Johnson of the S. C. Johnson and Son collection, "ART: USA," acceptance of which was approved during 1967 by the Smithsonian Art Commission and the Board of Regents.

Augmentation of the collections was also effected through purchase from budgeted funds for the first time.

The expanded space and facilities provided by the new quarters caused a great increase in the effectiveness of many offices and branches: the conservation laboratory allowed the full-time conservator, Charles Olin, to restore NCFA works of art on the premises; initial steps were taken toward a more fully equipped photographic

laboratory and frame shop; the Library initiated plans for an American art archives. An architectural designer, acting as liaison between NCFA and its architectural consultant, aided the staff in the development of detailed plans for work, office, and exhibition areas.

New projects were begun by the International Art Program (IAP), which received Smithsonian financial support for the first time. Other projects previously begun were continued: efforts toward the preservation of Government-owned art; the Art-in-the-Embassies program; the lending of paintings and prints to Government offices; the White House Rotating Exhibitions; and public lectures and films. Assistance was also continued in the planning for the John F. Kennedy Center for the Performing Arts. At the request of the White House, the popular seminar on American Art was repeated for the current White House Fellows. Planning went forward to formulate a program for the Court of Claims building, and assistance for the Cooper Union Museum continued. The project of recording all the exterior sculpture in the Washington, D.C., area was brought near completion.

Advice and assistance was provided in a number of areas, such as the selection, design, and planning for the monumental Calder stabile, to be presented to NCFA for the Smithsonian by Mrs. Morris Cafritz.

As if in response to this growth and increased activity, an unprecedented number of college undergraduates and graduates applied for internships.

All phases of activity must nevertheless be accelerated in the effort to open a major museum less than a year hence—completion of the interior architectural plans and details and the plans and "mock up" of gallery installations and lighting; the rounding out of the collections from gifts, purchases, or long-term loans; the restoration and conservation of works of art; and publication of catalogs or brochures on the history of the building, on the content and range of collections, and on the philosophy and mission of the bureau. Moreover, in order to achieve recognition as an important museum for the Nation and as the repository of American art, the needs of the collection must be made public.

The upcoming year presents great challenges, but the Museum staff, imbued with great enthusiasm and a determination to meet deadlines, expects that the museum will open on schedule and will be to the Nation a source of special pride.

Smithsonian Art Commission

At the forty-fourth annual meeting of the Smithsonian Art Commission, held in Washington on December 6, 1966, recommendations

were made for the reappointment of Gilmore D. Clarke, Stow Wengenroth and Andrew Wyeth for the usual four-year term. The following officers were re-elected: Edgar P. Richardson, Chairman, Gilmore D. Clarke, Vice-Chairman, and S. Dillon Ripley, Secretary. The following were re-elected to the Executive Committee: David E. Finley, Chairman, Gilmore D. Clarke, Ogden M. Pleissner, Henry P. McIlhenny, Edgar P. Richardson (ex officio), and S. Dillon Ripley (ex officio).

At the special spring meeting of the Commission in May, it was announced that Leonard Baskin had accepted an invitation to fill the vacancy created by the death of Paul Manship.

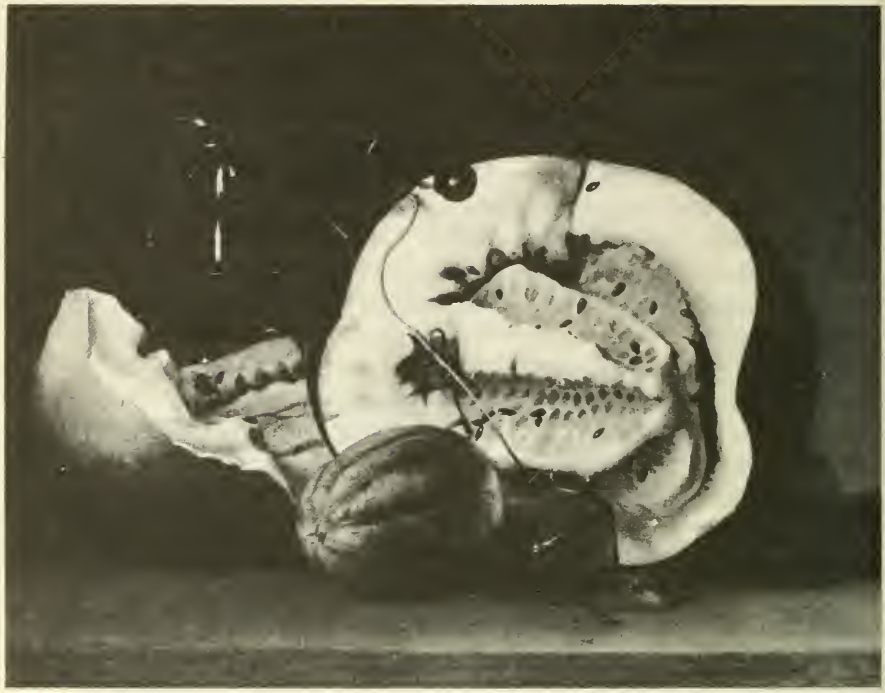
Commission members reviewed works which had been submitted since the December meeting and recommended their acceptance or rejection for the Collection. Importantly, the Commission examined a representative survey of the holdings in the NCFA collections which will form the body of the material to be presented at the public opening of the galleries in spring 1968.

The Collections

Among the major gifts received was the S. C. Johnson and Sons collection, a group of 102 contemporary paintings, which will constitute the core of the modern section of the survey of American art at the 1968 opening of the new galleries. A group of 209 watercolors was presented to NCFA by the Ford Motor Company. A gift of 20 works by Henry Lyman Sayen, from the artist's wife and daughter, are being prepared (with other works from a similar period in Philadelphia) for a future exhibition. Other recent gifts include Mary Cassatt's *Spanish Dancer Wearing a Lace Mantilla*, donated by Mrs. Victoria Dreyfus; Robert Henri's *The Blind Singer*, by J. H. Smith, Jr.; George Bellows' *Mr. and Mrs. Philip Wase* and Raphaelle Peale's *Melons and Morning Glories*, both given by Paul Mellon; and John Sloan's *Gwendolyn*, donated by Mrs. John Sloan.

A bequest from the estate of Paul Manship of approximately 285 works included sculpture, drawings, and medals. Other gifts by artists included *Space Curve* by Charles Shaw and *Sun Over the Hourglass* by Paul Jenkins.

Purchases included *View of Niagara Falls with Rainbow* by Alvin Fisher, *Corner of the Studio* by Henry McFee, *The Golden Gate* by Charles Sheeler, and *Catskill Creek* by Jasper Cropsey; and several hundred graphic arts items, including drawings by Robert Henri, John Sloan, William Glackens, George Luks, and Gaston Lachaise; and prints by Winslow Homer, Milton Avery, Ivan Albright, Grant Wood, Thomas H. Benton, Reginald Marsh, Arshile Gorky, Gabor Peterdi, Mauricio Lasansky, Jackson Pollock, Leonard Baskin, Ellsworth Kelly, Adolph



Raphaelle Peale (1774–1825) *Melons and Morning Glories*, 1813. Gift of Mr. Paul Mellon. (1967, 39.2)

Gottlieb, and many others. Commenced was an inventory of the Juley photograph archives, which are being purchased by NCFA. Altogether 200 paintings, 217 pieces of sculpture, 1412 prints and drawings, and 33 miscellaneous items of decorative arts were submitted for accessioning.

The Registrar's inventory showed that 839 NCFA works were on loan to Government agencies as of June 1967. During the year NCFA lent 199 works to museums and other educational institutions, 564 to offices of the Federal Government, including 85 contemporary paintings and prints to the offices of the Vice President, the Executive Offices, the National Council on the Arts, and the Bureau of the Budget; and to NCFA were returned 108 works. A total of 122 works were loaned to NCFA, primarily for the White House Program, and 107 works were returned to lenders. A total of 2,318 objects were photographed, including black and white, color transparencies, and color slides. Over 3,500 works of art were removed to the new gallery from the Museum of Natural History building and other storage areas; 100 were restored, including 96 paintings and 4 sculptures;

Mary Cassatt (1845–1926), *Spanish Lady with a Mantilla*. Gift of Mrs. Victoria Dreyfus. (1967.70)

and 193 were checked out through the Registrar's office for framing, including 16 done by outside contract.

A White House inventory, conducted during the summer of 1967, indicated that approximately 200 works are currently on loan at the White House. An inventory of the Barney collection showed that 174 were on loan. From this collection 16 paintings and pastels were restored; and a special exhibition of pastels by Alice Pike Barney,

Adolph Gottlieb (1903–) *Three Discs*, 1960. Gift of S. C. Johnson and Son Collection.

Personal Impressions, was organized. Contents of the Barney Studio House were cataloged and decorative art objects were purchased for use in the House.

The library collections of the NCFA and National Portrait Gallery were moved to spacious third-floor areas of the remodeled Patent Office building. NCFA received by purchase or exchange 538 books and catalogs; subscriptions to 70 periodicals were paid. In addition to items received by purchase and exchange, gifts were received, among which the most notable collections came from Dr. and Mrs. Charles Nagel, James Billman (from the Estate of Victor Proetz), Mrs. Adelyn D. Breeskin, and Stefan Munsing. Each of these donations consisted of several hundred items. Another important gift was the complete set of the "March of America" series, donated by the publishers, the Xerox Corporation.

Exhibitions

The ambitious program of exhibitions continued the policy inaugurated during the previous year. In its endeavor to present excellent material in depth, NCFA continues to select subjects primarily from American art: the seven American art exhibits of this year were all of works of the 20th-century. Three featured modern "old masters" and four were group shows of the works of artists who have reached prominence within the last decade or two. Two of the year's major exhibits were organized by other institutions and were made available to NCFA in Washington as well as to museums in other American cities. Two small exhibits—one of books, the other of photographs—reflect a new concern with the so-called minor arts. A second commitment, to present in Washington foreign art exhibits sponsored by the governments concerned, was represented by a show of ancient Afghanistan treasures—a rare occasion for American museums and the American public—continued over from the previous year.

Ancient Art From Afghanistan: Treasures of the Kabul Museum (continued from previous year).

Rugs of Afghanistan (continued from previous year).

Hard Edge Trend (July 13–September 18, 1966). The exhibition was organized for, and first presented at, the annual Department of State reception held July 4 for junior foreign service officers. It consisted of a number of paintings by contemporary American artists.

Eleven Pop Artists (July 20–September 18, 1966). The material exhibited consisted of 33 prints by eleven contemporary artists which had been presented to NCFA by the Philip Morris Company.

Paul Manship Memorial Exhibition 1885–1966 (August 10–September 25, 1966). Paul Manship was a member of the Smithsonian Art Commission for 44 years, 20 of these as Chairman. The exhibition of 43 sculptures and 11 drawings by Manship, selected from among the artist's gifts to NCFA, was a tribute to him as an outstanding American artist and as a benefactor of NCFA.

Drawing Society National Exhibition (September 15–November 13, 1966). NCFA was one of eleven museums to present this exhibition of 100 drawings by as many artists. The drawings had been selected from six preliminary exhibitions sponsored regionally by the Drawing Society.

The Drawings of Jasper Johns (October 26–December 4, 1966). The one-man show of 46 drawings by Jasper Johns was organized by NCFA with the cooperation of the Leo Castelli Gallery as a complement to the Drawing Society exhibit.

To Be Alive (October 26–December 4, 1966). The exhibition consisted of approximately 20 color photographs, blown up to exhibition scale and selected from the highly praised film of the same title produced for the Johnson Wax Company pavilion at the New York World's Fair, 1964–65. The still photographs came directly from the book form of the film published by the Macmillan Company, which coordinated with NCFA in planning the exhibit.

The United States at the 1966 Venice Biennale (December 1, 1966–January 15, 1967). The exhibition "brought home" the official American presentation at the XXXIII Venice Biennale, the prestigious biennial International Art Exhibition. The four artists selected to represent the United States were Helen Frankenthaler, Ellsworth Kelly, Roy Lichtenstein, and Jules Olitski; 23 paintings and one sculpture were shown.

William Glackens in Retrospect (February 10–April 2, 1967). Charles Buckley, Director of the City Art Museum of St. Louis, selected 132 paintings, drawings, and etchings that surveyed the work of this important American artist from the 1890s to 1937.

March of America (April 16–22, 1967). This small exhibit, organized in recognition of National Library Week, centered on the "March of America" series published by University Microfilms Library Service, Xerox Education Division. Consisting of 100 facsimile editions of significant literature in the study of American history, it also included a selection of the original volumes.

Stanton Macdonald-Wright (May 4–June 18, 1967). This retrospective exhibition of the work of one of America's pioneer artists in the 20th-century abstract form contained over 90 paintings which surveyed the 77-year-old artist's well-known Synchromist period (circa 1912–1919) and showed the progression of his work through 1967. Sections of a large 1935 mural, recently acquired by NCFA, were featured. Corollary to the exhibit were the first public presentation of Mr. Wright's unique Synchrome Kineidoscope, a film-art projection device, and the publication of a catalog which collected and reprinted many of the artist's commentaries on his artistic theory and philosophy.

The NCFA presented or assisted with special exhibitions in the Washington, D.C., area for the White House, the District of Columbia School Program, the Central Intelligence Agency, the General Accounting Office, the Bureau of the Budget, and the Greater Washington Area Hadassah Women's Organization. From the William T. Evans collection 33 paintings were sent on special exhibition to the IBM Galleries in New York City. A collection of lithographs, *Contemporary American Prints*, which recently returned from a two-year tour in Europe

where it was circulated by the International Art Program, was shown in the gallery of the American Federation of Arts in New York City.

International Art Program

The International Art Program (IAP) successfully concluded the showing in Washington of the American section of the XXXIII Venice Biennale. Approximately twenty new projects were undertaken during the year, including exhibitions of contemporary prints, children's art, and Appalachian handicrafts.

A contract was negotiated with Brandeis University to organize the American representation at the IX São Paulo Bienal, and a grant was made to the Pasadena Museum to undertake the American exhibition at the V Paris Biennial of Art.

Among the highlights of the year's activities were the development of plans for private sponsorship of a "Biennial Series" of publications, discussions with officials of National Educational Television for television coverage of the São Paulo Bienal and other IAP shows, and the coordination with the Department of State whereby grants can be obtained for artist-lecturers to accompany IAP exhibitions.

A major fund drive to finance the XXXIII Venice Biennale exhibition was successful, and budgetary provisions were made toward the IX São Paulo Bienal. The latter exhibit required limited supplementary funds which were obtained by a second appeal for private support.

Special Services

To inform the public about the National Collection of Fine Arts, a 16-page illustrated pamphlet describing briefly its history and plans for development was printed for free distribution, and a small model of the old Patent Office building was constructed, with a set of nine panels to orient the public to the "newest Smithsonian museum."

To arouse public awareness of the activities of the International Art Program and to discuss opinions of national art interest, a special symposium, "How Should American Art Be Presented Abroad?" was presented on December 8. The distinguished panelists were Hilton Kramer, art critic of the New York Times; Grace Borgenicht, gallery director; Kenneth Noland, artist; Clement Greenberg, critic, and Abram Lerner, curator of the Hirshhorn Collection. There was a standing-room-only audience for the event.

A special six-evening film series, "The History of the Art of the American Film," was prepared for the Smithsonian Associates. The programs included excerpts from famous films under the topics

Installation of the United States entries at XXXIII Venice Biennale Exhibition, in the National Collection of Fine Arts, showing the work of Roy Lichtenstein and Helen Frankenthaler.

of: The Comedy, The Serial, The Western, The Musical, The Spectacle, and The Star System.

In conjunction with the special exhibition programs, there were eight guest-lecture evenings, of which particularly noteworthy were three programs by Stanton Macdonald-Wright.

Jane Snyder, under the direction of the assistant for special services, did research on the history of the Venice and São Paulo biennials and on the old Patent Office building. Mrs. Daryl Rubenstein worked in the office of the assistant for special services as a volunteer doing special research for press releases and other projects. Following the resignation of John Latham, in May, Jane Morse assumed temporary direction of activities as acting assistant for special services.

Responsibility for a rotating exhibition of art in the White House continued; more than a hundred works by contemporary American artists have been kept on view there and in the Executive Office Building, displayed individually or in small changing exhibits.

The White House Fellows' Seminar on American Art, inaugurated last year, engendered so much interest that NCFA was requested to repeat the series, which consisted this year of five informal lectures or panel discussions. Developed for the White House Fellows, members of the White House staff, the Cabinet, and their wives, the Seminar surveyed the history of American art, with emphasis on the period since 1900. It was presented by staff members with guest speaker John W. McCoubrey, associate professor of art, University of Pennsylvania.

The Art-in-the-Embassies Program, directed by Mrs. Nancy P. Kefauver, Department of State adviser on fine arts, combines the

Appalachian Handicrafts exhibit of the International Art Program, on display in Helsinki, Finland. It was also seen in Reykjavik, Iceland, and Bonn, Germany, during the year.

energies of private interests and government to build a nationwide program to support a worldwide service. It is cultural diplomacy in action. Since its inception, in January 1964, collections have been provided for 75 United States embassies. Of the 64 collections currently in circulation, 32 were started during this year. The program currently represents nearly a thousand American artists, whose work is available from 483 lenders throughout the United States. NCFA continues to provide the facilities for reception, handling, and display of these works in Washington.

Recently NCFA has been instrumental in bringing together representatives of a cross-section of the art world in the greater Washington area. An informal meeting of art museum directors, curators, professors, and artists has been scheduled at least once yearly at Barney Studio House. These people have also been brought together through special events such as openings and pre-opening dinners, film showings, and lectures—all of which help to promote better working relationships among members of the various Washington art groups.

The NCFA sponsored a number of lectures this year in conjunction with its exhibitions and special events. During the showing of the exhibition *Ancient Art from Afghanistan*, four lectures were held: "The People of Afghanistan" by Leon B. Poullada; "Pre-Islamic Art of Afghanistan" by John M. Rosenfeld; "Nooristan, Afghan Ethnographic Enigma" by Alan Wolfe; and "Herat, A Great Art Center

in Afghanistan" by Richard Ettinghausen. In addition to the symposium held in conjunction with the Venice Biennale exhibition, there was a lecture to accompany the William Glackens exhibition, "The Art of William Glackens" by Richard Wattenmaker. The fourth lecture in the White House Fellows' Seminar, "The American Scene from the Civil War to 1900," by John W. McCoubrey was also open to the public.

Staff members participated in one or more sessions of the White House Fellows' Seminar. In addition, Mrs. Breeskin delivered a lecture on Jasper Johns in connection with the exhibition of his drawings; lectured to the Smithsonian Associates on the "Art of Mary Cassatt" and "New Trends in American Art"; participated in a two-day seminar on American Civilization during which she spoke six times to different groups; and lectured at the Northwood High School in Bethesda on "Art and Society," at a banquet for the Smithsonian Council on "The Role of Museums in Promoting the Advancement of Culture," and at the International Club in Washington on the "Role of Art in International Understanding."

Jacob Kainen delivered ten lectures to the Smithsonian Society of Associates on "Printmaking: A Historical Survey," which traced the development of printmaking from the Middle Ages to the early 20th century.

Donald R. McClelland lectured to the Society of Associates on "New Directions in American Art." He also spoke on American art at the National Capitol Planning Association, the Hospitality Information Service for Diplomats in Residence, the Chevy Chase Art Association, the West Virginia Art Association, and the University of West Virginia. Harry Lowe presented a third lecture series for the Society of Associates, "Art Collecting for the Amateur."

In April, Stefan Munsing lectured at the Heights Study Center in Washington on "Abstract Art in America." David Scott gave a lecture at the Akron (Ohio) Art Institute and Richard Wunder lectured at the Los Angeles County Museum of Art on "The Festival Designs of Inigo Jones."

The National Collection of Fine Arts provided Saul Steinberg with office space for several months during his term as the first Smithsonian Institution artist-in-residence. Mr. Steinberg presented the Smithsonian Institution with a 50-foot scroll depicting his impressions of Washington during his stay.

Staff Activities

To the staff of the NCFA 22 people, 2 at the curatorial level, were added.

William Glackens in Retrospect, on display in the Main Gallery during February and March, gave a comprehensive overview of the work of this important American artist of the early 1900s.

Lois Bingham, Chief, International Art Program, and William Dunn, IAP exhibits officer, became regular staff members on July 1, 1966. Both were formerly on detail from the U.S. Information Agency.

Other personnel, on special status, who provided valuable support to the NCFA, were: William Hofer, consultant designer; Mrs. Eva Thoby-Marcelin, who did special research on educational-program and sales-desk development; and Mallory Randle, on a predoctoral internship given by the Smithsonian Research Foundation, who performed research on murals and sculpture of the Public Works of Art Project. Valuable assistance was also provided through the internship program; the number of summer interns increased from 9 in 1966 to 12 in 1967.

Resignations and transfers included Farnham Blair, Susan Bratley Hornbostel, John Latham, and Mrs. Priscilla Wolff. The staff was saddened by the October 21 death of Rowland Lyon, who had resigned in August 1966. A further loss was sustained in the tragic death of Linwood Lucas on April 23, 1967.

Director David W. Scott was elected this year to active membership in the Association of Art Museum Directors. Curator of painting and sculpture Richard P. Wunder visited Florence, Italy, to evaluate an important collection of sculpture. Donald R. McClelland, associate

Ancient Art From Afghanistan—Treasures of the Kabul Museum, exhibit during July and August 1966, provided an opportunity to see antiquities of high aesthetic quality from a little-known culture.

curator of lending activities, served as staff coordinator in organizing and presenting the Second White House Fellows' Seminar. He examined 87 works of art brought to the NCFA for inspection, and juried 14 exhibits in four states and the District of Columbia. Jacob Kainen, who joined the staff in September 1966 as curator of prints and drawings, set about developing the department and its holdings for the 1968 opening. His efforts to acquire works to fill significant

This exhibit of ancient art from Afghanistan was on display in main gallery.

gaps in the collection entailed a number of trips to New York City to visit dealers and potential donors. He was instrumental in acquiring 800 new examples by prominent graphic artists. He participated in a symposium at the Washington Gallery of Modern Art; served as juror for two local exhibitions; and was elected to the executive committee of the Board of Directors of the Print Council of America. An exhibition of his paintings was held at the Franz Bader Gallery, Washington, D.C., in March 1967. Curator of contemporary art Mrs. Adelyn D. Breeskin juried shows at Chapel Hill, North Carolina; Pennsylvania State University, University Park, Pennsylvania; and locally at the National Institutes of Health, George Washington University, and the Arts Club of Washington.

Special consultant Stefan P. Munsing, on detail from the U.S. Information Agency, was a member of the selection committee for the White House Lending Program, and he lectured twice at the White House Fellows' Seminar. Curator of exhibits Harry Lowe served as the Deputy Commissioner of the United States Pavilion at the XXXIII Venice Biennale. Abigail Booth, assistant to the curator, served as registrar-secretary at the United States Pavilion at the Venice Biennale. David Keeler, technical assistant to the curator, had a one-man show at the Studio Gallery in Alexandria, Virginia, from February to March. Lois Bingham, in addition to her regular duties as Chief of the International Art Program, participated in the Department of State Panel Discussion on the role of visual arts in international educational exchange. Margaret Cogswell, deputy chief of the Program organized for the American Federation of Arts *The American Poster*, an exhibition which will be circulated throughout the United States. In April she traveled to Athens to reorganize the exhibition *Communication through Art*.

Research

Research at the National Collection of Fine Arts is directed toward promoting the appreciation and understanding of American art by making the works and information about them more widely available through such media as exhibitions, catalogs, books, and articles. The related activities range from biographical investigations to critical appraisals.

A number of projects have been undertaken by the department of painting and sculpture. Of first priority was the compilation of information on individual works of art preparatory to the publication of a definitive catalog of the collections. Curator Richard Wunder visited the Courtauld Institute of Art in London to study the identification and attribution of English paintings in NCFA. Research continued on the Catlin and miniature collections, and on individual artists such as William H. Holmes. Extensive research projects on art works in the Washington area continued with the compilation of information on existing art works commissioned under the Federal Works Project of the 1930s and on all public sculpture. A complete guide to the sculpture will be published next year. The department is preparing a booklet on the history of the Patent Office building. It also supervised the organizing, inventorying, and identifying of the 285 items in the Paul Manship bequest, preparatory to the selection of the memorial exhibition of his work.

Mrs. Adelyn D. Breeskin has devoted much time to research on the American artist Mary Cassatt, in preparation for the publication of a catalogue raisonné of Cassatt's works. For nine weeks during winter she was assisted by Joyce Keener, a student intern from Bennington College. Her studies carried her to all of the major museums, university art galleries, and dealers in the United States, London, and Paris. She has completed research on about 300 pastels, 269 oils, and 300 watercolors and drawings, and hopes to complete the work within the year. The two-volume catalogue raisonné will be published by the Smithsonian Institution Press.

David W. Scott gathered the material for two retrospective studies of 20th-century American artists. He wrote a critical and biographical essay for a memorial volume on the sculptor Albert Stewart, and he selected paintings and writings of Stanton Macdonald-Wright to serve as the basis for an exhibition and catalog which presented the first full survey of the artist's long and outstanding career.

Curator of prints and drawings Jacob Kainen, whose research has resulted in several articles and books, traveled to Wilmington, Delaware, and elsewhere to study the prints of John Sloan preparatory to the publication of a complete catalogue raisonné and analysis of Sloan's etchings, to be published within the year. He also examined all the prints of Raphael Soyer from 1917 to the present in preparation for the publication of a catalog on Soyer's works to be published by the American Association of Artists.

Publications

Publications prepared under the auspices of the National Collection of Fine Arts are as follows:

The art of Stanton Macdonald-Wright, including a treatise on color by S. Macdonald-Wright: A retrospective exhibition, May 4 through June 18, 1967. Introd. by David W. Scott. 100 pp., 30 illustr. Washington: Smithsonian Institution Press, publ. 4707, 1967.

Catalogue of the Alice Pike Barney Memorial Lending Collection, by Delight Hall. 195 pp., 99 illustr. Washington: Smithsonian Institution Press, publ. 4522, 1966.

The March of America, an exhibition celebrating National Library Week. Introd. by David W. Scott; foreword by Jacob Kainen; text by Peter C. Welsh. 32 pp., 18 illustr. Prepared by the Xerox Corporation for the National Collection of Fine Arts, 1967.

National Collection of Fine Arts, Smithsonian Institution, Washington, D.C. Introd. by David W. Scott, 20 pp., 12 illustr. Washington: Smithsonian Institution Press, publ. 4698, 1967.

Paul Manship, 1885–1966. Tributes by David E. Finley, Walker Hancock, Robert Cushman Murphy. Introd. by S. Dillon Ripley and Walter N. Trenerry. 24 pp., 17 illustr. Washington: Smithsonian Institution Press. publ. 4686, 1966.

Publications by the staff include the following:

COGSWELL, MARGARET, ed. The American poster. 84 pp., 106 illustr. New York: The American Federation of Arts and October House, Inc. 1967. Also, in the above, an article, p. 62: A changing medium: A new environment.

KAINEN, JACOB. Michael Ponce de Leon. Foreword to catalog of exhibition at the Corcoran Gallery of Art, October 1966. 6 pp., 2 illustr. Washington: Washington Print Club, 1966.

———. Gene Davis and the art of color interval. Art International (December 1966), vol. 10, no. 10, pp. 30–33, 5 illustr.

———. The etchings of Canaletto. 63 pp., 44 illustr. Washington: Smithsonian Institution Press, publ. 4676, 1967.

LOWE, HARRY. In Venice: Backstage at the Biennale. Museum News (November 1966), vol. 45, no. 3, pp. 11–18, 33 illustr.

MUNSING, STEFAN P. The drawings of Jasper Johns. Introd. and catalog. October 1966. 4 pp.

———. The sculpture and drawings of Jacques Lipchitz. Introduction and catalog of retrospective exhibition at Watergate Apartments, held by the Greater Washington Area Hadassah Women's Organization.

SCOTT, DAVID W.; MCCLELLAN, DOUGLAS; PALMER, ROBERT B.; and SHEETS, MILLARD. Foreword *in* Albert Stewart. Claremont, California: Scripps College, 1966.

———. American Section: Venice Biennale, 1966. Art Education (December 1966), vol. 19, no. 9, pp. 18–21, 7 illustr.

TRUETTNER, WILLIAM H. Portrait of America: 1865–1915. Introd. to catalog of exhibition held at IBM Gallery, New York, New York, January 16–February 25, 1967. 2 pp., 4 illustr.

WUNDER, RICHARD P. 17th and 18th century European drawings. 1966, 63 pp. (exhibition catalog). New York: The American Federation of Arts.

———. A forgotten French festival in Rome. Apollo (May 1967), vol. 85, no. 63, pp. 354–359.

National Portrait Gallery

CHARLES NAGEL, *Director*

NO LONGER APPLICABLE to the National Portrait Gallery is the dictum attributed to George V of England: "A public authority meanly housed may be a public authority meanly esteemed."

In January 1967 the NPG moved into the Fine Arts and Portrait Galleries, formerly the old Patent Office building. The new quarters are spacious and, thanks to architects Faulkner, Stenhouse, Fryer, and Faulkner and to the Gallery's associate architect, the late Victor Proetz, they are imbued with dignity, charm, and character. As the fiscal year ends, finishing touches are still being installed. Next will come the final steps of turning a handsome old public building into a useful museum, to the general purposes of which the aged structure has been sensitively altered and adapted. This transformation has involved many technical details impossible to foresee in full, or dependent upon funds that were insufficient. There will have to be as well a furnishing program of some size for the offices, library, laboratories , administrative suite, and public exhibition spaces of the building. It is obviously a far more difficult task to adapt unobtrusively a distinguished old building to the purposes of exhibition than it is to plan such a building from scratch. But at least a very good start has been made, and, meanwhile, the office space afforded is proving a luxurious contrast to former temporary quarters in the Arts and Industries building.

The Gallery now will be able to come out into the open. Scarcely a week passes that does not bring visitors interested in a preview of the building, so that during the interval before the opening in 1968 the Gallery's public image steadily grows in stature.

The opening date of the Gallery is now definitely set for September 1968, and preliminary preparations are already under way to gather a large exhibition of portraits to celebrate appropriately and in distinguished fashion this important occasion. The responses of those to whom requests have been directed, both individuals and institutions, have so far been encouraging. A special ad hoc committee drawn from the staff and the Portrait Gallery Commission, plus a few members without formal connection with the Gallery, has this matter well in hand. Thus, the Gallery is now well on the road to realizing what has been the dream of many people over a longer period of time than it perhaps should have been: the establishment of a great collection of the likenesses of those who for some two hundred years have created in the minds of men the world over an image of greatness for our country.

Meanwhile, there is much to do both in devloping an agreed-upon program and in preparing for opening to the public with an outstanding show. Fortunately, the Gallery is blessed in having ready for the task an able staff, and will now be permitted to add to it the additional members so greatly needed for it to emerge into a full-fledged museum—one that is, indeed, unique in the history of our country. A year of preparation is in order. That it will be a busy and rewarding one there can be no doubt.

National Portrait Gallery Commission

During the year, the roster of the National Portrait Gallery Commission remained the same, with those whose membership had expired being reappointed to a new term. The newest member, Dr. Edgar P. Richardson, former Director of the Detroit Institute of Arts and of the H. F. du Pont Winterthur Museum, who was appointed just previous to the beginning of the fiscal year, has been extremely helpful, giving the Gallery wise advice based on many years of practical experience in the museum field in general and in American art in particular.

The Collections

Paralleling the problems of getting the building in condition are, of course, those involving the collections. Solving these will now be facilitated greatly by the move of conservator Charles H. Olin into his new and well-equipped laboratory.

The 58 accessions for the year, in a variety of media, range from paintings and sculpture to a few exceptional photographic likenesses. Of these, 16 were carefully selected purchases from the Museum fund.

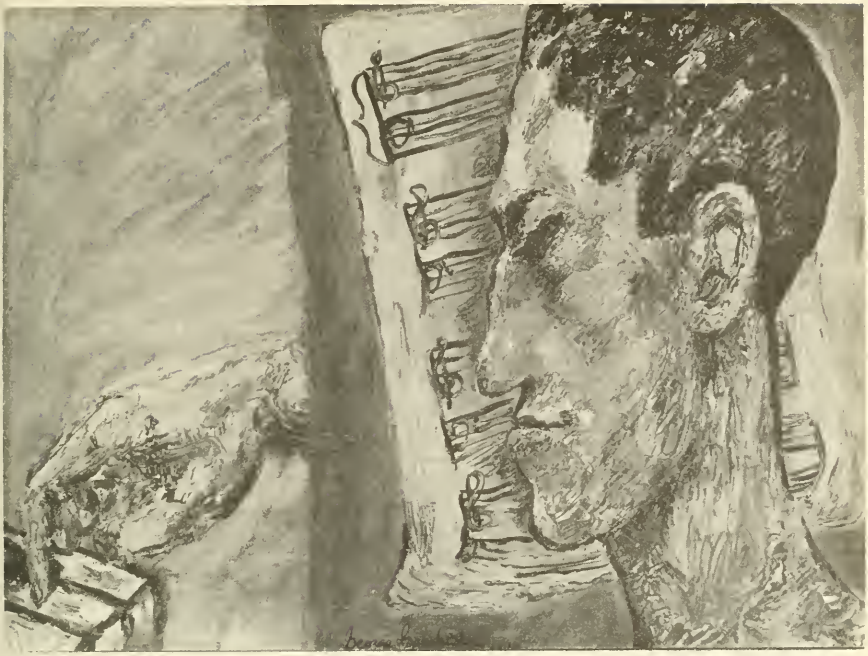
Adlai Stevenson, by Trafford Klots, gift of Mrs. Marshall Field and Mrs. Elizabeth Ives, 1967. (NPG.67.33)

During the year the Gallery held three exhibits in its hall in the Arts and Industries building: "Recent Accessions," with a checklist catalog prepared by curator Robert Stewart, and "Faces from the American Past" showed a cross section of our present collection and emphasized recent acquisitions; the third, "Interpretations of Notable Americans," was undertaken with the aid and cooperation of the John Hancock Mutual Life Insurance Company. This last show was of outstanding interest. In it was used a selection from that company's collection of modern illustrations of great American personages contrasted in each case with portraits from life of these same national figures drawn from the NPG collection. A 4-page catalog was contributed by the John Hancock Company. In September all portraits belonging to the Gallery will be brought to the new quarters in order to prepare them for the opening exhibition.

It is interesting to note that the accessions include practically all media: painting and sculpture are naturally the most frequent, but there are representations in a variety of techniques including a very contemporary painting of Adlai Ewing Stevenson by Edward Weiss on an acryllic globe. The Gallery is grateful for all gifts; mention of a few accessions gives an idea of the range in terms of period, the field of activity of the sitter, and the varying styles of portraiture that have come into the collections this year.

A satiric self-portrait of George Gershwin is a gift from his brother Ira; a likeness of Andrew Jackson by James Tooley, Jr., comes from Mary Lively Hoffman, Charles T. Lively, and William H. Lively; Charles Cotesworth Pinckney by Henry Benbridge and a self-portrait of James Barton Longacre, whose engraved portraits comprised the *National Portrait Gallery of Distinguished Americans*, published in 1834–39, were both purchases; a pair of portraits of General and Mrs. Samuel Smith by Gilbert Stuart was a gift from Dr. and Mrs. B. Noland Carter in memory of Dr. Carter's aunts Miss Mary Coles Carter and Miss Sally Randolph Carter; a painting of Adlai E. Stevenson by Trafford P. Klots was given by Stevenson's sister Mrs. Ernest L. Ives and Mrs. Marshall Field; a bust of Katherine Cornell by Richmond Barthé and a group of portraits of American Negroes came from the Harmon Foundation; a splendid likeness of Elihu Root by Augustus Vincent Tack was a bequest from the late Duncan Phillips; and finally a bronze bust of Florenz Ziegfeld, by an unknown artist was a gift from an anonymous donor. A full list of gifts and purchases is appended.

A beginning has been made in acquiring antique furniture for the galleries, thanks to the interest of David E. Finley, who is himself giving a Sheraton-Empire card table attributed to Duncan Phyfe,



George Gershwin, by George Gershwin, 1934, gift of Ira Gershwin, 1966. (NPG.66.48)

while Mrs. Finley and her sister Mrs. Eustis Emmet are contributing an early oak blanket chest, a pair of 19th-century side tables, and a large sideboard which once belonged to Daniel Webster. Nothing will enliven more effectively the galleries of portraits than the introduction into them of the sort of decorative arts with which the portraits were associated when they were privately owned, and the Gallery is delighted that an introduction to this program has been made.

Additions to the Collection

Subject	*Artist*	*Donor or Fund*
Anderson, Marian	Laura Wheeler Waring	Harmon Foundation
Barrow, Joe Louis	Betsy Graves Reyneau	Harmon Foundation
Bunche, Ralph	Betsy Graves Reyneau	Harmon Foundation
Chase, Samuel	John Wesley Jarvis	Museum Fund
Cooper, James Fenimore	Attributed to Charles Loring Elliott	Alexis I. duPont deBie
Cornell, Katherine	Richmond Barthé	Harmon Foundation
Drew, Charles	Betsy Graves Reyneau	Harmon Foundation
Du Bois, William	Laura Wheeler Waring	Harmon Foundation

Subject	*Artist*	*Donor or Fund*
Einstein, Albert	Max Westfield	Max Westfield
Eliot, Charles William	Anne Ware Sabine Siebert	John Marshall and Elizabeth L. Howie
Emmet, Thomas Addis	C. L. Hogeboom	Museum Fund
Fillmore, Millard	James Bogle	Museum Fund
Fiske, Minnie Maddern	Culin(?)	Mr. and Mrs. Walter H. Schnormeier
Ford, Worthington Chauncey	Artist unknown	William A. Ellis
Gershwin, George	George Gershwin	Ira Gershwin
Grant, Ulysses S. and Generals	Ole Peter Hansen Balling	Margaret Garber Blue
Green, Nathaniel	Valentine Green	Museum Fund
Harrison, William Henry	Albert Gallatin Hoit	Museum Fund
Helmuth, Justus Henry Christian	John Eckstein	Museum Fund
Heyward, Du Bose	George Gershwin	Ira Gershwin
Holmes, Oliver Wendell	Artist unknown	Museum Fund
Houston, Charles	Betsy Graves Reyneau	Harmon Foundation
Jackson, Andrew	James Tooley, Jr.	Mary Lively Hoffman, Charles T. Lively and William Lively
Jefferson, Thomas	Kosciusko-Sokolniki	Museum Fund
Johnson, Charles	Betsy Graves Reyneau	Harmon Foundation
Johnson, James	Laura Wheeler Waring	Harmon Foundation
Longacre, James Barton	James Barton Longacre	Museum Fund
Longfellow, Henry Wadsworth	James Henry Haseltine	Museum Fund
Marshall, Thurgood	Betsy Graves Reyneau	Harmon Foundation
Masters, Edgar Lee	Francis J. Quirk	Francis J. Quirk
Mendenhall, Thomas Corwin	Anne Ware Sabine Siebert	John Marshall and Elizabeth L. Howie
Morton, Levi Parsons	Leon-Joseph Florentin Bonnat	Mrs. Eustis Emmet and Mrs. David E. Finley
Nast, Thomas	John W. Alexander	Museum Fund
Pinckney, Charles Cotesworth	Henry Benbridge	Museum Fund
Pope, John Russell	Augustus Vincent Tack	The Phillips Collection
Randolph, Asa	Betsy Graves Reyneau	Harmon Foundation
Rockefeller, John D.	Adrian Lamb after John Singer Sargent	John D. Rockefeller III
Roosevelt, Eleanor	Alta Shore Purdy	Mrs. Richard Purdy
Root, Elihu	Augustus Vincent Tack	Duncan Phillips
Rose, Billy	Edward Weiss	Museum Fund
Sabin, Albert Bruce	Edward R. Amateis	Edward R. Amateis
Sandburg, Carl	Edward Steichen	Edward Steichen
Sandburg, Carl	Miriam Svet	Mrs. Dore Schary
Schoenberg, Arnold	Muriel P. Turoff	Mrs. Abraham Turoff
Smith, Mrs. Samuel	Gilbert Stuart	Dr. and Mrs. B. Noland Carter

Subject	*Artist*	*Donor or Fund*
Smith, Samuel	Gilbert Stuart	Dr. and Mrs. B. Noland Carter
Steichen, Edward	Joan Miller	Museum Fund
Stevenson, Adlai Ewing	Trafford Klots	Mrs. Marshall Field and Mrs. Elizabeth Ives
Stevenson, Adlai Ewing	Edward Weiss	Morris Leibman
Story, Joseph	Chester Harding	Museum Fund
Tubman, Harriet	Robert S. Pious	Harmon Foundation
Truman, President and His Military Advisers	Augustus Vincent Tack	The Phillips Collection
Washington, George	Valentine Green	Museum Fund
Watson, Forbes	Agnes Watson	John H. Paterson
Webster, Noah	James Herring	William A. Ellis
White, Walter	Betsy Graves Reyneau	Harmon Foundation
Wright, Louis Tompkins	W. E. Artis	Harmon Foundation
Ziegfeld, Florenz	Artist unknown	Anonymous Donor

History Department

The history department's activities have fallen into three separate but closely interconnected categories: exhibitions, the catalog of American portraits, and research and publications.

For exhibitions, the department supplied biographical captions for portraits appearing in the small catalog entitled "Recent Acquisitions," identifications for works shown in "Interpretations of Notable Americans," and a complete exhibition script for "Faces from the American Past." It submitted for the approval of the Gallery's Commission a preliminary list of sitters for the exhibition to be shown upon the official opening of the Gallery and has begun work with Riddick Vann on a plan for this exhibition.

The Catalog of American Portraits, a national inventory of likenesses of Americans of historical significance, has developed considerably. For each of nearly 10,000 portraits within it a dossier containing a detailed record and, wherever possible, a photograph is being set up. Much of the print and engraving collection of the Gallery, assembled by picture librarian Genevieve A. Kennedy, is being integrated into the Catalog. Reference service by sitter or by artist is being given now on inquiries about portraits. The first steps have been taken toward the use of automatic data processing for the Catalog, so that it can be indexed by any of its components or any combination of them. Filed by sitter, each record contains the sitter's dates, occupation, and region. Under each sitter, dossiers are arranged alphabetically by artist, giving the latter's dates and region. The medium, dimensions, description, and history of each representation are also supplied, with all facts documented.

In July 1966, Mrs. Virginia Purdy spent three days in Nashville, Tennessee, working with a photographer to catalog the portraits of Andrew Jackson and his circle at the Hermitage. Notes were made on other Jackson portraits in and around Nashville. This kind of research in the field represents one of the Gallery's approaches to the study of American portraiture. Another approach has been the acquisition of photographs of all portraits in several of the nation's major repositories, and many items from the Gallery's prints and photographs collection are being integrated into the Catalog. Several steps were also taken to coordinate the program of the Gallery with related works of the Prints and Photographs Division of the Library of Congress.

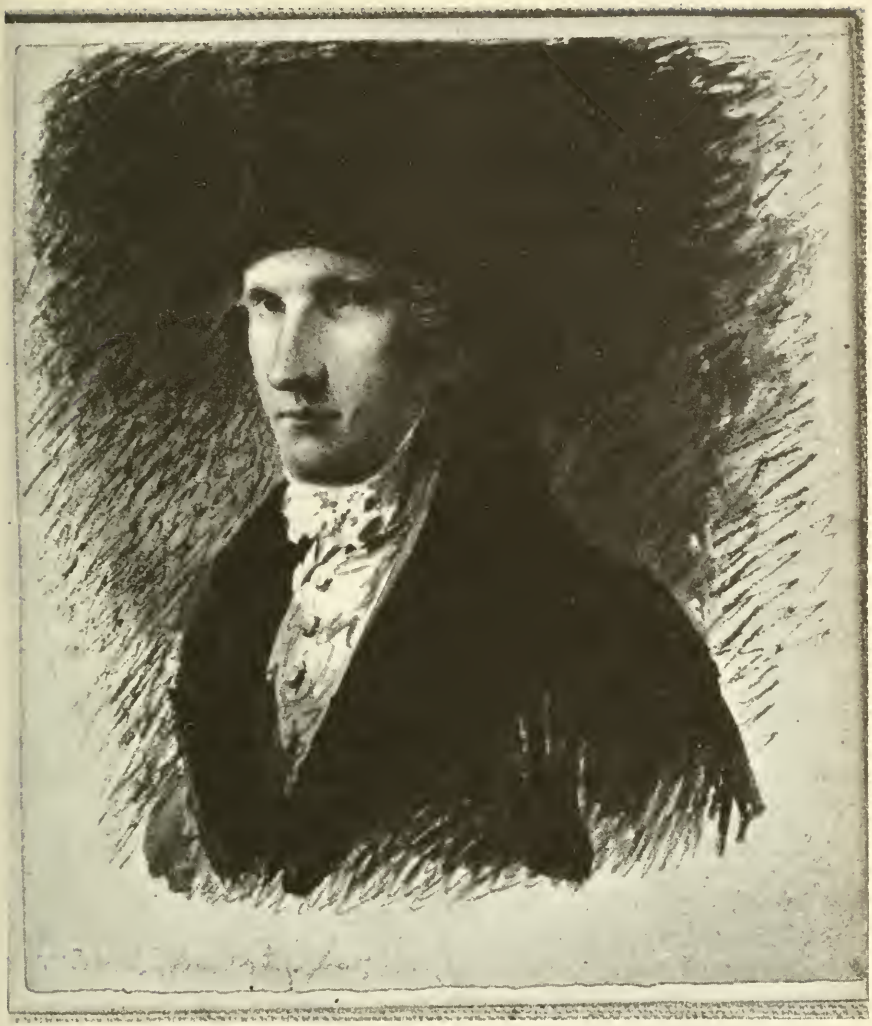
The long task of John Fraser of transcribing the records relating to American portraiture in the Frick Art Reference Library in New York was completed this year. The Gallery is beholden to the Frick Library for their willingness to make available these fundamental documents on which to base future research.

Daniel J. Reed has worked with the National Portrait Gallery Commission's recently appointed research and publication committee, of which Dr. E. P. Richardson is chairman, to set up the Gallery's future program. As a result of recommendations of this committee and divisions of the full Commission of the Gallery and its Director, the history department is responsible for the overall editing of a catalog of the Gallery's permanent collection and all future exhibition catalogs.

In the planning stages is a multi-volume study of the portraits of the leaders of the American Revolution to appear during the bicentennial celebration, and probably to include a publication in microfilm and letterpress of the papers of Charles Willson Peale, portrait painter of the Revolution. This latter task is being undertaken in cooperation with the American Philosophical Society.

Curatorial Activities

New staff members include Joseph A. Yakaitis who has assumed most ably the complex duties of administrative officer. Riddick Vann brings with him to the post of exhibits curator many years of valuable experience gained from the Office of Exhibits, U.S. National Museum. Charles Olin, who is serving as conservator to both NCFA and NPG, comes also from the National Museum and is working on objects from both collections in a laboratory well equipped for this most essential service. Thomas Girard joined the staff as the NPG representative



James Barton Longacre, by James Barton Longacre, ca. 1830, purchase, 1967. (NPG.67.14)

in the office of registrar and Monroe Fabian is assisting Mr. Stewart as fine arts historian in the curatorial department.

During the year the Director continued to work on the completion and furnishing of the building in addition to his normal duties. He addressed a Yale Club audience in New York, the Gunnery School in Washington, Connecticut, and the Arts Club of Washington, D.C.,

on the collections and program of the NPG. He also gave an address on the Gallery to the Regent and Vice Regents of the Mt. Vernon Ladies Association and was appointed a member of the Association's Advisory Committee. During the year he served on the Blair House Fine Arts Committee. His article, "The National Portrait Gallery," lavishly illustrated, appeared in the November 1966 issue of *Antiques*.

Dr. Reed, who went on a year's leave of absence in January, spoke on the program and collections at the Wayne State University in Detroit. An article by him on the Catalog of American Portraits will appear in the July issue of the *American Archivist*. Dr. Reed's absence leaves a large gap in the staff but it was felt important to permit him to perform a public service by pursuing, on a temporary basis, work with the National Commission on Libraries. He has continued diligently, however, to keep abreast of the activities of his department. Meanwhile, Mrs. Purdy, the assistant historian, has been an able substitute in his absence covering the day-to-day activities in the field of history.

"A Portrait of John Bartram Identified," an article of Robert G. Stewart, was published in the January–February 1967 issue of the *Garden Journal* of the New York Botanical Garden.

Librarian William Walker and Mrs. Shirley Harren of the Library staff are members of the District of Columbia Library Association, and Mrs. Harren became a member of the Special Libraries Association this year, of which the Librarian was already a member. In the local chapter of the Special Libraries Association, Mr. Walker served as Chairman of the local Picture Division Group. This library group met in the Fine Arts and Portrait Galleries building, where it was addressed by Mrs. Purdy of the NPG staff. During the year, Mr. Walker, Mrs. Harren, and Mrs. Aleita Hogenson have worked as a reference staff with curators and researchers in the preparation of all exhibitions mounted by NCFA and NPG. They have also assisted in regular research in the library and, in addition, have double checked bibliographies prepared by research staff.

A great lift was given the entire staff by the presence from February 15 to April 15 of C. Kingsley Adams, former Director of the National Portrait Gallery of London.

Mr. Adams made himself acquainted with every aspect of the Gallery's program and ingratiated himself with the entire staff during his stay here. Before leaving he prepared a report for the Director in which he made certain suggestions, tactfully pointing out, however, that the comparison of the Washington with the London galleries was based on little more than the fact that both were concerned only with portraits of those who had made distinguished contributions to the history of

General Samuel Smith, by Gilbert Stuart, gift of Dr. B. Noland Carter in memory of Miss Mary Coles Carter and Miss Sally Randolph Carter, 1966. (NPG.66.50)

their respective countries. He pointed out certain procedures that had proved successful in London, certain modifications that had been made through the years in these procedures, and modestly gave the benefit of his many years' experience in the portrait field. This report was sent to all members of the Commission.

A farewell tea was given in the Gallery by Mr. and Mrs. Adams before they left Washington, and the staff saw them go with very real

regret. No one could possibly have been more helpful than he during his visit.

It is sad to report the death on August 20, 1966, of Victor Proetz, the design consultant whose imagination and scholarly knowledge in the field of interior design has done so much to give individuality and character to the National Portrait Gallery. His architectural drawings were an invaluable legacy to the Gallery, and the second floor, particularly the administrative suite, will be a lasting monument to his discriminating taste. His witty, learned, and perceptive presence on the staff will be greatly missed. The Gallery is fortunate in having Elinor Merrell of New York volunteer professional help in working out the many complicated details of furnishing.

Lastly, the Gallery has had much welcome aid this year in the form of the various young people who have taken part in its program. Nora Attems was volunteer assistant to Charles Olin in the Conservation Laboratory, and Tescia Yonkers was a volunteer for the summer in the Curator's office. From the Smithsonian's summer-intern education and training program the Gallery's share of workers were William Michael Bigel, Patricia Greene, Mary Grace Holback, Norvell Jones, Mary Ann Mears, and Frances Yost; and from the Office of Economic Opportunity, one representative of the Neighborhood Youth Corps, Kathleen Bowen. Finally, the Gallery was able to employ four 700-hour appointees, Nancy Beinke, Tom Carter, Mrs. Mona Dearborn, and Mrs. Anna Gregersen, with whose aid many things were accomplished that would otherwise have been quite impossible.

Library

The National Collection of Fine Arts—Portrait Gallery library moved into the spacious third-floor area of the Fine Arts and Portrait Gallery building in February and March 1967. The library continues to grow steadily. During the past year 441 new titles were obtained for the NPG collections. Of the subscriptions this year to 104 journals and other serials, 34 titles were for NPG; in addition, several hundred journals, mostly museum publications, were received on exchange or as gifts.

In addition to items received by the joint library by purchase or exchange, over two thousand books, catalogs, and journals were received as gifts, of which the most notable came from Mrs. Adelyn Breeskin, Stephan Munsing, Dr. and Mrs. Charles Nagel, and the estate of the late Victor Proetz. Each consisted of several hundred items.

National Gallery of Art

JOHN WALKER, *Director*

SIR: Submitted herewith on behalf of the Board of Trustees is the report of the National Gallery of Art for the fiscal year ended June 30, 1967. This, the Gallery's 30th annual 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), U.S. Code, title 20, sec. 75(d).

Organization

The National Gallery of Art, although established as a bureau of the Smithsonian Institution, is an autonomous and separately administered organization and is governed by its own Board of Trustees. The statutory members of the Board 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 April 5, 1967, Stoddard M. Stevens was elected a general trustee of the National Gallery of Art to serve in that capacity for the remainder of the term expiring July 1, 1971, thereby succeeding John N. Irwin II. On May 4, 1967, Lessing J. Rosenwald was reelected a general trustee of the Gallery to serve in that capacity for the term expiring July 1, 1977. The three other general trustees continuing in office during the fiscal year ended June 30, 1967, were Paul Mellon, John Hay Whitney, and Dr. Franklin D. Murphy. On May 4, 1967, Paul Mellon was reelected by the Board of Trustees to serve as President of the Gallery, and John Hay Whitney was reelected Vice President.

The executive officers of the Gallery as of June 30, 1967, were as follows:

Chief Justice of the United States, Earl Warren, Chairman.
Paul Mellon, President.
Ernest R. Feidler, Secretary-Treasurer.
John Walker, Director.
E. James Adams, Administrator.
Ernest R. Feidler, General Counsel.
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 4, 1967, were as follows:

EXECUTIVE COMMITTEE

Chief Justice of the United States, Earl Warren, Chairman.
Paul Mellon, Vice Chairman.
Secretary of the Smithsonian Institution, S. Dillon Ripley.
John Hay Whitney.
Dr. Franklin D. Murphy.

FINANCE COMMITTEE

Secretary of the Treasury, Henry H. Fowler, Chairman.
Paul Mellon.
Secretary of the Smithsonian Institution, S. Dillon Ripley.
John Hay Whitney.
Stoddard M. Stevens.

ACQUISITIONS COMMITTEE

Paul Mellon, Chairman.
John Hay Whitney.
Lessing J. Rosenwald.
Dr. Franklin D. Murphy.
John Walker.

Personnel

At the close of fiscal year 1967, full-time Government employees on the permanent staff of the National Gallery of Art numbered 320. The United States Civil Service regulations govern the appointment of employees paid from appropriated funds.

Appropriations

For the fiscal year ended June 30, 1967, the Congress of the United States, in the regular annual appropriation, and in a supplemental appropriation required for pay increases, provided $2,822,000 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, that is, the Public Resolution No. 14, 75th Congress, 1st session, approved March 24, 1937 (50 Stat. 51), U.S. Code, title 20, secs. 71–75.

The following obligations were incurred:

Personnel Compensation and Benefits	$2, 377, 535. 14
All Other Items	394, 580. 39
Total Obligations	2, 772, 115. 53

Attendance

The 1,510,967 visitors to the Gallery during fiscal year 1967 represents a decrease of 66,141 from the attendance in 1966, which marked the 25th anniversary of the Gallery when attendance was unusually high. From July 1, 1966, through Labor Day and from April 1 through June 30, 1967, the Gallery was open to the public from 10 a.m. to 10 p.m. on weekdays and from noon to 10 p.m. on Sundays. For the remainder of the year the Gallery was open to the public every day, except Christmas and New Year's Day, on a schedule of 10 a.m. to 5 p.m. on weekdays and 2 p.m. to 10 p.m. on Sundays. Visitors during the additional hours in summer 1966 and spring 1967 numbered 141,440. The average daily attendance for the year was 4,162.

The Collections

There were 2,554 accessions to the collections by the National Gallery of Art as gifts, loans, or deposits during the year. The following gifts or bequests were accepted, and the following purchases were authorized, by the Board of Trustees:

PAINTINGS

Donor	*Artist*	*Title*
The Belcher Collection, Stoughton, Mass.	Tarbell	Mother and Mary
Countess Bismarck	Sully	The Vanderkemp Children
Colonel and Mrs. Edgar William Garbisch	Powell	Studebaker in his Wagon-Tire Shop, Hangtown, California
"	Prior	The Younger Generation
"	Chambers	Hudson River Valley, Sunset
"	Unknown	Fruit and Flowers

Donor	*Artist*	*Title*
Colonel and Mrs. Edgar William Garbisch	Feke	Alexander Graydon
"	Unknown	Christ on the Road to Emmaus
"	Kemmelmeyer	First Landing of Christopher Columbus
"	Williams	Miss Sarah Mershon
"	"	Daniel R. Schenck
National Gallery of Art, Ailsa Mellon Bruce Fund	Avercamp	A Scene on the Ice
National Gallery of Art, Ailsa Mellon Bruce Fund	Gossaert (Mabuse)	Portrait of a Banker
National Gallery of Art, The Chester Dale Fund	Delacroix	The Arab Tax
National Gallery of Art, Andrew Mellon Fund	Cole	The Notch of the White Mountains
National Gallery of Art, Purchase Funds	Leonardo da Vinci	Ginevra de'Benci
Morris Schapiro	Charles Willson Peale	Benjamin and Eleanor Ridgely Laming
	SCULPTURE	
National Gallery of Art, Ailsa Mellon Bruce Fund	Maillol	Summer
	GRAPHIC ARTS	
Mrs. Michael H. Egnal	Stuart Egnal	6 Etchings
Colonel and Mrs. Edgar William Garbisch	Unknown	Baptismal Wish for Catarina Titzlir
"	"	Reward of Merit for Anna Maria Gergard
"	"	Reward of Merit for Peter Schern
"	Emily Pelton	Jephthah Laments his Rash Vows
"	Pinney	Lolotte and Werther
"	Unknown	"George Washington is My Name"
"	Mary Ann Willson	The Prodigal Son Taking Leave of His Father
"	"	The Prodigal Son Wasted His Substance
"	"	The Prodigal Son in Misery
"	"	The Prodigal Son Reclaimed
"	Unknown	Fruit in Fluted Bowl
"	Crecelius	Miesse Family Record
"	Attributed to John Landis	The Temptation
"	J. Evans	Family of Four
Miss Hilda Katz	Hilda Katz	3 Prints

Donor	*Artist*	*Title*
Miss Alice Hall Kerr	L. Frameng, after Rembrandt	The 100 Guilder Print
"	R. Earlon, after Claude	A Landscape
Mrs. Arthur William Heintzelman	Arthur William Heintzelman	7 Prints
National Gallery of Art, Print Purchase Fund	Master H. L.	Cupid on a Snail Shell
"	Pissarro	Marche aux Légumes à Pontoise

WORKS OF ART ON LOAN TO THE GALLERY

The following works of art were received on loan, or were continued on loan:

From	*Artist*	*Title*
Nathan Cummings	Prendergast	Cove with Figures
Colonel and Mrs. Edgar William Garbisch	Hicks	Peaceable Kingdom
Jerome Hill	Delacroix	Lion Devouring a Goat
David Lloyd Kreeger	Bonnard	After Lunch
"	Cézanne	Road near Auvers
"	Degas	Woman Brushing Her Hair
"	Gauguin	Landscape
"	Monet	The Seine near Giverny
"	Maillol	Pomona
Mr. and Mrs. Paul Mellon	Stubbs	Lion Attacking a Deer
"	Stubbs	Lion Attacking a Horse
"	Various French Artists	68 Paintings
"	Various English Artists	137 Drawings and Water Colors
"	Prendergast	Salem Willows
"	Degas	14 Wax Sculptures
"	Degas	1 Bronze Sculpture
Rear Adm. and Mrs. Hubert W. Chanler	Various 18th Century Artists	24 Drawings and Water Colors

WORKS OF ART ON LOAN RETURNED

To	*Artist*	*Title*
Mrs. Mellon Bruce	Goya	Condesa de Chinchon
Colonel and Mrs. Edgar William Garbisch	Bradley	Emma Homan
"	Field	The Death of the First Born
"	Field	Egyptian Scene
"	Hofmann	View of the Schuylkill City Almshouse Property
"	Unknown Artist	Joseph and Anna Raymond
Mr. and Mrs. Paul Mellon	Degas	1 Wax Sculpture

WORKS OF ART LENT BY THE GALLERY

The following loans were made during the fiscal year:

To	*Artist*	*Title*
Abby Aldrich Rockefeller Folk Art Collection	Hudson Valley Artist	Johannes Van Vechten
"	"	Gentleman of the Willson Family
"	"	Miss Van Alen
"	"	Christ Talketh with a Woman of Samaria
Arkansas Arts Center	Catlin	18 Paintings of Indian Life
Blair House	Sargent	Miss Mathilde Townsend
Carnegie Institute Museum of Art, Pittsburgh, and Corcoran Gallery of Art	Hicks	The Cornell Farm
Cincinnati Art Museum	Twachtman	Winter Harmony
Cleveland Museum of Art	French, circa 1140	Chalice of the Abbot Suger
Department of State	Catlin	5 Paintings of Indian Life and 2 Indian Portraits
Detroit Institute of Art and Munson-Williams Proctor Institute	Charles Willson Peale	Benjamin and Eleanor Ridgely Laming
"	Rembrandt Peale	Richardson Stuart
"	"	Timothy Matlack
Howard University	Johnston	The Westwood Children
State of Illinois Art Mobile	Stuart	Sir John Dick
"	Zeliff	The Barnyard
Joslyn Art Museum	Catlin	35 Paintings of Indian Life
Kalamazoo Institute of Arts	Trumbull	Alexander Hamilton
"	Kensett	Newport Harbor
"	Homer	Breezing Up
Montreal Museum of Art	West	Colonel Guy Johnson
Museum of Early American Folk Art, New York	Unknown Artist	Girl in Plumed Headdress
"	"	22 Houses and a Church
"	Phillips	Joseph Slade
"	"	Alice Slade
Museum of Fine Arts, St. Petersburg, Florida	Romney	Sir Archibald Campbell
"	Raeburn	Captain Patrick Miller
"	Unknown Artist	Girl with Doll
"	Boucher	Diana and Endymion
Norfolk Museum of Arts and Sciences	Guardi	Castel Sant'Angelo
"	Winterhalter	Queen Victoria
"	Greuze	Girl with Birds
"	Lely	Barbara Villiers, Duchess of Cleveland

To	*Artist*	*Title*
Norfolk Museum of Arts and Sciences	Pater	Fête Champêtre
"	"	The Gift of the Fishermen
"	Highmore	A scholar of Merton College
Philadelphia Museum of Art	Manet	Still Life: Melon and Peaches
"	"	The Dead Toreador
Post Office Department (Interpex), New York	Homer	Breezing Up
"	Audubon	Columbia Jay
Smithsonian Institution	Unknown	Martha
Society of Four Arts, Palm Beach, Florida	Bradley	Little Girl in Lavender
"	Bundy	Vermont Lawyer
"	Chandler	Captain Samuel Chandler
"	"	Mrs. Samuel Chandler
"	Field	"He Turned Their Waters into Blood"
"	Phillips	Joseph Slade
"	"	Alice Slade
"	Unknown	Catherine Hendrickson
"	"	The Sargent Family
"	"	Mahantango Valley Farm
"	"	The Start of the Hunt
"	"	The End of the Hunt
"	"	General Washington on a White Charger
"	"	The Hobby Horse
"	"	Jonathan Benham
"	Walters	Memorial to Nicholas Catlin
Whitney Museum of American Art	Chandler	Captain Samuel Chandler
"	"	Mrs. Samuel Chandler
"	Cropsey	Autumn on the Hudson River
National Portrait Gallery, Washington	Durand	Gouverneur Kemble
"	Harding	Self-Portrait
"	Herring	Junius Brutus Booth
"	Huntington	Henry Theodore Tuckerman
"	"	James Hall
"	"	John Edwards Holbrook
"	Johnson	Edwin Forrest
"	"	Joseph Wesley Harper
"	Lawson	William Morris Hunt
"	Mount	Charles Loring Elliott

To	*Artist*	*Title*
National Portrait Gallery, Washington	Stuart	Stephen van Rensselaer
"	"	James Lloyd
"	Wiles	Julia Marlowe Sothern

Other Gifts and Bequests

Gifts and bequests of money and securities were made by Auchincloss, Parker and Redpath; Avalon Foundation; Mrs. Ailsa Mellon Bruce; Estate of Chester Dale; J. I. Foundation, Inc.; Institute of Appliance Manufacturers, Inc.; Samuel H. Kress Foundation; Estate of Miss Loula D. Lasker; Mr. Douglas B. Maitland; Mrs. Cordelia S. May; The A. W. Mellon Educational and Charitable Trust; Mr. Paul Mellon; Old Dominion Foundation; Mr. Allen E. Ripingill; Mrs. James T. Saari; and Mr. John Walker.

Exhibitions

The following exhibitions were held at the National Gallery of Art:

The Chester Dale Bequest (continued from previous year).

Art Treasures of Turkey (continued from previous year through July 17, 1966).

Etchings by Rembrandt from the Collection of the National Gallery of Art (continued from previous year through August 17, 1966).

An Exhibition of City Views from the 16th to the 20th Century from the Collection of the National Gallery of Art (July 1 through October 27, 1966).

Piranesi Etchings (August 13, 1966, through March 30, 1967).

17th- and 18th-Century Prints from the Collection of the National Gallery of Art (August 13 through October 2, 1966).

17th- and 18th-Century European Drawings (August 14 through September 11, 1966). Organized by the American Federation of Arts and sponsored by the Samuel H. Kress Foundation.

Engravings and Etchings by and after William Hogarth from the Rosenwald and Addie Burr Clark Memorial Collections (August 18 through December 13, 1966).

Chinese Art from the Collection of H. M. King Gustaf VI Adolf of Sweden (September 10 through October 9, 1966).

101 American Primitive Water Colors and Pastels from the Collection of Edgar William and Bernice Chrysler Garbisch (October 9 through November 20, 1966).

Canaletto and Bellotto Etchings (October 12, 1966, through April 24, 1967).

An Exhibition of Christmas Card Prints (October 28, 1966, through February 1, 1967).

Master Prints from the Collection of the National Gallery of Art (November 24, 1966, through March 5, 1967).

American Prints from the Collection of the National Gallery of Art (December 14, 1966, through April 20, 1967).

Musical Prints from the 15th to the 20th Century from the Collection of the National Gallery of Art (February 2 through May 30, 1967).

Festival Designs by Inigo Jones from the Collection of the Duke of Devonshire at Chatsworth (March 19 through April 23, 1967).

Selection of Post-Impressionist and Expressionist Prints from the Rosenwald Collection (April 21 through June 7, 1967).

100 European Paintings and Drawings from the Collection of Mr. and Mrs. Leigh B. Block (May 5 through June 11, 1967).

15th- and 16th-Century German Prints (May 31, 1967, to continue into the next fiscal year).

18th-Century Drawings from the Collection of Rear Admiral and Mrs. H. W. Chanler (June 8, 1967, to continue into the next fiscal year).

Gilbert Stuart, Portraitist of the Young Republic (June 28, 1967, to continue into the next fiscal year).

EXHIBITIONS OF RECENT ACCESSIONS: *A Lady Writing* by Jan Vermeer (from previous year through October 26, 1966); *Benjamin and Eleanor Ridgely Laming* by Charles Willson Peale (December 16, 1966, through January 2, 1967); *A Scene on the Ice* by Avercamp and *Portrait of a Banker* by Jan Gossaert (Mabuse) (February 1, 1967, through February 14, 1967); and *Ginevra de'Benci* by Leonardo da Vinci (March 17, 1967, to continue into the next fiscal year).

Graphic Arts

Graphic arts from the National Gallery of Art collections were included in four traveling exhibitions, and special loans were made to 33 museums, universities, schools, and art centers in the United States and abroad.

Curatorial Activities

Under the direction of chief curator Perry B. Cott, the curatorial department accessioned 52 gifts to the Gallery. Advice was given with respect to 1,818 works of art brought to the Gallery for expert opinion, and 56 visits to collections were made by members of the staff in connection with offers of gifts.

The registrar's office issued 136 permits to copy and 134 permits to photograph works of art in the Gallery's collections. About 7,000

inquiries, many of them requiring research, were answered orally and by letter. There were 318 visitors to the graphic arts study room. Approximately 9,000 photographs were transferred from the library to the graphic arts department; permits for reproduction of 136 photographs were thereafter issued by that department.

Assistant chief curator William P. Campbell served as a member of the Special Fine Arts Committee of the Department of State.

Assistant curator of graphic arts Katharine Shepard conducted a graduate seminar in ancient sculpture, semesters I and II, at Catholic University Art Department, Washington, D.C.

Assistant registrar Diane Russell taught a graduate and undergraduate course at American University in northern Renaissance painting.

The Richter Archives received and cataloged 206 photographs on exchange from museums here and abroad; 1,096 photographs were purchased and about 2,000 reproductions have been added to the Richter 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 9 paintings; gave special treatment to 72; and X-rayed 16 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 of Industrial Research, Pittsburgh, Pennsylvania. Technical advice was given in response to 214 telephone inquiries. Special treatment was given to works of art belonging to Government agencies including the United States Capitol and the Supreme Court.

Publications

A booklet on the new acquisition *Ginevra de' Benci* by Leonardo da Vinci was written by Perry B. Cott. The introduction to the catalog *101 American Primitive Water Colors and Pastels from the Collection of Edgar William and Bernice Chrysler Garbisch* was written by William P. Campbell and subsequently republished in the October issue of *Art News*. An article and exhibition catalog on Giovanni Batista Gaulli for the *Oberlin College Bulletin* was written by Mr. Cooke. An article entitled "The National Gallery" written by Miss Susan Bell was published in the *Catholic Traveler*, March 1967.

Publications Service

The Publications Service placed on sale ten new publications: *Ginevra de' Benci by Leonardo da Vinci*, a booklet with text by Perry B. Cott; *The National Gallery of Art* (in Japanese) by John Walker; reprints of an article on the Gallery by John Walker from the *National Geographic Magazine* for March 1967; *A Gallery of Children* by Marian King (revised edition in color); *The National Gallery of Art, A Twenty-Five-Year Report*; *Rembrandt: Life and Work* by Jakob Rosenberg (revised edition); *Paintings from the Samuel H. Kress Collection, Italian Schools, XIII–XV Centuries* by Fern Rusk Shapley; *Great Draughtsmen from Pisanello to Picasso* by Jakob Rosenberg; *Art and Architecture in Holland* by Rosenberg and Slive; *The Portrait in the Renaissance*, the A. W. Mellon Lectures in the Fine Arts for 1963 by John Pope-Hennessy.

Seven new catalogs of special exhibitions were placed on sale: *17th- and 18th-Century European Drawings; Chinese Art from the Collection of H. M. King Gustaf VI Adolf of Sweden; 101 American Primitive Water Colors and Pastels from the Collection of Edgar William and Bernice Chrysler Garbisch;* a second edition of *French Paintings from the Collections of Mr. and Mrs. Paul Mellon and Mrs. Mellon Bruce; Festival Designs by Inigo Jones; 100 European Paintings and Drawings from the Collection of Mr. and Mrs. Leigh B. Block; Gilbert Stuart, Portraitist of the Young Republic.*

A 52-page catalog listing items sold by the Publications Service was published; and 60,000 copies of a catalog with black-and-white illustrations of 49 Christmas cards, using reproductions of paintings, sculptures, prints, and drawings from the Gallery's collection was published and 60,000 distributed. Approximately 400,000 Christmas cards and notefolders were sold.

There were produced 11 new 11″ x 14″ color reproductions (to make a total of 295 subjects), 5 new color postcards (for a total of 244 subjects), and 13 2″ x 2″ color slides (for a total of 440 subjects). A slide set, *Painting in Georgian England*, from the collection of Mr. and Mrs. Paul Mellon, was made available with text and a recorded lecture.

New color reproductions stocked included 12 22″ x 28″ overall and 6 large ones published by private companies, also reproductions of 4 bronze heads from the set of 36 deputies by Daumier in the Rosenwald Collection.

Number of customers served:

Over-the-counter sales	310, 390
Sales by mail	13, 504
Total	323, 894

Ginevra de'Benci, by Leonardo da Vinci, ca. 1480. Below: Mrs. Lyndon B. Johnson and Mrs. J. Lee Johnson (back to camera), President of the Amon Carter Museum of Western Art in Fort Worth, Texas, with Ernest R. Feidler, the National Gallery's Secretary, Treasurer, and General Counsel (left), and Director John Walker viewing the Gallery's *Ginevra de'Benci* on Tuesday, April 4, 1967.

Educational Program

The program of the department was carried out under the direction of Margaret Bouton, curator in charge of educational work.

The department continued its series of lectures, conducted tours, and special talks on the works of art in the Gallery's collections. Attendance at the 736 tours was 22,126, an increase of 1,982 over last year. Attendance for all regularly scheduled general tours, tours of the week, and Picture of the Week talks amounted to 44,688, an increase of 4,565 over last year.

Special tours, lectures, and conferences (a total of 637) were arranged to serve 22,733 persons, an increase of 1,845 over last year. These special appointments were made for Government agencies and bureaus such as the Department of State, Foreign Service Institute, Foreign Students Service Council, and the Armed Forces. Tours and lectures were arranged for club and study groups and school groups from all areas of the United States.

The program of training volunteer docents was continued, and the department gave special instruction to 137 women from the Junior League of Washington, D.C., and from the American Association of University Women. By arrangement with the public and private schools in the District of Columbia and surrounding counties of Maryland and Virginia, these two organizations conducted tours for 2,641 classes with a total of 74,327 children.

A new program for pre-school children was begun this year in connection with the Cooperative Nursery Schools supervised by the Parents Pre-School Council of the D.C. Department of Recreation. Training was given by the department to 16 volunteer docents, and this program served 41 classes with a total of 820 children.

In the auditorium on Sunday afternoons 51 lectures were given with slides or films. Attendance at these lectures was 15,095, an increase of 120 over last year, when 52 lectures were presented. There were 33 guest lecturers, including the A. W. Mellon lecturer in the fine arts Professor Mario Praz, University of Rome, who gave a series of six lectures entitled "On the Parallel of Literature and the Visual Arts." Nine of the lectures were given by staff members. Two were full-length film presentations.

The slide library of the educational department has a total of 49,674 slides in its permanent and lending collections. During the year 916 slides were added to the collection, 658 slides were recataloged, and 714 slides were bound. A total of 292 persons borrowed 8,922 slides; it is estimated these were seen by 27,063 viewers.

Members of the staff participated in outside activities which included lecturing to various club and school groups and Government agencies

(some of which involved travel outside the metropolitan area). Margaret Bouton gave a lecture at the Teachers' Development Institute, Georgetown University. Raymond S. Stites gave two lectures at American University. Carleen Keating taught a survey course at Montgomery Junior College.

John Brooks was responsible for LecTour recordings: 5 new LecTours were recorded, 7 revisions were made in existing tapes, and 64 copies of master tapes were made and installed. For the school programs, 6 new texts were prepared, and in connection with the Picture of the Week series 37 texts were written by members of the department.

Members of the staff prepared and recorded 37 radio talks, which were broadcast during intermissions of the Sunday night concerts. The staff also prepared printed résumés to accompany the folios of color reproductions for the Radio Picture of the Week series. One member of the staff prepared the text for the Acoustiguide, which went into operation about the middle of June, and wrote the texts for new leaflets for eight Gallery rooms.

The monthly calendar of events was prepared for printing; it was distributed to approximately 9,400 persons each month.

Total public response to the educational program, excluding slide viewers, was 179,789, an increase of 13,580 over last year.

Extension Services

The Office of Extension Services, under the direction of Grose Evans, circulated traveling exhibitions, films, slide lectures with texts, film strips, and other educational materials.

Traveling exhibitions are lent free of charge except for shipping expenses. The 136 exhibits circulated in 1,256 bookings represents an increase of 134 bookings over the previous year. It is estimated that 879,200 persons viewed these exhibitions. In addition 13 exhibits are on loan to other organizations for circulation; these were seen by approximately 88,056 persons in 244 bookings. Of three films on the National Gallery and its collections, 80 prints were circulated in 723 bookings and were seen by approximately 79,530 viewers. This represents an increase over last year of 306 bookings and 33,660 viewers, when 50 prints of the films were circulated. A total of 2,446 slide-lecture sets were circulated in 8,400 bookings, an increase of 1,528 bookings over last year. These were seen by an estimated 630,000 viewers.

As a pilot project, 77 slide lectures were placed on loan to six school systems in various areas of the United States. Of the six systems, five reported a total of 1,381 bookings, with an attendance of approximately 103,575 viewers.

Based on the improved method of estimating audience size mentioned in the 1966 report, the Extension Service reached 1,780,361 persons, an increase of 361,677 over last year.

In an effort to increase the effectiveness of the extension services and to keep abreast of new developments in the audio-visual field, the curator and the assistant curator attended meetings and conventions in various states, displaying examples of the educational materials available from the National Gallery of Art.

The National Gallery of Art cooperated with the United States Office of Education and the George Washington University in a research teacher-training program offered by the latter institution at the Gallery from July 5 to August 12, 1966. Forty teachers were given courses in art history, preparation of gallery tours, audio-visual teaching aids, and Old Masters' techniques. A similar project under the same sponsorship began on June 26, 1967.

Library

Figures for processing of publications include: 2,143 accessioned by gift, exchange, and purchase; 1,319 publications processed; 4,665 cards filed in the main catalog and the shelf list; 3,180 periodicals received by gift, exchange, or purchase; 1,335 periodicals circulated to the staff; 4,224 books charged to staff members; and 6,971 books were shelved in regular routine.

The library distributed 1,333 National Gallery of Art publications to 195 domestic and 195 foreign institutions under its exchange program and 706 publications were received in exchange.

The library is the depository for black-and-white photographs of the 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 3,957 photographs were added to the stock in the library, and 1,409 orders for 9,274 photographs were filled, including 388 permits processed for reproduction of photographs covering 988 subjects.

This year a noticeable reduction in the figures for photographs added to stock and reproduction permits processed occurred because of the transfer, mentioned above under Curatorial Activities, of all graphic arts photographs (approximately 9,000) from the library to the graphic arts department.

Index of American Design

Under the supervision of Grose Evans, the Index of American Design circulated 32 exhibitions in 60 bookings in 13 states. The Index also circulated 144 sets of color slides (7,344 slides) throughout the United

States, and 437 photographs of Index subjects were used for the purpose of study, publication, and exhibition. The photographic file was increased by 21 negatives and 153 prints. The Index received 338 visitors who studied the material for research purposes and for collecting material for design and publication. Sixteen permits were issued for 146 subjects to be reproduced for publication.

Three special exhibitions of Index materials were prepared for use in the Gallery, and two were exhibited at the Interlochen (Michigan) Music festival. Two exhibitions of Index material were circulated by the Smithsonian Institution, and one was lent for a year to the National Foundation on the Arts and Humanities.

Operation and Maintenance

The Gallery building, mechanical equipment, and grounds have been maintained throughout the year at the established standards.

A portion of corridor 43 was remodeled by the installation of an acoustical ceiling, improved lighting, and fabric-covered plywood paneling.

A special installation was prepared for the exhibition of Leonardo da Vinci's painting *Ginevra de' Benci* in lobby B. Controllable spotlights were installed, and an electronic alarm system was provided for the protection of the painting.

The granite platforms in the approach to the Mall steps were raised and repointed.

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. A total of 4,135 potted or tubbed plants, all produced in the Gallery's own greenhouse, and valued at $50,470, were used in various stagings in the garden courts, in the rotunda, and in special exhibitions throughout the building. By the end of the year, the horticultural department will have completed 9,596 consecutive days of flowering plant arrangements in the garden courts.

A broadened growing program, which will be aided by new unit coolers currently being installed in the greenhouse, is beginning to produce a wider range of beautiful and exquisite flowering plants. Thus, the ever-changing panorama of the garden courts will provide even more enjoyable and restful interludes for the Gallery's many visitors.

Pre-Recorded Tours

The Gallery's radio tour system, LecTour, was used by 61,570 visitors. An additional electronic tour system, Acoustiguide, was made available

in June. This system makes use of a small tape-playback device and offers visitors a 45-minute tour of highlights of the Gallery's collection. The recording for this tour was made by Director John Walker.

Music

Under the supervision of Richard H. Bales, Assistant to the Director in Charge of Music, 38 concerts were given on Sunday evenings in the east garden court. The Gallery Orchestra, conducted by Mr. Bales, played ten of these concerts; two of them were made possible by grants from the Music Performance Trust Fund of the American Recording Industry. Thirty-two concerts were made possible by funds bequeathed to the Gallery by William Nelson Cromwell, and the 24th American Music Festival, consisting of six concerts on consecutive Sunday evenings, April 9–May 14, was sponsored by the J. I. Foundation, Inc. All concerts were broadcast locally by radio station WGMS-AM and FM. Music critics of the local papers continued their coverage of the concerts.

During intermissions at the concerts, talks on art subjects were given by members of the educational department, and program notes were given by Mr. Bales.

Two one-hour television programs by the National Gallery Orchestra, with Mr. Bales conducting, were telecast locally over WTOP-TV on November 29, 1966, and February 21, 1967. Paintings and sculpture in the Gallery's collections were reproduced.

Mr. Bales appeared as a guest on radio programs and at civic occasions, and served as chairman of the Instrumental Music Panel of the Arts Advisory Committee of the D.C. Board of Recreation during February and March 1967. He was awarded a certificate for the National Gallery Orchestra television concerts by the American Association of University Women. Mr. Bales' National Gallery Suite No. 3 and other compositions were performed by several orchestras and solo recitalists in other cities during the season.

Research Project

For more than 15 years, the National Gallery of Art has supported and maintained at the Mellon Institute in Pittsburgh, Pennsylvania, an outstanding scientific research laboratory for the application of the physical sciences to problems of art and art history. The primary objectives of the Research Project have been to develop new methods and materials for the care of museum objects and to develop new artists' materials. The program has been concentrated on two areas of broad significance to artists and to museums: the properties of protective coatings and the damaging effects of light. From these

investigations have come more than 30 technical publications including one book, *On Picture Varnishes and Their Solvents*, and the definitive study entitled *Control of Deteriorating Effects of Light upon Museum Objects* by Dr. Robert Feller.

In the past two years, the research team turned its attention to an important new area of interest: the application of nuclear science to problems of the examination of works of art. The completion of a highly successful research collaboration between scientists at Mellon Institute and Pittsburgh's Nuclear Science & Engineering Corporation was marked in March 1967 by the publication of a method of analysis that promises to be useful in detecting 20th-century forgeries of paintings produced allegedly in the 18th century or before. The need for objective methods that would help experts to determine the age of paintings was discussed with Mellon scientists a few years ago by Director John Walker and Secretary Ernest Feidler. It was decided to explore the possibility that a meaningful disequilibrium could be detected between the radioactivity concentrations of lead-210 and radium-226 in white lead pigment made from recently refined lead. With the assistance and facilities of the Nuclear Science & Engineering Corporation, it was soon shown that this expected disequilibrium could be measured in modern white lead but no longer existed in pigment made from lead refined more than approximately 150 years ago. Subsequent work readied the method for practical application. The new method has already been applied successfully to a number of known forgeries, and has been used on certain questioned paintings. Publication of results of these applications is expected within the next year.

Principally responsible for the aforementioned nuclear science work have been Dr. Bernard Keisch and Dr. Robert L. Feller, senior fellow of the Research Project.

In one phase of its activities, the laboratory at Mellon Institute serves as the technical advisor to the National Gallery of Art concerning the care of its collections. In the past year, for example, the research project has made recommendations on the protection of objects from the heating effects of strong illumination in showcases and in television broadcasting. In January 1967 the Research Project was called upon to design a case for transporting the famous portrait *Ginevra de' Benci* by Leonardo da Vinci from Liechtenstein to Washington, D.C. Security conditions dictated that the painting be carried in a case small enough to be easily handled by one person traveling by automobile and airplane over a period of 20 hours. During the journey the package would occasionally be exposed for brief periods to cold and inclement weather, and, hence, the delicate painting on wood panel required protection from sharp changes in temperature and

humidity. The problem was solved by building a special inner container for the painting which was then fitted into the fiber glass shell of a commercially available suitcase and surrounded by layers of thermal insulation. The satisfactory functioning of the package, first tested in refrigeration rooms at Mellon Institute, was fully confirmed in the successful completion of the mission during a single day's journey at the height of bad weather in February 1967.

Toward the end of January, the Committee to Rescue Italian Art (CRIA) requested that Dr. Feller be given leave to go to Florence to assist on problems concerning the care and treatment of frescoes which had been damaged by the flood of the Arno on November 4, 1966. His investigations, made in collaboration with the analytical laboratory at Mellon Institute, soon showed that two kinds of salts were causing problems in the flood-soaked walls: a water-soluble type, such as sodium sulfate, and a water-insoluble type, calcium sulfate dihydrate (gypsum). Several ways were devised to treat walls contaminated with water-soluble salts. The authorities in Florence later requested that Dr. Feller's visit be extended for a total period of two months to permit him to devote attention to an additional problem. Advice and assistance were needed on the properties of synthetic resins that might be used as adhesives and protective coatings in the work of preservation and repair. The Research Project thus has continued in the past year, in both practical and theoretical studies, to serve museum experts and artists everywhere in providing new knowledge for the care and treatment of museum collections.

The Research Project was responsible for the following publications during the fiscal year:

FELLER, R. L. Problems in retouching: Chalking of intermediate layers. Bull. Amer. Group-IIC, vol. 7, no. 1, pp. 32–34, 1966.

———. First description of Dammar picture varnish translated. Bull. Amer. Group-IIC, vol. 7, no. 1, pp. 8, 20, 1966.

———. Polymer emulsions II. Bull. Amer. Group-IIC, vol. 6, no. 2, pp. 18–19, 1966.

———. Rediscovery of the wheel. Color engineering, November-December 1966, pp. 20–23.

———. Standards of exposure to light II. Bull. Amer. Group-IIC, vol. 7, no. 2 pp. 8, 32, 1967.

———, and PAGE, JEAN B. A solvatochromic dye as a convenient indicator of the solubility parameter of petroleum solvents. Bull. Amer. Group-IIC, vol. 7, no. 2, pp. 29–30, 1967.

KEISCH, B., and LEVINE, A. S. Sample preparation for low-level Alpha-particle spectrometry of radium-226. Anal. Chem., vol. 38, p. 1,969, 1966.

———; FELLER, R. L.; LEVINE, A. S.; and EDWARDS, R. R. Dating and authenticating works of art by measurement of natural alpha emitters. Science, vol. 155, p. 1239. 1967.

Other Activities

To commemorate the 25th anniversary of the National Gallery of Art, the Trustees directed that the Gallery publish an illustrated history of its growth and activities. Accordingly, a 102-page volume entitled *The National Gallery of Art, a Twenty-Five Year Report* has been issued. The Report is divided into two parts. A narrative section touches on the highlights of 25 years, and a tabular section summarizes statistical data through June 30, 1966. The *National Geographic* magazine in its March 1967 issue, published an article, fully illustrated in color, honoring the 25th anniversary of the Gallery. The text was prepared by Director John Walker.

The Gallery provided facilities for the ceremony held by the Post Office Department on November 17, 1966, in honor of the first day of issue of a stamp in the Fine Arts series. The stamp is based on the Mary Cassatt painting, *The Boating Party*, in the Chester Dale Collection of the National Gallery.

To assist in securing help to restore the works of art damaged by the November floods of the Arno, the National Gallery of Art, on the evening of December 12, 1966, was made available for a program organized by the Committee to Rescue Italian Art (CRIA), Washington Area, of which Director John Walker is chairman and Assistant Director J. Carter Brown is deputy chairman. The program consisted of an illustrated eye-witness report given by Fred Licht, associate professor of art history at Brown University; a concert of Italian music performed by the National Gallery Orchestra under Richard Bales; and the American premier of Franco Zeffirelli's film *Florence—Days of Destruction*, narrated by Richard Burton.

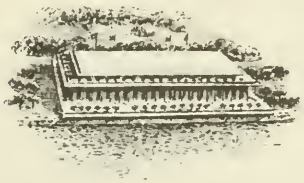
Henry Beville, head of the photographic laboratory, and his assistants processed 123,744 items which included negatives, prints, slides, color transparencies, and color slides. The great increase over the previous fiscal year (approximately double) resulted from the large number of color slides made for the Gallery's expanded Extension Services.

Audit of Private Funds

An audit of the private funds of the Gallery will be made for the fiscal year ended June 30, 1967, by Price Waterhouse and Co., public accountants. A report of the audit will be forwarded to the Gallery.

John F. Kennedy Center for the Performing Arts

Roger L. Stevens
Chairman, Board of Trustees

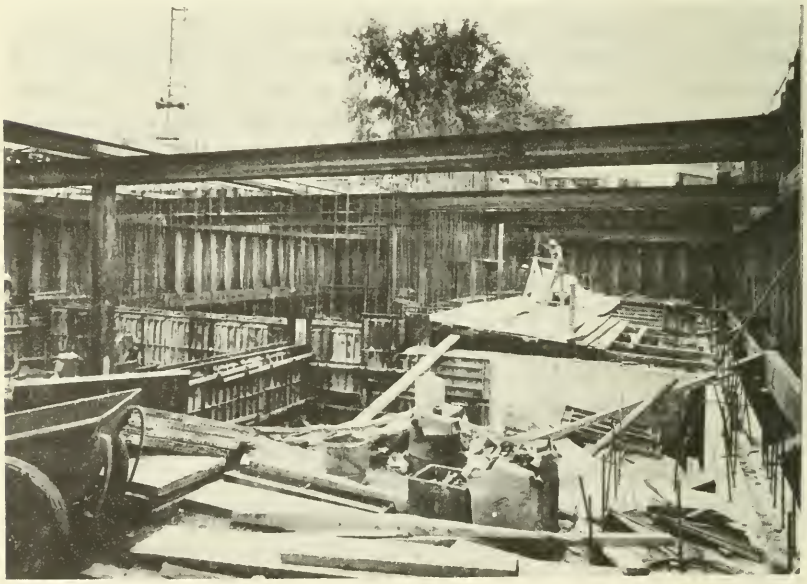


The John F. Kennedy Center has now reached that point in its progress where each succeeding stage will mean increased activity. Without any unforeseen major difficulties, the doors to the Center should be open early in 1970. Within the coming year it is expected that the appointments of the General and Artistic Directors will be announced, program policy covering the actual scope, content, and diversity of the Center's programs and services will be established, and the schedule of events for the opening season will begin to take shape.

It is reassuring to drive along the Rock Creek - Potomac Parkway and the E Street Expressway and view not only the gaily decorated segments of the fence surrounding the site but also the first element of the superstructure beginning to take shape. The interest in the Center, both in Washington and the rest of the Nation, that has and is being expressed in many ways, will be accelerated and heightened as major progress is made in the coming year. For no one now doubts that, at long last, our Nation's Capital will have appropriate facilities for the performing arts in which to display the accomplishments of the great artists of the theater, opera, music and dance, and a living tribute to our 35th President as well.

Increasing activity in regard to the Center can best be appreciated by the enthusiasm with which the various committees have pursued

Construction progress. Top: In January 1967 the site had been cleared and caissons were being placed to bedrock. By June (bottom) the substructure foundation was rising and steel was being erected.



Marjorie Setlogelo, 9, shows her sister Mrs. Albert Mohale, wife of the Ambassador of Lesotho, and Roger L. Stevens the panel she painted for the Tom Sawyer Project (see p. 371). Below: The entrance plaza (east front) of the Kennedy Center. Architectural scale photograph by Checkman.

their responsibilities and purposes. Many prominent foreign dignitaries visiting Washington have requested that their official itinerary include a visit to the Center's site or offices. The Friends of the Kennedy Center have also, particularly by means of their work on the Tom Sawyer Project, focused considerable attention on the Center's progress and its national impact. Daily, individuals find their way to the Center's offices either to indicate their interest in becoming associated with the Center, or to request information and material which will assist them in generating support and enthusiasm for the Center's aims and aspirations. News clippings received by the Center from January to November 1966 show that it was publicized in the Nation's press 3,442 times, including feature-length articles with extensive photo coverage in 65 American dailies and Sunday supplements and in 5 foreign periodicals. The three major television networks devoted coverage to Center events, as have the Voice of America and the press associations.

Organization

The need for a national cultural center in Washington has been recognized since the city's founding. When President Washington selected Pierre L'Enfant to submit plans for the Nation's Capital, it was with the intention of making this new city both the Federal and cultural capital of the United States. Subsequently, President John Adams recognized the necessity of ensuring that the capital of the fledgling Nation take its place with other capital cities in the western world as the focal point of both government and the arts, and so informed the Congress in November 1800.

More recently, support for appropriate facilities in Washington for the performing arts has come from the past six Presidents. The first positive action in this regard was taken by President Eisenhower in September 1958 when, at his suggestion, Congress passed the National Cultural Center Act (P.L. 85–874, 85th Cong., Sept. 2, 1958). Subsequently, President Kennedy submitted legislation to extend the Act an additional three years in order to provide additional time in which to raise the necessary funds. On January 23, 1964, President Johnson signed into law a bipartisan measure designating the National Cultural Center as the sole official memorial in the Nation's Capital to President Kennedy, renaming it the John F. Kennedy Center for the Performing Arts, and authorizing $15.5 million in matching Federal funds (P.L. 88–260). This Act also granted the Center's Trustees the authority to issue revenue bonds to the Secretary of the Treasury, payable from revenues accruing to the Board, to a value not greater

than $15.4 million, this sum to be used for the construction of the 1,600-car underground parking facilities.

BOARD OF TRUSTEES

Pursuant to the John F. Kennedy Center Act, the Board of Trustees is made up of 15 members who serve ex-officio, and 30 general members.

During the past year the terms of six general Trustees expired: Richard Adler, Ralph Bunche, Richard Reynolds, Arthur Schlesinger, Jr., Roger L. Stevens, and Robert Woodruff.

Richard Adler, Arthur Schlesinger, Jr., and Roger L. Stevens, Chairman, were reappointed to new 10-year terms.

To replace Ralph Bunche, Richard Reynolds, and Robert Woodruff, the President appointed Ralph Ellison, the writer and lecturer, presently teaching at Columbia University in New York City and recipient of the 1952 National Book Award for *Invisible Man;* Robert Lehman, partner in Lehman Brothers of New York City (investment bankers), director of 20th Century - Fox Film Corporation and of General Foods Corporation, and a member of the Advisory Committee of the Institute of Fine Arts; and Jack Valenti, former Special Assistant to the President and currently president of the Motion Picture Association of America.

To fill the vacancy left by the resignation, March 17, 1966, of Ernest R. Breech, the President appointed Mr. Robert I. Millonzi of Buffalo, senior partner in the law firm of Diebold & Millonzi and a Commissioner of the United States Securities and Exchange Commission during 1952 and 1953. Mr. Millonzi's term will expire on September 1, 1968.

Two changes occurred among the ex-officio Trustees. The new Congressional members of the Board are Senator Charles Percy of Illinois, appointed to replace Senator Leverett Saltonstall of Massachusetts, who chose not to run for re-election, and Representative Peter H. B. Frelinghuysen of New Jersey, to replace the Honorable Charlotte Reid of Illinois.

At the annual meeting of the Board of Trustees on February 28, 1967, the following officers were elected:

Roger L. Stevens, Chairman
Robert O. Anderson, Vice Chairman
Sol M. Linowitz, Vice Chairman
Ralph E. Becker, General Counsel
Daniel W. Bell, Treasurer
K. LeMoyne Billings, Secretary
Philip J. Mullin, Assistant Secretary and Administrative Officer
Kenneth Birgfeld, Assistant Treasurer
Paul J. Bisset, Assistant Treasurer
Herbert D. Lawson, Assistant Treasurer

The Bufalini quarry near Carrara, Italy, from which comes much of the exterior marble for the Kennedy Center.

Top: First shipment arrives in Baltimore, November 1966. Middle: Presentation ceremony, December 8, Roger L. Stevens (standing) and Ambassador Fenoaltea of Italy. Below: They inspect the first marble block.

Under the bylaws the following officers continue to serve as members of the Executive Committee:

Roger L. Stevens, Chairman
Robert O. Anderson, Vice Chairman
Sol M. Linowitz, Vice Chairman
Daniel W. Bell, Treasurer
K. LeMoyne Billings, Secretary
Ralph E. Becker, General Counsel
Secretary of the Smithsonian, S. Dillon Ripley
Chairman of the Commission of Fine Arts, William Walton

From the Board the Chairman reappointed to the Executive Committee the following persons, who are presently serving:

Charles Frankel
George B. Hartzog, Jr.
Mrs. John F. Kennedy
Mrs. Albert D. Lasker
Erich Leinsdorf
Mrs. Jouett Shouse
Mrs. Jean Kennedy Smith
Walter N. Tobriner

In addition, Jack Valenti was designated to fill one of two remaining vacancies on the Executive Committee.

At the present time the membership of the Board of Trustees of the John F. Kennedy Center is as follows:

Richard Adler
Howard F. Ahmanson
Floyd D. Akers
Robert O. Anderson
Ralph E. Becker
K. LeMoyne Billings
Mrs. Thomas W. Braden
Edgar M. Bronfman
Mrs. George R. Brown
Joseph S. Clark
Ralph W. Ellison
Mr. Justice Fortas
Charles Frankel
Peter H. B. Frelinghuysen
J. William Fulbright
John W. Gardner
Mrs. George A. Garrett
Leonard H. Goldenson
George B. Hartzog, Jr.
Harold Howe II
Robert F. Kennedy
Mrs. Albert D. Lasker
Robert Lehman
Erich Leinsdorf
Sol M. Linowitz
George Meany
Robert I. Millonzi
L. Quincy Mumford
Edwin W. Pauley
Arthur Penn
Charles Percy
Frank H. Ricketson, Jr.
S. Dillon Ripley II
Richard Rodgers
Arthur Schlesinger, Jr.
Mrs. Jouett Shouse
Mrs. Stephen E. Smith
Roger L. Stevens
Frank Thompson, Jr.
Walter N. Tobriner
Jack Valenti
William Walton
William J. Waters, Jr.
Edwin L. Weisl, Sr.
James C. Wright, Jr.

Mrs. Lyndon B. Johnson, Mrs. John F. Kennedy, and Mrs. Dwight D. Eisenhower continue to serve as honorary co-chairmen of the Center.

L. Corrin Strong

The Chairman, the Board of Trustees, and all individuals who have been active in the Center's progress since its inception, were deeply grieved by the passing, on September 9, 1966, of Ambassador L. Corrin Strong, Chairman Emeritus of the Center. From the date of his appointment in 1958 by President Eisenhower until late in 1961, Ambassador Strong had been the guiding force of the Center and almost single-handedly supported the National Cultural Center in its early and difficult years. In 1964 his resignation as Trustee and Vice Chairman, because of failing health, was reluctantly accepted by President Johnson. He was then elected Chairman Emeritus by the Trustees, in which position he continued to serve until his death.

On accepting his resignation, President Johnson on February 1, 1965, wrote: "The John F. Kennedy Center for the Performing Arts has become a reality because of your steadfast devotion to the ideal and to the task. Without your perseverance, leadership and generous financial aid the Center might have remained a vision."

At a meeting on February 28, 1967, the Board of Trustees adopted the resolution of the Executive Committee, expressing profound regret at the death of the first Chairman of the National Cultural Center, whose leadership and generous contribution of time, energy, and money were largely responsible for bringing the Center through the initial and vital stages of development. The Chairman expressed the sentiments of those who knew Ambassador Strong, saying that "as long as the Center stands on the banks of the Potomac and fulfills its mission, it will also serve as a proud tribute to an outstanding American—Corrin Strong."

Mr. Strong was born in Tacoma, Washington, in 1892, and lived for a time in Alaska. He graduated from Yale University in 1916, and served in the American Ambulance Corps and as a lieutenant of French Artillery 1917–1918. After working with the Guarantee Trust Company of New York, he joined the National Savings and Trust Company of Washington. He organized and established the Hattie M. Strong Foundation and for many years served as its President. From 1939 to 1941 Mr. Strong served as President of the Washington National Symphony. Ten months before Pearl Harbor he joined the United States Army and served in the Ordnance Department with the rank of major. For four years he served as chief liaison officer, International Division, Army Service Forces, with the rank of colonel. In 1942 he was sent on a special mission to China under White House priority. His

war service won him the American Legion of Merit. He was also the recipient of six foreign decorations. In 1953 President Eisenhower appointed him Ambassador to Norway. Mr. Strong was a member of the Board of Directors of the National Savings and Trust Company for many years and a Trustee of George Washington University, where he guided a successful building program.

Gifts and Presentations

Previous foreign gifts to the Center include a Waterford glass chandelier from the Government of Ireland, presently in the process of fabrication; sculptured bronze panels for the two main entranceways to the Center, from the Government of Germany, in the initial stages of casting; the eleven chandeliers for the Concert Hall, from the Government of Norway, also in the process of fabrication. New designs for the furniture for the Grand Foyer, from the Government of Denmark, were recently unveiled.

On December 8, 1966, a ceremony was held at the Center's site for the presentation of the first shipment of marble from the Government of Italy. A presentation was made by Ambassador Sergio Fenoaltea of Italy and the Chairman accepted the marble on behalf of the Center. During the ceremony a crate of marble weighing 900 pounds was opened and presented to Mr. Stevens by Ambassador Fenoaltea. The Italian Government is donating over 3,000 tons of white marble to the Center, which will meet the entire construction requirements. This gift, valued at more than $1.1 million, was formally pledged by Italian President Segni when President Kennedy visited Italy in 1963. The quarrying of the marble in the vicinity of Carrara has been completed. Some of it was taken from the quarries from which Michelangelo obtained his marble. Three companies—Bufalini, Montecatini, and Henraux—are supplying the marble, which is being cut according to architectural specification before being crated and sent to Leghorn for export. American Export Isbrandtsen Lines is transporting all of the marble from Italy to Baltimore at no cost to the Kennedy Center.

On January 13, 1967, Ambassador Hubert de Besche of Sweden announced that his Government would present 14 crystal chandeliers to the Kennedy Center, to be placed in the Grand Foyer. These chandeliers, valued at over $200,000, will be fabricated by Orrefors Glasbruk, Orrefors, Sweden. Carl Fagerlund, Orrefors' specialist in glass lighting fixtures, is designing the chandeliers in cooperation with the Center's architect.

On Thursday, February 9, Teruo Hachiya, Executive Director of the America-Japan Society of Tokyo, presented Japan's gift of a red-and-gold silk stage curtain to the Center, in a ceremony at the Embassy of Japan. The Chairman accepted the gift on behalf of the Center. This gift was made possible by an appropriation of the Japanese Government and contributions from private industry and individuals in Japan, which were raised by the America-Japan Society of Tokyo. The gift is valued at over $200,000. The curtain itself, which measures 47′ x 117′, is presently being stored in McLean, Virginia. At the ceremony an unexpected but exceedingly interesting and appreciated added attraction was the showing of a color movie depicting the making of the red-and-gold silk curtain by the Nishijin Textile Company of Kyoto.

Discussions and negotiations are continuing with a number of other countries who have expressed an interest in the Center.

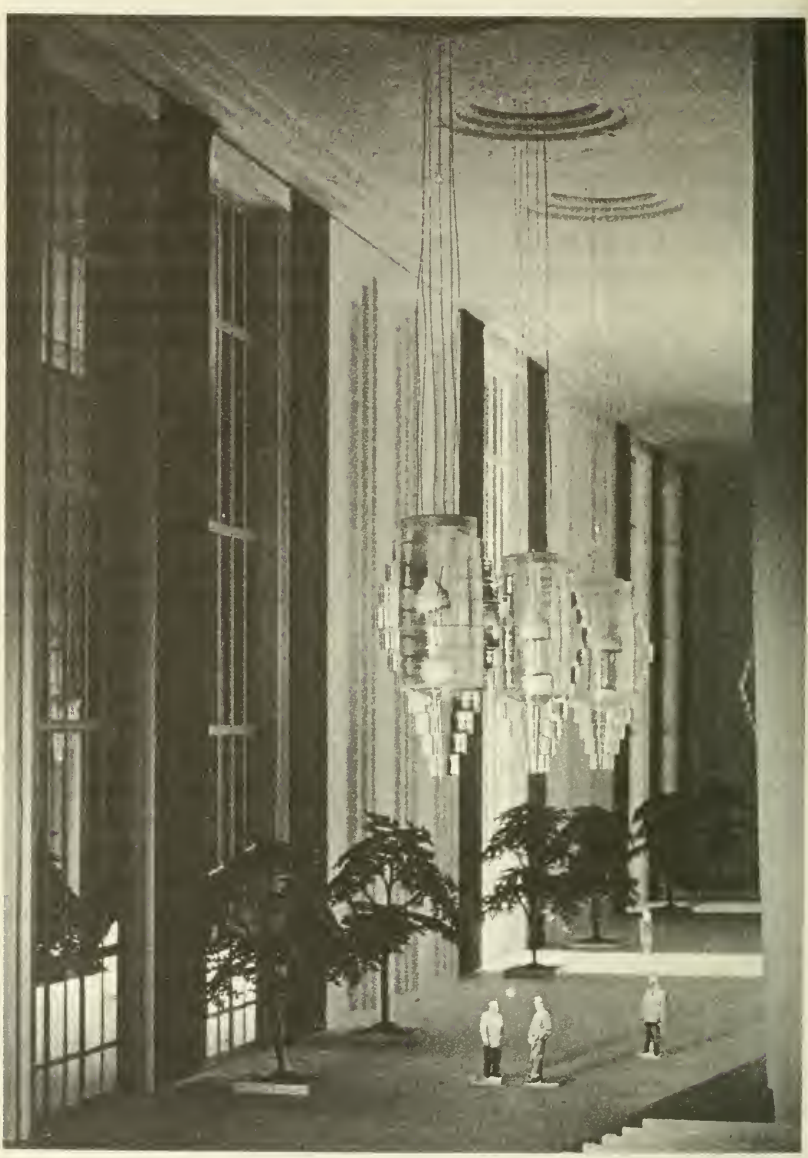
Friends of the Kennedy Center

The Friends of the Kennedy Center, which a year ago had fewer than 50 members, mostly from the Washington area, now has nearly 800 members throughout the country; 35 States and the District of Columbia are represented in the membership.

The Friends of the Kennedy Center held their first annual meeting in Washington on Thursday and Friday, May 18 and 19. Over 200 members from 22 States and the District of Columbia attended the two-day event. The meeting began at the White House when Mrs. Lyndon B. Johnson, honorary chairman of the Kennedy Center, and a member of the Friends, received the Friends of the Kennedy Center at tea. Following the White House reception members met at the Kennedy Center site for a presentation of ten new Tom Sawyer panels, each painted by children from a different State.

Roger L. Stevens, Chairman of the Board of Trustees, spoke to the Friends about the future of the Kennedy Center. Composer William Schuman, President of New York's Lincoln Center for the Performing Arts, gave the principal address of the gathering. And Jack Valenti, President of the Motion Picture Association of America, introduced an afternoon program of short, experimental films by leading directors, presented by Janus Films.

New officers of the Friends, announced at the meeting, are Mrs. Polk Guest, Chairman; Mrs. Norris A. Dodson, Jr., and George Stevens, Jr., Vice Chairmen; Murray Preston, Treasurer; Mrs. David Ginsburg, Secretary; and Mrs. Frank G. Wisner, Member at Large.



Model of the Grand Foyer, showing Sweden's magnificent gift to the Kennedy Center—fourteen crystal chandeliers to be fabricated by Orrefors Glasbruk, Orrefors, Sweden.

In Kyoto, ancient weaving center of Japan, dyeing the silk for Japan's gift of a stage curtain for the Opera House. Curtain (below) is being pieced together by skilled craftsmen.

Regional Chairmen have been named as follows: Mid-Atlantic, Mrs. Charles W. Engelhard, Far Hills, N.J.; South Atlantic, Mrs. Agnes H. Bahnson, Jr., Winston-Salem, N.C.; Gulf States, Mrs. Ellis Cooper, Laurel, Miss.; Midwest, Mrs. James H. Douglas, Jr., Lake Forest, Ill.; Rocky Mountain States, Mrs. James H. Smith, Jr., Aspen, Colo.; and Pacific Coast, Mrs. John A. McCone, San Marino, Calif.

Special Projects and Events

John F. Kennedy: Years of Lightning—Day of Drums was released to commercial film theaters throughout the country beginning in early fall. The film was voted the first documentary feature award of the Independent Film Importers and Distributors of America for 1966–1967. Negotiations are presently under way for subsequent distribution of the film to educational and charitable organizations and other non-profit groups. This will entail the processing of 16-mm. prints.

In May 1963 RCA Records distributed four recordings, all profits from which were to accrue to the benefit of the Center, consisting of various selections by the United States Army, Air Force, Marine, and Navy Bands. These records were and continue to be extremely popular items in the RCA Record catalog. Recently RCA Records agreed to re-issue a portion of the United States Marine Band performances in connection with a program of "Reader's Digest" to distribute outstanding recordings on a special club plan. As a result of negotiations with the Company, RCA agreed to make the Center a gift of $10,000 for this reproduction. Royalties will be paid on the re-issue, in accordance with the original contract.

On July 17, 1966, the Alabama State Society presented at Gallaudet Auditorium for the benefit of the Center the musical extravaganza *Stars Fell on Alabama*. Conceived, executed, and produced by Alabamians, it featured talented natives of that State. From the proceeds, the Alabama State Society expects to endow a $10,000 box in one of the Center's halls. At the same time, the Society hopes to encourage and stimulate other States to make similar contributions to the Center's needs.

The John Philip Sousa Memorial Committee of the American Bandmasters Association has to date raised 75 percent of its gift of $100,000 for the endowment of the stage and acoustical sound requirements in the Concert Hall. It is expected that within the next year the full amount will have been presented to the Center.

The Metropolitan Opera National Company, co-sponsored by the Kennedy Center and the Metropolitan Opera Association, completed

its inaugural tour on June 12, 1966, in Guadalajara, Mexico. Because of the nature of the Center's agreement with the Metropolitan Opera Association in assisting the Company, all financial commitments of the Center were completed in the first season and there were no continuing financial obligations during its second year, which began on September 15, 1966, again at the Clowes Auditorium in Indianapolis. This past year the Company was booked into 72 cities with a repertory consisting of Puccini's *La Boheme*, Verdi's *La Traviata*, Mozart's *Marriage of Figaro* and Britten's *Rape of Lucretia*. All these operas were performed in English, although the first two were also sung in Italian.

Because of the parent company's financial difficulties, the Metropolitan Opera National Company was temporarily disbanded and its tour for the 1967–1968 season cancelled. However, the American National Opera Company, under the direction of Sarah Caldwell, on an expanded performance schedule will, if requested and where possible, fill bookings already made for the proposed 1967–1968 National Company tour.

As the United States' official contribution to the 14th Joint Conference of UNESCO, which opened in Paris on November 9, 1966, an exhibit by the Kennedy Center was chosen. Full-scale models, interior and exterior color renderings and photographs of the Center comprised the exhibit. A new, large model of the Center was constructed, incorporating the latest revisions in the blueprints and interior electrical lighting. The response, not only in Paris but in other European capitals as well, was so enthusiastic that on the conclusion of its showing in the French capital the display was sent to London, where it was housed in the Embassy on Grosvenor Square, and open to the public for a two-week period. Subsequently the renderings and photographs were sent on a tour of American Embassies in other Western European capitals. Eventually it is hoped that this exhibit can be permanently displayed at the site of the Center.

The wooden fence surrounding the Kennedy Center site consists of 250 eight-foot square panels. Last summer 18 of these panels were decorated by children in the District of Columbia's Widening Horizons Project, under the supervision of Roger Selby, Curator of Education at the Corcoran Gallery of Art. So successful and so widely praised were these efforts, termed the Tom Sawyer Project, that the Friends of the Kennedy Center accepted the task of expanding this undertaking and, under the Chairmanship of Senator Saltonstall, the Governors of all 50 States and all the territories and trusts were invited to designate one or more young students to paint one such panel depicting the interests and resources and history of their native

President and Mrs. Zalman Shazar of Israel, during visit to Kennedy Center offices, are shown a model of the Center by Roger L. Stevens.

homes. The Embassies in Washington were similarly invited to participate in this endeavor. To date, including the 18 painted last summer, 65 segments of the fence have been decorated with paintings representing 25 States, the District of Columbia, 5 trust territories, and 16 foreign countries.

Construction Progress

Colonel William F. Powers, formerly Engineering Vice President of Lincoln Center in New York, began his full-time duties with the Center as Executive Director of Engineering on October 1, 1966. Colonel Powers was named by the General Services Administration as special assistant to the Contracting Officer and as Project Director for the

Center's construction. By this means, direct organizational relationships between the Center and GSA have been established. Colonel Powers continues to serve as Executive Director of Engineering in those areas of responsibility reserved to the Center and the Trustees.

The standing committee formerly known as the JFK Center/GSA Liaison Committee was renamed the Building Committee. It is made up of five Trustees: the Chairman, Mrs. Shouse, S. Dillon Ripley, George B. Hartzog, Jr., and Ralph Becker. Mr. Mullin and Colonel Powers serve as staff representatives and GSA is represented by the Commissioner of the Public Buildings Service, William Schmidt, and his Deputy, Robert Foster.

To appreciate fully some of the problems encountered in negotiating construction contracts and subcontracts, it is well to recall the history of the Center's design. The first blueprints submitted in 1959 by the architect, Edward Durell Stone, envisioned a Center on such a scale that the cost estimates at that time were $75 million. Subsequently the Trustees, after consultation with Presidents Eisenhower and Kennedy, decided that this concept was not practicable, since funds of this magnitude could not be raised on a voluntary basis from the general public. Accordingly, the architect was requested to provide an alternative design, which was unveiled in September 1962 to general and enthusiastic acceptance and approval. For reasons of economy and efficiency Mr. Stone recommended that all the halls be placed under one roof to afford savings in land usage, building materials, utilities, and managerial and maintenance personnel. This new concept was then estimated to cost $30 million, without the parking substructure.

Since that time, this cost figure has been maintained as the amount necessary for the construction of the Center. When final detailed plans and specifications were approved for the letting of bids for the general contract in July 1966, however, it became apparent that the rising costs of materials and labor would substantially increase this estimate.

Firms selected on the basis of reliability and favorable experience with similar projects were invited in June 1966 to submit bids for the general construction contract. The solicitation of bids on a selective basis was done with the approval of the Comptroller General of the United States and the concurrence of the Senate and House Committees on Public Works and Appropriations. After the bids were received and evaluated, the John McShain Company of Philadelphia was awarded the general construction contract on July 22, 1966. The McShain bid of $249,000 for his fee, including all on-site and off-site supervision and overhead during construction, is about one-sixth of what a normal bid would be. Mr. McShain preferred to undertake

this job as a public service rather than a normal profit-making business venture.

In addition to the general contract, contracts for demolition and site clearance, and for excavation and relocation of Rock Creek - Potomac Parkway, were completed and by year's end the general contractor had completed the excavation as well as the pouring of most of the concrete caissons, some of which run as deep as 27 feet.

When the first subcontract bids were opened it became apparent that actual costs, based on the materials required and increases in the costs of building construction generally, were out of line with the original cost estimates. Meetings were immediately arranged between Center officers, the Commissioner of Public Buildings Service, and subsequently with the GSA Administrator. The outcome was assumption by GSA of full responsibility for preparing a revised cost estimate and ascertaining the extent to which the prior estimates may have been understated. After their reports were received a new procedure for reviewing bids was developed, consisting of review and negotiation by a team representing the Center, McShain, and GSA.

Subsequently, a contract was awarded on February 24, 1967, to Bethlehem Steel for the steel requirements. Their low bid was $7,225,000.

In addition, the following subcontract awards were made:

Electrical—a joint venture of E. C. Ernst Inc. of Washington, D.C., and Fischbach & Moore of New York City, in the amount of $5,950,000.

Mechanical—awarded to the low bidder, Pierce Associates of Alexandria, on a bid of $7,375,000.

Steel testing—Gulick-Henderson Laboratories, Inc., of New York, in the amount of $56,000.

Reinforcing steel placement—C. J. Roberts Inc., of Springfield, Virginia, at a price of $390,000.

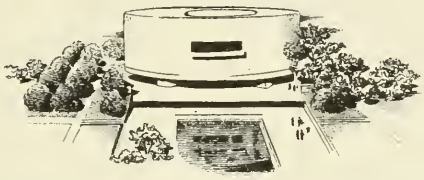
Fabrication of architectural cast stone—Eastern Schokcrete Corporation, New York, in the amount of $667,000.

Erection of architectural cast stone—Costello Company, Inc., of Cumberland, Maryland, in the amount of $230,000.

At year's end 75 percent of the paving marble procured from Bufalini had been received, inspected, and stored at the Naval Research Laboratory at Anacostia. The Henraux marble to be used for the exterior facing is expected to begin arriving sometime around the end of July, and the marble for the interior walls will probably begin to arrive in late summer. All this marble is included in the gift from the Government of Italy.

Joseph H. Hirshhorn Museum and Sculpture Garden

Abram Lerner, *Director*



On may 17, 1966, the president requested that Congress enact legislation to authorize acceptance of the Hirshhorn Collection of sculpture and paintings. In his message to the Congress, the President recalled the great tradition of private contributions which have enriched the cultural life of this city. He recalled James Smithson's bequest which led to the establishment of the Smithsonian in 1846; William Corcoran's founding of his art gallery in 1859; Charles Freer's donation of his collection and the gallery which opened in 1922; the gift of Andrew Mellon, which was accepted in 1937; and now the gift of Joseph Hirshhorn of his collection of contemporary art.

This gift of nearly 5,000 paintings and drawings and over 1,500 pieces of sculpture has been conservatively valued at $25,000,000 and is undoubtedly worth much more. Mr. Hirshhorn also gave $1,000,000 for future acquisitions for the collection. The terms of the gift required that the Smithsonian Institution obtain legislation and appropriations for the construction and operation of a museum and garden of sculpture on the Mall, and that the necessary appropriation be obtained before the end of the 90th Congress.

The Congress responded favorably to the President's request. By the Act of November 7, 1966 (P.L. 89–788, 89th Cong., S. 3389), it provided a site on the Mall and provided statutory authority for the

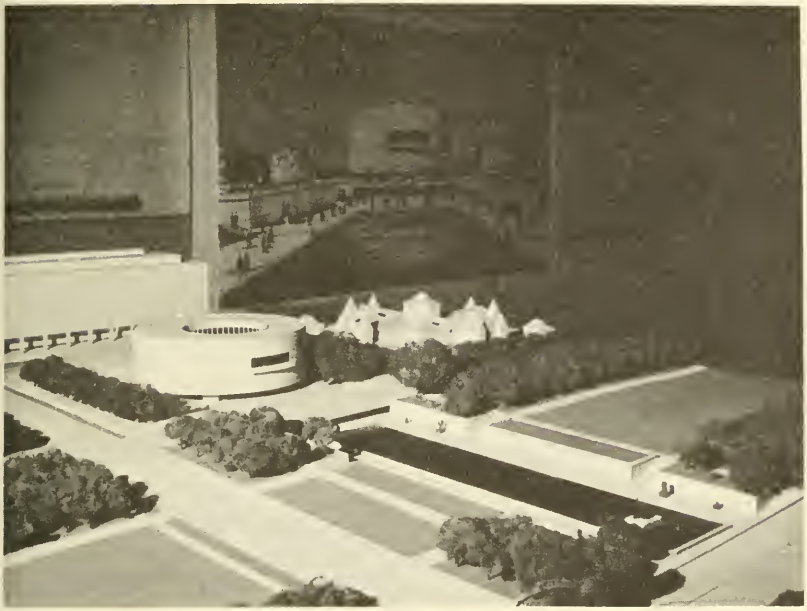
appropriation of construction and operating funds. In a companion Act, approved on November 2, 1966, the Congress authorized the Secretary of the Army to construct an addition to the existing Armed Forces Institute of Pathology at Walter Reed Army Medical Center to house the Medical Museum and medical research unit now housed in the existing building at 7th Street and Independence Avenue, on the site of the Hirshhorn Museum.

The Congress also provided preliminary planning funds and appropriated to the Smithsonian $803,000 for the preparation of contract drawings and specifications for the Hirshhorn Museum and Sculpture Garden. Construction funds will be sought in the Smithsonian's request for appropriations for the next fiscal year.

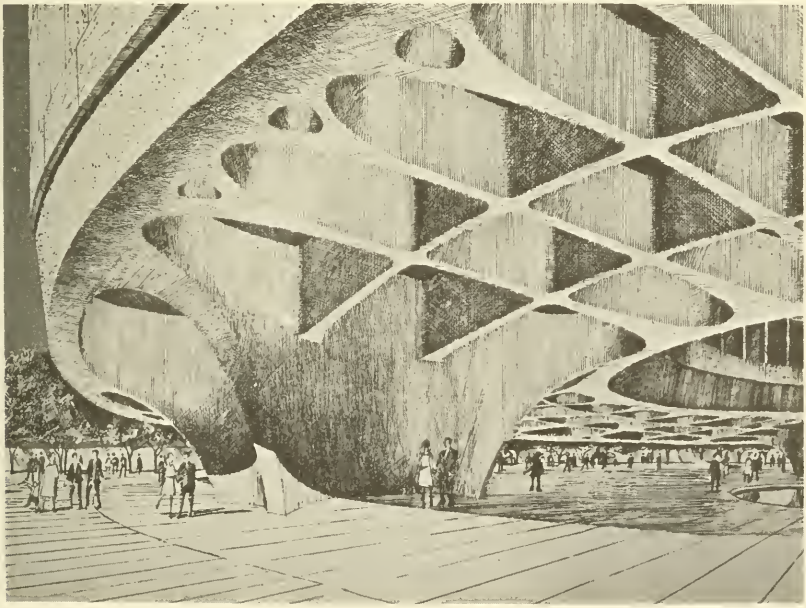
The authorizing legislation appropriated to the Smithsonian Institution the Mall area between 7th and 9th Streets and Independence Avenue and Jefferson Drive as the permanent site of the Museum. The Act also made available to the Institution as the permanent site of the Sculpture Garden, the area bounded by 7th Street, 9th Street, Jefferson Drive, and Madison Drive. The legislation provided further that the Smithsonian shall cooperate with the Secretary of the Interior so that the development and use of the Sculpture Garden is consistent with the open space concept of the Mall, for which the Secretary of the Interior is responsible, and with related developments regarding underground garages and street development. And the Act authorized an appropriation not to exceed $15,000,000 for the planning and construction of the Museum and Sculpture Garden.

The 12-acre Mall site thus provided is situated in the midst of the Smithsonian complex of museums and art galleries in a location most convenient to the millions of visitors who yearly crowd the Mall. The site is the only remaining one of appropriate size and location on the Mall for the proper display of this large collection of sculpture and painting. It lies within the Mall area contemplated by the Act of May 17, 1938, as the site for a Smithsonian gallery of art. And, it should be noted, the master plan for the Mall recently developed for the Secretary of the Interior, who is charged with the development of the Mall as a public park, visualizes the erection of a building such as the Hirshhorn Museum for public use and interest at this location.

The appointment of Abram Lerner as Director of the Joseph H. Hirshhorn Museum and Sculpture Garden was made on April 1, 1967. He has served as curator of the Hirshhorn Collection for the past ten years. Secretary Ripley has said: "That the Hirshhorn Collection is a monument to contemporary American art and a unique dossier of European moderns is, in large measure, a tribute to Abram Lerner, who influenced its growth and continuity."



Architect's model and detail sketch of Joseph H. Hirshhorn Museum, showing its relation to Smithsonian's Arts and Industries building (right) and Federal Aviation Agency building (rear) across Independence Avenue. Sunken Sculpture Garden extends across center strip of Mall.



The selection of Gordon Bunshaft of the architectural firm of Skidmore, Owings and Merrill as architect of the Joseph H. Hirshhorn Museum and Sculpture Garden was made jointly by the Smithsonian and Joseph H. Hirshhorn.

The preliminary design is presently underway. The design concept was completed and was presented to the Commission of Fine Arts, and to the National Capital Planning Commission.*

*The concept was approved by the Commission of Fine Arts on July 13, 1967, and by the National Capital Planning Commission on July 27, 1967.

Other Smithsonian Activities, Offices, Programs, and Services

United States National Museum

FRANK A. TAYLOR, *Director*

THE NATIONAL MUSEUM ACT OF 1966 has empowered the Director of the United States National Museum to cooperate with museums and their associations, to identify and study problems of concern to museums, to publish reports of research on these problems, to train museum personnel, to give advisory aid to museums requesting assistance, and to prepare and publish manuals of museum practices. Although no funds have been appropriated to implement the Museum Act, which was approved and signed into law by President Lyndon B. Johnson, October 15, 1966, a number of the activities of the Smithsonian in the past year relate to the purposes of the legislation.

Responding to repeated statements of the need for trained science-museum technicians, the Smithsonian Institution proposed to share the cost of training technicians. Three museums—the Los Angeles County Museum of Natural History in California, The American Museum of Natural History in New York, and the Field Museum of Natural History in Illinois—generously agreed to join in the trial project designed to produce nine trained technicians at the end of the year of work training. The cooperating museums are recruiting college graduates for training and have undertaken to provide instruction, and to absorb the administrative costs of the program.

In another cooperative project the American Association of Museums is sharing publication costs with the Smithsonian and is providing the editorial work to produce a revision of the widely needed manual *Museum Registration Methods* by Dorothy Dudley, Irma Bezold, and others.

The returns from the questionnaire on museums and their educational programs, circulated jointly with the Office of Education and the American Association of Museums, were processed for tabulation. The information received from the returns will form the beginning of an up-to-date documentation of the museum field.

The volume of requests received from museums for advice and aid increased enormously after the passage of the Museum Act. Smithsonian staff members were requested to consult with museum directors and their staffs on new programs, buildings, exhibits, and interpretation. Several spent substantial amounts of time at the requesting museums advising on a variety of museum projects. In the eight months subsequent to passage of the Act, inquiries were received at the rate of about 100 a month. From every State and from more than 20 Nations came requests for such assistance as reviewing programs and building plans, advising on the scope and activities of museums proposed for specific communities, suggesting sources of funding, predicting future museum needs and orientation, and evaluating museum exhibits and educational programs.

In cooperation with officers of the American Association of Museums representations were made to Government agencies justifying direct Federal aid for the construction of museum facilities. The basis of the justification was the increased demands upon museums by educational institutions stimulated by the Federal aid available to schools to take advantage of museums as supplementary teaching centers and for the use of museums for curriculum improvement and enrichment.

This cause was greatly advanced by the gracious and generous letter which President Johnson addressed to Mr. Ripley as Chairman of the Federal Council on the Arts and Humanities. This letter (see p. 14) recognizes museums as precious cultural and educational resources, and asks for recommendations of ways to support and strengthen them.

At the request of the Minister of Education of the Republic of Korea and of the Director of the Pacific Science Board of the National Academy of Sciences, the Smithsonian participated in the Symposium on a Korean National Science Museum and supported the attendance at Seoul of a number of museum professionals from other institutions. The report of the Symposium recommended a planning study for which the Korean Government has since appropriated the equivalent of $25,000. A newly formed foundation, The American Friends of the Korean National Science Cultural Center, under the direction of Joseph A. Patterson, former Director of the American Association of Museums, is endeavoring to obtain the rest of the support required for the study.

A year's use of the series of teaching exhibits on the elementary physics of light, for 4th- to 6th-grade students, was completed by schools in the Fairfax County, Virginia, school system. The results obtained were universally approved by the teachers and principals who observed them. Side effects of the program included increased self-reliance of students who had had their first learning experiences as individuals away from the classroom, and the stimulation of determined nonreaders to learn to read. The school system of Prince William County, Virginia, has requested the exhibits for next year and has undertaken to provide an evaluation test.

Notable progress was made in the long-continuing effort of the Smithsonian and other institutions and individuals to effect United States membership in the International Center for the Study of the Preservation and the Restoration of Cultural Property (an international organization of member states). The Department of State indicated that it will support U.S. membership in the Center and suggested that the Smithsonian undertake to obtain the authorizing legislation. To this end the Smithsonian held a number of meetings of representatives of the interested institutions and agencies that have indicated a uniform support of U.S. membership. Both the United States and the Center would gain from such membership and the mammoth worldwide task of preserving cultural objects and paintings would be greatly aided by stepping up research, training, consultation, and the dissemination of knowledge of advances in scientific conservation.

TRAVELING EXHIBITION SERVICE

The Smithsonian Institution Traveling Exhibition Service (SITES), working from a broad base of history, science, photography, design, and crafts, as well as the fine arts, endeavors to aid museums, libraries, universities, and other educational institutions in the development of their exhibition programs. Its income is derived from rental fees determined by the costs of preparing, mounting, and circulating the exhibitions.

As listed below, the number of exhibitions has increased to 108. An additional seven exhibitions were circulated to schools in the District of Columbia. The National Collection of Fine Arts and SITES have cooperated in providing seven exhibitions used in a grant program from the Arts Advisory Committee of the D.C. Recreation Board, which SITES administered in fiscal 1967, for a total of 23 showings.

Among the larger exhibitions, *Art Treasures of Turkey* opened in June 1966 at the National Gallery of Art in Washington, has crossed

Smithsonian Institution traveling exhibitions: *Tunisian Mosaics* viewed at the Museum of Natural History by teachers and children of Project Headstart, from Arlington, Virginia. Below: *Living with Wood*, installed in patio of U.S. Department of Agriculture administration building.

The Face of Chile, a special international exhibit, in the rotunda of the Museum of Natural History, March 1967. Below: Preview in the Museum of History and Technology of the traveling exhibition *Victorian Needlework*, a showing of items selected from the division of textiles' collections.

the U.S. twice, and is currently at San Francisco. The catalog of this great exhibition is being reprinted by the Smithsonian Institution Press.

The exhibition *Islamic Art from the Collection of Edwin Binney 3rd* is fully booked through 1968 and its catalog was selected by the Association of American University Presses as one of the top 25 publications of the year. Other exhibition catalogs published in 1967 are *Henry Moore, Paintings and Drawings by Elihu Vedder, Italian Architectural Drawings*, and in May 1967, *Tunisian Mosaics*.

Offerings of exhibitions by other museums have increased. The most notable is the loan of *Sources for Tomorrow: Paintings from the Michener Foundation Collection* by the Allentown Art Museum, the catalog for which was prepared by the Director, Richard Hirsch. Other offerings have been from the Toledo Museum of Art, American Museum of Natural History, American Philosophical Society Library, Museum of Contemporary Crafts, Addison Gallery of American Art, Los Angeles County Museum of Art, and the Paine Art Center and Arboretum.

Quickening interest of other Smithsonian groups has contributed five exhibitions to the SITES program, and two more are in preparation. The Office of International Activities has given exceptional aid in connection with the exhibition *Tunisian Mosaics*, opened in June 1967. This latter is a prime example of a Smithsonian cooperative effort that involved a broad range of offices and agencies of the Institution.

Many requests have been received from foreign countries for exhibitions to be sent on an exchange basis, and means are being sought to implement this aspect of the program. Meanwhile SITES continues to receive from abroad exhibitions for tour in the United States and Canada. Of 88 listed in the catalog, 38 are in this category, including *Art Treasures of Turkey*, *Henry Moore*, and *Tunisian Mosaics*. Foreign visitors, many of them sent from the Council on Leaders and Specialists, come to study SITES procedures for circulating its exhibits.

The first exhibition from Yugoslavia in conjunction with a proposed five-year plan has arrived and the second has been shipped. One Danish and one Finnish exhibition are in preparation. These are the result of a visit by the Chief of the Service to Europe in the summer of 1966, prompted by an invitation extended by the Yugoslav Commission for Cultural relations with Foreign Countries.

Exhibitions carried over from prior years number 75. SITES initiated 33 new shows, dispersed 21, and negotiated for 21 additional for bookings next year.

Exhibitions Initiated in 1967

Painting and Sculpture

Islamic Art from the Collection of Edwin Binney 3rd; Henry Moore; Paintings and Drawings by Elihu Vedder; Sketches by Frederic Edwin Church; Sources for Tomorrow: 50 Paintings from the Michener Foundation Collection; Jewish Marriage Contracts; Naive Art from Haiti; Tunisian Mosaics.

Drawings and Prints

Canaletto Etchings; Italian Architectural Drawings; Graphic Art from Yugoslavia; Graphics '67: Italy; Three Swedish Printmakers; Twentieth Print National.

Design and Crafts

Albers: Interaction of Color; Cape Dorset: The Arts of an Eskimo Community; Ceramic Arts USA; Contemporary Rugs from Argentina; Empire Profile; Fiber, Fabric, and Form; German Posters; Living with Wood; Victorian Needlework; Color and Light in Painting.

History

The Explorer's New Zealand; The People's Choice.

Childrens' Art

Les Enfants de Paris; Paintings by Children of Many Lands; Things and Other Things; Tokyo Children Look at the Olympic Games.

Natural History and Science

Animal Behavior; Minerals Magnified; Prehistoric Paintings of France and Spain.

Exhibitions Continued From Prior Years

1965–66: Art in Science; Eyewitness to Space; Art Treasures of Turkey; Pre-Columbian Gold from Peru; Action-Reaction; Contemporary African Printmakers; Contemporary Dutch Graphics; Dürer and His Time; Mirror of the Artist; Polish Graphic Art; Six Danish Graphic Artists; The World of William Hogarth; Art in Urban Architecture; Early Chicago Architecture; Calligraphy in Islamic Textiles; Folk Toys from Japan; Glass from Czechoslovakia; Jazz Posters; Posters from Denmark; Rugs from the McMullan Collection; Early Monuments and Architecture of Ireland; Danish Children Illustrate Hans Christian Andersen; Embroideries by Children of Chijnaya; Ghanian Textiles; Museum Impressions; The Preservation of Abu Simbel; Gentle Wilderness: The Sierra Nevada; Charles H. Currier: Victorian Photographer; New Names in Latin American Art.

1964–65: Watercolors by Pop Hart; Modern Watercolors from Sweden; The Art of the Yoruba; Contemporary American Drawings II; William Blake: Poet, Printer, Prophet; Bridges, Tunnels, and Waterworks; Contemporary Fine Presses in America; Eskimo Graphic Art III; The Fabulous Decade; Kokoschka: King Lear, Apulian Journey, Hellas; Prints from the Mourlot Press; Pier Luigi Nervi; American Costumes; American Furniture; Masters of Ballet Design; The American Flag; Be My Guest!; Brass Rubbings from England; World Fairs; National High School Prints; Paintings by Mexican Children; Paintings and Pastels by Children of Tokyo; Ancient Rock Paintings and Engravings; Colors and Patterns in the Animal Kingdom; the Stonecrop Family: Variations on a Pattern; The Color of Water.

1963–64: Alvar Aalto; Contemporary American Landscape Architecture; Birds of Asia; Antonio Frasconi 1952–63; Hearts and Flowers; The Nile; Religious Themes by Old Masters; Eero Saarinen; Swiss Posters.

1962–63: Craftsmen of the City; Historic Annapolis; Paintings by Young Africans.

1961–62: Physics and Painting; UNESCO Watercolor Reproductions; Contemporary Italian Drawings (2 shows); The Face of Viet Nam; Le Corbusier; Robert Capa: Images of War.

1960–61: Image of Physics.

THE CONSERVATION-ANALYTICAL LABORATORY

The new chief of the Conservation-Analytical Laboratory, Robert M. Organ, entered upon his assignment at the close of the year. Mr. Organ, who has had a distinguished career in the field of conservation and the analysis of museum objects, came to the Smithsonian Institution from the Royal Ontario Museum. Before going to Ontario he was, from 1951 to 1965, chief experimental officer of the Research Laboratory of the British Museum. The Smithsonian is fortunate to have a man of his experience and ability as head of its conservation and analysis programs.

Within the limitations of the available manpower the scientific effort of the laboratory has been directed toward using and improving facilities along the lines reported in 1966. In particular, X-ray diffraction techniques have been used in the examination of numerous samples of pigments and in the authentication of coins. The large number of bronze objects from Southern Arabia examined by X-ray fluorescence analysis, using a semi-quantitative method, have also been examined in cross section, and in order to facilitate metallographic work of this nature a Vickers projection microscope has been installed. An ultraviolet emission spectrograph is being brought into service, initially for the rapid semi-quantitative analysis of a wide

range of materials made available in the form of small samples. And the infra-red spectrometer continues to be useful in such tasks as the identification of synthetic materials proposed for use in storage, involving prolonged contact with museum objects.

In the normal course of estimating the accuracy of the quantitative analytical techniques employed, a comparison has been made between the results of wet-chemical and of X-ray fluorescence analysis of ancient bronzes having widely different compositions. The two methods appear to yield results of similar precision and can therefore prove equally acceptable to archeologists in need of analyses.

Looking ahead toward the future when local irradiation facilities may become available, considerable effort has been put into development of neutron activation analysis for trace elements in potsherds. A program of analysis is in progress for investigating possible differences in composition between products of various potteries in North Devon which were exported to America in the 17th century.

The scientific apparatus, however, has not been employed solely in laboratory testing. When a Flemish inlaid and painted wooden chest previously conditioned to a relative humidity approximating to 50 percent had to be exhibited in the un-airconditioned Great Hall of the Smithsonian building, an especially conditioned case was devised. For the case, the laboratory prepared ballasting material that would maintain steady conditions in order to minimize cracking and loss of inlay or paint.

The staff of the Conservation-Analytical Laboratory has numbered four during the greater portion of the year, but the addition of two technicians and the new chief has added considerably to its working capacity. During the year some 90 requisitions for work involving 370 objects were received from 21 sources. Of these only about 15 were not completed at year's end. One technician specializing in objects made of paper treated about 150 small objects such as currency decrees, drawings, and a decorated paper sewing box, and has restored about 100 photographs. Three large watercolors of the original Smithsonian buildings were treated by this technician in a workshop in Philadelphia as part of a training program.

OFFICE OF EXHIBITS

Under the direction of chief of exhibits John E. Anglim and assistant chief Benjamin W. Lawless, the Office of Exhibits made notable contributions to the Smithsonian's public education and information objectives as well as continuing in its role as pacesetter in the museum world for the development and application of exhibition techniques.

The Office, which designs, produces, and installs all permanent and special exhibits in the Museums of History and Technology and Natural History, also provides material assistance and consultation services for other branches of the Smithsonian.

During the year the Office of Exhibits opened 6 new permanent exhibition halls to the general public, completed supplementary portions of 25 other permanent exhibition halls, and produced 29 temporary and special exhibits—some of major national and international importance. In addition, the Office of Exhibits welcomed to its laboratories, to observe, and to receive instruction and advice, more than 200 professionals from museums all over the United States and more than a score of foreign countries, as well as large numbers of interested college and university students.

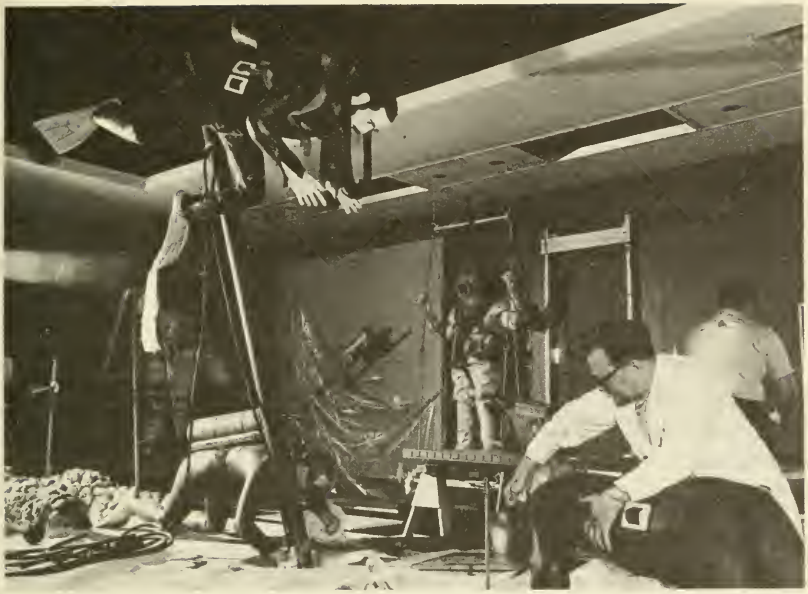
The Office also presented special programs in which staff members of its laboratories demonstrated the various techniques employed in making educational displays. In many of the "booths," visitor participation was encouraged. The first such demonstration program was held in October 1966 in the Museum of History and Technology exhibits laboratories in conjunction with the Smithsonian Associates and primarily for the enlightenment and edification of its members. The second was held in April 1967 at the Anacostia Naval Station as part of a "job fair" for high-school students and was presented in collaboration with the Neighborhood Youth Corps and the United Planning Organization.

The exhibits editor's office, under chief editor George Weiner, produced 7,106 labels for 89 permanent and special exhibits of museums and offices of the Smithsonian Institution and, in cooperation with the Smithsonian Institution Press and curators of the Museum of Natural History and the Museum of History and Technology, performed substantial work on three exhibits-oriented popular publications under preparation.

History and Technology Laboratory

Under assistant chief of exhibits Benjamin W. Lawless, the Museum of History and Technology laboratory opened 5 permanent exhibit halls to the general public and produced additional portions of 15 other permanent halls and a variety of special and temporary exhibits. These were designed under the supervision of chief designer Robert B. Widder and were prepared and installed under the supervision of production chief William M. Clark, Jr.

The permanent halls opened this year include the first two halls of the Institution's unique "Growth of the United States" exhibition complex,



In the hall of underwater exploration, exhibits preparators install the central life-size diving group and (below) an underwater treasure trove.

a comprehensive visual survey of every aspect of United States history, designed by Robert B. Widder and Mrs. Deborah Bretzfelder. The hall of power machinery, containing authentic examples of machines of the American Industrial Revolution, many of them operative, was produced under the direction of designer William F. Haase. The hall of petroleum, which covers the development of the United States petroleum industry from its beginnings to the present day, was designed by Riddick Vann, Barbara H. Bowes, and William Haase. The hall of underwater exploration, a delightfully adventurous survey of the quest for sunken treasure in American coastal waters, was designed by Nadya Kayaloff.

Special exhibits covered many facets of history and culture and brought pleasure and enlightenment to both the serious specialist and the casual viewer. The fresh and inviting exhibition of Japanese photographs of herons, designed by James Jerald Shelton, contrasted with Barbara Bowes's severe, no-nonsense design of the African backgrounds and Negro slavery exhibition, which was added to the hall of everyday life in early America.

Photographs showing man and his activities in every part of the globe comprised the loan exhibit from Germany, *World Exposition of Photography*, designed by Robert Widder. The original of the famous Yale Library Vinland map was the focal point of a comprehensive exhibit on the Vikings and their Atlantic voyages, designed by James Shelton, which drew scholars from all over the world. By using an excellent facsimile of the map after the loan period of the original terminated, this highly popular exhibit was able to remain on view four months longer than originally planned.

Superb 19th-century architectural drawings supplemented by photos of Irish castles and public buildings comprised the exhibition of Irish architectural drawings and photographs; and artist's renderings of the proposed Washington beautification program, displayed with enlargements of photographs of the same sites in their present conditions, gave Washingtonians and visitors to Washington a glimpse of the Nation's capital city of the future. Both of these exhibits were designed by Robert Widder.

Students of the decorative arts enjoyed the Wedgwood exhibit, containing 300 Wedgwood portrait medallions and about 200 other pieces of Wedgwood porcelain, produced under the direction of designer Morris Pearson in conjunction with the 1967 Wedgwood International Seminar. The nostalgic exhibition of Victorian needlework, designed by James Shelton and displayed in cases specifically designed to protect the delicate fabrics during a 2-year tour under the sponsorship of the Smithsonian Institution Traveling Exhibition

Service, was accompained by a central exhibit of 19th-century furniture and sewing equipment.

Two striking exhibits of antique automobiles, featuring the Winton Cross-Country car and the Winton Bullet, were prepared under the direction of designer John R. Clendening for the Constitution Avenue lobby of the Museum of History and Technology. And the fiftieth anniversary of World War I was marked by two notable exhibitions—one of combat art of the period, and the other of original war posters; these exhibits were prepared under the direction of designers Helen Hahm and Robert Widder.

Natural History Laboratory

Under the direction of chief of exhibits John E. Anglim, assisted by A. Gilbert Wright, a highly diversified program of exhibits projects was carried forward by the Museum of Natural History Laboratory. Designed under the supervision of John Anglim, the exhibits were prepared and installed under the supervision of production chief Julius Tretick and his successor, Frank Nelms.

The opening of a new hall of meteorites, designed by Mrs. Dorothy Guthrie, represented another milestone in the exhibits renovation program of the Museum of Natural History. Other exhibits relating to the earth sciences were also completed this year under the direction of Mrs. Guthrie, including new exhibition cases in the gem and mineral halls. Work continued on the design and production of exhibits for the hall of physical geology, which is scheduled to be opened next year.

Production of new units continued for the cultures of Africa and Asia hall, being designed by Lucius Lomax, which is scheduled for completion early next year; and designer James A. Speight completed designs for the ichthyological section of the hall of cold-blooded vertebrates. Designers Rolland O. Hower and Morris Pearson devoted much of their efforts to the preparation of designs for the forthcoming halls of botany and of Old World archeology, and designer Joseph Shannon devoted a major part of his time to the architectural design for the forthcoming hall of insect life.

During the year, a significant part of the work of the laboratory was devoted to the design and production of special and temporary exhibits. Of these, one of the most important was the 20-unit traveling Alaska Centennial exhibit commemorating the one-hundredth anniversary of the purchase of Alaska by the United States. Prepared under the direction of designers Hower, Speight, and Pearson in collaboration with historians and scientists of the University of Alaska, this exhibit traced the growth and development of Alaska from prehistoric times to the present.

Nancy Halliday applies oil color to models of African cattle and (below) Peter DeAnna completes background for life-group that will portray African Bushmen in a life-setting for the hall of African and Asian cultures.

In the plastics laboratory Leonard Shelton fabricates a mold of life-figure for the hall of African and Asian cultures, and (below) exhibit specialists William Donnelly, Mathew Ballou, and Michael Friello produce replicas, in plastic, of natural history and historical specimens.

Another special exhibit of international significance was *The Face of Chile*, designed by Pearson and prepared by the Laboratory in cooperation with the Chilean Embassy and the University of Chile. The largest and most varied exhibit of ancient Tunisian mosaics ever to be shown in the United States was prepared this year under the direction of designer Guthrie, in conjunction with the Government of Tunisia and the Smithsonian Institution Traveling Exhibition Service. Consisting of 57 large mosaics, 3 frescoes, 8 stone carvings, and 23 ceramic figures, the exhibit remained on display through the summer of 1967.

In connection with a widely publicized "kite carnival" sponsored by the Smithsonian Associates, the laboratory produced in conjunction with the National Air and Space Museum a special exhibition of kites of the world in the rotunda of the Museum of Natural History.

During the year, the freeze-dry facilities were extensively redesigned by Rolland O. Hower, supervisor of the freeze-dry laboratory. Installation of new equipment was begun which will greatly increase production and will also make possible the freeze-dry preparation of much larger biological specimens than before. Publication of Mr. Hower's comprehensive paper, *The Freeze-Dry Preservation of Biological Specimens*, elicited many letters of inquiry from the museum world.

OFFICE OF THE REGISTRAR

The general public's insatiable quest for knowledge on every subject was reflected again this year in letters seeking information or transmitting items for identification. These communications, some 250 to 275 a week, come particularly from elementary and secondary school students, and are received and processed through the Office of the Registrar, which serves both the Museum of Natural History and the Museum of History and Technology. Dinosaurs remained the most popular subject, with American Indians a close second and followed by Stradivarius violins, coins, and requests for information on early Americana. The NBC Smithsonian television series has generated a sizeable influx of questions relating to the subject matter of the programs Typically, one young man wrote, "I love your television shows but I like the one on meteorites best. Please send me . . . ."

Among the interesting and significant types of cargo handled by the shipping office, which processed 14,947 pieces totalling 1,079,702 pounds, were 16,000 pounds of whale bones and skulls carried by motor freight from California. Another was the 15,000-pound El Taco, Campo del Cielo meteorite, shipped back to the Smithsonian from Germany after cutting and later, by special arrangement, returned

to Argentina together with a model of the original specimen. Yet another was a collection of Mexican coins weighing 4,000 pounds that was successfully moved by combined air and armored car service on a rigid schedule and security basis. Valuable pieces of art for special shows of the National Collection of Fine Arts, a 25,000-pound McMillan synchrotron, a chariot dated 1825, and a fragile Dutch marquetry cabinet were also transported through careful and painstaking efforts of the staff.

Accessions to the collections were registered in 3,257 transactions, and tables compiled in the Office of the Registrar, indicating the distribution of these materials, appear on pages 123 and 270.

Passports numbering 293, and 310 visas, were obtained for official travelers to countries from Costa Rica, Panama, Mexico, Poland, and Hungary, to Indonesia and Diego Garcia in the Pacific. Permits were obtained for field expeditions to Venezuela, Brazil, Tunisia, Pakistan, and the inland waterways of Iceland and Norway.

Art objects for the National Collection of Fine Arts, natural history specimens for identification, personal effects for a paleontologist on an expedition—a small part of the daily traffic handled by the Office of the Registrar.

International Exchange Service

J. A. Collins, *Director*

Establishment of the International Exchange Service in 1849 provided a system whereby institutions in the United States could transmit their publications to libraries in other countries and, in return receive publications from the foreign institutions. This system grew rapidly and the quantity of material transmitted has steadily increased through the years. Today many libraries are dependent upon the exchange system for their foreign publications.

During the fiscal year 1967, publications were received from over 400 organizations in the United States for transmission to more than 100 countries. Over 345,000 pounds of official United States publications were received for transmission to foreign depository libraries in exchange for the official publications of other countries. The daily issues of the *Federal Register* and the *Congressional Record* were exchanged for the parliamentary journals of other countries. The United States patent specifications were sent to patent offices in other countries in exchange for the foreign patent specifications. Bulletins, journals, reports, and transactions of universities, observatories, societies, government agencies, agricultural experiment stations, and congressional committees were transmitted to libraries throughout the world in exchange for publications of similar foreign organizations.

A paper, "The International Exchange Service," presented by Collins at a program on documents during the 1965 American Library Association Conference, was published in *Library Resources and Technical Services* (summer 1966), vol. 10, no. 3, pp. 337–341.

During the past year Carl E. Hellyer, who was connected with the International Exchange Service for many years, retired as Assistant Director.

PACKAGES RECEIVED FOR TRANSMISSION FROM FOREIGN AND DOMESTIC SOURCES, FISCAL YEAR 1967

Classification	*For transmission abroad by the Smithsonian*		*Received by the Smithsonian 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	1, 036, 751	388, 259	—	—
Publications received from foreign sources for U.S. parliamentary addressees	—	—	9, 016	11, 618
U.S. departmental documents received for transmission abroad.	322, 367	301, 042	—	—
Publications received from foreign sources for U.S. departmental addressees	—	—	7, 966	14, 726
Miscellaneous scientific and literary publications received for transmission abroad	157, 315	218, 720	—	—
Miscellaneous scientific and literary publications received from abroad for distribution in the United States	—	—	51, 102	90, 507
Total	1, 516, 433	908, 021	68, 084	116, 851
Total packages received	1, 585, 417	—	—	—
Total pounds received	—	—	—	1, 024, 872

Science Information Exchange

MONROE E. FREEMAN, *Director*

VOLUNTARY INPUT OF INFORMATION to the Science Information Exchange (SIE) by all Government and non-Government agencies has increased an estimated 20 percent over the previous year, and good progress has been made toward SIE's primary program objective, a comprehensive national inventory of research in progress. The demand for information services from the scientific community has also increased at least 20 percent over 1966.

During this period, however, as a result of increased automation of information handling, SIE has been able to absorb an increase in costs of about 10 to 15 percent, so that the net gain in economy and efficiency is about 30 percent. For example, an inverted-file disc storage for subject retrieval reduced the computer search to 0.1 hour per question. And a "Unique Last Term" (ULT) index was developed that permits automatic hierarchical assignment of index codes by the computer, eliminating this phase of manual coding.

The man-machine computer-based scientific information system used by SIE is quite complex in its operating detail, and is now automated to the fullest extent that is presently consistent with the practical economics of full-scale production line operations. New methods and equipment are progressively added when practical and when substantial cost-benefits are assured, and future plans include further sophistication of the information-handling system by full-text computer storage. A detailed systems study in progress promises substantial cost-benefits, further reduction in response time, and substantial progress toward standardization and compatability with other information systems. New studies on quality control of information are beginning with an investigation of the amount of irrelevancy acceptable to user-scientists. This will permit the realistic adjustment of input-indexing techniques to the direct computer output of information products acceptable to the users.

Attention was given to the integrated classification and description of urban research. In this program Dr. Scott Keyes, University of Illinois, served as a consultant to the Exchange for six months. Dr. Keyes is also editor of *Research Digest*, published by the Bureau of

Community Planning, University of Illinois. To establish closer cooperation in the collection of information on urban research, a series of informal meetings on urban affairs brought together at SIE specialists in the Washington area with interest in the classification and description of the field. SIE and Department of Housing and Urban Development co-sponsored a regional meeting in New York City on "Cooperation and Communication in Urban Research."

Staff members participated in the Inter-University Communications Council (EDUCOM) at the University of Colorado, Boulder, Colorado, during July 1966 to develop "engineering and operation plans for a prototype network for education information processing." A survey paper on the nature and functions of national information centers was contributed by SIE participants.

The second volume of the *Water Resources Research Catalog* and a new *Water Resources Research Thesaurus* were prepared for the Office of Water Resources Research, U.S. Department of the Interior. The *Outdoor Recreation Research* (a 1966 reference catalog) was also prepared for publication for the Bureau of Outdoor Recreation, U.S. Department of the Interior.

Papers Presented or Published

FOSTER, W. R. Services of the Science Information Exchange in the field of mental health. Presentation before the Committee on Mental Health, HEW, Washington, D.C., April 12, 1967.

FREEMAN, M. E. Science Information Exchange educational information services. Presented before the Education Research Information Center (ERIC), HEW, Washington, D.C., January 31, 1967.

———. The urban program of the Science Information Exchange. Presented before the Conference on Cooperation and Communication in Urban Research, City University of New York, New York, February 1, 1967.

———. The Science Information Exchange as a source of information. Presentation before the New Jersey Chapter of the Special Libraries Association, Edison, New Jersey, April 5, 1967.

———. The Science Information Exchange. Presentation before the Northern, Central and Southern Ohio Chapters of the American Documentation Institute, Cincinnati, Ohio, April 14, 1967.

———. Science Information Exchange—research-in-progress—who, where and what? Presentation before the Seminar on Government Sources of Scientific and Technical Information, sponsored by the University of Houston and by the Southern

Methodist University, Dallas, Texas, in cooperation with the Special Libraries Association—Texas Chapter, May 11 and 12, 1967.

———. Science Information Exchange's triad, producer-processor-user. Presentation before The Workshop on Drug Information Sources Within the Government at the Drug Information Association meeting, May 25–26, 1967, Philadelphia, Pennsylvania.

———. Determining costs of information systems. Journal of Chemical Documentation (May 1967), vol. 7, no. 2, pp. 101–106.

Hersey, D. F. The role of the Science Information Exchange in assisting small businesses. Presentation before the NASA–SBA Conference at Lewis Research Center, Cleveland, Ohio, May 25, 1967.

———. The role of the Science Information Exchange in the nuclear technology field. Presentation before the Symposium on Nuclear Technology Information, Buffalo, New York, January 21, 1967.

Kreysa, F. J. Science Information Exchange and national registry of current research. Presentation before the Symposium on Information Resources for Nuclear and Radiation Technology, Edison Club, Rexford, New York, May 17, 1967.

Long, B. L. Bridging the pre-publication gap in scientific information. Geotimes (March 1967), pp. 18–19.

Marron, H., and Foster, W. R. Subject searches on current research information of parallel computer and manual files. Proceedings of the American Documentation Institute, October 3–7, 1966, pp. 123–129.

Maturi, V. F. Some elements of a federal scientific information center. Presentation before the Gordon Conferences, New Hampton, New Hampshire, July 19, 1966.

———; Liebman, S.; Fitzpatrick, W. H.; and Kreysa, F. J. Science information centers. Journal of Chemical Education (November 1966), vol. 43, no. 11, pp. 605–606.

Smithsonian Institution Libraries

MARY A. HUFFER, *Acting Director*

INCREASED ACTIVITY WITHIN THE INSTITUTION in research, education, exhibits, and public services caused a substantial increase in the workload of all Smithsonian Libraries this year. Of the 44,209 items added, 7,369 came through purchase. Of the 16,939 titles cataloged, 8,121 items were handled in the bindery unit. No circulation figures are available for the major portions of the collections which are freely accessible to staff and visiting scholars within their own bureaus and departments, but over 51,000 items were circulated through the loan desks. The reference staff handled over 60,000 questions and letters. At the end of the year about a third of the collections was fully classified and cataloged. Most of the uncataloged material had been sorted, shelved, and can now be retrieved through various temporary control files.

Progress continues on the automation program. In July 1966, James Crockett, program analyst, was assigned to the Director's office to assist in the system studies and programming of the Libraries' automation projects. By the end of the year he had completed the review and updating of all the programs for accounting procedures and acquisitions of monographs and was beginning to phase in the purchasing, check-in, and control system for serials.

The staff of the Smithsonian liaison librarian at the Library of Congress continued to provide able assistance and support services to Smithsonian staff members, thereby saving much valuable time for both research and library staff members.

During the year 12,000 pages were submitted for translation on the Special Foreign Currency Information Program administered by the National Science Foundation.

In September the acquisitions staff moved into new quarters, in the west range of the Natural History building, which provided more space for staff, equipment, and operations. Thomas L. Wilding, who was named exchange and gift librarian in July 1966, was most successful in reactivating inactive exchange partners, and he increased by 50 percent the number of new exchanges. Improvements in the operations of the automatic data processing system made possible the handling of a 40 percent increase in book funds without additional staff.

In the cataloging section the year was one of transition. With the arrival of Carol Raney as the new chief and the appointment of Charles King as serials cataloger in August, the professional staff has been complete for most of the year, and the output of cataloging increased accordingly. Expansion of the department into the space vacated by the acquisitions section resulted in a much better flow of work and improved control of materials in process. The survey of the manual system and preliminary report for the conversion of the serial records for machine processing was completed by the end of the year. In May the hand binding and commercial binding units were combined under the supervision of Mrs. Mary J. Pierce.

The assistant director of reader services, Jean C. Smith, resigned in May because of serious illness in her family.

Among the notable donations received during the year were the following:

Brooklyn Museum: 219 volumes on art.
Carnegie Institution: 103 volumes, including a complete set of the H.M.S. *Challenger* Reports.
Edwards, Mrs. Carolyn E.: 17 monographs, including 2 rare books:
Bradley, Eliza. An authentic narrative of the shipwreck and suffering of Mrs. Eliza Bradley. 1820.
Philips, George. Travels in North America. 1824.
Martin, Mr. and Mrs. Albert: 41 items on art.
Nagel, Charles: 1488 items on art and art history.
Proetz, Victor, Estate of: 195 items on fine art from his estate.
Watson, Paul, Estate of: 137 items on communications from his estate.
White, John H., Jr.: 86 items on transportation.

Staff Activities

In November at the U.S. Department of the Interior Library's Biennial Departmental Workshop Mrs. Huffer spoke about the Smithsonian Libraries—their history and collections. Informal talks were given throughout the year to visiting groups of foreign librarians and numerous groups of library graduate students. Jack Goodwin gave several lectures during the year, among them one on "The Historiography of the American Revolution" at the graduate school of Maryland University. The Smithsonian Institution was elected to a two-year term of membership on the Federal Library Committee in June. Mrs. Huffer has continued her work with the Committee's Task Force on acquisitions of library materials and correlation of Federal library procedures. Staff members continue to be active in many professional societies and the Institution was well represented at meetings of the American Library Association and the Special Libraries Association.

The following papers by a library staff member appeared in various journals:

GOODWIN, JACK S. The trade literature collection of the Smithsonian Library. *Special Libraries* (October 1966), vol. 57, no. 8, pp. 581–583.

———. Current bibliography in the history of technology. *Technology and Culture* (Spring 1966), vol. 7, no. 2, pp. 258–309.

Branch Libraries

Work continued in the entomology branch library on the organization of the collection with special emphasis on the serial holdings.

The remainder of the paleobiology department library collection was integrated into the general natural history collection and the entire general natural history collection housed in the central library was moved to the new west-range stack area on the ground floor of the Natural History building, thereby partially relieving the critical shortage of shelving space in the central library.

By October 1966 the branch library in the Radiation Biology Laboratory had been remodeled and enlarged, new library shelving installed, and all the books cleaned and reshelved in proper sequence.

Mrs. Ruth Schallert, who was appointed librarian for the botany department branch library in December, continued the review, weeding, and reorganization of the botany collection begun last year. An inventory of the collection was completed with the help of senior research associate William Archer. Reclassification of this collection from the Dewey to the Library of Congress system begins next year. An anonymous gift of nearly a thousand dollars, and special effort by the acquisitions section through the exchange program, added several desirable items to the collection and filled many gaps in the serial collection.

The staff of the branch library in the Museum of History and Technology continued to organize the trade-catalog collection.

During February and March of 1967, the branch library serving the National Collection of Fine Arts and National Portrait Gallery moved from the Natural History building into its new quarters on the third floor of the Fine Arts and Portrait Galleries (the old Patent Office building).

This collection continues to receive close attention, so that an adequately staffed and well-organized and stocked library will be available when the Galleries open to the public.

The branch library in the Smithsonian Office of Anthropology continued to expand its collection, improve its organization of materials, acquire additional space, and increase its services.

Miss Elizabeth H. Weeks in July 1966 was appointed branch librarian for the Smithsonian Astrophysical Observatory at Cambridge, Massachusetts. With the addition of a full-time library aid the cataloging backlog was brought under control, a modest selective dissemination of information program was put into effect, and two library publications initiated—*Library Acquisitions* and *Library Publications*.

The Acting Director in August spent ten days at the Smithsonian Tropical Research Institute in Panama surveying the branch library while consulting with the scientific staff. Some new procedures were initiated which resulted in better control of the materials, more rapid response, and additional support from the central library in assisting the staff with the acquisition of new materials and providing improved reference and research services.

Smithsonian Institution Press

ANDERS RICHTER, *Director*

THE SMITHSONIAN HAS LONG BEEN NOTED for its publication of research reports in serial form, which are funded mainly by Government appropriations; and for popular pamphlets and guides, which are produced mainly with private funds and distributed through its Museum Shops. It has not been recognized as a publisher of books, as are the sixty-six other academic institutions whose presses are members of the Association of American University Presses. During the course of the past fiscal year, the Smithsonian Institution Press acquired the form and functions of a full-fledged university press in order that it may support a program of book publishing in addition to serials and popular publications. The Press was reorganized on the basis of functional departments which are common to American publishing houses.

The editorial section was revised so that specific editors are no longer charged with the total editing and production of a particular series. Editors now receive manuscripts according to schedule priorities rather than subject matter, and they are usually relieved of production concerns. Direction of the section was assumed by Roger Pineau, formerly liaison editor of the Museum of History and Technology, on his appointment to the position of managing editor. Mr. Pineau is a historian, translator, and Japanese linguist who has written several books and other publications. Although the editorial staff was reduced by four persons during the year, a considerable reduction in editorial backlog was achieved.

The production section was established under the direction of managing designer Stephen Kraft, a prominent member of the graphic arts community in the City of Washington, where formerly he conducted his own typography and design studio for 14 years. Subsequent to his appointment, he was joined by Mrs. Betty Sur, who came to the Press as assistant design and production manager from the publications office of the Library of Congress. Including an additional staff of two designers, the production section is responsible for the purchasing, scheduling, and design of Press printing.

The promotion section was established with the appointment of Virginia Foster, formerly manager of the Kiplinger Book Service, as

promotion manager. Her responsibilities include annual catalogs, direct mail announcements, space advertising, distribution of review copies, book jackets, exhibits, and book-trade relations. In the last six months of the fiscal year her efforts produced three direct-mail circulars sent to 20,000 addresses and five space advertisements appearing in seven periodicals, and culminated with distribution of 40,000 copies of a 28-page catalog announcing new titles and listing back titles. Late in the year, a working arrangement with the S. G. Stackig advertising agency was concluded.

The most urgent problem facing Press management at the beginning of the year was that of a large backlog of manuscripts accepted for publication in the several Smithsonian series. By the end of the year this problem had been considerably reduced and had been eliminated for shorter papers in the natural sciences which, by that time, were being issued as rapidly as four months after receipt of the manuscript. The reorganization of the editorial and production sections, the application of "cold" (typewriter) composition to appropriate jobs, the screening out of deficient manuscripts, the employment of free-lance editors, the elimination of continuous pagination in a major series, the stress on making changes in manuscript rather than on proofs, and the elimination of such extraordinary editorial services as complete checking of citation and quotations all had beneficial effects on schedules and output. There is still a serious problem of backlog with longer or heavily illustrated works but, by the end of the year, every manuscript accepted by the Press earlier than seven weeks before that date was in editorial work or at the printer.

During the past fiscal year, 128 publications were issued by the Smithsonian Institution Press (as compared with 109 in the previous year). Of these, 92 were funded by the Federal appropriation in the amount of $223,916 and 36 were issued with Smithsonian private funds in the amount of $134,037, including 3 supported by grants and gifts in the amount of $15,745. The titles of all works published by the Press are listed in Appendix 3.

The distribution section, under the able direction of Mrs. Eileen McCarthy, mailed out 306,494 publications. Midway in the year, it was decided to move the section to the second floor of a leased garage at 1242 Twenty-fourth Street, where the office personnel and entire stock of Press publications can be integrated in a unified operation. It is hoped that this move will give the Press sufficient warehouse space to accommodate expansion of inventory for at least five years.

During the past year, the Press pursued a policy of divesting itself of inherited functions that are not matters of publishing. Accordingly,

the fiscal and operating responsibility for the purchase of office forms was transferred to the Division of Organization and Methods, for exhibit labels to the Office of Exhibits, and for book rebinding to the Library. The Press also clarified its relationship with the Museum Shops, with the result that it will purvey its publications to the Shops for re-sale on a publisher-bookstore basis.

In keeping with the Smithsonian's purpose of making available works which describe and interpret its activities and related science to the public at large, the Press management has continued to participate in cooperative arrangements with private publishers. A contract for a major publishing project was executed with the American Heritage Publishing Company in June 1966, providing for collaboration in publishing a series of illustrated books for a popular audience. *The Smithsonian Library* series was publicly announced by American Heritage in February 1967. The subjects for the books will range the diverse fields of Smithsonian interests with strong accent on the natural sciences and the history of technology. American Heritage will procure the manuscripts and artwork, and will produce and sell the volumes. The Smithsonian is providing archival services and photographs, and consults on the correctness of fact and interpretation in the manuscripts. It is hoped that the series will provide the public with insights into the essence and process of academic research, and will help to repair the breach in the mutuality of scholars and laymen. By the end of the year seven authors were under commission to prepare manuscripts.

In 1966, Simon and Schuster published, in cooperation with the Smithsonian, *The Golden Age of Science.* Edited by Bessie Zaban Jones, the volume is a collection of biographies of 30 prominent scientists of the 19th century, reprinted from the Appendixes of the *Annual Reports* of the Smithsonian Institution.

Notable personal accomplishments include the selection of Crimilda Pontes' design of *Islamic Art from the Collection of Edwin Binney, 3rd* as one of the 25 best of the year by the jury for the Association of American University Presses. Miss Pontes was also awarded a place in the Art Directors Club of Washington annual show for her design of *Art Treasures of Turkey.* Upon request of Admiral Samuel E. Morison, Roger Pineau was detached for eight weeks to Japan, where he assisted Admiral Morison* with research for his forthcoming biography of

*While in Japan, Admiral Morison, on behalf of the Smithsonian Institution, presented to the city of Hikone a life-size wooden statue of Naosuke Ii, Japan's first prime minister, which had been given to the Smithsonian after its exhibition at the Columbian Exposition of 1893 in Chicago. (See also p. 126.)

Commodore Matthew C. Perry. He was elected a trustee of the Japan-America Society of Washington, and he was guest lecturer in Newport, Rhode Island, on June 15 at the annual meeting of the Preservation Society of Newport County, giving an illustrated talk "With Admiral Samuel Morison in Far East Pursuit of Commodore Matthew C. Perry." Stephen Kraft taught a semester course on "Advanced Graphic Design" at The American University. The Director represented the Smithsonian on the Inter-Agency Book Committee, and was a member of the Copyright Committee of the Association of American University Presses.

The Press continues to administer a print shop, a small branch of the Government Printing Office, which exists to serve immediate printing needs—many of which, such as labels for collections, are peculiar to the Smithsonian. The shop, with a staff of two journeymen printers, completed 905 jobs during fiscal 1967.

Under the authority of its first Secretary, the Smithsonian Institution was established as a center for advanced studies and as an academic publishing house. Under the present administration, the historic mandate for a publications program continues to receive major emphasis.

Office of International Activities

WILLIAM W. WARNER, *Director*

THE OFFICE OF INTERNATIONAL ACTIVITIES, now in its third year of developing and administering programs of international cooperation, has given emphasis to those areas of basic research in the sciences and humanities where further advancement of knowledge in this country requires continuing and strong cooperative research programs in other nations. These programs benefit not only the Smithsonian, but the many other American institutions of higher learning that carry out research of interest to the Institution and are recipients of the Office's foreign currency and other grants.

The Office also serves as the Institution's point of liaison with government agencies and international organizations concerned with international matters relating to Smithsonian interests. The Director or other of the Office staff members represent the Institution on such advisory councils or working groups as the International Committee of the Federal Council for Science and Technology, the Department of State's Interagency Council on International Educational and Cultural Affairs, the Foreign Area Research Coordination Group, the Cultural Activities Committee of the United States National Commission for UNESCO, the International Committee of the National Trust for Historic Preservation, and the Organization for Tropical Science, to name a representative sampling.

In addition to programs which it directly administers, the Office also assists other elements of the Smithsonian in establishing research projects or exchanges of exhibits which involve substantial participation of foreign institutions or intergovernmental negotiation. During the period under review, such assistance ranged from obtaining host country and American Embassy support for multi-national research programs, such as the Office of Anthropology's Ancient Technologies Program, which has carried out field research in Iran, Turkey, and Ceylon, to making arrangements for locally shown art exhibits or cultural events with the Embassies of Peru, Chile, Tunisia, Iran, and Czechoslovakia.

The Office last year welcomed two new staff members, David Challinor, as Deputy Director, and Kenneth Whitehead, as Deputy to the Foreign Currency Program Director. Dr. Challinor holds a degree

in forestry from Yale University, where he also served as Deputy Director of the Peabody Museum. At the Smithsonian, he has been instrumental in the development of cooperative programs with the Organization for Tropical Studies, described in more detail below, and the National Research Council of Iceland. Mr. Whitehead comes to the Smithsonian after a Foreign Service career in Italy, Lebanon, and Libya. His interest in Old World archeology and his fluency in Arabic and French have been instrumental in the successful development of many Foreign Currency Program projects in the Mediterranean area.

Foreign Currency Program

Following an initial concentration on archeology and related disciplines, the Foreign Currency Program, under its Director, Kennedy B. Schmertz, broadened its scope to include systematic and environmental biology. This was the result of Congressional approval of a broader program authority and an increased appropriation, in the amount of $2,316,000 in excess foreign currencies deriving from the sale of surplus agricultural commodities under Public Law 480.

Among the first projects to be carried out in the biological sciences were a Johns Hopkins University study of the small mammals of Bengal, an investigation that combines basic and applied research through the identification of rodents and their disease-bearing ecto- and endoparasites; a Southern Methodist University study of the Qattara Depression, a vast below-sea-level basin in northwestern Egypt that holds the record of the interesting environmental changes that have occurred in this region from the Quaternary period to the present; and a University of Michigan study of the cytology of certain Indian mollusks which are of interest in themselves for their great morphological diversity and of importance to medical, veterinary, and public health research.

Foreign currency grants for projects in the biological sciences were also made to elements of the Smithsonian itself, through the Smithsonian Research Foundation. Prominent among these were the inauguration of the Mediterranean Marine Sorting Center in Tunisia, and a study of the behavior and ecology of the Ceylonese elephant, headed by Dr. John Eisenberg of the National Zoological Park, in cooperation with the University of Ceylon and the Wildlife Department of the Ceylonese Government's Ministry of State. The Sorting Center was established through the cooperation of the Tunisian Institute of Oceanography and Fisheries at Salambo on the coast north of Tunis; Dr. David Damkaer of the Smithsonian Oceanographic Sorting Center assumed duties as Resident Director in November

The Foreign Currency Program is supporting a study of migratory birds in northeast Africa by George E. Watson of the Musuem of Natural History. The bird that the young Bedouin girl is removing from the net will be banded for identification purposes and set free. Below: nets set around base of tree.

of 1966. This new sorting facility has greatly advanced the Oceanographic Sorting Center's general mission of identification of marine organisms and has also served as the collection and specimen processing center for special projects in the marine biology of the Mediterranean.

In accord with Congressional directives to support the objectives of the International Biological Program (IBP), the Foreign Currency Program also provided grants to carry out ecological surveys of opportunity in areas which may later be singled out for intensive study under the IBP. These surveys were conducted in India, Congo (Kinshasa), Pakistan, and Israel and involved scientists from some ten American universities. In cooperation with the National Academy of Sciences, grants were made to support American participation at planning conferences of the Terrestrial Productivity and Terrestrial Conservation Sections of the IBP in Warsaw and Tunis, respectively.

Continuing projects in archeology and related disciplines, established during the first year of the Program, included:

The Hebrew Union College-Jerusalem School of Archeology excavation at Gezer, best known as the city given by Pharaoh Shishak as a dowry to his daughter, who became King Solomon's queen. More significant is the fact that the Gezer excavation is developing strong evidence of the city's destruction by Nebuchadnezzar. The Smithsonian's grant also permits the Jerusalem School to conduct a general archeological survey of the Negev and to hold an annual seminar on Near Eastern Civilization for American graduate students.

The Carnegie Museum-University of Pittsburgh excavations at Ashdod in Israel, which have confirmed Biblical reports of the city's periodic destruction and have unearthed occupation sequences ranging from late Bronze Age to the Byzantine period.

The American Academy of Benares, a center for the study of Indian art history and archeology. In its second year the Academy commenced preparation of an encyclopedia of medieval temple architecture and published bulletins on the sculpture of Kashmir and the Bronze Age sculpture of Eastern India. In its more general tasks, the Academy has already produced and accessioned over 4,000 photographs for its archives and developed a library with some 2,500 books and journals.

The University of Missouri-Corning Museum of Glass excavations of ancient Phoenician glass manufactories along the Israeli coast, which have uncovered evidence of the earliest use of melting tanks, as opposed to the more primitive glass-making pots.

New projects included excavation of Neolithic sites near Cracow,

by the University of Michigan and the Polish Academy of Sciences' Institute for the History of Material Culture, and a University of Colorado expedition to Oued el Akarit, a Middle Stone Age site with artifacts from the Mousterian culture that is expected to reveal relationships with similar sites in Europe and cast further light on the evolution of hominoids and early man.

A major obstacle to further development of the Program came at the end of the period of this report with the outbreak of the Arab-Israeli war. The hostilities caused suspension of a number of major projects in Egypt. Among these were:

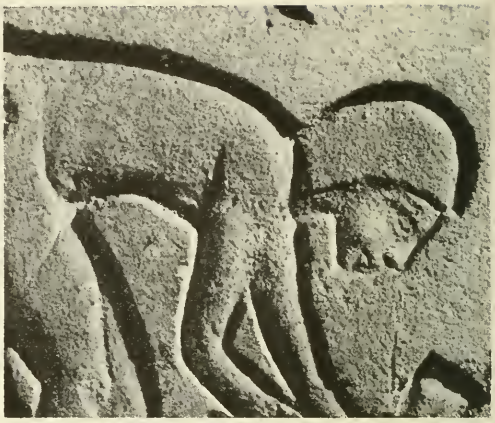
The American Research Center in Egypt's various research and excavation projects. The Research Center represents a consortium of ten American universities; at the time of the outbreak it was making plans to continue an epigraphic survey at Luxor, archival research at St. Catherine's monastery on Mount Sinai, and major excavations at Mendes on the Sinai peninsula and Gebel Adda and Hierankopolis on the Upper Nile.

A University of Pennsylvania project to photograph and match with the use of computers the massive stones of the temple of Akhenaten stored at random in Luxor. The interpretation of the pictorial scenes and hieroglyphics on the stone faces was expected to reveal much about life in the XVIIIth Dynasty.

The University of California Lawrence Radiation Laboratory-Ein Shams University project to discover interior chambers in the Great Pyramids through use of cosmic rays and a spark chamber. Instruments had been installed and calibrated at the Pyramid of Cheops when hostilities forced cessation.

In June of 1967 the Office Director visited Belgrade and concluded a general program agreement with the Yugoslav Government permitting cooperative programs in archeology. Soon thereafter Stanford University made intensive preparations for joint excavations and surveys with the Territorial Museum of Sarajevo in a rich area threatened with flooding by dam construction. The area, known as the Trebisnjica Basin, lies in the mountains northeast of Dubrovnik and contains large Roman and medieval Slavic necropolises, as well as archeological sites and monuments of Pre-Illyrian, Illyrian (Iron Age), and Greek origin. It is also known for the curious tombstones of the Bogomils, a 13th-century heretical sect.

By the end of its second fiscal year, the Foreign Currency Program had awarded excess currency grants totaling $3,400,000 which benefited 23 American universities and museums.



Some 30,000 blocks from the Temple of Akhnaten, at Karnak, Egypt, stored haphazardly in boxes, are carved with detailed scenes from the life and times of the revolutionary Pharaoh Akhnaten and his consort Queen Nefertiti. The University of Pennsylvania, University Museum, is undertaking a project to photograph the blocks and to record them with the help of a computer. By this means they hope to reassemble them in correct sequence and thus reveal as a coherent story-telling whole the magnificent decoration of the temple.

Exchange of Persons Programs

The Office continued to help with the programming of foreign visitors coming to the United States under Department of State or other Federal and private exchange of persons programs. A significant number of these visitors were public officials from ministries of culture or education interested in such subjects as the organization of the Smithsonian and its various bureaus, museum education, the U.S. National Museum Act, or Federal programs for the performing arts, sciences, and humanities in general. In this category were Mr. Wah-Siang Woon, Permanent Secretary of the Ministry of Cultural Affairs of Singapore, Dr. Prem Kirpal, Secretary of India's Ministry of Education; Ambassador Ante Rukavina, Executive Director of the Yugoslav Fulbright Commission; Dr. K. N. Saxena, Field Advisor of India's National Council of Educational Research and Training; Mr. Janez Vipotnik, Yugoslavia's Federal Secretary for Education and Culture; Mr. Noom Yoonaidharma, Executive Secretary of the Department of Fine Arts of the Ministry of Education of Thailand; and Mr. Chedli Klibi, Tunisia's Secretary of State for Information and Culture.

Visits to the Smithsonian and programming assistance were also arranged for museum directors from Australia, Brazil, the Republic of China, Ecuador, India, Rumania, Tunisia and Venezuela. Significant discussions were held on international conservation and national park museums with Mr. Webungo Bukachi Akatsa, Under Secretary of Kenya's Ministry of Natural Resources.

In addition, the Smithsonian accepted total programming responsibility for Joseph F. K. Acquaye, Assistant Director of Ghana's National Science Museum, and Guy Ramanantsoa of the Malagasy Government's Department of Forests and Water Resources. Mr. Acquaye, who was the recipient of a State Department specialist grant, received practical training with the Smithsonian's Office of Exhibits and a two-month observation tour of museums across the nation. Mr. Ramanantsoa, whose visit was in part funded by Duke University, studied with Dr. John Buettner-Janusch, of Duke's Medical Center, methods of breeding lemurs and other primates in captivity. He also observed various national parks and visited the Smithsonian Tropical Research Institute in Panama. The Institution was pleased to have helped provide these opportunities for Mr. Ramanantsoa, whose professional duties are directly concerned with the preservation of Madagascar's unique flora and fauna.

To an increasing degree the Institution cooperated with the Office of Protocol of the Department of State in holding diplomatic gatherings

or making arrangements for the official visits of chiefs of state. On the eve of Washington's birthday, the Smithsonian and the Office of Protocol held a joint dinner for all foreign chiefs of diplomatic missions in the Flag Hall of the Museum of History and Technology. The Ambassadors and their wives had a preview of the growth of the United States hall and heard period music from Washington's time by the First Maryland Fifes and Drums and the Smithsonian *Collegium Musicum*, a vocal and instrumental group led by John Fesperman, Smithsonian associate curator of musical instruments.

In April the Institution played host to His Excellency Cevdet Sunay, President of the Republic of Turkey. He was met in the Presidential Room of the Museum of History and Technology by Acting Secretary James Bradley who presented him with an inscribed copy of the newly published *Art Treasures of Turkey*, which contains illustrations of many of the objects shown in the exhibition being circulated in this country by the Smithsonian Institution Traveling Exhibition Service.

At the end of the period under review, the Smithsonian received His Excellency Asgeir Asgeirsson, President of the Republic of Iceland. A luncheon at which Vice President Humphrey and Secretary Ripley presided, was held for President Asgeirsson in the Museum of History and Technology. The Vice President spoke of the importance of cooperative scientific research in Iceland; Mr. Ripley outlined some of the Smithsonian's long-standing interests in Iceland and presented to the President, an ardent bibliophile, a specially bound and inscribed copy of *Dürer and His Time*, recently published by the Smithsonian Institution Press.

Conferences

The Office assisted in the arrangements for the Smithsonian Symposium 1967: The Quality of Man's Environment, and provided foreign currency grants which enabled participants from Israel, India, Pakistan, Tunisia, and Yugoslavia to attend the Symposium.

In cooperation with the American Institute of Biological Sciences, the Office organized and provided travel for American participation in the Surtsey Research Conference held under the auspices of the National Research Council of Iceland and the Surtsey Research Society in Reykjavik in June 1967. The purpose of this conference was to report on the progress of research in the biological and geological sciences concerned with the island of Surtsey, which was born of a submarine volcanic eruption off the south coast of Iceland in November 1963, and to make plans for the coordination of future research efforts. Surtsey Island represents the most continuously studied of all recent volcanos. As such, it is vital to the understanding of oceanic volcanism

The Lawrence Radiation Laboratory of the University of California at Berkeley has initiated a project to search for hidden chambers in the Great Pyramid of Cheops and the second pyramid of Chephren by the use of high-energy particle detectors placed inside the pyramids. Equipment is unloaded (top) and a mock-up of the detector to measure the angle of arrival of incident cosmic rays is carried through tunnels in the Great Pyramid to the inner chambers, to assure that passageways are wide enough.

At Obre, Yugoslavia, the University of California at Los Angeles and the Zemaljski Musej in Sarajevo are excavating a village settlement of the prehistoric Butmir culture. Above: Butmir pottery, ca. 4000 B.C., with sophisticated spiral designs, uncovered at the excavation.

and may offer predictive information for similar geophysical occurrences. Surtsey also represents virtually the only sterile environment that can be conveniently studied in the world today.* It is for this reason that Assistant Secretary for Science Sidney Galler has characterized Surtsey as "a unique opportunity to investigate the dynamics of ecological succession."

In addition to Dr. Galler, Smithsonian scientists and staff members attending the Surtsey Conference were Kurt Fredriksson, curator of meteorites; William Melson, associate curator of petrology; David Challinor, Deputy Director of the Office of International Activities; and Helen Hayes, Special Assistant to the Assistant Secretary for Science. All had the opportunity to land on the island, which now boasts a modest combined laboratory and bunkhouse. As a result of his visit, Dr. Melson is collaborating with Icelandic scientists in the study of certain greenstones found around the core of Iceland's deeply eroded volcanos which are also enigmatically occurring in dredge hauls made along midocean ridges, especially the Mid-Atlantic Ridge, with increasing frequency.

Cooperative Programs

The Office of International Activities continued to carry out cooperative programs with organizations ranging from the Pan American Union to the Peace Corps. For the second year, Peace Corps Volunteers around the world have collected specimens or made field observations for Smithsonian scientists. Especially valuable were the contributions of the first contingent of Volunteers to go to Guyana, seven of whom spent two days at the Smithsonian during their training period in the United States.

Also for the second year, the Fellowship Program and the Department of Scientific Affairs of the Pan American Union funded field research opportunities for Latin American graduate students at the Smithsonian Tropical Research Institute in Panama. During the year under review, fellowships were granted to Profesora Maria Andrada de Luraschi of Argentina, who is specializing in the taxonomy and evolution of orchids, and Sr. José Eduardo Olazarri of Uruguay, whose interests center on mollusks.

In November 1966, the Smithsonian became a member of the Organization for Tropical Studies (OTS), a consortium of 16 leading Ameri-

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*"Travel Notes from Iceland" (*Atlantic Naturalist* (April–June 1967), vol. 22, no. 2, pp. 87–96), by Office Director William W. Warner, describes, among other things, a flight over Surtsey and its neighboring volcanic island of Syrtlingur.

United Fruit Company's Botanical Gardens in Lancetilla, Honduras, are to be developed as a graduate training and research center in tropical biology by the Organization for Tropical Studies. The Smithsonian, as a member of this consortium of American universities, was instrumental in arranging with the United Fruit Company for the use of the Gardens.

can universities and the University of Costa Rica dedicated to encouraging the study of tropical biology. Soon thereafter the Office of International Activities took a leading role in interesting the Organization in the possibilities of the United Fruit Company's botanical gardens in Lancetilla, Honduras, as a field research and training center. The gardens, which are surrounded by a 3,400-acre forest reserve which serves as the watershed for the nearby town of Tela, have one of the world's outstanding collections of tropical plants, with both native and exotic species. Lancetilla is also very close to the Río Ulua valley, an area vital to the archeology of Middle America, and is thus of added interest to the OTS in view of plans to extend its graduate training programs to the anthropological sciences.

At a meeting held in New Orleans during May 1967, the United Fruit Company generously offered the use of the Lancetilla gardens and associated facilities to the OTS through a legal agreement. At the

moment of writing, plans are being made to conduct a three-month graduate course in tropical forestry during the winter of 1968 and to improve laboratory facilities and living quarters. It is hoped that in the future Lancetilla can serve as one in a chain of research and training centers located in different environmental regimes, along with the Smithsonian Tropical Research Institute in Panama, the Chesapeake Bay Center for Field Biology, and the OTS field stations in Costa Rica. The Smithsonian and all member institutions of the Organization consider such increased field training and research opportunities to be vital to man's knowledge of the Tropics, which represent the last great frontier for human occupancy left on earth and an outstanding challenge for pioneer scientific investigations for many generations to come.

Notable progress was achieved in seeking United States membership in the International Centre for the Study and Preservation of Cultural Property at Rome. The Rome Centre, as it is better known, is an international organization with 42 member nations dedicated to the advancement of museum conservation and historical or archeological site preservation through training programs, consultation missions and technical publications.

In accord with a Board of Regents recommendation that the Smithsonian explore the necessary measures to obtain U.S. membership, Smithsonian General Counsel Peter Powers and the Office Director sought the opinions of a wide range of museum conservators and officials of Federal agencies or private organizations concerned with conservation or historic sites preservation on the potential benefits of American membership in the Rome Centre, through consultations and meetings held at the Smithsonian. Uniformly favorable reactions were obtained, and it was with some gratification that in October 1966, the Institution received a letter from Joseph Sisco, Assistant Secretary of State for International Organization Affairs, expressing Department of State support of United States membership and suggesting that the Smithsonian might appropriately seek legislative action to achieve the same, in view of the Institution's professional concern with the work of the Rome Centre. In April of 1967, Mr. Powers and Frank A. Taylor, Director of the U.S. National Museum, attended the Centre's General Assembly in Rome as observers in order to obtain first-hand knowledge of the Centre's administration and programs. Upon their return, a draft bill providing for membership and a supporting statement giving detailed information on the programs and operation of the Centre was readied for submission to the Congress.

Office of Education and Training

CHARLES BLITZER, *Director*

THE OFFICE OF EDUCATION AND TRAINING during the past year continued its program of visiting research appointments for postdoctoral scientists and scholars, for graduate students, and for undergraduates. (Lists of those receiving awards appear in Appendix 6.) The number of applications in these programs attests to the high interest that they have aroused in the academic community. During the year arrangements were completed with the American Council of Learned Societies under which the Council will work with the Smithsonian in the selection of postdoctoral fellows in the humanities.

The Institution's program in American Civilization continued to grow, most notably through the offering of courses in cooperation with universities in the District of Columbia. A detailed report is to be found under the Museum of History and Technology, page 251.

The Smithsonian's Belmont Conference Center began regular operations late in the year. During May and June conferences were held there by The American Historical Association, The Smithsonian Society of Associates, The American Academy of Arts and Sciences, the U.S. Office of Education Postdoctoral Fellows, and Outward Bound, Inc.

Planning proceeded for an experimental exhibit for the blind. Supported by a grant from the Vocational Rehabilitation Administration, a proposal for an exhibit, "The Four Senses—Imagination and Flight," was prepared by Brian O'Doherty with the aid of a distinguished advisory committee. Funds will be sought for the construction of this exhibit in the near future. It is our belief that Dr. O'Doherty's exhibit will be of the greatest interest to all museum visitors; those who happen to be blind will perhaps be able to enjoy it even more than the sighted.

During the year, the Office of Education and Training worked closely with the Anacostia Neighborhood Advisory Council in planning and developing an experimental neighborhood museum. With funds raised from private sources, a motion picture theater was rented in Anacostia—a community in which 78 percent of the population is non-white,

Belmont, the Smithsonian Institution's conference center, lies about twelve miles south of Baltimore and eight miles from Friendship International Airport. The estate is thirty-five miles north of Washington, D.C.

Built in 1738 by Caleb Dorsey of Annapolis, Belmont is situated on 340 acres of rolling fields and woodlands bordering the Patapsco River and Park near Elkridge, Maryland. In 1805, Priscilla Dorsey married Alexander Hanson and since then the property has gone through numerous generations of the Dorsey-Hanson families. In 1917, ownership of Belmont was transferred from the last direct heir to a cousin and her husband, Mr. and Mrs. Howard Bruce.

The estate was acquired by the Smithsonian in 1964 and, following extensive restoration and modernization, the manor house was opened as a conference center in spring 1967.

The aim of the Smithsonian's conference center is to provide a peaceful location in pleasant surroundings for the pursuit and sharing of knowledge, and all conferences held at Belmont relate directly or indirectly to the Smithsonian's educational objectives. The Institution sponsors conferences at Belmont in the fields of its special interest—the sciences, history, and the arts—and welcomes meetings of educators and others devoted to the increase and diffusion of knowledge in any field.

Belmont conferences are organized either entirely under Smithsonian auspices or by outside organizations and governmental agencies having similar interests. Specialized conferences often bring in outside experts for consultation in particular fields.

The Belmont estate at present provides comfortable overnight quarters for twenty-two guests, while fifty may be accommodated for lectures and discussions. The main conference room seats thirty-six, and special rooms for informal meetings or working sessions are available. The dining room can seat fifty guests.

Additional sleeping accommodations are provided in neighboring hostelries, pending the restoration of other residential buildings on the property.

in which 41 percent is under 18 years of age, and in which the median family income in 1960 was $3,430. With the help of volunteers of all ages, the building and adjoining grounds were transformed into a museum and small park, and work has begun on the preparation of exhibits chosen by the neighborhood. Under the direction of John Kinard, the new Anacostia Neighborhood Museum, scheduled to open September 15, 1967, holds promise of bringing the resources of museums to the very substantial part of our population that has not in the past been reached by them.

During the 1966–67 school year, 35,318 schoolchildren were taken on guided tours of Smithsonian museums by docents of the Junior League, who had in turn been trained by museum instructors on the staff of the Office of Education and Training. With the generous assistance of the Junior League, and under the experienced guidance of Nathaniel R. Dixon, new and imaginative programs for relating the resources of the Smithsonian to the needs of schools and children are being prepared.

Office of Public Affairs

FREDERIC M. PHILIPS,* *Director*

THE OFFICE OF PUBLIC AFFAIRS provided, through a busy year of transition, a diverse range of services to the public—from recorded telephone information and a nationwide television series to a free educational film theater and material for the local, national, and international press.

Every Saturday afternoon through the fall and winter, a half-hour filmed color television program entitled "The Smithsonian" brought various aspects of the Institution and its areas of concern into the homes of an estimated four million viewers. Produced by the National Broadcasting Company with the day-to-day cooperation of this office and bureaus concerned in each program, the films were addressed to the following topics: underwater archeology, aviation and space flights, osteology, election campaigns, American inventors, ecology, conservation, meteors, patriotism, first ladies, sports, radiation, George Catlin and the American Indian, physical anthropology, systematics, expeditions, and American folk art.

Plans were completed and schedules set for cooperation in two hour-long television programs to be filmed in the latter half of 1967 and broadcast early in 1968—a children's story of a pet dinosaur entitled "The Enormous Egg" and a documentary on the ecology of East Africa, centered around the field work of Smithsonian conservationists Lee M. and Marty Talbot.

By the end of this reporting period, tape-recorded interviews with twenty bureau directors, department heads, and curators throughout the Institution had been broadcast over the worldwide facilities of

*Appointment effective July 2, 1967. The Office of Public Affairs, successor to the Office of Public Information, under which name the work reported above was conducted, was organized July 12, 1967, to assume responsibility for Smithsonian activities in public information, press relations, radio and television, films and other audio-visual services, community relations, special events (these events were handled during the year by the Smithsonian Museum Service and are reported under that heading herein, p. 433), and activities associated with these areas. The work of the Office is organized into the following components: News (George J. Berklacy), film and broadcasting (William C. Grayson), and special events (Meredith Johnson).

Armed Forces Radio in a continuing effort. Plans moved ahead at the same time for an interview series on commercial radio.

In the area of the written word, some 150 news releases in all areas of Smithsonian activities were issued. Included in these were the first in a continuing series of "featurettes" providing feature-article handling of topics of general interest.

Major events that required more than routine effort in this connection included the Smithsonian Symposium, "The Quality of Man's Environment," inaugural ceremonies for the new Department of Transportation, the four-day Festival of American Folklife, and several major hall and exhibit openings. Press coverage in the United States and abroad reflected the breadth and diversity of Smithsonian programs.

The two monthly general news publications of the Smithsonian—the employees' *Torch* and *The Smithsonian Associate* for the 5,000 Washington area members of this organization—became the responsibility of the office during the year. An improved format was introduced for a third office publication, the monthly *Smithsonian Calendar of Events*, now distributed to 15,000 members of the press and public.

The Smithsonian's Free Film Theater, which presents educational films of broad interest every Wednesday night from October through May, drew a cumulative audience of approximately 12,000 this year. Each film was introduced by an expert in the subject area. These included Smithsonian staff members, embassy personnel, and faculty members of universities in the Washington area.

The weekly film program is the central focus for audio-visual library activities that also include distribution of educational motion pictures, slides, and still photographs throughout the country.

Locally a Dial-A-Museum recorded telephone information service was instituted to provide up-to-the-minute information on the day's events and the highlights of new exhibits. It parallels the established Dial-A-Satellite service that presents information on artificial satellites and other celestial objects visible overhead. Some 25,000 incoming Dial-A-Museum calls were recorded in the first ten months of operation. The figure on Dial-A-Satellite, material for which is provided by the Smithsonian Astrophysical Observatory for use in Washington and other cities, was more than 126,000.

Smithsonian Museum Service

JAMES R. MORRIS, *Director*

ACTIVITIES OF THE MUSEUM SERVICE were expanded to include projects in the performing arts in addition to its special events programs, planning for exhibitions, lectures, hall openings, musical events, seminars and conferences, movies and entertainments, and numerous visitors' services.

A carousel was in evidence on the Mall during the summer for the enjoyment of the thousands of children visiting the Smithsonian museums. The Mall terrace of the Museum of History and Technology was the scene of concerts by the United States Marine Band, the United States Army Field Band, and an evening of Bavarian folk dancing in which the audience participated.

James R. Morris, who was appointed Director in October, brings to the position an extensive professional background in the arts, both in management and production, which will be valuable in the development of cultural programs in a variety of media, such as Sound and Light, readings and concerts, films, live demonstrations, and special exhibitions.

The Sound and Light production is anticipated as a regular event on the Mall, to begin in 1968. The presentation will provide a varied and exciting 50-minute panorama of the Institution and the related history of the City of Washington, and will bring to life the remarkable personalities and achievements of the Institution in the dramatic context of the growth of the Capital and the Nation. Also in the planning stage is an extensive musical program. The Smithsonian Institution, with its resources for research and its collection of early instruments, for example, represents an ideal center for a resident chamber-music group.

Throughout the fall, winter, and spring the Junior League docents conducted weekend tours of the Museum of History and Technology for the general public, for Congressional constituents, and for numerous organized groups, including many from the foreign community. Mrs. Nicholas Paul was an active and effective chairman of the group.

During the year approximately fifty Girl Scouts were trained as information aides and worked on weekends during the winter and on a full schedule in the summer in three of the buildings.

Visitors services included preparation of revised floor plans of the Museum of Natural History, the Arts and Industries building, and the Museum of History and Technology (these plans are being translated into French and Spanish), and the distribution of such other guides as the Smithsonian Institution leaflets.

Among the special events arranged by the Museum Service were the visits of the Prime Minister of the Republic of Korea, the President of the Republic of Turkey, the wife of the Vice President of Nationalist China, and the wife of the Chancellor of the Federal Republic of Germany, as well as presentations of the Robert J. Collier Trophy and awards of the Hodgkins and Langley Medals. Two major entertainments of the year were the dinners on February 21 and 22, the first for the Washington Diplomatic Corps, co-hosted by the Chief of Protocol and Mrs. Symington, the second for those members of the Congress most closely connected with the Smithsonian. At the latter the Vice President swore in the members of the American Revolution Bicentennial Commission.

April 1 marked the commencement of the third annual spring-summer season of events, and of the night-open hours for Smithsonian Museums. On that day, also, was celebrated the establishment of the Department of Transportation. The theme of the day was a Pageant of Transportation in which all facets of the world of transportation were represented by demonstrations of equipment, special exhibits, and appropriate ceremonies. The new Secretary of Transportation was introduced, with his staff, and events continued throughout the day and evening, including service bands and units. Attendance totaled more than 100,000.

Smithsonian Associates

LISA SUTER, *Program Director*

MOST GRATIFYING AND HEARTENING is the dramatic growth of the Smithsonian Associates, in which the membership has increased from 1500 to over 4000 within a year.

Activities of the Associates spread in many directions and reached into many new areas. Major emphasis was placed on the development of a junior program. Zoo morning talks on "What is a Reptile?," "What is a Bird?," and "What is a Mammal?" offered young Associates the chance to learn about animals by seeing and even touching some of them. Naturalists on the staff conducted Botany Tours, Bird Walks, Insect Walks, Fossil Hunts, and Rock Hunts in nearby parks and quarries.

The first of what will be an annual Kite Carnival was presented jointly with the National Air and Space Museum. Over a thousand kite enthusiasts of all ages responded to talks on the origins, varieties, and uses of kites, to kite-making workshops and flying demonstrations, and to the kite contest on the Mall. Colorful kites from all parts of the world were displayed for a month in the Museum of Natural History to demonstrate the pleasures of kite flying.

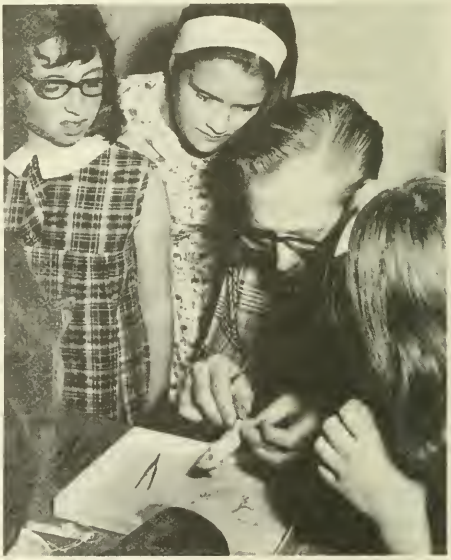
Perhaps for the first time in a museum, organized classes were conducted by scientists in an experimental program for four- and five-year olds. Through field trips and lectures the youngsters were introduced to our natural surroundings while their mothers attended coffee discussions.

Over 2500 students ranging in age from 4 to 83 were enrolled in the subscription seminars and workshops for young people and adults, started by the Associates last fall. In these, 75 courses, comprising 578 lectures, were taught in antiques, art, archeology, anthropology, astronomy, aviation, botany, mammals, minerals, mathematics, music, sea life, space science, philately, oceanography, natural history, and general science.

G. Carroll Lindsay, who resigned as Executive Secretary of the Associates last August, returned from Albany to give a seminar on connoisseurship at Belmont, the Smithsonian's handsome new conference center in Elkridge, Maryland.

Proceeds from a benefit "Evening with the Santa Maria" enabled

Members of the Smithsonian Associates digging at Plum Point, Maryland, during a fossil hunt in May.



Curator Charles Handley shows young Associates how to skin a mouse and prepare the skin for preservation.

Zoo Morning Talk with young Smithsonian Associates: "The elephant's big ears help him hear better."

212 students to attend classes without charge. Scholarships were awarded to 163 area children and to 49 senior citizens and Job Corps youth. As their first official activity, the Ladies Committee presented a successful benefit preview of the movie *Grand Prix* which will enable another 250 scholarship students to attend this year.

The proceeds from three series of luncheon talks were used to send speakers to nursing homes, orphanages, hospitals, and other welfare institutions whose residents were unable to come to the Smithsonian. Luncheon talks by staff curators presented "Mainstreams of American Art," "The Agitator in America," "Females, Ladies and Women," "Art and Anthropology," "Gem Lore," and "The Land of Punt."

Membership lectures acquainted Associates with the diversity of the Smithsonian's activities. "Secrets of the Smithsonian" were revealed in a behind-the-scenes tour of exhibit production, and in special family tours of all exhibit buildings and the zoo. Fine performances by the Madison Madrigal Singers and the Santa Barbara Madrigal Singers supplemented the Institution's active music program.

Members were invited to 15 previews, among which were the exhibitions *Recent Acquisitions of the National Portrait Gallery*, *The United States Exhibition at the XXXIII Venice Biennale, 1966*, and *William Glackens in Retrospect*, and the opening of the growth of America hall. An entertaining history of the art of American motion pictures, featuring "The Comedy," "The Western," "The Serials," "The Musical," "The Star System," and "The Spectacle," was presented through selected scenes from the early silents to the varied experiments of today.

The Associate, an illustrated newsletter containing articles on Smithsonian research projects, field expeditions, exhibitions, acquisitions, and programs, began bimonthly publication in January.

Recently innovated sales exhibitions, sponsored jointly with the Museum Shops, offered members special discounts and the chance to preview works before they were offered to the public. Associate volunteers mounted and framed the first two exhibitions: *Applique Molas Made by the Cuna Indians of the San Blas Islands, Panama*, and *Childrens' Embroideries from Peru*.

A volunteer program was started to encourage personal involvement of members in the Institution's activities and growth. Several hundred Associates who offered their assistance to the professional staff for periods from a few hours a month to full time are being matched by education, skills, and experience with jobs at the Smithsonian or with ones that can be done at home.

A new vitality has been created by this close interplay between the Smithsonian's professional staff and an interested public. The extent of its reach is an exciting speculation.

Administrative Support Services

The Smithsonian Institution's unique complex of museums, art galleries, zoological park, laboratories, and information centers require certain administrative and technical support services to meet the needs of its various programs. A number of groups serve the Institution in this capacity and by so doing contribute to its accomplishments in research, education, exhibitions, and public service.

The office of programming and budget, in preparing the Smithsonian's budget presentations to the President and the Congress, and in response to the President's interest in applying planning-programming techniques to the budget process whenever feasible, gave particular emphasis to organizing the Institution's work into a program structure. The supply division handled well in excess of 10,000 purchases, including orders for such unusual items as a life-size model of a mule, sunken treasure, a 14-foot replica of a grasshopper, and ostrich hackle. Participation in the Government property-utilization program brought to the Smithsonian a Titan missile, two tons of silver coins, a rocket sled, and a turn-of-the-century counting machine.

The fiscal division worked toward a revision of its accounting system to provide improved reporting and control for financial management and budget purposes. A new and comprehensive accounting manual was prepared.

The information systems division provided automatic-data-processing support to the administrative, curatorial, and research activities. In addition to routine payroll, accounting, mailing lists, library purchasing, and other business applications, an information retrieval system using 200 descriptors was developed for the collection of 20,000 covers in the division of philately. This indexing and cross-referencing system provides prompt responses to the reference needs of researchers, collectors, and the general public. Similarly, an analysis program was prepared to assist in the correlation of biological and other specimen data. In such a cluster-analysis program, somewhat simplified, a scientist first classifies small groups of biological specimens on which certain characters have been measured. A computer program calculates a "measure of similarity" for each group and then clusters the groups by the magnitude of their resemblance. The program and the methodology are equally applicable to non-biological categories. In archeology, for example, it could apply to grouping and breaking the code of unknown hieroglyphs from series of artifacts of an extinct culture.

Design of an information storage and retrieval system for biological and geological data was completed and is being implemented. The system provides a data bank containing collection records and descriptive and bibliographic information on zoological and geological specimens. Participating in the project are the National Museum of Canada and Universidad Nacional Autónoma de México.

The buildings management department operated, maintained, improved, and protected over three million square feet of building space, as well as other property in the Washington area; it guarded 60 million objects of cultural, historical, scientific, and technological importance; and it gave information, directions, or other assistance to the more than 13 million visitors who viewed the public exhibits. The department performed a variety of special engineering, design, repair, fabrication, transportation, communication, and safety services in support of Smithsonian work. The moves of the National Collection of Fine Arts and the National Portrait Gallery into the newly renovated Fine Arts and Portrait Galleries building were accomplished. Work continued toward preparing this building for opening to the public in 1968. Expanded cultural and educational activities, including those on the Mall, were reflected in greatly increased requirements for buildings management services. More than 1,100 meetings, seminars, lectures, concerts, special exhibitions, and other events received assistance. The department provided extensive alterations and modifications to the Arts and Industries and other buildings in order to make space available for new and expanding activities. A strengthened accident-prevention program led by the Safety Office resulted in a reduced number of injuries to Smithsonian employees and earned the Institution the President's Safety Award.

The personnel division conducted employee health and training programs: glaucoma testing and tetanus shots were made available to employees, and special physical examinations were given scientists planning arduous fieldwork such as underwater research. Training sessions to develop supervisory skills were attended by approximately 150 employees, and the division administered a year-round program of on-the-job training for 30 to 40 youths under the Neighborhood Youth Corps Program. In addition, the Institution provided summer jobs for some 60 young persons under the President's Youth Opportunity Program.

The photographic services division produced almost a quarter of a million photographs and slides to meet research, exhibition, education, and public service needs, and the division started work on an index of the photographic resources of the Institution.

A central travel services office was established in November 1966 to assist Smithsonian travelers in planning trips including economical routings, making reservations, arranging accommodations, and obtaining tickets. By the end of June, over 750 domestic and 280 foreign travel itineraries were processed, 3,200 air and rail reservations made, and 200 hotel and motel accommodations obtained. Special attention was given to travel arrangements for the foreign currency program of the office of international activities.

The office of the general counsel, the Smithsonian archives, the contracts office, the organization and methods division, the central files, and the duplicating section all furnished administrative and technical support to the office of the Secretary, and to bureaus and other Institution organization units.

Appendix

1.

Report of the Executive Committee of the Board of Regents of the Smithsonian Institution

For the Year Ended June 30, 1967

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.

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 U.S.C. 54) and by the Act of March 12, 1894 (20 U.S.C. 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 on the following page are deposited in the United States Treasury and draw 6 percent interest.

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 $9,964,359 which has been invested. Of this sum, $8,647,226 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.

Sources: Smithsonian Fund Deposited in U.S. Treasury

Donor	Unrestricted funds		Income 1967
James Smithson	$727,640		$43,659
Avery	14,000		840
Habel	500		30
Hamilton	2,500		150
Hodgkins (General)	116,000		6,960
Poore	26,670		1,600
Rhees	590		35
Sanford	1,100		66
	Restricted funds	$889,000	53,340
Hodgkins (Specific)	100,000		6,000
Reid	11,000		660
		111,000	6,660
		$1,000,000	60,000

Consolidated Fund

[Income for the unrestricted use of the Institution]

Fund	Investment 1967	Income 1967
Abbott, W. L., Special	$24,753	1,412
*Avery, Robert S., and Lydia	65,611	3,681
Forrest, Robert Lee	1,898,832	77,624
Gifts, royalties, gain on sale of securities	458,632	25,719
Goddard, Robert, Memorial Fund	15,018	621
Hachenberg, George P., and Caroline	6,602	398
*Hamilton, James	671	40
Hart, Gustavus E.	809	46
Henry, Caroline	2,009	115
Henry, Joseph and Harriet A.	81,431	4,589
Higbee, Harry, Memorial Fund	21,815	913
*Hodgkins, Thomas G. (General)	50,318	2,823
Morrow, Dwight W.	128,453	7,226
Olmsted, Helen A.	1,332	74
*Poore, Lucy T. and George W.	270,399	15,402
Porter, Henry Kirke	475,715	26,676
*Rhees, William Jones	786	45
*Sanford, George H.	1,479	83
*Smithson, James	34,546	2,318
Taggart, Gansen	596	42
Witherspoon, Thomas A.	214,359	12,019
Total	$3,754,166	181,866

*In addition to funds deposited in the United States Treasury.

Consolidated Fund

[Income restricted to specific use]

Fund	*Investment 1967*	*Income 1967*
Abbott, William L., for investigations in biology . . .	$173, 169	9, 709
Armstrong, Edwin James, for use of Department of Invertebrate Paleontology when principal amounts to $5,000.00.	2, 626	119
Arthur, James, for investigations and study of the sun and annual lecture on same.	66, 432	3, 728
Bacon, Virginia Purdy, for traveling scholarship to investigate fauna of countries other than the United States.	83, 220	4, 668
Baird, Lucy H., for creating a memorial to Secretary Baird.	60, 881	3, 333
Barney, Alice Pike, for collection of paintings and pastels and for encouragement of American artistic endeavor.	47, 642	2, 671
Barstow, Frederick D., for purchase of animals for Zoological Park.	1, 661	93
Brown, Roland W., endowment fund-study, care and improvement of the Smithsonian paleo-botanical collections.	53, 992	2, 548
Canfield collection, for increase and care of the Canfield collection of minerals.	63, 659	4, 108
Casey, Thomas L., for maintenance of the Casey collection and promotion of researches relating to Coleoptera.	20, 821	1, 168
Chamberlain, Francis Lea, for increase and promotion of Isaac Lea Collection of gems and mollusks.	46, 776	2, 623
Division of Mammals Curators Fund, for support of scientific purposes.	3, 304	143
Dykes, Charles, for support in financial research . . .	71, 520	4, 009
Eickemeyer, Florence Brevoort, for preservation and exhibition of the photographic collection of Rudolph Eickemeyer, Jr.	18, 055	1, 012
Guggenheim, David 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.	75, 560	1, 608
Hanson, Martin Gustav and Caroline Runice, for some scientific work of the Institution, preferably in in chemistry or medicine.	14, 767	828
Hillyer, Virgil, for increase and care of Virgil Hillyer collection of lighting objects.	10, 917	612
Hitchcock, Albert S., for care of the Hitchcock Agrostological Library.	2, 622	149
Hrdlicka, Ales and Marie, to further researches in physical anthropology and publication in connection therewith.	100, 678	4, 686

Consolidated Fund—Continued

Fund	Investment 1967	Income 1967
Hughes, Bruce, to found Hughes alcove	$31, 795	1, 785
Johnson, E. R. Fenimore, research in underwater photography.	13, 910	613
Lindsay, Jessie M. H., for the general use of the institution as specified by the donor.	10, 679	1, 035
Loeb, Morris, for furtherance of knowledge in the exact sciences.	144, 797	8, 258
Long, Annette and Edith C., for upkeep and preservation of Long collection of embroideries, laces, and textiles.	902	53
Maxwell, Mary E., for care and exhibition of Maxwell collection.	32, 581	1, 829
Myer, Catherine Walden, for purchase of first-class works of art for use and benefit of the National Collection of Fine Arts.	33, 552	1, 881
Nelson, Edward W., for support of biological studies. .	39, 501	2, 071
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, 597	94
Pell, Cornelia Livingston, for maintenance of Alfred Duane Pell collection.	12, 314	695
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, 315	693
Rathbun, Richard, for use of division of U.S. National Museum containing Crustacea.	17, 668	996
*Reid, Addison T., for founding chair in biology, in memory of Asher Tunis.	29, 545	1, 326
Roebling Collection, for care, improvement, and increase of Roebling collection of minerals.	200, 467	11, 237
Roebling Solar Research	41, 608	2, 141
Rollins, Miriam and William, for investigations in physics and chemistry.	265, 396	13, 458
Smithsonian employees' retirement	23, 665	784
Smithsonian Institution and THF	7, 615	301
Sprague Fund, for the advancement of the physical sciences.	1, 977, 357	79, 036
Springer, Frank, for care and increase of the Springer collection and library.	29, 787	1, 670
Stevenson, John A., Mycological Library Fund, for care, maintenance, and additions to the Library.	10, 005	509
Strong, Julia D., for benefit of the National Collection of Fine Arts.	16, 609	1, 266
Walcott, Charles D. and Mary Vaux, for development of geological and paleontological studies and publishing results of same.	936, 803	51, 566

*In addition to funds deposited in the United States Treasury.

Consolidated Fund—Continued

Fund	Investment 1967	Income 1967
Walcott, Mary Vaux, for publication in botany	96, 106	5, 200
Zerbee, Francis Brinckle, for endowment of aquaria	1, 576	88
Total	$4, 906, 452	236, 400

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 objects 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 as an endowment fund for the operation of the Gallery. The fund now amounts to $12,107,418.

Summary of Endowments

Invested endowment for general purposes	$5, 831, 906
Invested endowment for specific purposes other than Freer endowment.	5, 132, 453
Total invested endowment other than Freer	10, 964, 359
Freer invested endowment for specific purposes	12, 107, 418
Total invested endowment for all purposes	$23, 071, 777

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
Investments other than Freer endowment (cost or market value at date acquired):		
Bonds	$3, 767, 781	
Stocks	4, 840, 083	
Real estate and mortgages	1, 303, 741	
Uninvested capital	52, 754	9, 964, 359
Total investments other than Freer endowment.		10, 964, 359
Investments of Freer endowment (cost or market value at date acquired):		
Bonds	6, 707, 634	
Stocks	5, 404, 536	
Advanced from unexpended income	(4, 752)	12, 107, 418
Total investments		$23, 071, 777

Gifts and Bequests

The Smithsonian Institution gratefully acknowledges gifts and bequests from the following:

Anonymous Donor: For the Botany Research Project.	$5,000
American Petroleum Institute: For research entitled *The Crustose Corallines of the North Atlantic.*	10,000
Archbold Foundation: For the *Biological Survey of Dominica* Project.	15,000
Blaisdell Publishing Co.: To publish a manuscript entitled *Introduction to the Theory of Stellar Atmosphere.*	500
Hardy Jefferson Bowen: For the *Bowen-Andros Island Expedition* Fund.	1,153
Morris and Gwendolyn Cafritz Foundation: For the purchase of a stabile designed by Alexander Calder.	40,000
Center for the Study of Democratic Institutions: To commission ten original drawings for a conference in Switzerland.	15,000
Edmond DeBeer: To the National Portrait Gallery for Kinsley Adams.	279
Department of Commerce: For the division of electricity.	100
Division of Mineralogy: For the William F. Foshag Memorial Fund.	535
Explorers Research Corporation: For the *Bermuda Expedition—Summer 1967.*	9,000
The Daniel and Florence Guggenheim Foundation: For the commemorative Guggenheim Exhibit, an annual Daniel Guggenheim Lecture, and annual Guggenheim Fellowships for graduate students for research at the National Air Museum.	25,000
Susan Morse Hilles: To the National Collection of Fine Arts for a G. W. Rickey piece of sculpture.	20,000
Felix and Helen Juda Foundation: To the Freer Gallery of Art for the purchase of collections.	279
International Business Machines Corporation: In support of the Smithsonian's *Sound and Light* production.	10,000
Junior League of the City of Washington, D.C.: For a supervisory docent to train volunteers for the Education and Training museum program.	5,000
The Kevorkian Foundation: For the publication of Indian sculptures in the Freer Gallery of Art.	16,785
Claudia B. Kidwell: For the Historic Dresses Fund.	75
The Link Foundation:	2,300
For support of the Third Annual Edwin A. Link Lecture.	
For support of the Fourth Annual Edwin A. Link Lecture.	
MacMillan Company: To the National Collection of Fine Arts for reproducing and enlarging negatives related to the book, movie, and exhibition, *To Be Alive.*	4,000
Uta C. Merzbach: For the division of physical sciences.	15
J. Jefferson Miller II: For Gardner-Miller Ceramics and Glass Fund.	100
Minkus Stamp Journal: For the Philatelic Fund.	160
National Geographic Society:	45,715
For research entitled *Survey of Deep Water Wreck Sites in Bermuda.*	
For research entitled *Exploration and Analysis of a 16th-Century Shipwreck, Central Bahamas.*	

For research entitled *Visual Observations of Sedimentation Patterns in Submarine Canyon Heads.*	
To defray travel costs to Australia for E. P. Henderson.	
To study the ecology of echinoids in the Florida Keys.	
For research entitled *Marine Mollusks of the Marquesas Islands and Pitcairn Group.*	
For the study of Sharns in Copper Mountain Mining District, Alaska.	
JACK E. OTTINGER: To defray costs of salvaging, restoring, and preserving the U.S.S. *Tecumseh.*	10
MRS. KENNETH DALE OWEN: To defray travel expenses for Richard H. Howland.	75
PITNEY BOWES, INC.: To the division of philately and postal history.	500
MARJORIE MERRIWEATHER POST: For photographing objects by Madame Rosso.	1,000
RESEARCH CORPORATION: For the Ivy Neck properties.	100,000
THE RICHARDSON FOUNDATION, INC.: For the Commission of White House Fellows.	20,500
BERNARD T. ROCCA: To the Rocca Fund.	300
SIDNEY N. SHURE: To purchase further supplies for mounting the collection donated by the Sidney N. Shure Fund.	100
THE SIDNEY PRINTING AND PUBLISHING COMPANY: For the increase and diffusion of numismatic knowledge in the United States.	1,000
C. R. SMITH: To the National Collection of Fine Arts for the Art-in-the-Embassies Program.	500
SOUTH PADRE ISLAND SHELL CLUB: To defray travel expenses of Harold A. Rehder.	208
JOSEPH W. SPRAGUE FUND: Final settlement of a bequest from the late Joseph White Sprague to establish a fund for the advancement of the physical sciences.	161,497
STANDARD OIL COMPANY OF NEW JERSEY: For the completion of the Mississippi River Delta model for the hall of petroleum.	1,000
THE TARGET ROCK FOUNDATION, INC.: To the National Collection of Fine Arts.	900
TEXACO, INC.: For the construction of four half-models of oil tankers for the hall of petroleum.	3,290
UNIVERSITY OF MICHIGAN: To the Freer Gallery of Art for the *Ars Orientalis* Fund.	3,000
LILA ACHESON WALLACE FOUNDATION: For the extra developments of the program for the division of musical instruments.	5,000
C. MALCOLM WATKINS: For buying folk pottery for the division of cultural history.	100
FRANCIS C. WELCH: For the *New England Textile Mill Survey* Project.	200
WENNER-GREN FOUNDATION:	10,500
For research entitled *Cooperative Field Work in Rapidly Changing Cultures.*	
For an analysis of Wilkes collection of Polynesian artifacts.	
CHARLES M. WORMSER: For the Moritz Wormser Memorial Fund.	200

The Smithsonian Institution gratefully acknowledges gifts, for the special purposes indicated, from the following:

For the Bosch Mineral Collection: *$33, 125*

Mrs. C. Belz
Robert C. Nelson, Jr.
Franklin Ogdensburg Mineral Society
Gem Lapidary and Mineral Society of Montgomery County, Maryland

For the Botany Library Fund: *425*

Anonymous donor
Robert A. Vines

For the Chesapeake Bay Center for Field Biology: *80, 000*

Max C. Fleischmann Foundation of Nevada [1]
Old Dominion Foundation

For the Jeanne Toor Cummings Fund: *525*

Mrs. Nathan Cummings
Mrs. Julius W. Gilbert

For the Charles Darwin Foundation Fund: *1, 888*

Harold Coolidge
E. Yale Dawson
Mrs. Irving Johnson
Mrs. Cazenove Lee

For the Dawson Memorial Fund: *335*

Dr. and Mrs. D. Abbott
J. L. Barnard
Department of Botany
Dr. R. L. Pressler
K. O. Emery
Sidney Galler
Hanover Insurance Group
Institucion Privada
G. F. Papenfuss
Paul C. Silva

For the Freer Gallery of Art: *1, 150*

H. P. Kraus
Ellen Bayard Weeden Foundation

For the National Collection of Fine Arts' Knoedler Fund: *925*

Margaret Nalle
Mr. and Mrs. S. G. Edwards
Marjorie Phillips
Norman Holmes Pearson

For the Neighborhood Museum: *27, 262*

Lucian B. Platt
Anne S. Richardson Fund
Whitney Museum of American Art
Eugene and Agnes Meyer Foundation

For the Pageant of Transportation: *9, 450*

Aerospace Industries Association of America, Inc.
Air Line Pilots Association International
Air Transport Association
American Petroleum Institute
American Road Builders' Association
American Trucking Association, Inc.
Association of American Railroads
Association of Local Transport Airlines
Automobile Manufacturers Association, Inc.
Automotive Safety Foundation
Brotherhood of Railroad Trainmen
Committee of American Steamship Lines
Freight Forwarders Institute
National Association of Motor Bus Owners

National Defense Transportation Association
Railway Progress Institute
Rubber Manufacturers Association
The American Waterways Operators, Inc.
The Common Carrier Conference of Domestic Water Carriers
The National Industrial Traffic League
Transportation Association of America

For the History of Photography Purchase Fund: *$3, 750*

George Eastman House
Polaroid Corporation
Time, Inc.

For the Marjorie Merriweather Post Fund: *35, 300*

Count V. Alderberg
His Excellency, The Ambassador of Kuwait and Madame Al-Ghoussein
The Honorable and Mrs. Clinton P. Anderson
Admiral and Mrs. George W. Anderson
Mr. and Mrs. H. Loy Anderson
His Excellency, The Ambassador of Panama and Madame Arias
Mr. and Mrs. James Y. Arnold
Commander and Mrs. Clyde B. Ault
Miss Madeleine Austin
Mr. Robert Calhoun Baker
Mrs. W. Edwards Beach
Mrs. Walter E. Beach
The Honorable and Madame Guillermo de Belt
Lady Birley
The Princess Cito di Bitetto
Mrs. Robert Woods Bliss
Mrs. B. Pleydell Bouverie
Mr. and Mrs. Willis Boyd
Doreen The Lady Brabourne
General and Mrs. Omar N. Bradley
Donna Julia Brambilla
Mr. A. Marvin Braverman
Mr. and Mrs. E. Fontaine Broun
Mr. and Mrs. Leon Brown
The Honorable and Mrs. Percival F. Brundage
The Honorable and Mrs. Wiley T. Buchanan, Jr.
Mr. and Mrs. George R. Bunker
Dr. and Mrs. Robert C. Burt
Mrs. Harold W. Cannella
The Princess Cantacuzene
Mr. Charles T. Carey
Dr. and Mrs. Leonard Carmichael
Mr. and Mrs. Leslie E. Carpenter
Miss Geni Chester
The Honorable and Mrs. Cyrus Ching
Mr. Justice and Mrs. Thomas C. Clark
Mr. and Mrs. Robert L. Clarkson
Sir Bede and Lady Clifford
Mr. and Mrs. Clark M. Clifford
Mr. and Mrs. David P. Close
Mr. Marvin J. Coles
Mr. and Mrs. Donald L. Colvin
Mr. and Mrs. John T. Connor
Mr. and Mrs. C. W. Cook
Mr. and Mrs. Harold Jefferson Coolidge
The Honorable and Mrs. John Sherman Cooper
Mr. and Mrs. Raymond E. Cox
Mrs. W. Philip Cox
The Honorable and Madame Cretzianu
Mr. and Mrs. Francis X. Crowley
Mr. and Mrs. J. A. B. Dahlgren
Mr. and Mrs. Freeman J. Daniels
Mr. and Mrs. Harry R. Davidson
Major General and Mrs. Howard C. Davidson
Mr. and Mrs. Andre de Limur
Dr. and Mrs. Lowell Russell Ditzen
Miss Alice L. C. Dodge
Mrs. James P. Donahue
Mr. and Mrs. M. Dorland Doyle
Mr. and Mrs. Henry A. Dudley
Mr. Franklin A. Durr
General and Mrs. Dwight D. Eisenhower
Mr. and Mrs. Shearen D. Elebash
Mr. Douglas L. Elliman
Mr. Alfred W. Englehardt
Mr. Erik J. H. Eriksen
Captain and Mrs. Evert Eriksson
Mr. and Mrs. Benjamin C. Evans, Jr.
Miss Meta Evans
Mrs. Herbert Farrell

His Excellency, The Ambassador of Italy and Madame Fenoaltea
Judge and Mrs. Homer Ferguson
Mrs. Harold Fitzgerald
The Honorable and Mrs. John Clifford Folger
The Honorable and Mrs. Hiram Fong
Miss Hank Fort
The Honorable and Mrs. Henry H. Fowler
The Honorable and Mrs. William Chapman Foster
Mrs. Carson G. Frailey
The Honorable and Mrs. Clarence Francis
The Honorable and Mrs. J. William Fulbright
Mrs. Lawrence C. Fuller
The Honorable James G. Fulton
The Honorable and Mrs. Arthur Gardner
His Excellency, The Ambassador of Portugal and Madame Garin
The Honorable and Mrs. George A. Garrett
Judge and Mrs. Oliver Gasch
Mr. and Mrs. Leonard F. Genz
Mr. and Mrs. Charles Carroll Glover, Jr.
Mr. and Mrs. Robert M. Gorrell
Major General Ulysses S. Grant III
The Honorable Robert Keith Gray
The Honorable Homer H. Gruenther
General and Mrs. Wade H. Haislip
Mr. and Mrs. Harris Hammond
Mr. and Mrs. Donald E. Handelman
Mr. and Mrs. Meyer Handelman
Mr. and Mrs. William L. Hanley
Mr. Channing W. Hare
General and Mrs. Franklin A. Hart
Mr. and Mrs. Robert Z. Hawkins
Mr. and Mrs. George W. Headley
Mr. and Mrs. Ray Henle
Mr. Stephen Hopkins Hensel
Mr. and Mrs. Kurt Hetzel
Mrs. J. Monroe Hewlett
Mr. Edward T. Howe
Mr. Richard H. Howland
Dr. and Mrs. R. Gordon Hoxie
Mr. and Mrs. John B. Hull
Miss Laura Hungerford
Rear Admiral and Mrs. Raymond P. Hunter
Mrs. Patrick J. Hurley
Miss Carol Hynes
Mr. and Mrs. Carlton A. Johanson
Mr. and Mrs. James M. Johnston
His Excellency, The Ambassador of Sweden and Madame Jonsson
Mr. and Mrs. Samuel H. Kauffmann
Mr. Thomas S. Kenan III
The Honorable and Mrs. Joseph P. Kennedy
Mr. and Mrs. A. Atwater Kent
Dr. and Mrs. A. Atwater Kent, Jr.
Miss Beverly King
Mr. and Mrs. Ludlow King, Jr.
Mr. and Mrs. Milton W. King
Mr. and Mrs. Slocum Kingsbury
The Honorable and Mrs. James R. Knott
Mrs. Katharine McCook Knox
Mr. and Mrs. Fritz-Alan Korth
The Honorable Fred Korth
Miss Verita Korth
Vice Admiral Emory Scot Land
Mrs. Clark J. Lawrence
Mrs. Sidney Kent Legare
Mr. and Mrs. George C. Leib
Lady Lewis
Miss Jane Lingo
Dr. and Mrs. George W. Lloyd
Mr. Grover Loening
Mr. and Mrs. John A. Logan
His Excellency, The Ambassador of France and Madame Lucet
General and Mrs. Anthony C. McAuliffe
The Honorable and Mrs. John T. McCone
Mrs. Robert R. McCormick
Mr. and Mrs. William P. McCracken
Brigadier General Godfrey T. McHugh
Mrs. J. P. McKinney
Mr. William J. McManus
Mr. Robert D. McMillen
The Honorable and Mrs. Douglas MacArthur II
Mrs. Clarence MacKay
Mr. and Mrs. J. Noel Macy
Lt. Colonel and Mrs. William J. Maddox, Jr.

Mr. and Mrs. Edward P. Maffitt
Mr. and Mrs. Joseph F. Major
Mr. and Mrs. Elovius Mangor
Mr. James D. Mann
Mr. and Mrs. Daniel B. Markel
Rear Admiral and Mrs. Gene Markey
Mrs. George C. Marshall
Mr. and Mrs. Hunter S. Marston
Miss Cecilia B. Martin
Mr. and Mrs. Nathan L. Maryn
His Excellency, The Ambassador of Greece and Madame Matsas
Mr. and Mrs. Herbert A. May, Jr.
Mr. Philip D. May
His Excellency, The Ambassador of Spain and The Marquesa de Merry del Val
The Honorable Perle Mesta
Mrs. Hope Ridings Miller
Dr. and Mrs. Howard Mitchell
Mr. and Mrs. C. Carroll Morgan
Mrs. Marion K. Morgan
Dr. and Mrs. William A. Morgan
Madame Wilhelm Munthe de Morgenstierne
Mr. and Mrs. Edgar Morris
Mrs. George Maurice Morris
Lt. General and Mrs. William H. Morris
Mr. and Mrs. Charles C. Mortimer
Mr. and Mrs. Charles A. Munn
His Excellency, The Ambassador of India and Madame Nehru
Dr. and Mrs. Walter R. Newbern
Mr. Gerson Nordlinger, Jr.
Mrs. Bissett Norment
Mr. and Mrs. Barbu Niculescu
Colonel Serge Obolensky
Mrs. James R. Offield
Mrs. Rufus L. Patterson
His Excellency, The Ambassador of Peru and Madame Pastor
Colonel C. Michael Paul
Mr. Richard E. Pearson
Mr. and Mrs. Peter Pelham
Mr. and Mrs. John S. Pillsbury
Mr. and Mrs. Landra B. Platt
Mr. and Mrs. Charles W. Post
Dr. and Mrs. M. Hayward Post
Madame Edgar Prochnik
Mr. Gene Raymond
Mr. Justice and Mrs. Stanley F. Reed
Mrs. Ogden Reid
Mr. and Mrs. Charles Reinke
Mrs. Helen Rich
Mr. and Mrs. Eugene Henry Rietzke
Dr. John B. Riggs
Mr. and Mrs. S. Dillon Ripley II
Mr. John E. Rovensky
Mr. and Mrs. Robert Rogers
Major General and Mrs. William C. Rose
Mr. and Mrs. Marvin C. Ross
Madame Augusto Rosso
Mr. J. Frederick Roy
Mr. and Mrs. Stephen Sanford
Mr. and Mrs. John Schapiro
His Excellency, The Ambassador of Belgium and The Baroness Scheyven
Mr. and Mrs. Theodore C. Sheaffer
The Honorable and Mrs. Jouett Shouse
Major General and Mrs. Alden K. Sibley
Miss Julia P. Sibley
Sigma Alpha Theta Sorority
Sigma Beta Epsilon Fraternity
Mr. and Mrs. Douglas R. Smith
Mr. and Mrs. Wendell Smith
Mr. and Mrs. Humphrey Statter
Mr. and Mrs. Theodore D. Stoney
Rear Admiral and Mrs. Lewis L. Strauss
Mrs. L. Corrin Strong
General and Mrs. Philip G. Strong
The Honorable and Mrs. John L. Sullivan
Mr. and Mrs. Preston L. Sutphen
His Excellency, The Ambassador of Japan and Madame Takeuchi
His Excellency, The Ambassador of Venezuela and Madame Tejera-Paris
Mrs. Sigourney Thayer
The Honorable and Mrs. Clark W. Thompson
Madame Thor Thors
His Excellency, The Ambassador of Chile and Madame Tomic
Mr. Carl W. Trent
Mr. and Mrs. Bronson Trevor
Mrs. John B. Trevor, Sr.
Mr. and Mrs. John B. Trevor, Jr.
Mr. Leonard W. Trimmer
Mrs. Francis B. Trudeau, Sr.
Dr. and Mrs. Francis B. Trudeau, Jr.

Mr. and Mrs. E. Russell True, Jr.
Mrs. Max O'Rell Truitt
The Honorable and Mrs. Joseph D. Tydings
Mr. and Mrs. Andrew Van Pelt
Mr. and Mrs. Edward Van Pelt
Mrs. E. P. Van Zandt
The Honorable and Mrs. Jamshed Vesugar
Mrs. Latimer Voigt
Mr. and Mrs. H. Alexander Walker
Miss Evelyn Walker
Mr. and Mrs. James N. Wallace
His Excellency, The Ambassador of Australia and Mrs. Waller
Mr. and Mrs. Roy Garrett Watson
Mr. and Mrs. Osby L. Weir
Mr. and Mrs. Edwin Borden White, Jr.
Mrs. Robert W. White
Mr. and Mrs. C. V. Whitney
Mrs. Searle Whitney
Mr. and Mrs. Howard E. Whittemore
Mr. George Livingston Williams
The Honorable and Mrs. Charles F. Willis, Jr.
Mrs. Orme Wilson
Dr. and Mrs. Max Wolf
Mr. and Mrs. William G. Woodward
Mr. and Mrs. Burdette S. Wright, Jr.
Mr. and Mrs. J. Bernard Wyckoff
Mrs. Robert R. Young
Mrs. Jorge Zalles

For the Victor Proetz Memorial Fund: *$8,961*

Miss Mary Allis
Mr. Alfonso Alverez
Mrs. A. W. Barnett
Mr. John W. Barnett
Mrs. Laura D. Barney
Dr. William G. Barrett
Captain Peter Belin
Miss Isadora Bennett
Mrs. Pemberton Berman
Mr. Newton P. Bevin
Mr. Louis C. Bodenheimer
Miss Marguerite A. R. Booraem
Mrs. Catherine Drinker Bowen
Mrs. Benjamin H. Brewster
Mr. Charles W. Brooks
Mr. John Nicholas Brown
Mr. John Young Brown
The Earl Mountbatten of Burma
Miss Madeleine E. Callard
Mrs. Alex Camp
Mrs. Marquis W. Childs
Mrs. Austin B. Chinn
Mr. and Mrs. Leonard de V. Clarke
Mr. and Mrs. Willson Cummer
Mrs. Edwin C. Custer
Mr. John Burton Custer
Mrs. C. Kenneth Deming
Mr. C. R. Duckels
Mrs. Peyton Hawes Dunn
Mrs. Tirzah Dunn
Mr. John G. Edgar
Mr. H. Cutler Fall
Mrs. Henry T. Ferriss
Mr. David E. Finley
Mr. Henry Grattan
Mr. Ralph C. Hall
Mr. and Mrs. Paul L. Hexter
Mrs. Oveta Culp Hobby
Mr. William E. Katzenbach
Mrs. Abel Kenin
Mr. Edward Kessler
Mr. Robert M. Leylon
Mr. and Mrs. Kenneth R. McElheny
Mr. Paul McFarlane
Mr. Charles Nagel
Mrs. M. Burton Paradise
Mr. William Julius Polk, Jr.
Mr. Joseph Pulitzer, Jr.
Mr. Henry V. Putzel
Miss Margaret Ramsay
Mr. Frank C. Rand, Jr.
Mr. Robert H. Reid
Dr. E. P. Richardson
Miss Virginia Rice
Mr. Don W. Rogers, Jr.
Mr. Meyric R. Rogers
Dr. Frederick H. Scharles
Mr. Brooks Shepard, Jr.
Mrs. Thomas B. Sherman
Dr. Richard H. Shryock
Mr. Robert Gordon Stewart
Mrs. William G. Stott
Mr. Charles P. Thompson
Colonel Frederick P. Todd

Mr. Roul Tunley
Mr. Charles Van Ravenswaay
Mr. Phelps Warren
Mr. Henry Wexler
Miss Mary P. Wheeler
Mr. Wayman Whettermore
Mr. Nelson C. White
Miss Emily M. Wilson
Mrs. Paul J. Zentay

For the São Paulo Bienal Fund: *$6,800*

Best Products Company of Lynchburg
Mr. Jacob Blaustein
Mr. Huntington T. Block
Mrs. Edith K. Bralove
Mrs. Marcella Brenner
Mr. J. Carter Brown
Mr. William A. M. Burden
Mrs. Gwendolyn Cafritz
Miss June P. Carey
Miss Edith Newman Cook
Crown Zellerbach Corporation
Mr. C. Douglas Dillon
Mr. and Mrs. David E. Finley
Mrs. John Clifford Folger
Mr. Justice and Mrs. Abe Fortas
Mr. Wreatham E. Gathright
Mr. Ira Gershwin
Mr. Henry H. Hecht, Jr.
Mrs. Arthur U. Hooper
International Telephone and Telegraph Corporation
Mrs. Dora Jane Janson
Mrs. Ruth Carter Johnson
Albert Kunstadter Family Foundation
Mr. Morton D. May
Robert and Beatrice Mayer Foundation
Mrs. Louise Tompkins Parker
Mr. Jefferson Patterson
Mrs. Stanley J. Sarnoff
Rita and Taft Schreiber Foundation
Mr. David Scott
Philip M. Stern Family Fund
Mrs. Fredrika M. Tandler
Mr. and Mrs. Stanley Woodward

For the Portrait of Ambassador Stevenson: *3,500*

Mrs. Elizabeth Ives
Mrs. Marshall Field

For the Venice Biennale Fund: *2,918*

Gollin Foundation, Inc.
Mrs. Sarah A. Jarman
The Honorable Robert S. McNamara
Mr. Laurance S. Rockefeller
Mr. Thomas Watson

For unrestricted purposes: *1,030*

Mr. Aaron J. Farfel
His Excellency, the Ambassador of Germany, Heinrich Knappstein
The Reader's Digest
Mr. Alvin Solomon

Funds and Federal Appropriations

The following appropriations were made by Congress for the Government bureaus under the administrative charge of the Smithsonian Institution for the fiscal year 1967:

Salaries and Expenses	$22,699,000
National Zoological Park	$2,039,500
Appropriation made to the National Gallery of Art (which is a bureau of the Smithsonian Institution under a separate Board of Trustees).	$2,822,000

The Institution also received appropriations to continue the 12-year capital improvement program at the National Zoological Park ($1,589,000); and for the restoration and renovation of buildings ($2,300,000).

For fiscal year 1967, the Smithsonian was granted an appropriation of $2,316,000 in foreign currencies for museum programs and related research.

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, Department of the Interior, for archeological investigations in river basins throughout the United States	$219,000

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.

Audit

The report of the audit of the Smithsonian Private Funds is attached.

Respectfully submitted:

Robert V. Fleming
Caryl P. Haskins
Clinton P. Anderson
Executive Committee

Washington, D.C., *October 6, 1967*

PEAT, MARWICK, MITCHELL & CO.
CERTIFIED PUBLIC ACCOUNTANTS
1140 CONNECTICUT AVENUE NW.
WASHINGTON, D.C. 20036

THE BOARD OF REGENTS,
SMITHSONIAN INSTITUTION:

We have examined the balance sheet of private funds of Smithsonian Institution as of June 30, 1967 and the related 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 other similar property are not included in the accounts of the Institution; the amounts of investments in such properties are not readily determinable. Current expenditures for such properties are included among expenses. The accompanying statements do not include the National Gallery of Art, the John F. Kennedy Center for the Performing Arts, nor 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 balance sheet of private funds and the related statements of changes in funds present fairly the assets and funds principal of Smithsonian Institution at June 30, 1967 and changes in fund balances resulting from cash transactions of the private funds for the year then ended, on a basis consistent in all material respects with that of the preceding year.

PEAT, MARWICK, MITCHELL & CO.

October 6, 1967

In the Auditor's report, the following statement precedes schedules 1 and 2:

THE BOARD OF REGENTS
SMITHSONIAN INSTITUTION:

Accountants' Report on Supplementary Data

We have reported separately herein on the basic financial statements of private funds of Smithsonian Institution. The current year's supplementary data included in Schedules 1 and 2 were subjected to the same auditing procedures and, in our opinion, are stated fairly in all material respects when considered in conjunction with the basic financial statements taken as a whole.

October 6, 1967

SMITHSONIAN

BALANCE SHEET OF PRIVATE

Assets

Current funds:		
General:		
Cash:		
United States Treasury current account		$322,724
In banks and on hand		98,996
		421,720
Notes receivable		140,000
Investments—stocks and bonds (quoted market value $2,543,038) (note 1)		2,659,611
Reimbursements due:		
Grants	$107,151	
Contracts	807,532	914,683
Travel and other advances		36,307
Other assets		119,367
Due from general endowment funds		311,240
Total general		4,602,928
Restricted:		
Cash:		
United States Treasury current account	1,292,936	
In banks	148,825	1,441,761
Due from general fund	1,376,552	
Due from Freer Gallery of Art endowment fund	4,752	1,381,304
Total restricted		2,823,065
Total current funds		7,425,993

EXHIBIT A

INSTITUTION

FUNDS, JUNE 30, 1967

Liabilities and Fund Balances

Current funds:			
General:			
Due to restricted funds			$1, 376, 552
Fund balance (Exhibit B)			3, 226, 376
Total general			4, 602, 928
Restricted:			
Due to restricted endowment fund			48, 030
Fund balances (Exhibit C):			
Unexpended income from endowment:			
Freer Gallery of Art	$507, 607		
Other restricted	641, 028	$1, 148, 635	
Funds for special purposes:			
Gifts	450, 465		
Grants	786, 113		
Contracts	389, 822	1, 626, 400	2, 775, 035
Total restricted			2, 823, 065
Total current funds			7, 425, 993

Assets—Continued

Endowment funds and funds functioning as endowment:			
Freer Gallery of Art fund, Stocks and bonds (quoted market value $18,202,916) (note 1)		12, 112, 170	
Other funds:			
Cash	$315, 957		
Stocks and bonds (quoted market value $9,598,449) (note 1)	8, 594, 479		
	8, 910, 436		
Loan in perpetuity to U.S. Treasury	1, 000; 000		
Other stocks and bonds (quoted market value $25,045) (note 1)	13, 386		
Real estate (note 2)	1, 388, 188		
Due from restricted unexpended income	48, 030		
Total other funds		11, 360, 040	
Total endowment funds and funds functioning as endowment			23, 472, 210
			$30, 898, 203

See accompanying notes to financial statements.

EXHIBIT A—Continued

Liabilities and Fund Balances—Continued

Endowment funds and funds functioning as endowment:			
Freer Gallery of Art fund:			
Due to Freer Gallery of Art restricted fund			4, 752
Fund balance (Exhibit D)			12, 107, 418
Total Freer Gallery of Art fund			12, 112, 170
Other funds:			
Mortgages payable (note 2)		84, 441	
Due to general funds		311, 240	
Fund balances (Exhibit D):			
Restricted	$5, 132, 453		
General	5, 831, 906	10, 964, 359	
Total other funds			11, 360, 040
Total endowment funds and funds functioning as endowment			23, 472, 210
			$30, 898, 203

EXHIBIT B

SMITHSONIAN INSTITUTION: PRIVATE FUNDS

STATEMENT OF CHANGES IN CURRENT GENERAL FUND BALANCE

YEAR ENDED JUNE 30, 1967

	Balance at beginning of year	*Receipts (Schedule 1)*		*Disbursements (Schedule 2)*	*Balance at end of year*
		Transfers	*Other*		
Operations	$3, 163, 479	3, 696, 737	1, 532, 874	5, 166, 714	3, 226, 376
Gifts	. . . . .	715, 263	. . . . .	715, 263	. . . . .
Grants	. . . . .	6, 827, 166	. . . . .	6, 827, 166	. . . . .
Contracts	. . . . .	6, 313, 505	. . . . .	6, 313, 505	. . . . .
	$3, 163, 479	17, 552, 671	1, 532, 874	19, 022, 648	3, 226, 376

See accompanying notes to financial statements.

EXHIBIT C

SMITHSONIAN INSTITUTION: PRIVATE FUNDS

STATEMENT OF CHANGES IN CURRENT RESTRICTED FUND BALANCE

YEAR ENDED JUNE 30, 1967

	Unexpended income	*Funds for special purposes*			*Total*
		Gifts	*Grants*	*Contracts*	
Balance at beginning of year	$1, 022, 845	505, 550	98, 972	191, 408	1, 818, 775
Add:					
Collection of prior years' advances	.....	.....	.....	529, 677	529, 677
Income from endowment:					
Freer Gallery of Art	630, 262	.....	.....	.....	630, 262
Other restricted funds	243, 146	.....	.....	.....	243, 146
Restricted funds	235, 166	.....	.....	.....	235, 166
Sale of publications	54, 616	.....	.....	.....	54, 616
Gifts and grants	125, 377	446, 822	8, 629, 864	6, 387, 364	15, 589, 427
Traveling exhibition	.....	225, 157	.....	.....	225, 157
Advances from general fund at year end	.....	.....	107, 151	807, 530	914, 681
Other	555	.....	.....	.....	555
	1, 289, 122	671, 979	8, 737, 015	7, 724, 571	18, 422, 687
	2, 311, 967	1, 177, 529	8, 835, 987	7, 915, 979	20, 241, 462

Deduct:					
Transfers to current income:					
Freer Gallery of Art	534, 889	.....	.....	.....	534, 889
Other restricted funds	167, 127	.....	.....	.....	167, 127
Unrestricted funds	335, 166	.....	.....	.....	335, 166
Direct costs	.....	715, 263	6, 827, 166	6, 313, 505	13, 855, 934
Overhead	.....	.....	1, 269, 886	715, 828	1, 985, 714
	1, 037, 182	715, 263	8, 097, 052	7, 029, 333	16, 878, 830
Other:					
Income added to principal	47, 416	.....	.....	.....	47, 416
To (from) general fund	64, 406	(29, 203)	(59, 553)	(60, 127)	(26, 071)
To gifts	14, 328	(17, 402)	3, 074	.....	.....
Prior year advances	.....	.....	.....	556, 951	556, 951
	126, 150	11, 801	(56, 479)	496, 824	578, 296
Total transfers	1, 163, 332	727, 064	8, 040, 573	7, 526, 157	17, 457, 126
Refund of prior years' unexpended	.....	.....	9, 301	.....	9, 301
Total deductions	1, 163, 332	727, 064	8, 049, 874	7, 526, 157	17, 466, 427
Balance at end of year	$1, 148, 635	450, 465	786, 113	389, 822	2, 775, 035

See accompanying notes to financial statements.

EXHIBIT D

SMITHSONIAN INSTITUTION: PRIVATE FUNDS

STATEMENT OF CHANGES IN PRINCIPAL OF ENDOWMENT FUNDS AND FUNDS FUNCTIONING AS ENDOWMENT

YEAR ENDED JUNE 30, 1967

Balance at beginning of year		$22, 361, 069
Add:		
Gifts		197, 262
Income added to principal as prescribed by donor		47, 416
Transfer from general fund		185, 387
Net gain on investments		480, 643
		23, 271, 777
Deduct:		
Real estate sold		200, 000
		$23, 071, 777
Balance at end of year consisting of:		
Freer Gallery of Art		$12, 107, 418
Other:		
Restricted	5, 132, 453	
General	5, 831, 906	10, 964, 359
		$23, 071, 777

See accompanying notes to financial statements.

SMITHSONIAN INSTITUTION: PRIVATE FUNDS

NOTES TO FINANCIAL STATEMENTS

JUNE 30, 1967

(1) Investments are stated at cost or appraised value at date of gift.

(2) At June 30, 1967, two parcels of property which were acquired by gift or bequest were pledged as security for mortgages with unpaid balances totaling $84,441.

SMITHSONIAN INSTITUTION: PRIVATE FUNDS

SCHEDULE OF CURRENT GENERAL FUND RECEIPTS: YEAR ENDED JUNE 30, 1967

	Operations	*Gifts*	*Grants*	*Contracts*	*Total*
Transferred from other funds:					
Endowment income:					
Freer Gallery of Art	$534, 889	.....	.....	.....	$534, 889
Other restricted funds	167, 127	.....	.....	.....	167, 127
Unrestricted	335, 166	.....	.....	.....	335, 166
Gifts, grants and contracts—direct cost	.....	$715, 263	$6, 827, 166	$6, 313, 505	13, 855, 934
Overhead:					
Grants	1, 269, 889	.....	.....	.....	1, 269, 889
Contracts	715, 828	.....	.....	.....	715, 828
Computer time	517, 453	.....	.....	.....	517, 453
Unexpended income	64, 406	.....	.....	.....	64, 406
Funds functioning as endowment	182, 455	.....	.....	.....	182, 455
Gifts	29, 204	.....	.....	.....	29, 204
Grants	(59, 553)	.....	.....	.....	(59, 553)
Contracts	(60, 127)	.....	.....	.....	(60, 127)
Total transfers	3, 696, 737	715, 263	6, 827, 166	6, 313, 505	17, 552, 671

SCHEDULE 1—Continued

Other receipts:					
Investment income	139, 584	.....	.....	.....	139, 584
Publications and photographs	87, 906	.....	.....	.....	87, 906
Gifts	381, 614	.....	.....	.....	381, 614
Museum Shops Sales Desks	625, 496	.....	.....	.....	625, 496
Smithsonian Institution Society of Associates	68, 059	.....	.....	.....	68, 059
Computer time	77, 513	.....	.....	.....	77, 513
Other	152, 702	.....	.....	.....	152, 702
Total other receipts	1, 532, 874	.....	.....	.....	1, 532, 874
Total receipts	$5, 229, 611	715, 263	6, 827, 166	6, 313, 505	19, 085, 545

SCHEDULE 2

SMITHSONIAN INSTITUTION PRIVATE FUNDS

SCHEDULE OF CURRENT GENERAL FUND DISBURSEMENTS: YEAR ENDED JUNE 30, 1967

	Operations	*Gifts*	*Grants*	*Contracts*	*Total*
Salaries:					
Administrative	$1, 680, 563	.....	.....	.....	1, 680, 563
Research	77, 242	$116, 784	2, 535, 053	2, 417, 086	5, 146, 165
Computer	477, 123	.....	.....	.....	477, 123
Employee benefits	242, 812	7, 224	189, 878	186, 315	626, 229
Total salaries	2, 477, 740	124, 008	2, 724, 931	2, 603, 401	7, 930, 080

Purchases for collection	528, 416	83, 128	5, 066	.....	616, 610
Researches and exploration and related administrative expenses:					
Travel and transportation of persons	119, 965	97, 469	253, 545	211, 916	682, 895
Transportation of things	14, 473	42, 017	180, 933	20, 831	258, 254
Equipment and supply	30, 679	36, 489	68, 147	47, 084	182, 399
Other supplies and materials	25, 388	31, 360	381, 453	126, 936	565, 137
Scientific and photo equipment	7, 618	3, 467	1, 536, 013	67, 620	1, 614, 718
Publication and photographs	14, 984	1, 469	3, 679	299	20, 431
Buildings, equipment and grounds:					
Buildings and installations	45, 936	.....	102, 213	8, 490	156, 639
Court and grounds maintenance	844	.....	.....	.....	844
Rents and utilities	200, 064	4, 512	248, 786	175, 184	628, 546
Contractual services:					
Computer	462, 582	.....	700, 147	362, 530	1, 525, 259
Subcontracts	.....	.....	.....	2, 271, 164	2, 271, 164
Other services	598, 547	195, 037	329, 372	347, 862	1, 470, 818
Supplies and expenses:					
Meetings, special exhibits	4, 003	.....	.....	.....	4, 003
Lectures	26, 217	.....	.....	.....	26, 217
Printing and reproductions	168, 716	86, 876	97, 988	17, 701	371, 281
Sales desk	335, 112	1	40	.....	335, 153
Stationery and office supplies	57, 192	713	8, 632	20, 286	86, 823
Postage, telephone and telegraph	48, 238	7, 794	186, 221	32, 201	274, 454
Other	.....	923	.....	.....	923
Total current disbursements	$5, 166, 714	715, 263	6, 827, 166	6, 313, 505	19, 022, 648

2.

Smithsonian Foreign Currency Program Grants Awarded Fiscal Year 1967

Anthropology—Systematic and Environmental Biology

ANTHROPOLOGY

American Institute of Indian Studies, Philadelphia, Pennsylvania. To continue support for the American Academy of Benares, India, an institution for research in art history and archeology (second year).

American Research Center in Egypt, Boston, Massachusetts. To continue support for a program of research and excavation in Egypt; a) Excavation of the ancient city of Hierakonpolis b) Continuation of an epigraphic and architectural survey at Luxor c) Continuation of a stratified Pharonic site at Mendes, d) Continuation of a field project for recording and preserving treasures at St. Catherine's Monastery, Mt. Sinai (second year).

Brooklyn Museum. To support the study of the Giza Necropolis, Egypt (second year).

Lawrence Radiation Laboratory, University of California, Berkeley. To continue to test the utilization of cosmic rays to "X-ray" the Egyptian pyramids in search of presently unknown chambers.

University of California at Los Angeles. A joint UCLA-Sarajevo Territorial Museum research project on the prehistory of Obre, Bosnia, Yugoslavia.

Carnegie Museum, Pittsburgh. To continue excavations of a Philistine City at Ashdod, Israel (second year).

University of Chicago. To provide research assistantships in archeology and art history for Universtiy of Chicago students at the American Academy of Benares, India.

University of Colorado. To support prehistoric archeological research at Oued El Akarit, Tunisia.

Peabody Museum of Natural History at Harvard University. To excavate a prehistoric site at Starcevo, Yugoslavia.

Jerusalem School of Archeology of Hebrew Union College. To excavate an archeological site at Gezer, Israel, and to conduct a Summer Institute on Near Eastern Civilizations (second year).

University of Michigan. To initiate a program for research and training in prehistoric archeology in Israel and to conduct excavations at the site of Tabun, Israel.

University of Missouri. To complete investigation of ancient Phoenician glass manufacturing sites in Israel (second year).

University of Missouri. To excavate the Greek trade site of Yavneh Yam, Israel.

University Museum, University of Pennsylvania. To study the remaining stones of the Temple of Akhnaten at Luxor, Egypt (second year).

University Museum, University of Pennsylvania. To study the inscriptions of the Dra Abu Naga Tombs, Egypt.

Smithsonian Institution, Office of Anthropology. To conduct an archeological investigation of Western Phoenician culture at Carthage, Tunisia.

Southern Methodist University. To study the prehistory of the area around Sibaiya, Egypt (second year).

Stanford University. To conduct a joint Stanford-Sarajevo Territorial Museum archeological expedition in the Trebisnjica Basin, Yugoslavia.

University of Wisconsin. Reexamination of the late prehistoric sites in Kharga and Dakhla Oasis, Egypt.

Peabody Museum of Natural History at Yale University. To study the paleontology and stratigraphy of the Paleocene, Eocene and Oligocene deposits to enlarge knowledge of primitive man in Egypt (second year).

SYSTEMATIC AND ENVIRONMENTAL BIOLOGY

Johns Hopkins University. To study the behavior and ecology of small mammals of Bengal, India.

University of Michigan. To conduct cytological studies of Indian Mollusks.

National Academy of Sciences/National Research Council. To support an International Biological Program planning symposium in Tunisia for a Mediterranean region conservation program.

Southern Methodist University. To investigate the quaternary environment of the Qattara Depression in the Western Desert of Egypt.

SMITHSONIAN INSTITUTION:

OFFICE OF ECOLOGY. To study the flora and vegetation of Ceylon.

OFFICE OF ECOLOGY. To support a symposium on recent advances in tropical ecology in Benares, India.

OFFICE OF ECOLOGY. To conduct a survey of ecological research opportunities for the International Biological Program in Poland, Yugoslavia, Tunisia, Israel, Republic of the Congo, and India.

MUSEUM OF NATURAL HISTORY. To continue studies in India leading to publication of a handbook on Indian birds.

MUSEUM OF NATURAL HISTORY. To study the migration of Indian birds.

MUSEUM OF NATURAL HISTORY. To conclude research and publish a study of the Triassic ostracods of Israel.

MUSEUM OF NATURAL HISTORY. To conduct serological and ectoparasitic surveys of migratory birds in Northeast Africa.

MUSEUM OF NATURAL HISTORY. To conduct a field expedition in Egypt to broaden the Department of Entomology collections.

NATIONAL ZOOLOGICAL PARK. To study the behavior and ecology of the Ceylonese elephant.

OFFICE OF OCEANOGRAPHY. To study in Israel the biological Interchange between the Eastern Mediterranean and the Red Sea through the Suez Canal.

OFFICE OF OCEANOGRAPHY. To establish a Marine Sorting Center at Salammbo, Tunisia.

RADIATION BIOLOGY LABORATORY. To study in Israel the effects of solar radiation on plants through comparative observation at different latitudes.

3.

Publications of the Smithsonian Institution Press

For the Year Ended June 30, 1967

BOOKS AND ATLASES

Seabirds of the tropical Atlantic Ocean: Smithsonian identification manual, by George E. Watson. (Second edition of Preliminary Smithsonian identification manual: Seabirds of the tropical Atlantic Ocean, issued March 1965.) xxix+120 pp., 12 pls. Publ. 4680, November 21, 1966 ($3.75.)

Trap-nesting wasps and bees: Life histories, nests, and associates, by Karl V. Krombein. iv+570 pp., 2 figs., 29 pls., 36 tables. Publ. 4670, March 1, 1967. ($12.50.)

The etchings of Canaletto, by Jacob Kainen. 63 pp., 44 illustr. Publ. 4676, April 20, 1967. ($5.95.)

The art of Stanton Macdonald-Wright, introduction by David W. Scott. 100 pp., 31 illustr. Publ. 4707, May 4, 1967. (paper, $3.50, cloth, $7.50.)

The Large Magellanic Cloud, by Paul W. Hodge & Frances W. Wright. v+108 pp., 81 pls., 12 tables. Publ. 4699, June 6, 1967. ($25.00.)

POPULAR PUBLICATIONS

Opportunities in oceanography, prepared by Interagency Committee on Oceanography. 33 pp., 44 illustr. (3rd revision of publ. 4537, issued July 1964), April 10, 1967. ($1.00.)

The Continental gunboat *Philadelphia* and the Northern Campaign of 1776, by Phillip K. Lundeberg. 22 pp., illustr. Publ. 4651, August 1, 1966. (50 cents.)

The Apollo program, a midstream appraisal, by George M. Low. 22 pp., 8 illustr. Publ. 4693, January 25, 1967. ($1.00.)

The American parade of politics, 1788–1960, by Keith Melder. 24 pp., 13 illustr. Publ. 4696, May 4, 1967. (50 cents.)

EXHIBITION CATALOGS

Contemporary Dutch graphics, by Dolf Welling. 20 pp., 9 illustr. Publ. 4665, July 1, 1966. (75 cents.)

Paul Manship, 1885–1966. 24 pp., 17 illustr. Publ. 4686, August 10, 1966. (75 cents.)

Recent acquisitions, National Portrait Gallery, Smithsonian Institution, entries compiled by Robert G. Stewart, foreword by Charles Nagel. 36 pp., 15 illustr. Publ. 4685, September 15, 1966. (N.C.)

Islamic art from the collection of Edwin Binney 3rd, foreword by Richard Ettinghausen. 100 pp., 90 illustr. Publ. 4682, October 1966. ($1.50.)

Paintings and drawings by Elihu Vedder, introduction by Regina Soria. 32 pp., 11 illustr. Publ 4689, October 5, 1966. ($1.00.)

Catalog of the Alice Pike Barney memorial lending collection, by Delight Hall. 195 pp., 99 illustr. Publ. 4522, November 18, 1966. ($4.75.)

Sculptures and drawings of Henry Moore. 38 pp., 32 illustr. Publ. 4688, December 1966. ($1.00.)

Italian architectural drawings, introduction by John Harris. 60 pp., 55 illustr. Publ. 4690, January 1967. ($1.60.)

Battle art, American Expeditionary Forces 1918, by Edgar M. Howell. 24 pp., 10 illustr. Publ. 4700, April 17, 1967. (30 cents.)

Tunisian mosaics, foreword by Mohamed Yacoub. xv+34 pp., 41 illustr. Publ. 4709, May 1967. ($1.75.)

REPRINTS

Paintings, pastels, drawings, prints, and copper plates by and attributed to American and European artists, together with a list of original Whistleriana, in the Freer Gallery of Art, by Burns A. Stubbs. vi+153 pp., 30 illustr. (Repr. of publ. 3905, Freer Gallery of Art Occasional Papers, vol. 1, no 2, issued August 1948), May 12, 1967. ($1.00.)

Smithsonian meteorological tables, by Robert J. List. 6th edition. xi+527 pp., 174 tables. (3rd repr. of Smithsonian Misc. Coll. vol. 114 [whole volume], publ. 4014, issued September 1951), October 7, 1966. ($5.00.)

The world of dinosaurs, by David Dunkle. ii+22 pp., illustr. (Repr. of publ. 4296, issued May 1957), July 1, 1966. (50 cents.)

Folk religion of Southwest China, by David Crockett Graham. viii+245 pp., 10 figs., 28 pls. (Repr. of Smithsonian Misc. Coll., vol. 142, no. 2, publ. 4457, issued November 1961), May 4, 1967. ($5.00.)

Dürer and his time, by Fedja Anzelewski. 252 pp., 150 illustr. (Repr. of publ. 4647, issued November 1965), April 28, 1967. ($8.95.)

ANNUAL REPORTS

Smithsonian Year 1966: annual report of the Smithsonian Institution for the year ended June 30, 1966, including the financial report of the Executive Committee of the Board of Regents. vii+409 pp., illustr. Publ. 4697, January 25, 1967.

Annual report of the American Historical Association for the year 1965, volume 1, proceedings. xxix+93 pp. December 16, 1966.

SMITHSONIAN SERIES

Smithsonian Miscellaneous Collections

VOLUME 149

10. Emerged Quaternary shore lines in the Mississippi embayment, by C. Wythe Cooke. 41 pp., 20 figs. Publ. 4677, July 18 1966. (N.C.)
11. [end of volume]. Additional data on the host relations of the parasitic cowbirds, by Herbert Friedmann. 12 pp. Publ. 4678, August 16, 1966. (N.C.)

VOLUME 151

2 Aspects of the ecology of the iguanid lizard *Tropidurus torquatus* at Belém, Pará, by A. Stanley Rand and Patricia J. Rand. 16 pp., 4 figs., 3 tables. Publ. 4666, July 8, 1966. (N.C.)

3. Surface conditions of the Orgueil meteorite parent body as indicated by mineral associations, by Kurt Boström and Kurt Fredriksson. 39 pp., 18 figs., 5 tables. Publ. 4667, July 27, 1966. ($1.50)
5. Precipitation in five continents, by C. G. Abbot. 32 pp., 17 figs., 7 tables. Publ. 4694, May 31, 1967. (N.C.)
6. The early history of the sun, by A. G. W. Cameron. 19 pp., 7 figs. Publ. 4674, July 15, 1966. (N.C.)
7. The birds of Socotra and Abd-El-Kuri, by S. Dillon Ripley and Gorman M. Bond. 37 pp., 8 pls., 1 map, 1 table. Publ. 4681, August 16, 1966. (N.C.)

8 The behavior of *Ateles geoffroyi* and related species, by John F. Eisenberg and Robert E. Kuehn. iv+63 pp., 10 figs., 6 pls. 23 tables. Publ. 4683, November 29, 1966. (N.C.)

9. Four new Eocene echinoids from Barbados, by Porter M. Kier. 28 pp., 16 figs., 1 pl. Publ. 4673, August 30, 1966. (N.C.)

VOLUME 152

1. Cretaceous *Thyasira* from the western interior of North America, by Erle G. Kauffman. 159 pp., 18 figs., 5 pls., 7 tables. Publ. 4695, June 30, 1967. (N.C.)
2. Supplement to a long-range forecast of United States precipitation, by C. G. Abbot and Lena Hill. 8 pp., 1 table. Publ. 4711, May 31, 1967. (N.C.)

United States National Museum Bulletins

MUSEUM OF HISTORY AND TECHNOLOGY

241 (as whole volume). Contributions from the Museum of History and Technology: Papers 45 to 51 on history. vii+232 pp., illustr. February 16, 1967 (preprints of individual papers issued as indicated in earlier reports).

252. Contributions from the Museum of History and Technology: Papers 69– , on science and technology.
   69. James Millholland and early railroad engineering, by John H. White. 36 pp., 29 figs. June 21, 1967.
   70. William Gunn Price and the Price current meters, by Arthur H. Frazier. 68 pp., 39 figs. March 29, 1967.

MUSEUM OF NATURAL HISTORY

247, parts 3 and 4. Fossil marine mammals from the Miocene Calvert Formation of Maryland and Virginia, by Remington Kellogg. pp. iv+65–101, figs. 32–38, pls. 33–45. November 28, 1966.

251. Pacific Tunicata of the United States National Museum, by Takasi Tokioka. v+247 pp., 105 figs. April 27, 1967.

255. A revision of the moths of the subfamily Prodoxinae (Lepidoptera: Incurvariidae), by Donald R. Davis. iv+170 pp., 155 figs., 3 tables, 17 maps, 3 diagr. April 18, 1967.

BUREAU OF AMERICAN ETHNOLOGY BULLETINS

197. An analysis of sources of information on the population of the Navaho, by Denis Foster Johnston. v+220 pp., 7 maps, 36 tables. September 28, 1966.

198. Inter-agency Archeological Salvage Program, River Basin Survey Papers, edit. Robert L. Stephenson.
   39 [whole volume]. An interpretation of Mandan culture history, by W. Raymond Wood. xiv+232 pp. 17 figs, 9 pls, 20 maps, 15 tables. June 21, 1967.

199 The ethnoarcheology of Crow Village, Alaska, by Wendell H. Oswalt and James W. VanStone. viii+136 figs., 16 pls., 1 map. May 1, 1967.

Smithsonian Contributions to Anthropology

VOLUME 2

1. Early skeletons from Tranquillity, California, by J. Lawrence Angel. pp. iii+1–19, 4 pls., 3 tables. November 25, 1966.
2. New Zealand artifacts from the United States "Transit of Venus Expedition" 1874–1875, by Ian W. Keyes. pp. iv+21–27, 3 pls. March 6, 1967.
3. Muskogean charm songs among the Oklahoma Cherokees, by Jack Frederick Kilpatrick and Anna Gritts Kilpatrick. pp. iv+29–40, 11 figs. March 6, 1967.
4. Land tenure of the Rainy Lake Chippewa at the beginning of the 19th century, by Harold Hickerson. pp. iv+41–63, 1 map. March 6, 1967.

VOLUME 3

[Whole volume.] Early cultures and human ecology in south coastal Guatemala, by Michael D. Coe and Kent V. Flannery. xi+136 pp., 50 figs., 32 pls., 15 tables. February 24, 1967.

VOLUME 4

[Whole volume.] Seneca morphology and dictionary, by Wallace L. Chafe. vii+126 pp. June 28, 1967.

Contributions From the National Herbarium

VOLUME 37

3. Studies of Pacific island plants, XVIII: New and noteworthy flowering plants from Fiji, by Albert C. Smith. pp. 69–106. May 4, 1967.

Proceedings of the United States National Museum

(Starting with the first number (3538) in volume 119, each number thereafter is paged separately.)

VOLUME 117

Title page, table of contents, and index. pp. v+681–710. October 21, 1966.

VOLUME 118

3533. Revision of chalcid wasps of genus *Eurytoma* in America north of Mexico, by Robert E. Bugbee. pp. 433–552, 31 figs., 37 maps. March 21, 1967.

3534. The euryhaline copepod genus *Eurytemora* in fresh and brackish waters of the Cape Thompson region, Chukchi Sea, Alaska, by Mildred Stratton Wilson and Jerry C. Tash. pp. 553–576, 3 figs., 2 tables. December 30, 1966.

3535. Neotropical Microlepidoptera, IX: Revision of genus *Pseudatteria* (Lepidoptera: Tortricidae), by Nicholas S. Obraztsov. pp. 577–622, 12 figs., 43 pls. December 30, 1966.

3536. Decapod crustaceans from St. Helena Island, South Atlantic, by Fenner A. Chace, Jr. pp. 623–661, 15 figs., 2 pls. December 30, 1966.

3537 [end of volume]. Revision of sharks of genus *Isurus* with description of a new species (Galeoidea, Lamnidae), by J. A. F. Garrick. pp. 663–690, 9 figs., 4 pls., 2 tables. March 15, 1967.

VOLUME 119 (numbers paged separately)

3538. Review of South American characid fishes of subtribe Nannostomina, by Stanley H. Weitzman. 56 pp., 12 figs. December 30, 1966.

3539. A revision of the hammerhead sharks (family Sphyrnidae), by Carter R. Gilbert. 88 pp., 22 figs., 10 pls., 5 maps, 9 tables. April 27, 1967.

3540. Neotropical Microlepidoptera, X: Systematic position of two taxa erroneously placed in family Stenomidae (Lepidoptera), by W. Donald Duckworth. 6 pp., 2 figs., 1 pl. December 30, 1966.

3541. Benthic Amphipoda of Monterey Bay, California, by J. Laurens Barnard. 41 pp., 7 figs., 10 tables. December 30, 1966.

3542. A new genus and six new species of entocytherid ostracods (Ostracoda, Entocytheridae), by Horton H. Hobbs, Jr., and Margaret Walton. 12 pp., 2 figs., 1 table. December 30, 1966.

3543. Neotropical Microlepidoptera, XI: Revision of genus *Idolatteria* (Lepidoptera: Tortricidae), by Nicholas S. Obraztsov. 12 pp., 3 figs., 8 pls. December 30, 1966.

3544. Range and variations of subspecies of *Cambarus longulus* (Decapoda: Astacidae), by Hugo A. James. 24 pp., 2 figs., 1 pl., 2 maps. December 30, 1966.

3545. The lizards of Ecuador, a check list and key, by James A. Peters. 49 pp., 6 figs. March 8, 1967.

3546. Noctuid moths of the American genus *Eusceptis* Hübner, by E. L. Todd. 22 pp., 34 figs., 1 map. December 30, 1966.

3547. Revision of Nearctic Gelechiidae, I: The *Lita* group (Lepidoptera: Gelechioidea), by Ronald W. Hodges. 66 pp., 31 pls. December 30, 1966.

3548. Notes on Aradidae in the U.S. National Museum, IV (Hemiptera: Heteroptera), by Nicholas A. Kormilev. 25 pp., 23 figs. December 30, 1966.

3549. The freeze-dry preservation of biological specimens, by Rolland O. Hower. 24 pp., 9 figs., 4 pls., 6 tables. March 15, 1967.

3550. Catalog of type specimens of the darters (Pisces, Percidae, Etheostomatini), by Bruce B. Collette and Leslie W. Knapp. 88 pp., 5 figs. December 30, 1966.

3551. Review of New World moths of genus *Euchromius* Guenée with descriptions of two new species (Lepidoptera: Crambidae), by Hahn W. Capps. 9 pp., 8 figs., 1 pl. December 30, 1966.

3552. Preliminary revision of butterflies of the genus *Calycopis* Scudder (Lycaenidae: Theclinae), by William D. Field. 48 pp., 126 figs. February 1, 1967.

3553 [end of volume]. Type-specimens of Polychaetes described by Edith and Cyril Berkeley (1923–1964), by Marian H. Pettibone. 23 pp. February 1, 1967.

VOLUME 120 (numbers paged separately)

3554. A new species of burrowing acontiate anemone from California (Isophelliidae: Flosmaris), by Cadet Hand and Ralph Bushnell. 8 pp., 2 figs. March 8, 1967.

3555. Review of South American freshwater angelfishes—genus *Pterophyllum*, by Leonard P. Schultz. 10 pp., 4 pls., 4 tables. February 16, 1967.

3556. Some portunid crabs from the Pacific and Indian Oceans in the collections of the Smithsonian Institution, by William Stephenson and May Rees. 114 pp., 38 figs., 9 pls., 2 tables. March 8, 1967.

3557. Classification of *Culex* subgenus *Culex* in the New World (Diptera: Culicidae), by Ralph A. Bram. 122 pp., 33 figs., 3 tables. March 6, 1967.

3558. Amblyceran *Mallophaga* (biting lice) found on the Bucerotidae (hornbills), by Robert E. Elbel. 76 pp., 72 figs., 13 tables. February 16, 1967.

3559. Studies of Neotropical caddis flies, II: Types of some species described by Ulmer and Brauer, by Oliver S. Flint, Jr. 20 pp., 5 figs., 2 pls. December 30, 1966.

3560. Notes and descriptions of some Neotropical agaristine moths (Lepidoptera: Noctuidae), by E. L. Todd. 15 pp., 4 pls. December 30, 1966.

3561. Review of some species of *Loxostege* Hübner and descriptions of new species (Lepidoptera, Pyraustidae: Pyraustinae), by Hahn W. Capps. 75 pp., 178 figs. March 15, 1967.

3562. Notes on flies captured in treetops in Malaya (Diptera: Empididae, Neriidae, Platystomatidae, Sepsidae, Muscidae), by George C. Steyskal. 16 pp., 4 figs. December 30, 1966.

3563. *Euphilomedes arostrata*, a new myodocopid ostracod from Maldive Islands, Indian Ocean, by Louis S. Kornicker. 21 pp., 10 figs. February 15, 1967.

3564. A comparison of Australasian and American specimens of *Hemisquilla ensigera* (Owen, 1832) (Crustacea: Stomatopoda), by William Stephenson. 18 pp., 3 figs., 3 tables. March 8, 1967.

3565. The benthic Polychaeta and Amphipoda of Morro Bay, California, by Donald J. Reish and J. Laurens Barnard. 26 pp., 1 fig., 2 tables. March 8, 1967.

3566. Supplementary description of the myodocopid ostracod *Euphilomedes multichelata* from the Great Bahama Bank, by Louis S. Kornicker. 16 pp., 6 figs. February 16, 1967.

3567 [end of volume]. Taxonomy, distribution, and polymorphism in the *Labidocera jollae* group with remarks on evolution within the group (Copepoda: Calanoida), by Abraham Fleminger. 61 pp., 17 figs., 11 tables. April 18, 1967.

VOLUME 121 (numbers paged separately)

3568. Revision of click beetles of genus *Melanotus* in America north of Mexico (Coleoptera: Elateridae), by Laurence W. Quate and Sarah E. Thompson. 83 pp., 12 figs., 1 pl. April 18, 1967.

3569. Soldier fly larvae in America north of Mexico, by Max W. McFadden. 72 pp., 156 figs. February 1, 1967.

3570. Revision of the family Pandaridae (Copepoda: Caligoida), by Roger Cressey. 133 pp., 356 figs. February 16, 1967.

3571. Supplementary descriptions of two myodocopid ostracods from the Red Sea by Louis S. Kornicker. 18 pp., 6 figs. February 16, 1967.

3572. Caligoid copepods parasitic on sharks of the Indian Ocean, by Roger F. Cressey. 21 pp., 54 figs. March 15, 1967.

3573. New cyclopoid copepods associated with the alcyonarian coral *Tubipora musica* (Linnaeus) in Madagascar, by Arthur G. Humes and Ju-Shey Ho. 24 pp., 69 figs. March 8, 1967.

3574. Copepod crustaceans parasitic on teleost fishes of the Hawaiian Islands, by Alan G. Lewis. 204 pp., 70 figs., 23 tables. June 22, 1967.

3575. Some bathyal polynoids from Central and Northeastern Pacific (Polychaeta: Polynoids), by Marian H. Pettibone. 15 pp., 5 figs. February 16, 1967.

3576. New species and records of Pacific Ampeliscidae (Crustacea: Amphipoda), by J. Laurens Barnard. 20 pp., 4 figs. March 8, 1967.

3577. Bredin-Archbold-Smithsonian Biological Survey of Dominica: 1. The echinoids of Dominica, by Porter M. Kier. 10 pp., 3 figs., 2 pls. December 30, 1966.

3578. Bredin-Archbold-Smithsonian Biological Survey of Dominica: 2. New species of Diptera from Dominica (Anisopodidae and Bibionidae), by Alan Stone. 6 pp., 2 figs. December 30, 1966.

3579. Valid zoological names of the Portland Catalogue, by Harald A. Rehder. 51 pp., 2 figs. March 21, 1967.

3580 [end of volume]. The myodocopid ostracod families Philomedidae and Pseudophilomedidae (new family), by Louis S. Kornicker. 35 pp., 12 figs., 1 pl., 2 tables. February 16, 1967.

VOLUME 122 (numbers paged separately)

3581. Classification of the Western Hemisphere *Balclutha* (Homoptera: Cicadellidae), by H. Derrick Blocker. 55 pp., 35 figs. March 21, 1967.

3582. Revision of the circumtropical shorefish genus Entomacrodus (Blenniidae: Salariinae), by Victor G. Springer. 150 pp., 11 figs., 30 pls., 70 tables. June 14, 1967.

3583. Bathypelagic calanoid copepods of the western Indian Ocean, by George D. Grice and Kuni Hulsemann. 67 pp., 319 figs., 1 table. March 15, 1967.

3584. The extinct sea mink, with taxonomic notes, by Richard H. Manville. 12 pp., 2 figs., 1 pl., 2 tables. December 30, 1966.

3585. Neotropical Microlepidoptera, XII: Further studies on genus *Lethata* (Lepidoptera: Stenomidae), by W. Donald Duckworth. 38 pp., 38 figs., 3 pls., 10 maps. March 6, 1967.

3586. New cyclopoid copepods associated with the coral *Psammocora contigua* (Esper) in Madagascar, by Arthur G. Humes and Ju-Shey Ho. 32 pp., 115 figs. March 8, 1967.

3587. A new genus and three new species of ostracods with a key to genus *Dactylocythere* (Ostracoda: Entocytheridae), by Horton H. Hobbs, Jr. 10 pp., 1 fig. February 16, 1967.

3588. Variation and distribution of the pelagic amphipod *Cyphocaris challengeri* in the Northeast Pacific (Gammaridea: Lysianassidae), by Thomas E. Bowman and John C. McCain. 14 pp., 9 figs. February 16, 1967.

3589. Notes on the genus *Manningia* with description of a new species (Crustacea: Stomatopoda), by Raymond B. Manning. 13 pp., 3 figs., 1 table. March 15, 1967.

3590. Neotropical Microlepidoptera, XIII: Review of genus *Loxotoma* (Lepidoptera: Stenomidae), by W. Donald Duckworth. 8 pp., 9 figs., 1 pl., 1 map. March 15, 1967.

3591. Neotropical Microlepidoptera, XIV: Chilean Microlepidoptera described by Emilio Blanchard, by J. F. Gates Clarke. 8 pp., 5 figs. March 21, 1967.

3592. The psolid holothurian genus *Lissothuria*, by David L. Pawson. 17 pp., 5 figs. March 15, 1967.

3593. A new species of *Victorella* from southern California (Bryozoa: Ctenostomata), by William C. Banta. 18 pp., 7 figs. April 18, 1967.

3594. A study of three species of *Sarsiella* (Ostracoda: Myodocopa), by Louis S. Kornicker. 46 pp., 4 pls., 19 figs. March 15, 1967.

3596. An enzyme method of clearing and staining small vertebrates, by William Ralph Taylor. 17 pp. May 24, 1967.

3598. A new genus and new species of zoarcid fish from the north Pacific Ocean, by Leonard P. Schultz. 5 pp., 3 figs. June 14, 1967.

3600 [end of volume]. Genus *Gloiopotes* and a new species with notes on host specificity and intraspecific variation (Copepoda: Caligoida) by Roger F. Cressey. 22 pp., 55 figs., 4 pls. June 22, 1967.

VOLUME 123 (numbers paged separately)

3603. The species of *Hermetia* of the *aurata* group (Diptera: Stratiomyidae), by Maurice T. James and Willis W. Wirth. 19 pp., 12 figs. June 22, 1967.

3607. The role of the depressor mandibulae muscle in kinesis of the avian skull, by Richard Zusi. 28 pp., 13 figs. June 22, 1967.

3608. Studies of Neotropical caddis flies, IV: New species from Mexico and Central America, by Oliver S. Flint, Jr. 24 pp., 71 figs. June 22, 1967.

Smithsonian Contributions to Astrophysics

VOLUME 9

[Whole volume.] Variable stars in the Small Magellanic Cloud, by Cecilia Payne-Gaposhkin and Sergei Gaposhkin. vi+205 pp., 21 figs., 130 tables. December 9, 1966.

VOLUME 10

2. 5,000- and 10,000-year star catalogs, by Gerald S. Hawkins and Shoshana K. Rosenthal. pp. 144–179, 3 tables. May 1, 1967.

OFFICIAL PUBLICATIONS—INFORMATION LEAFLETS

Smithsonian research opportunities: Fine arts, history, science. vi+153 pp. Publ. 4691, October 17, 1966. (N.C.)

National Collection of Fine Arts, Smithsonian Institution, foreword by David W. Scott. 20 pp., 12 illustr. Publ. 4698, February 1967. (N.C.)

Belmont, the Smithsonian Institution's conference center at Elkridge, Maryland. 8 pp., 7 illustr. Publ. 4703, February 1967. (N.C.)

Anthropology as a career, by William C. Sturtevant. 20 pp. Reprint, revised, of publ. 4343, issued July 1958. March 20, 1967. (N.C.)

How to wet clean undyed cotton and linen, by Maureen Collins McHugh. Smithsonian Institution Information Leaflet, no. 478, 10 pp., illustr. 1967.

Instructions for collecting bird parasites, by George E. Watson and A. Binion Amerson, Jr. Smithsonian Institution Information Leaflet, no. 477, 12 pp., illustr. 1967.

4.

Smithsonian Associates

The interest and generous support of the Smithsonian Associates have made it possible to initiate many new activities at the Institution this year. For this, our deepest gratitude is extended to our more than 4,000 members, and especially to those listed below, who have contributed amounts in excess of the membership dues.

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5.

Members of the Smithsonian Council

June 30, 1967

H. Harvard Arnason. Vice President for Art Administration of the Solomon R. Guggenheim Foundation, 1071 Fifth Avenue, New York, New York 10028. Born 1909. B.S. and A.M. Northwestern University, M.F.A. Princeton University, 1939. Worked with O.W.I. 1942–1945 and the State Department, Office of International Information and Cultural Affairs, 1945–1946; from 1947–1961 served as professor and chairman of the Department of Art at the University of Minnesota; appointed to present position in 1961. Member of the *Art in America* editorial board as well as many professional organizations. Author of numerous articles on medieval and modern art, *Modern Sculpture* (1962) and *Conrad Marca-Relli* (1962).

Whitfield J. Bell, Jr. Association Librarian, American Philosophical Society, 105 South Fifth Street, Philadelphia, Pennsylvania 19106. Born 1914. A.B. Dickinson College, Ph. D. University of Pennsylvania, 1947. Associated with Dickinson College 1937–1954; assistant and then associate editor of the Papers of Benjamin Franklin 1954–1961; and from 1961 Association Librarian of the American Philosophical Society. Editor of *Bibliography of the History of Medicine in the U.S. and Canada* (1948–1953) and *Mr. Franklin* (with L. W. Labaree) (1956). Author of *Needs and Opportunities for Research in the History of Early American Science* (1955).

Fred R. Eggan. Department of Anthropology, University of Chicago, 1126 East 59th Street, Chicago, Illinois 60601. Born 1906. Ph. B., University of Chicago, Ph. D. University of Chicago, 1933. Has been with the University of Chicago since 1934 (Chairman of the Department of Anthropology since 1961 and Director of the Philippine Studies Program since 1953). Has served as the U.S. official delegate to the Pacific Science Congresses

in Manila (1953), Bangkok (1957), and Honolulu (1961). Research centers on the Indians of western United States and the tribes of the Philippines. Author of *Social Organization of the Western Pueblos* (1959). Editor of *Social Anthropology of North American Tribes* (1937 and 1955).

DONALD S. FARNER. Chairman, Department of Zoology, University of Washington, Seattle, Washington 98105. Born 1915. B.A. Hamline University, Ph. D. University of Wisconsin, 1941. Washington State University 1947–1966 (Dean of the Graduate School 1960–1966). Author of *The Birds of Crater Lake National Park* (1952) and contributor to many scientific publications, mainly on the subject of ornithology.

ANTHONY N. B. GARVAN. Chairman, Department of American Civilization, University of Pennsylvania, Philadelphia, Pennsylvania 19104. Born 1917. B.A. and M.A. Yale University, Ph. D. Yale University, 1948. Has been with the University of Pennsylvania since 1951, except three years (1957–1960) as Head Curator of the Department of Civil History at the Smithsonian Institution (Chairman of the Department of American Civilization since 1960). Editor of the *American Quarterly* 1951–1957. Author of *Architecture and Town Planning in Colonial Connecticut* (1951), *Index of American Cultures* (1953).

G. EVELYN HUTCHINSON. Sterling Professor of Zoology, Yale University, New Haven, Connecticut 06520. Born 1903. University of Cambridge. Has been at Yale since 1928. Author of *The Clear Mirror* (1936), *The Itinerant Ivory Tower* (1953), *A Treatise on Limnology, Vol. 1* (1957), *A Preliminary List of the Writings of Rebecca West 1919–1951* (1957), *The Enchanted Voyage* (1962), *The Ecological Theater and the Evolutionary Play* (1965), and many scientific papers. Studies lie in the fields of oceanography and limnology, ecology, population biology, and biology in the development of literature and the fine arts.

JAN LARUE. Department of Music, Graduate School of Arts and Sciences, New York University, New York, New York 10003. Born 1918. S.B. Harvard, M.F.A. Princeton University, Ph. D. Harvard University, 1952. Taught at Wellesley College 1942–1943, 1946–1957 (Instructor to Associate Professor and Chairman of the Music Department), with New York University since 1957. Author of numerous articles on 18th-century music, style analysis, ethnomusicology, papyrology and bibliography, computers and music and musicological editing.

CLIFFORD L. LORD. President, Hofstra University, Hempstead, Long Island, New York 11550. Born 1912. A.B. and A.M. Amherst College, Ph. D. Columbia University, 1943. Was Director of the New York State Historical Association 1941–1946; organized the Farmers' Museum in Cooperstown, New York, in 1942; Honorary Director of Circus World Museum (Director 1955–1958); Vice President of the National Railroad Museum 1956—; Dean of the School of General Studies and Professor of History at Columbia University 1958–1965. Member of many historical associations. Author of *History of U.S. Naval Aviation* (1949).

CHARLES D. MICHENER. Watkins Distinguished Professor of Entomology, University of Kansas, Lawrence, Kansas 66044. Born 1918. B.S. University of California at Berkeley, Ph. D. University of California at Berkeley, 1941. Has been with the University of Kansas since 1948 (Watkins Distinguished Professor since 1959). Served as State Entomologist 1949–1961. Author of *American Social Insects* (with Mary H. Michener) (1951), *Nest Architecture of the Sweat Bees* (with S. F. Sakagami) (1962), and approximately 200 technical works, mainly on bees. Work in taxonomy reflects his interest in concepts of numerical taxonomy, behavior, and ecology.

PETER M. MILLMAN. National Research Council of Canada, Ottawa 2, Ontario, Canada. Born 1906. B.A. Toronto, Ph. D. Harvard University, 1932. President of the Royal Astronomical Council of Canada. A meteoritic specialist whose studies include those of the upper atmosphere with planetary and space research; also interested in the culture of Japan and international exchanges.

ELTING E. MORISON. Acting Master, Ezra Stiles College, Yale University, New Haven, Connecticut 06520. Born 1909. A.B. Harvard University, M.A. Harvard University, 1937. Was a member of the faculty of Massachusetts Institute of Technology 1946–1966. Served as consultant to Houghton-Mifflin Company 1946–1951, and to Research and Development Board, U.S. Department of Defense 1946–1952. Author of *Admiral Sims and the Modern American Navy* (1942), and *A Study of the Life and Times of Henry L. Stimson* (1960). Editor of *The Letters of Theodore Roosevelt* (8 vols.) (1951–1954); *Cowboys and Kings* (1954); *The American Style* (1959).

ROBERT MOTHERWELL. 173 East 94th Street, New York, New York 10028. Born 1915. A.B. Stanford University, 1937. A well-known artist who has exhibited nationally and internationally and contributes to American and foreign magazines. Editor of *The Documents of Modern Art* 1944–1952.

NORMAN D. NEWELL. Curator of Fossil Invertebrates, American Museum of Natural History, New York, New York. Born 1909. B.S. and A.M. University of Kansas, Ph. D. Yale University, 1933. Since 1945 has been a professor at Columbia University as well as curator of invertebrate paleontology at the American Museum of Natural History. Author of *The Nature of the Fossil Record* (1959), *Organism Communities and Bottom Facies, Great Bahama Bank* (1959) and is the organizer of the pelecypod volume of the *Treatise on Paleontology*. Co-editor of the *Journal of Paleontology* (1939–1942). Has visited all parts of North America, Europe, Australia, and Asia in the study of the Permian of the world.

NORMAN HOLMES PEARSON. Professor of American Studies, Yale University, New Haven, Connecticut 06520. Born 1909. A.B. Yale University, Ph. D. Yale University, 1941. Has been with Yale University since 1941. Editor of *Complete Novels of Hawthorne* (1937), *The Oxford Anthology of American Literature* (with W. R. Benet) (1938), *Walden* (1948), *Poets of the English Language* (with W. H. Auden) (1950), and *The Pathfinder* (1952).

ANDRÉ SCHIFFRIN. Editorial Director, Pantheon Books, 22 East 51 Street, New York, New York 10022. Born 1935. B.A. Yale University, 1957. Received degree from Cambridge 1959. Has been with Pantheon Books since 1962. Editor of Pantheon Studies in Social History, including Edward Thompson's *The Making of the English Working Class* and Michel Foucault's *Madness and Civilization*.

FREDERICK SEITZ, President, National Academy of Sciences, 2101 Constitution Avenue, NW., Washington, D.C. 20418. Born 1911. A.B. Leland Stanford Jr. University, Ph. D. Princeton University, 1934. Has taught physics at University of Rochester, University of Pennsylvania, Carnegie Institute of Technology, and University of Illinois (Head of Department of Physics 1957—) (also Dean of Graduate College and Vice President for Research 1964–1965). Was Chairman of Governing Board of the American Institute of Physics 1954–1959. President, National Academy of Sciences since 1962. Author of *Modern Theory of Solids* (1940), *The Physics of Metals* (1943).

CYRIL STANLEY SMITH. Institute Professor, Room 14N–321, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Massachusetts 02139. Born 1903. B.S. University of Birmingham, Sc. D. Massachusetts Institute of Technology, 1926. Has been with M.I.T. since 1945 (Institute Professor since 1961). Was a member of the President's Science Advisory

Committee in 1959. Coauthor of *Structure and Properties of Solid Surfaces* (1953), *Reaumur's Memoirs on Steel and Iron* (1956), *Treatise on Divers Arts by Theophilus* (1963). Author of *A History of Metallography* (1960). A primary interest is the historical interaction between science and technology, and he is a frequent consultant to the Freer Gallery of Art and the Smithsonian Office of Anthropology.

JOHN D. SPIKES. College of Letters and Science, University of Utah, Salt Lake City, Utah 84112. Born 1918. B.S. California Institute of Technology, Ph. D. California Institute of Technology, 1948. Has been with the University of Utah since 1948 (except for a period on leave as Cell Physiologist of the Division of Biology and Medicine of the Atomic Energy Commission). Became Dean of the College of Letters and Science in 1964. Author of numerous publications in scientific journals, bulletins, etc. Major research is in biophysics, especially photobiology.

STEPHEN E. TOULMIN. Department of the History and Philosophy of Science, Brandeis University, Waltham, Massachusetts 02154. Born 1922. B.A. King's College, Ph. D. King's College, 1948. Has taught at Oxford, University of Melbourne, University of Leeds, New York University, Stanford University, and Columbia University, and from 1960–1966 was Director of the Nuffield Foundation Unit for History of Ideas. Author of *The Place of Reason in Ethics* (1950); *The Philosophy of Science, an Introduction* (1953); *Metaphysical Beliefs* (author of one of three essays) (1957); *The Uses of Argument* (1958); *Foresight and Understanding* (1961); "The Ancestry of Science": vol. 1 (*The Fabric of Heavens*) (1961), vol. 2 (*The Architecture of Matter*) (1962), vol. 3 (*The Discovery of Time*) (1965); *Night Sky at Rhodes* (1963).

WARREN H. WAGNER, JR. Department of Botany, University of Michigan, Ann Arbor, Michigan 48105. Born 1920. A.B. University of Pennsylvania, Ph. D. University of California at Berkeley, 1950. Has been a member of the faculty of the University of Michigan since 1951. Serves as a panelist in systematic biology for National Science Foundation 1962—. Research centers on higher plants, origin and evolution of ferns, methods of accurate deduction of phylogenetic relationships of fossil and living plants.

6.

Research Participation Programs

Appointments 1966–1967

Post-Doctoral, Graduate, Undergraduate

POST-DOCTORAL RESEARCH ASSOCIATES

Charles J. Bartlett, Massachusetts Institute of Technology: Stellar and interplanetary dynamics.

Carl W. Condit, Northwestern University: The history of building materials and techniques.

Tetsuro Hanai, University of Tokyo: Ecology and taxonomy of Ostracoda.

Leo J. Hickey, Princeton University: Lowermost Wasatchian floras of western North Dakota and central Wyoming.

Clarence J. Laughlin, Research of the nature of the achievements of American Victorianism, especially as involved with the field of architecture.

Chauncey C. Loomis, Princeton University: A biography of Charles Francis Hall.

Katherine Luomala, University of Hawaii: Gilbert Islands culture and ecology.

Robert H. McCorkell, Massachusetts Institute of Technology: Study of extraterrestial materials in sea sediments by means of cosmic ray produced radio-isotopes.

John V. Murra, University of Chicago: Research on anthropology of Andean societies.

W. John Niven, Claremont Graduate School: A biography of Gideon Welles, Connecticut editor of the Jacksonian period.

Thornton L. Page, Wesleyan University: Evolution of galaxies.

Francesco Parenti, Università Degli Studi di Milano: Effect of previous photoperiodic treatment of leaves on biosynthetic capacity of isolated chloroplasts.

Vladimir Pokorny, Karlova Universita, Charles University (Prague, Czechoslovakia): Research on the ostracodes of the family Hemicytheridae.

Jay C. Shaffer, Cornell University: Taxonomy of the Anerastiinae of the Western Hemisphere.

Soekarja Somadikarta, Museum Zoologicum Bogoriense (Indonesia): Study of the systematics of genus *Collocalia* of the East Indian swift.

GEORGE A. THOMAS, University of Melbourne (Australia): Upper Paleozoic Brachopods from Northwest Australia.

ALAN M. TITLE, California Institute of Technology: Solar velocity fields.

TREVOR C. WEEKES, University College, Dublin: High energy gamma rays from astronomical objects.

HOWARD O. WRIGHT, University of California at Berkeley: Social behavior of crabs.

GRADUATE RESEARCH PARTICIPATION PROGRAM

(*denotes Predoctoral Internship)

LEONARD P. ALBERSTADT,* University of Oklahoma: A comparative study of Upper Ordovician brachiopods with a detailed statistical analysis of several orthid genera.

MICHELE A. L. ALDRICH, University of Texas: A guide to manuscripts (science) in the Smithsonian Institution collections.

TRENTON W. BATSON, JR., George Washington University: Compilation of historical data concerning railroad-car building firm of Eaton and Gilbert, Troy, New York.

JOSEPH L. CAMERON, Davis and Elkins College: Organization of periodicals and catalogues; mounting slides portraying much of NCFA's permanent collection.

EVERETT D. CASHATT, Catholic University: Continuation and expansion of 1964 project of consolidating and rearranging, according to the latest revisionary study, the USNM collection of N. A. Chrysauginae.

WADE D. CHAMBERS,* Harvard University: Theories of evolution and of race in nineteenth-century Latin America.

T. JOHN CONOMOS,* University of Washington: Chemical and mineral composition of suspended particulate matter transported by the Columbia River to the coastal waters of the Pacific Ocean.

NANCY M. CRAMER,* George Washington University: Spionidae of the Gulf and the Caribbean.

ISABEL M. DAVIES, University of London: Investigation of historical records pertaining to china used by the First Ladies; Study of World War I posters.

BEATRIZ E. R. DE FERRADAS,* Universidad Nacional de Córdoba (Argentina): A study of the ornithology, mammalogy, and acarology of Argentina.

ANANDA DUBE,* Patna University (India): Mineralogical and chemical investigations on some rare Indian meteorites.

LEWIS EDSON, Humboldt State University: Revision of the Genus *Scolytus* (Scolytidae Colesptera) in North America.

CAROLYN R. FAWCETT, Radcliffe College: Transcribing and translating from notebook of Lorenzo della Volpaia, a contemporary of Cellini, da Vinci, and Poliziano, with particular attention to the planetary clock and scientific instruments designed and executed by della Volpaia.

JAMES K. FLACK,* Wayne State University: The influence of an intellectual elite on American politics, 1860–1900.

AMY J. GILMARTIN, University of Hawaii: An alpha taxonomic and taximetric study of the Bosmeliaceae of Ecuador.

BARBARA GREENBERG, University of Texas: A guide to science manuscripts in the Smithsonian Institution collections.

RALPH W. GUNDERSON, JR., University of Minnesota: Taxonomic studies on the Genus *Enochrus* for Mexico, Central America, and the West Indies (Hydrophilidae: Coleoptera).

LEE H. HERMAN, Catholic University: Investigation of the taxonomy and zoogeography of the 40 genera of the subfamily Oxytelinae, with intense study of the large genus *Bledius*.

CLAUDE M. HLADIK,* Université de Paris à la Sorbonne: Feeding behavior and diet of primates in respect to comparative histology and histochemistry of digestive system.

PHYLLIS J. KINGSBURY, University of Oklahoma: Identification of one group of freshwater and marine copepods.

CHARLES J. LARUE, JR., University of Maryland: Variation and functional interrelations of the major components of the bird skull.

JOHN N. MACTAVISH, Western Reserve University: Study of faunal elements of part of the Lodgepole limestone, Teton Mountains, Wyoming.

AKIKO MURAKATA,* George Washington University: Analysis and clarification of imperialist and non-imperalist arguments following the Spanish-American war.

MARTIN G. NAUMANN,* University of Kansas: Observations on the biology of the social wasps of Central America.

JANE E. NIELSON, George Washington University: Origin of nickel-iron alloys in terrestrial rocks.

JOHN R. OPPENHEIMER,* University of Illinois: Ecology and behavior of the white-faced monkey *Cubus capucinus*.

GALE E. PETERSON, University of Maryland: Research on the history of herbicides; completed report on the discovery and development of 2,4-D.

GEORGE E. RADWIN,* George Washington University: A review of the genus *Anachis* H. & A. Adams in the Western Atlantic.

MALLORY B. RANDLE,* University of Texas: Southwestern muralists and sculptors of the PWAP: a study and catalogue of the permanent decorations in public buildings of 1933–34.

JAMES L. REVEAL,* Brigham Young University: A revision of the genus *Eriogonum*, subgenus *Ganysma*.

KEN E. ROGERS, University of Tennessee: Revision of the genus *Manisuris*.

PASTORA E. SANJUAN,* George Washington University: A study of the changing role of the woman in America during the nineteenth century.

FRANK SCHITOSKEY, JR., Texas Technological College: Research on the house mice of Iran.

KENNETH W. SHIPPS, Yale University: Inquiry into development and prevalence of political campaign music in the U.S. from the earliest traces in Jefferson's campaign through 1860.

DORMAN H. SMITH, University of California at Berkeley: Development of systematic music iconography index; preparation of musical instrument collection checklist.

NICHOLAS E. SMYTHE,* University of Maryland: The behavior and ecology of three neotropical cavimorph rodents.

FLOYD W. STECKER,* Harvard University: Investigation of the physical conditions and photon and particle interactions relevant to superdense states of matter which might correspond to the early stages of the big-bang model of the universe.

DONNA M. STEIN, New York University: Detailed study of Whistler and Turner paintings in the NCFA collections.

MICHAEL E. TAYLOR, University of California at Berkeley: Biostratigraphy of the Upper Cambrian Biomere in Eastern Nevada.

ALLAN WATSON,* University of London: The preparation of a synopsis of the world genera of Arctiidae and to produce a revisionary catalogue of same.

MICHAEL P. WILDERMAN, University of Miami: Systemics and ecology of copepod parasites.

EDWIN N. WILMSEN,* University of Arizona: A systemization of the description and classification of Paleo-Indian lithic inventories and drawing the sociological inferences from them.

UNDERGRADUATE RESEARCH PARTICIPATION PROGRAM

CHARLES H. BALLARD, University of Michigan: Prepared an index to photographs in the George H. Clark collection of radioana; performed experiments to determine feasibility of exhibiting an operational spark transmitter and coherer receiver of types that would have been used circa 1901.

WILLIAM O. BEEMAN, Wesleyan University: Learning concepts and principles of the study of ethnohistory and acculturation; application of these principles to a series of manuscripts (in German) on Georgia history in order to obtain information concerning the early ethnology of Creek Indians.

CECILIA B. BROWN, Mount Holyoke College: Consolidation of part of inflated larval collection from adult collection of Lepidoptera.

DANIEL C. CHURCH, Yale University: Studying manifestations of the American romantic movement in objects of material culture in connection with the Gothic and Italianate revivals.

DEBORAH P. CLEMENTS, Bennington College: Sought, studied, and catalogued biographical information concerning 19th-century French civil engineers.

ROBERT L. COFFMAN, JR., Indiana University (Bloomington): Attempting to discover possible correlation between early stages of plant growth and later development.

MARTHA COOPER, Oxford University: Study of anthropological analyses of art, especially in Oceania.

ROBIN L. DAVIS, Grinnell College: Study of several species in subfamily of sparrows to determine whether the inflated bubble-like bone covering the ear in some instances is linked with a special habitat or a certain type of behavior.

RAYMOND J. DEMALLIE, JR., University of Chicago: Study of materials relating to the three divisions of Dakota Indians, as well as other closely related Siouan Tribes.

GLORIA J. EDYNAK, Goucher College: Measured long bones in skeletons of Eskimo children and found many sexual differentiations.

SYLVIA H. FORMAN, University of California at Berkeley: Examination of Peruvian and other New World crania for indications of osteoporosis.

BENJAMIN A. G. FULLER, III, Princeton University: Study of commerce in the port of Charleston from 1752 through 1766, primarily to determine the effects of war upon the city's commerce.

JEROLD L. GRASHOFF, Michigan State University: Comparative anatomical study of bambusoid grasses.

PATRICIA M. GREENE, Manhattanville College of the Sacred Heart: Worked on several projects concerned with various aspects of American portraiture

JUDITH M. GREENFIELD, Alleghany College: Compiled bibliographical catalogues and files on certain groups of gastropods.

MARY G. HYDE, Alleghany College: Survey of specific changes in American military costume.

KENNETH S. KARB, University of Virginia: Study of scale morphology and differentiation in the North American cyprinid genus *Hybopsis* and comparison of the relationships of 25 species to other cyprinid fishes; compilation of special systematic bibliography of literature concerning Blennoidea fishes; sorting and identifying Indian Ocean blennoid fish.

ELINOR R. KEENAN, George Washington University: Compiling an inventory of U.S.N.M. Japanese ceramic collection; discerning which shapes and designs of pottery were influenced by Japanese fashion, and which by Western fashion, during the period 1850–1920.

JOYCE A. KEENER, Bennington College: Assisted in preparation of a catalogue of Mary Cassatt's paintings, pastels, watercolors, and drawings.

DORIS E. KELLEY, Wellesley College: Studied history of quantum mechanics, especially the theoretical development of Schrodinger's wave mechanics.

BENJAMIN B. KILBOURNE, Yale University: Studied techniques of exhibit installation.

WILBUR R. KNORR, Harvard University: Study of U.S.N.M. collection of planimeters as well as other devices for integration which were primarily developed during the period 1815–1870.

PETER L. KOFFSKY, Oberlin College: Investigated records concerning the Consul General's Shanghai Postal Agency during the period 1867–1907.

SAUL J. KROTKI, University of Utah: Assisted in organization and integration of Bosch mineral collection; studied advanced techniques of crystal drawing: made x-ray identifications of rare mineral specimens.

ELIZABETH B. LASSISTER, Bennington College: Analysis and description of 40 of the pocket notebooks of Joseph Henry.

ANDREW D. LEEDS, Bard College: A study of American hand-painted political banners.

JEFFREY A. LEVY, Bard College: Morphometric study of parasitic copepoda on fish.

STUART J. MACKENZIE, II, Notre Dame University: Research on German and Japanese aircraft in NASM collections.

RUSSELL B. MERRILL, University of Kansas: Study and description of appendages of two species of *Actinocythereis*, Puri, 1953, from the Northeastern U.S.

HARVILEEN M. MOEBS, George Washington University: Investigated initial effects of light irradiation in plants; studied levels of phosphates to determine what changes occur in growth process.

STEFANIE A. MUNSING, American University: Assisted in compiling an inventory of NCFA paintings on loan to government agencies.

CAROL J. NOEL, Mary Baldwin College: Observed, classified, sectioned, stained and compared specimens of freshwater turbellaria.

ROBERT W. POOLE, Cornell University: Study of the genus *Pero*, family Geometridae.

JOAN M. RYAN, College of New Rochelle: Chemical analyses of several meteorites, using both "wet" procedures and instrumental methods.

JANET G. SCHECTER, City College of New York: Prepared critical bibliography of American Indian literature.

VERE H. SCOTT, University of Manitoba: Compiled information on three rare species of African antelope.

SANDRA E. SEIM, Webster College: Sorted and identified various groups of marine benthic invertebrates.

WILLIAM L. SILKSTONE, Kalamazoo College: Hermaphroditism in fishes of the order Iniomi and its relationship to the problem of classification.

DOROTHY SPATES, University of North Carolina (Greensboro): Studied techniques of collecting, classifying, and storing botanical specimens.

JEFFREY M. STANDER, California State University (Hayward): Investigated the systematics of North Pacific Paguridae for the purpose of revising the old method of subjective description.

JAMES A. TEERI, University of New Hampshire: Studied floral anatomy of *Rhexia virginica* (Melastomataceae).

ANN C. UNDERHILL, Beloit College: Recorded data on growth and maturation of six species of tenrecs; also studied vocalizations of young spider monkeys.

ROBERT E. WEEMS, Randolph-Macon College: Restoration and study of the remains of twelve individual turtles from the Calvert formation (Miocene era).

FRANCIS M. WILLIAMS, Southern Colorado State College: Experiments concerned with effects of light on growth of corn coleoptiles.

7.

Staff of the Smithsonian Institution

June 30, 1967

Secretary	S. Dillon Ripley
Office of the Secretary	Robert W. Mason, Executive Assistant
	Philip C. Ritterbush, Assistant to the Secretary
	Charles L. Clapp, Assistant to the Secretary (Development).
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[1] Resigned, effective July 1, 1967; replaced by Mason Hale as Acting Chairman.

[2] Replaced by Richard Eyde, effective July 1, 1967.

[3] National Fungus Collections are curated by U.S. Department of Agriculture staff.

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